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BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 BASELINE REPORT

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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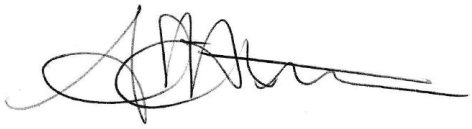
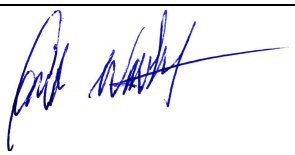
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Chapter	Section	Written By	Mapping By	Reviewed By	Senior Reviewed and Approved By
Chapter 1: Introduction	All but Appendices	A. Buckman	D. MacKinnon	R. Cross, H. Bears	H. Bears
Chapter 1: Introduction	Appendix A: Dataset Quality Rating	D. MacKinnon	N/A	H. Bears	H. Bears
Chapter 1: Introduction	Appendix B: Terrestrial Ecosystem Mapping	A. Buckman, D. MacKinnon, C. Warbington, R. Cross	D. MacKinnon	A. Buckman, R. Cross, H. Bears	H. Bears
Chapter 1: Introduction	Appendix C: Significant Wildlife Habitat	C. Chui	D. MacKinnon	R. Cross, H. Bears	H. Bears
Chapter 1: Introduction	Appendix E: Aquatic Habitat Mapping	A. Buckman	A. Hamilton, D. MacKinnon	R. Cross, H. Bears	H. Bears
Chapter 1: Introduction	Appendix F: Environmental DNA	C. Warbington	A. Hamilton	R. Cross, H. Bears	H. Bears
Chapter 2: Vegetation	All	C. Chui, R. Cross	A. Hamilton, D. MacKinnon	H. Bears	H. Bears
Chapter 3: Wetland and Riparian Environments	All	A. Buckman, R. Cross	A. Hamilton, D. MacKinnon	H. Bears, A. Buckman	H. Bears
Chapter 4: Mammals	1.0 Introduction	C. Warbington	N/A	R. Cross, H. Bears	H. Bears
Chapter 4: Mammals	2.0 Ungulates	H. Bears, C. Chui	N/A	R. Cross, H. Bears	A. Buckman, H. Bears
Chapter 4: Mammals	3.0 Carnivores	A. Buckman, C. Warbington	N/A	R. Cross, H. Bears	H. Bears
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Chapter 9: Ecosystem Function and Services	All	A. Buckman, R. Cross	A. Hamilton, D. MacKinnon	H. Bears, A. Buckman	H. Bears

Signatures:

		
Heather Bears Principal, Senior Ecologist (M.Sc., Ph.D., R.P.Bio.)		Andrea Buckman Senior Ecologist (Ph.D., R.P.Bio.)
		
Celia Chui Wildlife Biologist (M.Sc., R.P.Bio.)		Deanna MacKinnon GIS Specialist (B.Sc. Phys. Geog.)
		
Amanda Hamilton Wildlife Biologist (M.Sc., M.F.)		Camille Warbington Quantitative Ecologist (M.Sc., Ph.D.)
		
Regan Cross Scientific Editor & Ecologist (Ph.D.)		



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BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 BASELINE REPORT (CHAPTER 1: INTRODUCTION)

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GLOSSARY AND ABBREVIATIONS

AHM	Aquatic Habitat Mapping
ANSI	Areas of Natural or Scientific Interest in Ontario
AOI	Area of Interest
BIS	Biodiversity Impact Studies
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approaches
BV	Biodiversity Value; The biotic environmental components that will be considered for study within The Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components.
CanNorth	Canada North Environmental Services; consultants to the NWMO for the Environmental Media Baseline Program (EMBP)
CNSC	Canadian Nuclear Safety Commission
CSM	Conceptual Site Model
DGR	Deep Geological Repository
eDNA	Environmental DNA
Ecoregion	Second highest level of the ELC hierarchy. Large geographic areas primarily identified by sub-continental climatic regimes and bedrock geology.
Ecosite	Second lowest level of the ELC hierarchy (Crins et al. 2009). The land within an ecosite will generally contain similar substrate and vegetation.
Ecosystem function	In the context of biodiversity, ecosystem functions include the physiochemical and biological processes that occur within the ecosystem to maintain biodiversity.
Ecosystem services	Ecosystem services are the direct and indirect benefits to human well-being that the natural environment provides through healthy ecosystems. Ecosystem services include provisioning services such as the production of food and water, regulating services such as the control of climate and disease, supporting services such as nutrient cycles and oxygen production, and cultural services such as spiritual and recreational benefits. Ecosystem services related to recreation, tourism, aesthetic appreciation, or spiritual enjoyment of nature will be addressed in other IA pillars outside of the BIS.
ELC	Ecological Land Classification
EMBP	Environmental Media Baseline Program
Herpetofauna	The reptiles and amphibians of a particular region, habitat, or geological period.
IA	Impact Assessment
IAA	Federal *Impact Assessment Act*
IAAC	Impact Assessment Agency of Canada
IK	Indigenous Knowledge

LSA	Local Study Area LSA_{TER} = Terrestrial Local Study Area LSA_{AQU} = Aquatic Local Study Area LSA_{ECO} = Local Study Area for Ecosystem Function and Services
Mitigation hierarchy	A tool designed to help limit the negative impacts of development on biodiversity and ecosystem services. Involves a sequence of four key actions – avoid, minimize, restore, and offset – and provides a best practice approach to aid in the sustainable management of environmental resources by establishing a mechanism to balance conservation needs with development priorities.
MNRF	Ontario Ministry of Natural Resources and Forestry
NHIC	Ontario Natural Heritage Information Centre
NSCA	*Nuclear Safety and Control Act*
NWMO	Nuclear Waste Management Organization
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose traditional territories include the project location.
RSA	Regional Study Area RSA_{AQU} = Aquatic Regional Study Area RSA_{ECO} = Regional Study Area for Ecosystem Function and Services
SAR	Species at Risk
SCC	Species of conservation concern
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SWH	Significant Wildlife Habitat; Defined in the Ontario Provincial Policy Statement, 2020, as: *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. *Significant* – in regard to wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system
TEM	Terrestrial Ecosystem Mapping
The Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines for Designated Projects Subject to the *Impact Assessment Act and the Nuclear Safety and Control Act*
Ungulate	The term ungulate roughly means "being hoofed" or "hoofed animal". In the context of this report, it includes moose and white-tailed deer.

VC	Valued Component. For impact assessments of designated projects under the *Impact Assessment Act*, the Agency's Glossary of Terms defines VCs as "environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties. Valued components may be identified as having scientific, biological, social, health, cultural, traditional, economic, historical, archaeological and/or aesthetic importance."
WLON	Wabigoon Lake Ojibway Nation

EXECUTIVE SUMMARY

Overview

The Nuclear Waste Management Organization (NWMO) is responsible for implementing the Adaptive Phased Management Deep Geological Repository (DGR) (hereafter 'the Project'), which is Canada's plan for the safe, long-term management of used nuclear fuel, in a manner that protects both people and the environment. The NWMO has retained Zoetica™ Environmental Consulting Services ('Zoetica') to undertake Biodiversity Impact Studies (BIS) for the Project at the two remaining potential locations being considered for the DGR and associated infrastructure. This BIS Baseline Report focuses on the Saugeen Ojibway Nation (SON)-South Bruce siting area[1] near the Township of Teeswater.

The BIS is focused on the study of biodiversity values (BVs) of known or predicted relevance to the potential Project, to ultimately enable impact predictions and optimal application of the mitigation hierarchy[2]. Initial scoping of BVs for the BIS, along with rationale for inclusion, is found in Section 3.1 of the *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach* (BPPA) Report (Zoetica 2021). The following BVs have been included in the scope of the BIS for baseline study to date:

1. Vegetation
2. Wetlands and Riparian Environments
3. Mammals – Ungulates, Carnivores, Small Terrestrial Mammals, Semi-Aquatic Mammals, Bats
4. Herpetofauna – Amphibians, Reptiles
5. Terrestrial Invertebrates
6. Birds (including migratory birds) – Upland Breeding Birds (including Game Birds), Shorebirds, Waterbirds, Raptors
7. Fish and Fish Habitat – Fish, Primary and Secondary Producers (including aquatic invertebrates)
8. Ecosystem Function and Services

Project Location and Study Areas

The exact location of Project infrastructure in the SON-South Bruce siting area is under development. For the BIS, several study areas were established to ensure that adequate but not extraneous information is collected to support the biodiversity impact assessment (IA). Study areas include the Area of Interest (AOI) which was designed to encompass the extent of anticipated Project activities and impacts, Local Study Areas (LSAs) which consider the distribution of BVs across the landscape, and Regional Study Areas (RSAs) which consider potential cumulative impacts that may occur in the region within the ranges of the BVs. For the BIS, terrestrial and aquatic study areas were designed separately due to the unique considerations

[1] The 'SON-South Bruce siting area' refers to the broader area surrounding the defined area within which the Project may be located, in southwestern Ontario. The 'SON-South Bruce siting area' is located near the Municipality of South Bruce and the traditional territory of the Saugeen Ojibway Nation. The other potential location for the Project is the Wabigoon Lake Ojibway Nation (WLON)-Ignace siting area located in Treaty #3 in the traditional territory of Wabigoon Lake Ojibway Nation, among other Indigenous communities, in northwestern Ontario.

[2] The mitigation hierarchy is a tool designed to help limit the negative impacts of development on biodiversity and ecosystem services. It involves a sequence of four key actions – avoid, minimize, restore, and offset – and provides a best practice approach to aid in the sustainable management of environmental resources by establishing a mechanism to balance conservation needs with development priorities.

of each. Descriptions and rationale for developing these study areas can be found in Section 5.2 of the BPPA Report (Zoetica 2021).

Work Completed

The Project is in early phases of baseline data collection. The BIS follows a tiered approach to baseline studies (see Section 4.2 of the BPPA Report (Zoetica 2021)) and is currently in Tier 1. Tier 1 is focused on collating existing data on the presence of species and known important habitats and collecting foundational habitat information through the following studies:

- Terrestrial Ecosystem Mapping (TEM)
- Aquatic Habitat Mapping (AHM)
- Environmental DNA (eDNA) metabarcoding[3] studies in aquatic habitats
- Opportunistic identification of candidate Significant Wildlife Habitat (SWH) alongside TEM.

To date, Tier 1 field studies have focused on areas within the AOI and terrestrial and aquatic LSAs, as well as select locations within the aquatic RSA and at potential control sites outside of the RSA (for AHM and eDNA studies).

Summary of Findings

Species of Interest

Several types of species of interest were considered during baseline work, including i) species of conservation concern (SCC), ii) species of interest to stakeholders and rights-holders, and iii) invasive species. The consideration of indicator species will be included in future iterations of the baseline report once a formal Project Description has been released and after more information is gathered about potential project impacts and species habitat associations (e.g., through Tier 2 community composition studies) within the BIS study areas. See Section 4.2 of the BPPA Report (Zoetica 2021) for further discussion of indicator species.

Species of conservation concern include federally and provincially listed species at risk (SAR) and provincially rare species that are protected through various federal and provincial regulations. A total of 72 SCC, including 43 SAR and 29 provincially rare species, have been detected (or potentially detected) within relevant BIS study areas. Observations of SCC were collated through searching existing biodiversity databases, studies conducted by the Toronto Zoo's Native Bat Conservation Program, carnivore surveys sent to landowners in the area, Tier 1 eDNA metabarcoding studies, vegetation community assessments through Tier 1 TEM and AHM studies, and incidental observations recorded during AHM, eDNA, and TEM field studies. Up to twenty-two SCC have been detected within the AOI[4]; these include two at-risk plants (black ash and butternut), one provincially rare plant (eastern green-violet), three at-risk species bats (silver-haired bat, eastern red bat, and hoary bat), eight at-risk birds (bald eagle, bank swallow, barn swallow, bobolink, eastern meadowlark, eastern wood-peewee, lesser yellowlegs, and wood thrush), two

[3] In all sections of this 2023 BIS Baseline Report, where eDNA studies and results are noted, they refer to the use of eDNA in combination with metabarcoding for multi-species identification.

[4] To protect sensitive species and ecosystems, spatial data pertaining to provincially tracked (at-risk and rare) species and wildlife concentration areas (e.g., nest colonies) are represented by a 1 km grid, rather than a point or polygon, as per the NHIC's Sensitive Data Location Standards (NHIC n.d.). Counts of SCC within the AOI were based on overlap with the 1 km grid squares, not the actual point or polygon locations. As such, not all 22 SCC were necessarily found within the AOI.

provincially rare birds (upland sandpiper and white-crowned sparrow), three at-risk reptiles (eastern milksnake, midland painted turtle, and snapping turtle), one at-risk terrestrial invertebrates (monarch), one provincially rare terrestrial invertebrate (juniper seed moth), and one provincially rare primary and secondary producer (digger crayfish). In addition, as proposed critical habitat for at-risk rainbow (mussel) exists within the AOI, it is expected that rainbow (provincially listed as Special Concern) also occur in the AOI. Three bat SAR and one vegetation SAR are restricted and thus Zoetica cannot confirm whether they were detected within or outside of the AOI. To date, the remaining 46 SCC have only been detected outside the AOI.

Species of interest to stakeholders and rights-holders include those that have been mentioned during engagement as important to include in the BIS (see Appendix B in the BPPA Report (Zoetica 2021)). To date, only a few species of importance were mentioned by stakeholders and rights-holders and, except for lake whitefish, none have been detected within the relevant BIS study areas. Lake whitefish were only detected in Lake Huron based on desk-based searches of relevant datasets. Engagement to date has largely focused on environmental concerns of stakeholders and rights-holders, and mentions of species were typically related to important habitats rather than species of importance to stakeholders and rights-holders. Engagement is ongoing to ascertain species of importance to stakeholders and rights-holders.

Invasive species are those that are not native to Ontario, or to a part of Ontario, and where the species' introduction or spread threatens the natural environment, human health, or socio-economic values. A total of 20 invasive species, and 41 other weedy or introduced vegetation species were detected within the relevant BIS study areas. Thirteen invasive species were reported in the AOI including eight plant species (broad-leaved cattail, European buckthorn, European reed, purple loosestrife, reed canarygrass, Scots pine, Norway maple, and white sweet-clover), four invertebrate species (common earthworm, red earthworm, emerald ash borer and spongy moth) and one secondary producer (rusty crayfish). Additionally, 20 introduced vegetation species (bittersweet nightshade, orchard grass, Queen Anne's lace/wild carrot, redtop, stinging nettle, sweet cherry, common dandelion, common speedwell, common timothy, English plantain, garden bird's-foot trefoil, lesser burdock, meadow fescue, narrow-leaved cattail, Norway spruce, red clover, soybean, sulphur cinquefoil, water speedwell, and white clover), and six weedy vegetation species (bull thistle, Canada thistle, eastern poison ivy, knapweed spp., smooth bedstraw, and western poison ivy) were reported in the AOI. Additional forest diseases were detected within the BIS study areas, including some with vectors that are classified as invasive. For example, beech bark disease was detected within the AOI, and Dutch elm disease and white pine blister rust were detected in BIS study areas outside of the AOI.

Important Habitat

Several types of important habitats were considered during baseline work, including critical habitat for SAR, confirmed and candidate SWH, and important fish habitat. These habitats are components of the natural heritage features and areas that are protected by the Ontario Provincial Policy Statement under the *Planning Act* (MMAH 2020). Critical habitat is habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in a federal recovery strategy or action plan for the species. SWH includes seasonal concentration areas, rare vegetation communities, specialized habitat for wildlife, habitat for SCC, and animal movement corridors. Important fish habitat includes habitat required to fulfill important life history phases of fish species, such as for spawning, rearing, overwintering and migration between seasonally important habitats.

Based on desk-based searches of critical habitat identified in recovery strategies and Ontario Natural Heritage Information Centre (NHIC) records for at-risk species, critical habitat belonging to six species exists within the BIS study areas. Proposed critical habitat exist for rainbow within the AOI and extending into the LSA_{AQU}. Critical habitat squares (NHIC masking) for two reptiles (wood turtle and spotted turtle), and two plant species (goldenseal and American ginseng) also overlap with the AOI. Critical habitat squares for wood turtle, spotted turtle, goldenseal, and American ginseng also partially overlap with the LSA_{AQU} and the BV-specific RSAs. Additionally, critical habitat for pugnose shiner was identified in Cargill Mill Pond in the RSA_{AQU}. The habitat regulation for wood turtle (O. Reg. 832/21) under the Ontario *ESA* does not currently apply to areas within the County of Bruce. However, following the mitigation hierarchy with consideration of this habitat regulation may contribute to positive effects of the Project through conservation efforts toward the species' recovery.

Zoetica has documented and mapped SWH already identified and reported through NHIC and Ontario Ministry of Natural Resources and Forestry (MNRF) databases and has mapped candidate SWH through desk-based analyses of ecosites and other habitat criteria, and through the identification of candidate SWH during initial Tier 1 field studies. To date, Zoetica has identified four types of confirmed SWH: Deer Winter congregation Areas, Seeps and Springs, Terrestrial Crayfish, and habitat for barn swallow (Special Concern). Of the confirmed SWH, seeps and springs, barn swallow nesting sites, and terrestrial crayfish chimneys or burrows were observed in the AOI. Seeps and springs and terrestrial crayfish chimneys or burrows were also identified in the LSA_{AQU}. Deer Winter Congregation Areas were mapped by the MNRF in the ungulate-specific RSA and extended into the LSA_{TER} outside of the AOI. In addition to confirmed SWH, there is strong evidence to support candidate SWH (which may become confirmed SWH with additional required studies), including within the AOI, for Bat Maternity Colonies and habitat for two Special Concern or Rare Wildlife Species: snapping turtle and eastern green-violet. Furthermore, SWH types related to amphibians are likely present within the BIS study areas for herpetofauna. Additionally, several other candidate SWH were identified within the AOI, including Woodland Raptor Nesting Habitat, Turtle Nesting Areas, colonially-Nesting Bird Breeding Habitat (Ground), Open country Bird Breeding Habitat, Colonially-Nesting Bird Breeding Habitat (Bank and Cliff), and Shorebird Migratory Stopover Area.

Desk-based information collated to date identified one important fish habitat: a brook trout spawning area on Alps Creek in the southern LSA_{AQU}. Potentially important fish habitats were also identified within the BIS study areas during field-based Tier 1 studies. Several groundwater seeps and springs and riffle habitats were noted during 2022 AHM field studies, including within the AOI. These areas could be used by various fish species for spawning. In addition, many reaches surveyed during AHM studies had suitable riparian and shoreline cover (e.g., coarse woody debris, boulders, in-water vegetation) that can provide good quality rearing habitat. Several deeper pools were also identified in reaches, including within the AOI, which could be used by various species for overwintering. Lastly, during desk-based searches of available datasets and AHM field surveys, many potential barriers and obstacles to fish passage were identified. If the SON-South Bruce study area is selected for the project, these areas may be evaluated further to ascertain whether they could potentially interfere with migratory habitat for fish.

Wetlands and Riparian Areas

Wetlands and riparian areas fulfill a wide range of ecological, hydrological, and biochemical functions and provide unique and specialized habitats for wildlife that depend on these features for various life history phases and movement and migrations through connected, undisturbed habitat networks. In Ontario,

wetlands are considered natural heritage features that require protection and sustainable management. During Tier 1 studies within relevant BIS study areas, Zoetica determined the distribution and prevalence of wetlands and riparian areas through desk-based analyses of ecosites and existing data for Provincially Significant Wetlands. Zoetica also mapped various riparian buffer widths around watercourses and waterbodies that should be retained or enhanced to preserve wetland function into the future.

Ecosystem Function and Services

Ecosystem functions include the physical, chemical, and biological processes within the ecosystem that maintain biodiversity. Ecosystem services are the variety of benefits that nature provides to people, including regulating services (e.g., shading, pollutant removal, regulation of water), provisioning services (e.g., material benefits such as food, water, raw materials, and medicinal resources), and cultural services (e.g., non-material benefits including recreation and mental and physical health) (MEA 2005). Protected lands can provide ecosystem function and services for an area by conserving important habitat for biodiversity and human uses. Zoetica collated spatial data on Areas of Natural or Scientific Interest (ANSIs), Conservation Authority Lands, County and Municipal Lands, and trail networks to map protected lands within the BIS study areas. Zoetica also collated desk-based data on important habitat for supporting BVs, as well as desk- and field-based observations of SCC and any species of interest to stakeholders and rights-holders.

Zoetica also conducted preliminary analyses of regional forest health conditions, as these may inhibit ecosystem function. Several forest pests and diseases were detected within the BIS study areas including ash leaf spot disease, beech bark disease, black knot disease, Dutch elm disease, emerald ash borer, tar spot disease, and white pine blister rust. Beech bark disease, emerald ash borer, and spongy moth were reported within the AOI. Of the forest pests and diseases detected in desk- and field-based data thus far, spongy moth and emerald ash borer may be the greatest causes for forest health concerns. Zoetica also conducted preliminary assessments of riparian habitats, as these areas can provide essential ecosystem functions for a region and are often afforded provincial protections. Approximately half of the riparian buffers were unmapped anthropogenic areas, and the remaining buffers were predominantly forested areas with lesser proportions of meadows, plantations and shrublands. These proportions suggest that many wetlands, watercourses, and waterbodies in the BIS study areas have some good quality and some poorer quality riparian habitat. Zoetica recognizes that wetlands and riparian areas can provide important habitat for biodiversity and important regulating services which benefit people. Additional information collected through other environmental and social programs may assist in assigning relative importance of these areas to biodiversity and humans. Thus, the BIS program will continue to examine habitats that can increase ecosystem functioning, benefit biodiversity, and provide important services for humans.

Next Steps

Initial Tier 1 and select Tier 2 BIS studies, other environmental studies conducted as part of the Environmental Media Baseline Program (EMBP) designed by CanNorth (CanNorth 2020), and additional studies on the human, social, and economic aspects, will altogether inform the site selection process for the Project. Tier 1 studies will continue in the future (anticipated in 2024) at the SON-South Bruce site. In addition, once a site has been selected with a willing host community, the BIS will continue with additional Tier 1 studies and proceed with collecting Tier 2 biodiversity data at the selected site.

Additional Tier 1 studies at the selected site may include, for example, extending TEM to the RSA to collect relevant data for determining important species habitat associations for select species, for determining

the relative proportion of available high-quality habitat in the various BIS study areas, and for selecting appropriate control sites. eDNA metabarcoding studies may continue and include repeated seasonal sampling to enable occupancy modelling, identify biological hotspots within the BIS study areas, and detect cryptic species that may not be as easily detected through traditional methods.

Tier 2 studies at the selected site will focus on collecting data to understand community and population metrics for biodiversity (e.g., relative abundance, species richness or diversity) within relevant BIS study areas. These data will be important for determining the overall effects (impacts and positive effects) of the Project on biodiversity. Tier 2 studies will also prioritize data collection for species of interest including SAR, species of importance to stakeholders and rights-holders determined through engagement with the relevant communities, and species that can act as indicators of ecosystem health.

1.0 OVERVIEW

Zoetica™ was retained by the Nuclear Waste Management Organization (NWMO) to undertake Biodiversity Impact Studies (BIS) within two potential locations that are being considered for the long-term deep geological storage of Canada's used nuclear waste. The BIS focuses on studying biodiversity values (BVs) of known or predicted relevance to the Adaptive Phased Management Project (hereafter, 'the Project') at each potential site to ultimately enable impact predictions and optimal application of the mitigation hierarchy for the Impact Assessment (IA) to control impacts and enhance benefits, where possible.

Major BIS deliverables by Zoetica include:

1. A *Best Practices and Preferred Approaches (BPPA) Report* for biodiversity studies (Zoetica 2021);
2. A *Baseline Program Design (BPD) Report* with detailed Standard Operating Procedures (Zoetica 2022a);
3. **Baseline reports highlighting an accumulating knowledge of the conditions of the proposed Project site and surrounding area as they relate to biodiversity (Current report);**
4. A biodiversity Change Assessment Memo flagging potential impacts and solutions (Compendium memo report), which draws from baseline information in #3 (Zoetica 2022b); and
5. Contributions to a formal IA under the *Impact Assessment Act* (2019) (Future date, contingent upon the outcome of the site selection process).

The current report is the first iteration of deliverable #3: the 2023 BIS Baseline Report for the Saugeen Ojibway Nation (SON)-South Bruce siting area.

Zoetica will release periodic baseline reports alongside reports on potential impacts, recommended mitigation (deliverable #4), and opportunities for benefits. The comprehensiveness of each subsequent report will increase over time, concomitant with increased learning about the site, refined Project engineering, regulatory inputs, and important social, economic, and health considerations addressed as part of the overarching IA for the Project. For the present 2023 BIS Baseline Report, Zoetica has included a comprehensive Table of Contents that reflects the required biodiversity information indicated within the Tailored Impact Statement Guidelines (TISG) Template for Designated Projects Subject to the *Impact Assessment Act* (*IAA*) and the *Nuclear Safety and Control Act* (*NSCA*) (IAAC 2020) (hereafter, 'nuclear TISG Template'). Recently this Template was removed from the Impact Assessment Agency of Canada (IAAC) website because the IAAC and the Canadian Nuclear Safety Commission (CNSC) are developing a new template for nuclear projects that integrates the licensing requirements under the *NSCA*. The new template will mirror the updated version of the generic TISG Template (IAAC 2022) (hereafter, 'TISG Template') and integrate CNSC's regulations. The 2022 generic template is available on the IAAC website and referenced throughout this 2023 BIS Baseline Report. When the new template for nuclear projects becomes available (anticipated in 2024), Zoetica will reference that document in future iterations of the BIS Baseline Report. The TISG Template will be supplanted by a project-specific TISG according to the prescribed IA process outlined by the IAAC. Appendix C of Zoetica's BPPA Report (Zoetica 2021) lists the elements of the nuclear TISG Template that are relevant to the BIS, along with the requirements that will likely need to be addressed for the final IA.

Producing iterative baseline reports and assessing the Project for potential interactions with biodiversity values will facilitate a growing knowledge of the biodiversity values in the SON-South Bruce siting area that the Project could negatively or positively impact. This iterative process will also enable the continual improvement of future field programs by identifying data gaps and important areas/issues needing more study. Baseline studies will provide a growing database of information about current conditions that communities can consider when evaluating the merits/benefits and risks of the Project. Iterative reports will allow for the early identification of potential environmental challenges, input from affected communities, experts, and regulators, and the mitigation hierarchy to be applied throughout all stages of the Project.

1.1 Report Organization

As aforementioned, the 2023 BIS Baseline Report for the SON-South Bruce siting area is organized to follow the former nuclear TISG Template (IAAC 2020), which mirrors the updated generic TISG Template (IAAC 2022) discussed herein. Section 8.0 of the TISG Template (IAAC 2022) outlines a list of elements within the existing biophysical environment setting that could be scoped into the baseline program. The Baseline Report is organized such that it can be cross-referenced with Section 8.0 of the TISG Template as it relates to biodiversity. Several sections within Section 8.0 of the TISG Template are not within the scope of the BIS (e.g., groundwater, water chemistry), and are being addressed by other contractors to the NWMO and/or NWMO staff with different discipline-specific expertise. For example, the NWMO has retained Canada North Environmental Services ('CanNorth') to design the environmental media baseline program (EMBP) for the Project (CanNorth 2021). Environmental components to be studied through the EMBP include surface water quality, soil and sediment quality, hydrology, shallow groundwater, air quality, noise and light, and tissue samples for baseline concentrations of pollutants. These environmental components (excluding tissue samples) represent the abiotic environment upon which living organisms depend. As potential impacts on and benefits to BVs selected for inclusion in the BIS could occur through the alteration of the abiotic environment, the EMBP will inform the BIS.

Only sections of the TISG Template relevant to biodiversity are reported in the 2023 BIS Baseline Report. **Table 1-1** outlines the elements in the TISG Template that relate to biodiversity, the BVs considered within these themes, and where they are addressed within this report. Chapter 1 (this Chapter) includes a general introduction to the Project as it relates to biodiversity and information relevant to all chapters (e.g., study areas). This Chapter also includes appendices containing the quality rating of datasets used, and the results of Tier 1 studies that are currently available. Appendices included are as follows:

1. Appendix A: Dataset Quality Rating
2. Appendix B: Terrestrial Ecosystem Mapping (TEM)
3. Appendix C: Significant Wildlife Habitat (SWH)
4. Appendix D: Aquatic Habitat Mapping (AHM)
5. Appendix E: Environmental DNA Studies (eDNA)

Each BV chapter draws from the data reported within these appendices, where relevant, and includes additional BV-specific information from desk-based searches of existing databases and BV-specific studies.

Table 1-1. Overview of TISG themes and Baseline Report chapters.

Tailored Impact Statement Guidelines Template Header	**Biodiversity Value**	**Chapter Number[1]**
Species at Risk	All BV Chapters	All
Vegetation	Habitat – TEM	Chapter 1
	Vegetation	Chapter 2
Riparian and Wetland Environments	Habitat – TEM, AHM	Chapter 1
	Wetland and Riparian Environments	Chapter 3
Terrestrial Wildlife and their Habitat	Habitat – TEM, SWH, AHM	Chapter 1
	Mammals - Ungulates	Chapter 4
	Mammals - Carnivores	Chapter 4
	Mammals - Small Terrestrial Mammals	Chapter 4
	Mammals - Semi-Aquatic Mammals	Chapter 4
	Mammals - Bats	Chapter 4
	Herpetofauna - Amphibians	Chapter 5
	Herpetofauna - Reptiles	Chapter 5
	Terrestrial Invertebrates	Chapter 6
Birds, Migratory Birds, and their Habitat	Habitat – TEM, SWH, AHM	Chapter 1
	Birds - Upland Breeding Birds	Chapter 7
	Birds - Shorebirds	Chapter 7
	Birds - Waterbirds	Chapter 7
	Birds - Raptors	Chapter 7
Fish and Fish Habitat	Habitat – TEM, SWH, AHM	Chapter 1
	Fish and Fish Habitat - Fish	Chapter 8
	Fish and Fish Habitat - Primary and Secondary Producers	Chapter 8
Ecosystem Services	Ecosystem Function and Services	Chapter 9

Notes:
[1]Appendices to Chapter 1 include reports of Tier 1 studies: TEM = Appendix B; SWH = Appendix C; AHM = Appendix D; eDNA = Appendix E.

2.0 INTRODUCTION

The NWMO is responsible for safe long-term management of Canada's used nuclear fuel. The NWMO recommended Adaptive Phased Management as their preferred approach for developing a deep geological repository (DGR) for the long-term storage of used nuclear waste, and the federal government accepted this recommendation in 2007 (Nuclear Waste Management Organization 2005, NWMO 2010). The site selection process began in 2010 and has required that communities take the initiative and move through a collaborative process involving interested communities, First Nation and Métis communities, and surrounding municipalities.

The site selection process began with 22 municipalities and Indigenous communities that expressed interest in learning about and exploring their potential to host the Project. Since 2010, the NWMO has narrowed their focus on fewer areas based on technical site evaluations and social engagement to assess the safety and potential to build supportive and resilient partnerships. At present, site selection for the Project involves two locations, the first of which is the focus of the present report:

1. The SON-South Bruce siting area in southwestern Ontario, and

2. The Wabigoon Lake Ojibway Nation (WLON)-Ignace siting area in northwestern Ontario.

Multi-disciplinary teams of independent, expert consultants were retained by the NWMO to design data collection programs to characterize the existing environment ("Baseline Programs"). Zoetica was retained to design and undertake biodiversity impact studies. The BIS baseline program focuses on studying biodiversity values of known or predicted relevance to the Project in both potential siting areas. These BVs may become topics which are included in one or more valued component (VCs) which will be studied in the impact assessment, and studies of BVs will enable impact predictions and optimal application of the mitigation hierarchy. This baseline information builds on previous studies (see Section 2.3) and will be used to inform decision-making.

Early baseline information will feed into impact studies that support decision-making by both communities and the NWMO. The early production of assessment documents will also assist in the timely implementation of the mitigation hierarchy, should the site be selected. If the site is selected, a federal IA process would need to be undertaken under the *Impact Assessment Act* (IAA; 2019), which may require additional baseline data collection to meet the project-specific TISG issued by the IAAC. As a project-specific TISG document has not yet been developed, the BIS program has been designed to follow the TISG Template, which will be supplanted by a project-specific TISG according to the prescribed IA process outlined by the IAAC. The TISG Template recommends considerations for selecting VCs for an IA and outlines a list of elements within the existing biophysical environment setting that could potentially be scoped into the baseline program (IAAC 2022). Zoetica has reviewed elements listed in the TISG Template that are relevant to biodiversity and included these elements in the design of baseline studies (see Section 3.0 of Zoetica's BPPA Report (Zoetica 2021) for more information on baseline scoping). Relevant elements for the BIS include:

- Riparian and wetland environments
- Vegetation (including soils)
- Fish and fish habitat
- Birds, migratory birds and their habitat

- Terrestrial wildlife and their habitat
- Species at risk

Relevant components of the nuclear TISG Template, along with requirements for each component, are presented in Appendix C of Zoetica's BPPA Report (Zoetica 2021).

BVs scoped into the BIS baseline program include those listed in **Table 1-1**.The list may be further refined during the review of habitat information collected during baseline studies by investigating species' habitat requirements and the prevalence of these habitat features within the SON-South Bruce siting area. This refinement would exclude species or SAR that are limited to habitat types within the SON-South Bruce siting area that would have no potential for interaction with the Project. Appendix E of Zoetica's BPPA Report (Zoetica 2021) provides a table of laws and regulations relevant to biodiversity that were also considered in the scoping of BVs into the BIS baseline program.

The BIS baseline program design follows a tiered approach as outlined in **Figure 2-1** and detailed in Section 4.2 of Zoetica's BPPA Report (Zoetica 2021). Zoetica began the tiered approach by collating desk-based information. Tier 1 field data collection was initiated in June 2022 by field data collection teams contracted by the NWMO and followed Zoetica's Baseline Program Design Report ('BPD Report'; (Zoetica 2022a). Tier 1 studies focus on collecting habitat information (terrestrial and aquatic), incidental observations, and aquatic eDNA to establish initial evidence of species detections. These data were received by Zoetica from the field data collection contractors for inclusion in the 2023 BIS Baseline Report. Additional Tier 1 baseline data are anticipated to be collected by field data collection contractors in the future (planned for 2024) to fill identified Tier 1 data gaps. Should the SON-South Bruce site be selected, data from Tier 1 studies will be used to inform the Tier 2 baseline program designs, which are specific to BVs. In turn, the Tier 2 baseline program information will inform the Tier 3 program design, if warranted, as the program moves from a relatively broad to specific scope.

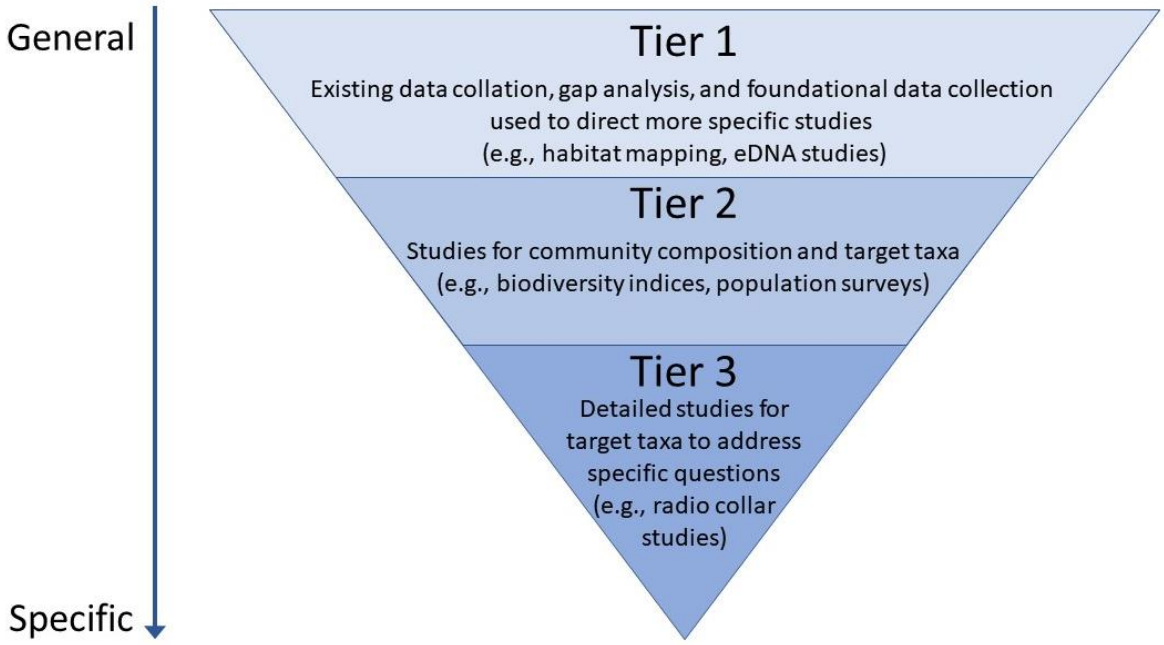


Figure 2-1. Graphical representation of the tiered approach for planning the BIS Baseline Program. Tier 1 studies involve more general information collection with increasing specificity and focus in Tiers 2 and 3. Tier 1 studies focus on collecting foundational and broadly applicable data that will be used to support, justify, inform, and plan future Tier 2 and Tier 3 studies.

2.1 Goals and Objectives

The goals and objectives of the 2023 BIS Baseline Report are to:

1. Present preliminary (Tier 1) baseline information on the presence and distribution of habitats and areas of ecological importance to BVs and key species of interest (e.g., SAR, rare species, species of interest to stakeholders and rights-holders[5], invasives) within BV-specific study areas (see Section 3.0 for study areas and descriptions);
2. Provide community-level species composition (i.e., number of species) data, where possible, to indicate areas within the BIS study areas (see Section 3.0) that may host more or fewer species; and
3. Provide analytical products (e.g., maps, species lists) that can be used to
    a. further design focused and statistically sound studies in subsequent years;
    b. support engagement regarding values, concerns, and next steps in the BIS program; and
    c. help to inform infrastructure design and placement.

[5] As the NWMO has yet to identify a preferred site, it is acknowledged that the Impact Assessment process has not been initiated, and the Duty to Consult has not been triggered. The NWMO has been and will continue to engage with potentially impacted Indigenous peoples as the IAAC does not delegate its Duty to Consult. Throughout this document, the term stakeholder has been used to identify community members, agencies, private entities, while rights-holder has been used to identify Indigenous peoples and communities (i.e., First Nations and Métis).

Additional Tier 1 field data from subsequent field seasons will be included in future iterations of the BIS Baseline Report. If the SON-South Bruce siting area is selected for the Project, Tier 2 studies will be implemented to address the requirements of the Project-specific TISG when it is developed. Zoetica's BPPA Report (Zoetica 2021) proposes potential Tier 2 studies that will be required to meet the requirements of the TISG Template. Future baseline studies are designed to:

1. Establish the functioning of ecosystems and the biodiversity they support to understand the potential impacts and benefits of the Project;
2. Demonstrate how stakeholder and rights-holder concerns and aspirations are addressed; and
3. Provide additional baseline data to help inform the Project's biodiversity IA and mitigation measures and to assist in the potential development of monitoring program(s) to address environmental, regulatory, and stakeholder/rights-holder concerns.

2.2 Project Description

2.2.1 Project Location

The SON-South Bruce siting area is the broader area surrounding the defined area within which the Project may be located. For this report, the term 'SON-South Bruce siting area' describes the general area surrounding the Municipality of South Bruce and includes the traditional territory of the Saugeen-Ojibway Nation (SON) in southwestern Ontario (see **Figure 2-2**).

The exact location of the Project infrastructure is under development. Within the SON-South Bruce siting area, an Area of Interest (AOI) was developed (see Section 3.1 for further detail). According to Ontario's Ecological Land Classification (ELC) System, the SON-South Bruce siting area and AOI are located within the Mixedwood Plains Ecozone and the Lake Simcoe-Rideau Ecoregion (6E). The AOI along with its context relative to various ecoregions, communities, roadways, and ecological features, is presented in **Figure 2-2**. **Figure 2-3** shows the lakes, rivers, and watershed boundaries in the SON-South Bruce siting area.

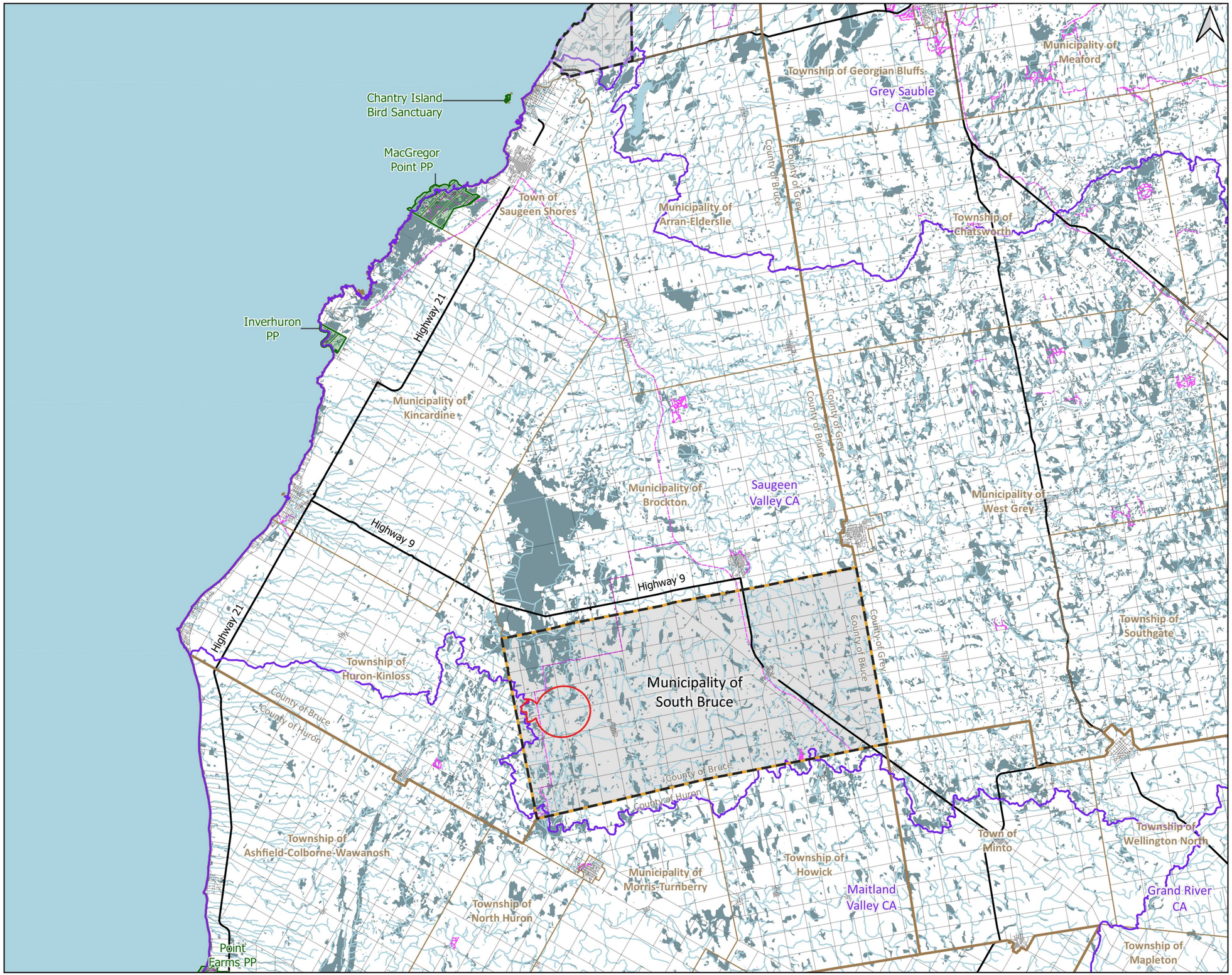
2.2.2 Conceptual Site Model

No detailed Project Description is currently available for the Project. However, the Project's conceptual preliminary design was prepared by the NWMO and can be found in *Deep Geological Repository Conceptual Design Report Crystalline/Sedimentary Rock Environment* (Naserifard et al. 2021). A *Preliminary Conceptual Site Model* (CSM) was then developed by CanNorth along with their EMBP and includes a description of the project components (CanNorth 2021). Most recently, CanNorth produced an updated CSM in their *Biophysical Conceptual Site Model Update and Screening Level Change Assessment* (CanNorth 2023). Zoetica used this CSM to make assumptions about the Project (e.g., regarding project components and their overall sizes) needed for designing the BIS Program. Impacts and benefits of relevance to the EMBP will also be relevant to the BIS Program (e.g., impacts due to Contaminants of Potential Concern could lead to decreased survival and reproduction of BVs). Therefore, pathways linking the CSM to the EMBP have also been considered in determining how the Project could interact with BVs and ecosystem function and services. Section 2.3 of Zoetica's BPPA Report (Zoetica 2021) includes a review of work to be completed as part of the EMBP. Impacts on and benefits to social, economic, or health values will also need to be considered for their potential to impact BVs and ecosystem function and services.

NWMO Biodiversity Impact Studies

Overview of SON-South Bruce Siting Area

Figure 2-2

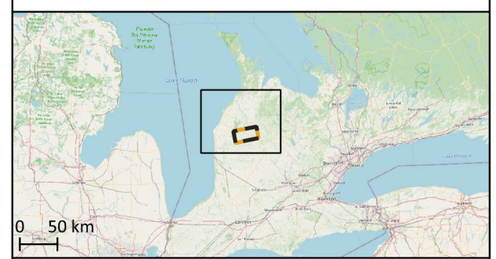


- Area of Interest (AOI)
- Conservation Authority (CA) Boundary
- South Bruce Boundary
- County Boundary
- Municipal Boundary
- Saugeen No. 29
- Protected Area or Provincial Park (PP)
- Trail
- Highway
- Local Road
- Lake
- Watercourse
- Wetland

1:325,000

0 4 8 km

ZOETICA



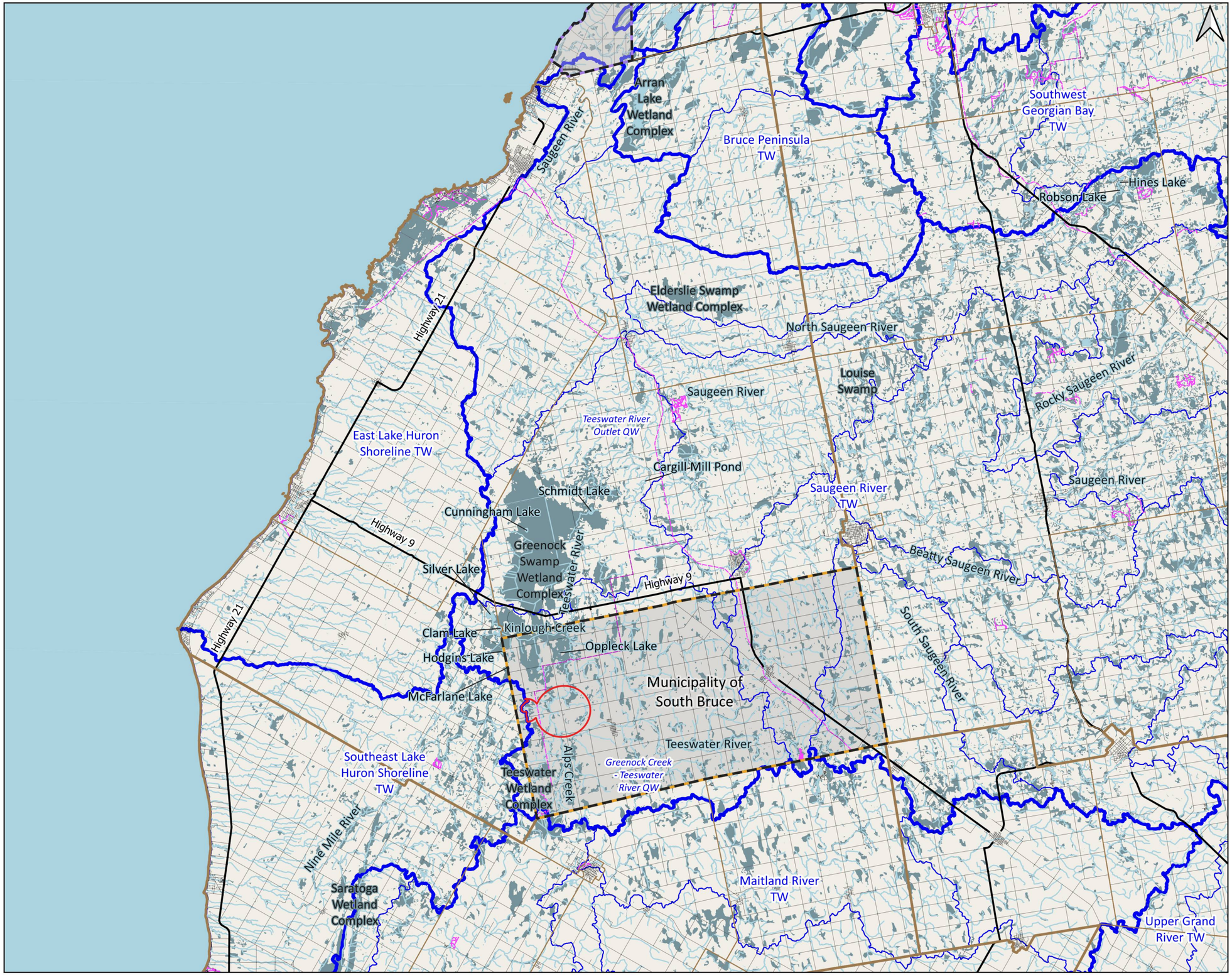
Data received from:
Ontario GeoHub — Conservation authority administrative area (MECP); Indian Reserve (NDMNRF); OGN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment (NDMNRF); OTN Trail Segments (NDMNRF); Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (NDMNRF)
NWMO — AOI
IBAT — World Database on Protected Areas (UNEP-WCMC and IUCN)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: HB	Approved by: HB
October 21, 2022	Map ID: NWMO_BIS_D111B	

NWMO Biodiversity Impact Studies

Water Features and Watersheds in the SON-South Bruce Siting Area

Figure 2-3



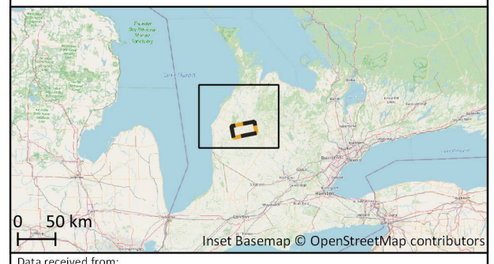
- Area of Interest (AOI)
- South Bruce Boundary
- Municipal Boundary
- County Boundary
- Saugeen No. 29
- Trail
- Highway
- Local Road
- Tertiary Watershed (TW) Boundary
- Quaternary Watershed (QW) Boundary
- Lake
- Watercourse
- Wetland

Only quaternary watersheds, watercourses, lakes and wetlands of relevance to the project have been labeled.

1:325,000

0 4 8 km

ZOETICA



Data received from:
Ontario GeoHub — Indian Reserve (NDMNRF); OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); Ontario Watershed Boundaries (NDMNRF); ORN Road Segment (NDMNRF); OTN Trail Segments (NDMNRF); Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (NDMNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: HB	Approved by: HB
October 21, 2022	Map ID: NWMO_BIS_D112b	

2.3 Previous Environmental Studies for the Project

The BIS baseline program designed by Zoetica seeks to build on environmental data available in the SON-South Bruce siting area, wherever possible. Available datasets include past work and information gathered for the Project by the NWMO with support from contractors who are experts in their field, Big Unobstructed Databases, and government sources. A review of previous biodiversity and related work in the SON-South Bruce Area is detailed in Section 2.0 of Zoetica's BPPA Report (Zoetica 2021).

2.4 Engagement for Biodiversity Impact Studies

A full discussion of community engagement to date is found in Zoetica's BPPA Report (Zoetica 2021). A brief overview is provided here.

The Project will only proceed with the involvement of rights-holders (i.e., First Nation and Métis communities) and stakeholders in the area and surrounding communities. These parties working together to implement the Project is integral for the success of the BIS. The underlying participatory approach to the broader environmental baseline program is one of continuous learning. The program will be updated as more is learned from the communities and the data collected. It will evolve as a co-designed program in collaboration with diverse stakeholders and rights-holders. Engagement with the communities in the SON-South Bruce Area has begun (see Section 1.4 of Zoetica's BPPA Report (Zoetica 2021)) and ongoing engagement is planned to discuss environmental concerns of stakeholders and rights-holders surrounding the SON-South Bruce siting area. Any local knowledge and/or Indigenous Knowledge (IK) shared will be used and documented as the knowledge holders see fit and following the NWMO's IK policy (NWMO 2016). Feedback will be interwoven into the BIS' early planning phases (e.g., at each Tier of study). Information learned through initial stages of study is shared with the communities, and concerns regarding potential effects of the Project on the surrounding biodiversity can be systematically addressed in the BIS, consistent with the NWMO's IK policy (NWMO 2016).

The TISG Template requires that the list of VCs ultimately selected for the IA will be informed through engagement with the public, Indigenous communities, lifecycle regulators, jurisdictions, federal authorities, and other interested parties. The rationale for inclusion (or exclusion) of VCs must consider environmental, cultural, spiritual, historical, health, social, economic, recreational, and aesthetic considerations, and IK. The value of a component, including biodiversity, depends on its intrinsic function in the ecosystem and the extrinsic value placed on it by local and Indigenous communities.

Engagement sessions with stakeholder and rights-holder groups were conducted in 2020 to solicit feedback on what is important to local communities and stakeholders regarding the environment, perceived impacts and benefits, and values of importance for baseline study. Stakeholder and rights-holder concerns raised in 2020 that are related to biodiversity are summarized in Table 1-2 of Appendix B of Zoetica's BPPA Report (Zoetica 2021). A complete discussion of feedback from engagement conducted to date is available in Section 1.4 of Zoetica's BPPA Report (Zoetica 2021). Additional community feedback will be sought on an ongoing basis and included with each iteration of the BPPA report.

3.0 STUDY AREAS

For the BIS, several study areas were established to ensure that adequate, but not extraneous information is collected to support the biodiversity IA. Study areas were designed conservatively to encompass the farthest potential extent of anticipated Project activities and effects (both negative impacts and benefits)

while also considering the distribution and potential movement of BVs across the landscape. The design of study areas also considered potential cumulative impacts that may occur in the region within the ranges of the BVs. For the BIS, the terrestrial and aquatic study areas were designed separately due to unique considerations of each. **Table 3-1** outlines the local and regional study areas for each BV. The AOI applies to all BVs. A brief description of the study areas and their development and purpose is presented below. Section 5.2 of the BPPA Report (Zoetica 2021) contains a full description and rationale for developing these study areas.

Table 3-1. Local (LSA) and regional (RSA) study areas used for each BV.

Biodiversity Value	LSA Name	LSA Area (ha)	RSA Name	RSA Area (ha)	Relevant Sections of BPPA Report for Rationale
Chapter 2: Vegetation					
Vegetation	LSA_{TER}	3,840	RSA_{VEG}	169,415	Section 5.2.1.4; Figure 5-1
	LSA_{AQU}	27,472			
Chapter 3: Wetlands and Riparian Environments					
Wetlands and Riparian Environments	LSA_{ECO}	27,879	RSA_{AQU}[1]	78,410	Section 5.2.12.4; Figure 5-11 & 5-12
Chapter 4: Mammals					
Ungulates	LSA_{TER}	3,840	RSA_{UNG}	21,359	Section 5.2.2.4; Figure 5-2
Carnivores	LSA_{TER}	3,840	RSA_{CAR}	169,415	Section 5.2.3.4; Figure 5-3
Small Terrestrial Mammals	LSA_{TER}	3,840	NA	NA	Section 5.2.4.4; Figure 5-4
Semi-Aquatic Mammals	LSA_{AQU}	27,472	RSA_{SAM}	52,561	Section 5.2.5.4; Figure 5-5
Bats	LSA_{TER}	3,840	RSA_{BAT}	18,834	Section 5.2.6.4; Figure 5-6
Chapter 5: Herpetofauna					
Amphibians	LSA_{TER}	3,840	$RSA_{HRP-AQU}$	40,825	Section 5.2.8.5; Figure 5-8
Reptiles	LSA_{TER}	3,840	RSA_{HRP}	28,354	
			$RSA_{HRP-AQU}$	40,825	
Chapter 6: Terrestrial Invertebrates[2]					
Terrestrial Invertebrates	LSA_{TER}	3,840	NA	NA	Section 5.2.9.4; Figure 5-9
Chapter 7: Birds					
Upland Breeding Birds	LSA_{TER}	3,840	RSA_{AVI}	13,197	Section 5.2.7.5; Figure 5-7
Shorebirds	LSA_{TER}	3,840	$RSA_{AVI-AQU}$	31,621	
Waterbirds	LSA_{TER}	3,840	$RSA_{AVI-AQU}$	31,621	
Raptors	LSA_{TER}	3,840	RSA_{AVI}	13,197	
			$RSA_{AVI-AQU}$	31,621	
Chapter 8: Fish and Fish Habitat[2]					
Fish	LSA_{AQU}	27,472	RSA_{AQU}	78,410	Section 5.2.10.4; Figure 5-11
Molluscs and Crustaceans	LSA_{AQU}	27,472	NA	NA	Section 5.2.10.4; Figure 5-10
Primary and Secondary Producers	LSA_{AQU}	27,472	NA	NA	Section 5.2.11.4; Figure 5-10
Chapter 9: Ecosystem Function and Services					
Ecosystem Services	LSA_{ECO}	27,879	RSA_{ECO}[1]	186,893	Section 5.2.12.4; Figure 5-12

Notes:

[1]Wetland and Riparian Environments is included in Section 5.2.12 (Ecosystem Function and Services) of the BPPA Report and is reported in its own chapter (Chapter 3) within the BIS Baseline Report to match the elements outlined in the TISG Template. The RSA for Wetlands and Riparian Environments differs from the RSA for Ecosystem Function and Services because effects of the Project on wetlands and riparian environments are not anticipated to extend outside of the LSA_{ECO}. the RSA_{AQU} is included for Wetland and Riparian Environments to capture habitat information needed to assess impacts to other BVs that use these areas.

[2]Semi-aquatic invertebrates are included in Section 5.2.9 (Terrestrial and Semi-aquatic Invertebrates) of the BPPA Report and are presented in the Fish and Fish Habitat Chapter (Chapter 8) of the BIS Baseline Report.

3.1 Area of Interest (AOI)

The AOI is an oval shaped polygon that is approximately 8.6 km long and 4.3 km wide, with an area of approximately 18.2 km^2 (1,827 ha). The AOI is located northwest of the community of Teeswater and south of the Greenock Swamp Wetland Complex (**Figure 3-1**). The AOI includes land acquired by the NWMO along with other privately owned lands. The exact location of the Project infrastructure, if it were to be in the SON-South Bruce siting area, is currently under development but will be contained within NWMO owned/optioned lands within the AOI. The AOI includes an area necessary to maintain design flexibility for the Project into and beyond the IA stage. The AOI is consistent for all BVs discussed in this report. A more detailed description of the proposed location and associated project infrastructure can be found in Section 1.1 of the EMBP Design document (CanNorth 2021).

The data objectives for studies within the AOI mainly focus on determining how the potential Project footprint and associated infrastructure could directly impact terrestrial and aquatic habitats, and species that depend on these habitats.

3.2 Local Study Areas

Three local study areas (LSAs) have been established for the BIS: a terrestrial LSA (LSA_{TER}), an aquatic LSA (LSA_{AQU}), and an LSA for the study of ecosystem services (LSA_{ECO}). The LSAs were developed to enable consideration of the extent to which Project impacts and benefits would potentially extend beyond the immediate project footprint. Examples of project impacts expected to extend beyond the project footprint include dust, noise, vibration, and water inputs. A brief description of each LSA is provided below and the size of each LSA is reported in **Table 3-1**. All LSAs include the entire AOI. Additional information and rationale on the development of each LSA can be found in Zoetica's BPPA Report (Zoetica 2021).

3.2.1 LSA_{TER}

The LSA_{TER} is bounded by a 1 km buffer around the AOI (see **Figure 3-1**). This study area was developed by considering the design considerations in the CSM and the anticipated extent of indirect effects (e.g., due to dust deposition, noise, and vibration). Data objectives for studies carried out within the LSA_{TER} are primarily driven by potential project interactions and the possibility for localized cumulative effects on terrestrial BVs.

3.2.2 LSA_{AQU}

The LSA_{AQU} is defined using a watershed approach and is bounded on the west by the Greenock Creek–Teeswater River quaternary watershed boundary and the Teeswater River Outlet quaternary watershed boundary. It is bounded to the south by the Greenock Creek–Teeswater River quaternary watershed boundary (see **Figure 3-1**). The LSA_{AQU} includes all areas that drain into the Greenock Swamp Wetland Complex and the Teeswater Wetland Complex, except for tributaries upstream of the Project site that drain into these wetlands on the east and south sides (see **Figure 3-1**). The LSA_{AQU} was designed to capture potential impacts on and benefits to aquatic and semi-aquatic BVs. This study area was developed by considering both the design considerations in the CSM and general water flow direction. Data objectives for studies conducted within the LSA_{AQU} are primarily driven by potential project interactions and localized cumulative effects on aquatic BVs and on BVs that rely on aquatic habitats to fulfill various life history requisites.

3.2.3 LSA_{ECO}

The LSA_{ECO} was designed to encompass the outermost boundary of the LSA_{TER} and LSA_{AQU} combined (see **Figure 3-1**). The LSA_{ECO} enables a local evaluation of overall ecosystem function and services (values that ecosystems provide for human benefit) that could be affected by the Project. Data objectives for studies conducted within the LSA_{ECO} are primarily driven by potential project interactions and localized cumulative effects on ecosystem function and services, including relevant ecosystems (e.g., wetlands) that may be impacted by both terrestrial and aquatic influences.

3.3 Regional Study Areas

Regional study areas (RSAs) have been established for the BIS on a BV-by-BV basis for BVs that are better assessed over a larger geographic range and BVs whose populations or habitat could be affected by the Project. The BV-specific RSAs are large enough to provide a regional context of terrestrial and aquatic habitat in the SON-South Bruce siting area, provide suitable control sites for habitats within the AOI, and account for the movements of wide-ranging species. Tailored RSAs were designed for BVs that occur or have the potential to occur in and around the Project and have the potential to interact with the Project. These BV-specific RSAs will be used to assess potential cumulative effects in the IA.

3.3.1 BV-Specific Terrestrial RSAs

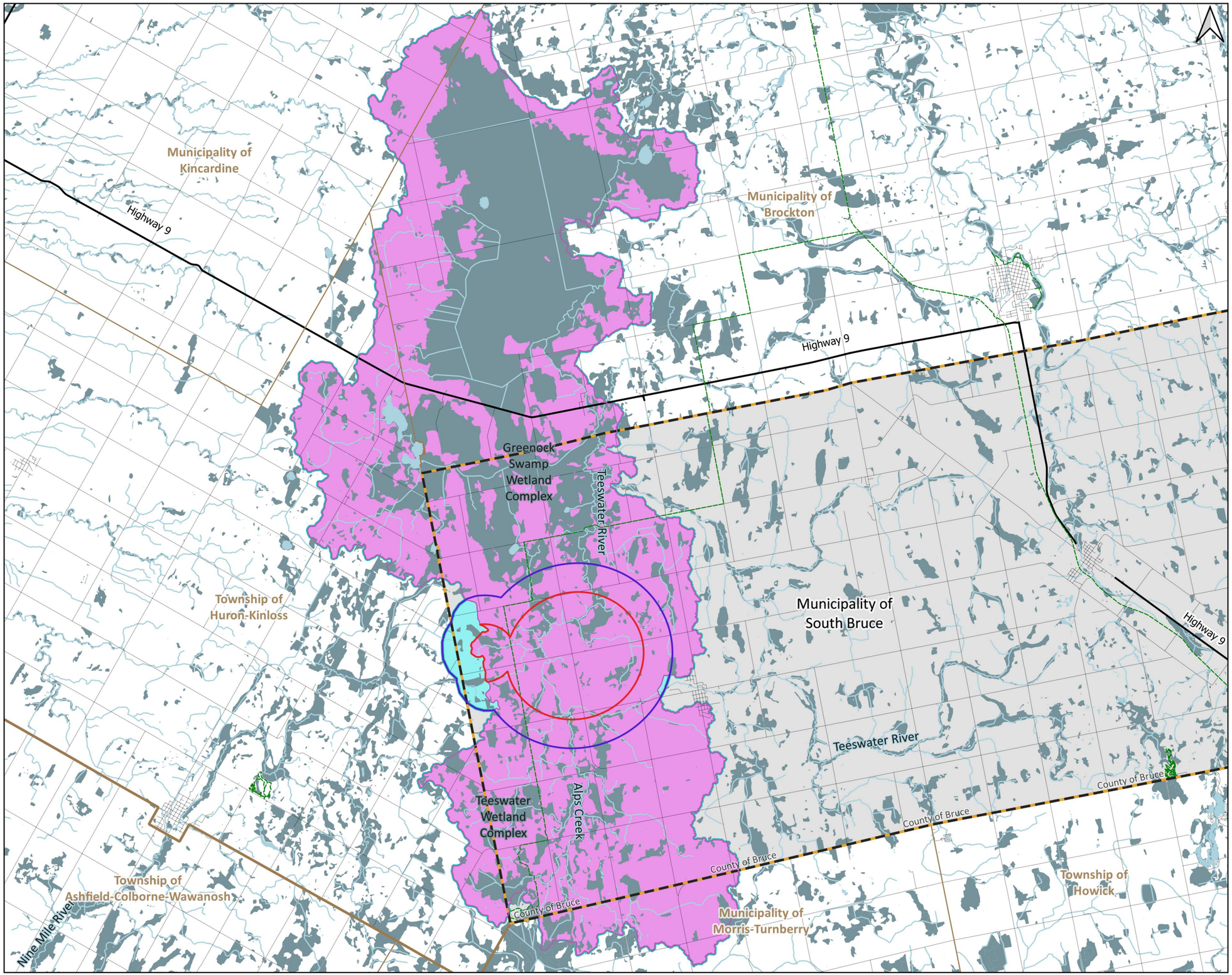
BV-specific terrestrial RSAs are presented in **Figure 3-2**, and the size of each RSA is reported in **Table 3-1**. RSA boundaries for terrestrial BVs were established by considering annual home ranges of potential species within each BV group, using the most conservative (largest published) range to calculate the BV-specific RSA (see Zoetica's BPPA Report; (Zoetica 2021). Each BV-specific RSA represents a broader study area that provides a regional context for the distribution of wildlife and the ecosystems on which wildlife populations depend. Each RSA also represents the broader area needed to support populations of species that migrate and move through their annual life histories. Potential Project impacts and benefits relating to regional wildlife habitat will be assessed at the RSA scale. More information and rationale on the development of the BV-Specific terrestrial RSAs can be found in Zoetica's BPPA Report (Zoetica 2021).

3.3.2 Aquatic RSA (RSA_{AQU})

A single aquatic RSA (RSA_{AQU}) was designed for all aquatic and semi-aquatic BVs (see **Figure 3-3**). The RSA_{AQU} was delineated using a watershed approach. The RSA_{AQU} contains all water that flows into the Greenock Swamp Wetland Complex, the Teeswater Wetland Complex, and waters downstream of these wetlands. Downstream areas include portions of the Teeswater River, and the Saugeen River downstream of its confluence with the Teeswater River, to the outlet of the Saugeen River into Lake Huron. The RSA_{AQU} also includes a conservative buffer of a 500 m radius into Lake Huron at the outlet of the Saugeen River. More information and the rationale for including these areas in the RSA_{AQU} is found in Zoetica's BPPA Report (Zoetica 2021). The size of the RSA_{AQU} is reported in **Table 3-1**. The RSA_{AQU} is designed to be large enough to provide a regional context of habitat in the SON-South Bruce siting area and to provide suitable control sites for habitat within the AOI and LSA_{AQU}. Additional areas outside of the Saugeen River tertiary watershed may be used as control sites if additional control sites are required or if no suitable control sites exist in the Saugeen River tertiary watershed. More information and rationale on the development of the RSA_{AQU} can be found in the BPPA Report (Zoetica 2021).

3.3.3 RSA_{ECO}

The RSA_{ECO} was designed to encompass the largest of all areas used to study species and guild-specific BVs; to enable a regional evaluation of overall ecosystem function and services (values that ecosystems provide for human benefit) that could be affected by the Project; and to enable the selection of control sites for other habitats (e.g., wetlands) that may be impacted by both terrestrial and aquatic Project pathways. Additional areas outside the RSA_{ECO} may be used as control sites if no suitable control sites exist within the RSA_{ECO} (e.g., control sites for the Greenock Swamp Wetland Complex). The RSA_{ECO} is bounded by the outermost extent of the terrestrial RSAs (RSA_{VEG} being the largest) and the RSA_{AQU} (see **Figure 3-3**). The size of the RSA_{ECO} is provided in **Table 3-1**. More information and rationale on the development of the RSA_{ECO} can be found in Zoetica's BPPA Report (Zoetica 2021).



NWMO Biodiversity Impact Studies

Area of Interest and Local Study Areas

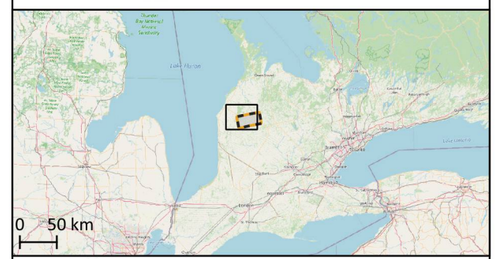
Figure 3-1

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Wetland
- South Bruce Boundary
- Other Municipal Boundary
- County Boundary
- Highway
- Local Road
- Trail

1:130,000

0 2 4 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment with Address (NDMNRF); OTN Trail Segment (NDMNRF); Municipal Boundary - Lower Tier and Upper Tier (MMAH); Wetlands (NDMNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: HB	Approved by: HB
October 21, 2022	Map ID: NWMO_BIS_D107b	

NWMO Biodiversity Impact Studies

Terrestrial Regional Study Areas

Figure 3-2

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Local Study Area (LSA_{TER})
- Regional Study Area (RSA_{AVI})
- Regional Study Area (RSA_{BAT})
- Regional Study Area (RSA_{HRP})
- Regional Study Area (RSA_{SAM})
- Regional Study Area (RSA_{UNG})
- Regional Study Area (RSA_{CAR})
- Watercourse
- Lake
- Wetland
- South Bruce Boundary
- Other Municipal Boundary
- County Boundary
- Highway
- Local Road
- Trail

1:200,000

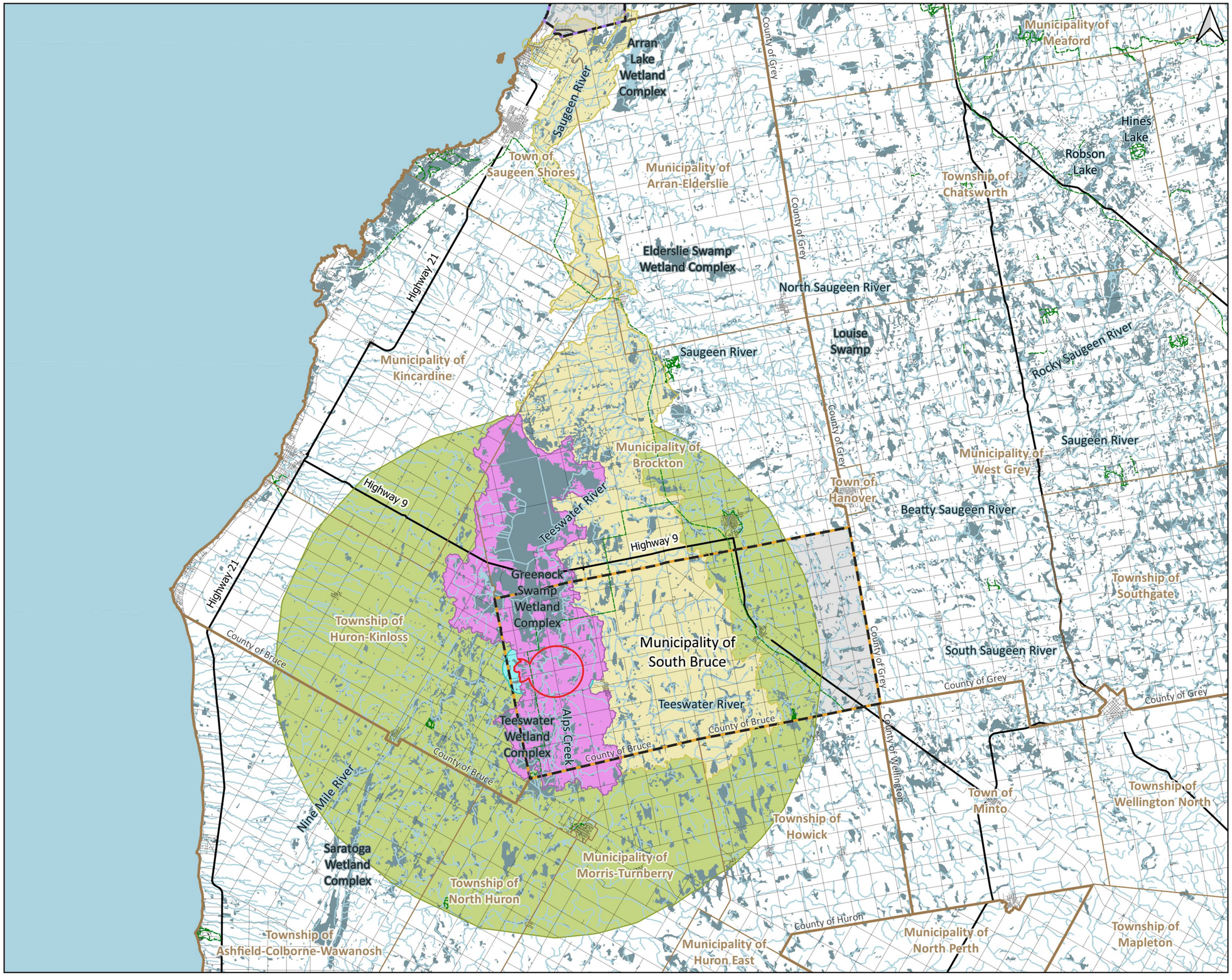
0 4 8 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment with Address (NDMNRF); OTN Trail Segment Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (NDMNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: HB	Approved by: HB
October 21, 2022	Map ID: NWMO_BIS_D108b	



NWMO Biodiversity Impact Studies

Aquatic and Ecosystem Services Regional Study Areas

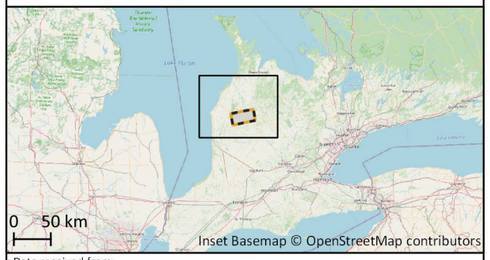
Figure 3-3

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AQU})
- Regional Study Area (RSA_{ECO})
- Watercourse
- Lake
- Wetland
- Saugeen No. 29
- South Bruce Boundary
- Other Municipal Boundary
- County Boundary
- Highway
- Local Road
- Trail

1:325,000

0 4 8 km

ZOETICA



Data received from:
Ontario GeoHub — Indian Reserve (NDMNRF); OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment with Address (NDMNRF); OTN Trail Segment Municipal Boundary - Lower Tier and Upper Tier (MMAH); Wetlands (NDMNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: HB	Approved by: HB
October 21, 2022	Map ID: NWMO_BIS_D109b	

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Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 DATASET QUALITY REPORT

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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Glossary and Abbreviations

ANSI	Areas of Natural and Scientific Interest
AOI	Area of Interest
BIS	Biodiversity Impact Studies
BV	Biodiversity Value
CABIN	Canadian Aquatic Biomonitoring Network
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSV	Comma Separated Value
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
EDDMapS	Early Detection and Distribution Mapping System
GBIF	Global Biodiversity Information Facility
IBAT	Integrated Biodiversity Assessment Tool
IUCN	International Union for Conservation of Nature
Km/KM	Kilometre
MECP	Ministry of the Environment, Conservation and Parks
MMAH	Ministry of Municipal Affairs and Housing
MNRF	Ministry of Natural Resources and Forestry
MVCA	Maitland Valley Conservation Authority
NHIC	Natural Heritage Information Centre
NRCan	Natural Resources Canada
NWMO	Nuclear Waste Management Organization
OBBN	Ontario Benthos Biomonitoring Network
OFAT	Ontario Flow Assessment Tool
OGS	Ontario Geological Survey
OHN	Ontario Hydro Network
ORN	Ontario Road Network
ORWN	Ontario Railway Network
OWB	Ontario Watershed Boundaries
OWES	Ontario Wetland Evaluation System
PC	Plant Community
PIN	Personal Identification Number

StatCan	Statistics Canada
SAM	Semi-Aquatic Mammals
SARA	Species at Risk Act
SARO	Species at Risk in Ontario
SOLRIS	Southern Ontario Land Resource Information System
SVCA	Saugeen Valley Conservation Authority
SWOOP 2020	South Western Ontario Orthophotography Project
UNEP-WCMC	United Nations Environment Programme - World Conservation Monitoring Centre
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WCA	Wildlife Concentration Area
WDPA	World Database on Protected Areas
WMU	Wildlife Management Unit

APPENDIX A - DATASET QUALITY RATING

This appendix summarizes and assesses the quality of all datasets received from external sources used in the Biodiversity Impact Studies (BIS). Only data from external sources outside of data collected as part of BIS studies are assessed for quality because information on the methods used and effort in gathering these data are generally limited. Any datasets used for mapping, reporting, or screening for relevant data for any BIS deliverable (see Section 1.0 of Chapter 1 for BIS deliverables) are included in **Table A-1**. The data quality rubric used to assess the dataset quality, itemized in **Table A-1** under the heading, "Quality Assessment" (Likelihood of Bias, etc.), is presented in Section A.1. Zoetica™ and the NWMO regularly search for relevant data sources and as more datasets are received and included in the BIS, **Table A-1** will be updated in future iterations of the BIS Baseline Report.

Table A-1. Summary of external datasets used for the BIS, including an assessment of their quality. Dataset quality was rated according to the data quality rubric outlined in Section A.1. Files only used as a basemap layer were not assessed for quality and were marked as "N/A" in these columns. Data were ranked from 1 to 5, with 1 indicating the highest score and 5 indicating the lowest. Where similar datasets received the same quality assessment score and assessment results, the columns were merged. Alternating row shading differentiates the datasets with unique data quality ratings.

Dataset Details						Quality Assessment							Assessment Results				
Layer Official Name	**Layer Type**	**Dataset Format**	**Received From**	**Received Date**	**Source**	**Likelihood of Bias**	**Reliability**	**Temporal Relevance**	**Geographic Relevance**	**Expertise[1]**	**Data Collection Methods**	**Review**	**Is the Data Considered Sensitive?**	**Assessed Cautions**	**Assessed Limitations**	**Source Caution or Use Limitation[2]**	**Other Notes**
SedimentarySites_LandAccess_Purchased_or_Optioned_r3	Basemap Layer	Shapefile	NWMO	2022-01-18	NWMO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	None	None
South Bruce AOI	Basemap Layer	Shapefile	NWMO	2020-01-16	NWMO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	None	None
SouthBruce_TeranetOwnerParcel	Basemap Layer	Shapefile	NWMO	2022-01-25	Teranet	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	Does not contain any information in attribute table other than a PIN that can be used to visualize accessible land parcels. NWMO did not transfer full attribute table due to landowner privacy.	None	None
SouthBruce_TeranetOwnerParcel_surrounding	Basemap Layer	Shapefile	NWMO	2022-01-25	Teranet												
SVCA_Properties	Basemap Layer	Shapefile	NWMO	2021-12-10	SVCA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	See AGR_20201028_NWMO_NDASensitiveData- Confidentiality and Non-disclosure Agreement	None
MVCA Woodlots	Basemap Layer	Geodatabase	NWMO	2020-11-20	MVCA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	For NWMO and consultants working on NWMO project only. Data were provided by the conservation authority and NWMO accepted it as delivered; NWMO has no way to verify the accuracy.	None
Bruce County Forests	Basemap Layer	Shapefile	Bruce County Open Spatial Data	2021-11-09	Bruce County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	Shows parcel boundary of County Tract, may not all be forested.	Bruce County Open Data Licence	None
Bruce County Parcels Open Data	Basemap Layer	Shapefile	Bruce County Open Spatial Data	2021-11-09	Bruce County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Bruce County Open Data Licence	Use Teranet Parcels instead for most accurate data.
County Tracts	Basemap Layer	Shapefile	Huron County Open Data	2021-11-10	Huron County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	Shows parcel boundary of County Tract, may not all be forested.	Open Government Licence –The County of Huron	None
Lots and Concessions	Basemap Layer	Shapefile	Huron County Open Data	2021-11-10	Huron County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	Shows original lot fabric, not actual parcels.	Open Government Licence –The County of Huron	Use Teranet Parcels instead for most accurate data.
Parks	Basemap Layer	Shapefile	Huron County Open Data	2021-11-10	Huron County	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	Shows parks as a point, does not show extent of park area	Open Government Licence –The County of Huron	None
Municipal Boundary - Upper Tier and District	Basemap Layer	Shapefile	Ontario GeoHub	2019-11-19	MMAH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	None
Municipal Boundary - Lower and Single Tier	Basemap Layer	Shapefile	Ontario GeoHub	2019-11-19	MMAH												

Dataset Details						Quality Assessment							Assessment Results				
Layer Official Name	**Layer Type**	**Dataset Format**	**Received From**	**Received Date**	**Source**	**Likelihood of Bias**	**Reliability**	**Temporal Relevance**	**Geographic Relevance**	**Expertise[1]**	**Data Collection Methods**	**Review**	**Is the Data Considered Sensitive?**	**Assessed Cautions**	**Assessed Limitations**	**Source Caution or Use Limitation[2]**	**Other Notes**
Areas of Natural and Scientific Interest (ANSI)	Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	None
Conservation Authority Administrative Area	Basemap Layer	Shapefile	Ontario GeoHub	2022-01-06	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	None
EcoZone	Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	Boundaries represent a 'fuzzy boundary', which means it does not have a definitive or hard edge and instead is a gradual transition between zones. Shapefiles are limited to showing everything as definitive polygons.
EcoRegion	Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF												
EcoDistrict	Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF												
Indian Reserve	Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	None
Ontario Digital Elevation Model (Imagery-Derived)	Basemap Layer	Disc Image File (Raster)	Ontario GeoHub	2022-02-01; 2022-03-01	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	None
Results from Ontario Flow Assessment Tool (now called Ontario Watershed Information Tool)	Basemap Layer	Webtool	OFAT Webtool	2020-03-04	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	None	None
Ontario Road Network (ORN) Segment With Address	Basemap Layer	Shapefile	Ontario GeoHub	2019-11-29	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	None
Ontario Watershed Boundaries (OWB)	Basemap Layer	Shapefile	Ontario GeoHub	2020-08-17	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	None
Ontario Hydro Network (OHN) - Waterbody	Aquatic Habitat; Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF	1	2	1	1	3	5	5	No	Limited methods information is available. Expertise and review process unknown.	No limitations as a basemap layer. When used to delineate aquatic habitat, it should be noted that it has not been field verified.	Open Government Licence – Ontario	None
Ontario Hydro Network (OHN) - Watercourse	Aquatic Habitat; Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF												
Ontario Hydro Network (OHN) - Hydrographic Polygon	Aquatic Habitat; Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF												
Ontario Hydro Network (OHN) - Hydrographic Line	Aquatic Habitat; Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF												
Ontario Hydro Network (OHN) - Hydrographic Point	Aquatic Habitat; Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF												
Constructed Drain	Aquatic Habitat; Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF												

Dataset Details						Quality Assessment							Assessment Results				
Layer Official Name	**Layer Type**	**Dataset Format**	**Received From**	**Received Date**	**Source**	**Likelihood of Bias**	**Reliability**	**Temporal Relevance**	**Geographic Relevance**	**Expertise[1]**	**Data Collection Methods**	**Review**	**Is the Data Considered Sensitive?**	**Assessed Cautions**	**Assessed Limitations**	**Source Caution or Use Limitation[2]**	**Other Notes**
Southern Ontario Land Resource Information System (SOLRIS) 3.0	Basemap Layer	.TIF (Raster)	Ontario GeoHub	2019-11-29	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	None
SWOOP 2020	Basemap Layer	.TIF (Raster)	NWMO	2022-03-17	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	None	None
Trail Segment	Basemap Layer	Shapefile	Ontario GeoHub	2022-10-17	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Must include text in Other Notes on reproductions. Limited to the "MNRF Electronic Intellectual Property End-User Licence Agreement".	Produced under Licence with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.
Utility Line	Basemap Layer	Shapefile	Ontario GeoHub	2021-04-20	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	None	None
UTM (Universal Transverse Mercator) 1 Km Grid	Basemap Layer	Shapefile	Ontario GeoHub	2020-05-02	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	None
UTM (Universal Transverse Mercator) 5 Km Grid	Basemap Layer	Shapefile	Ontario GeoHub	2020-05-02	MNRF												
UTM (Universal Transverse Mercator) 10 Km Grid	Basemap Layer	Shapefile	Ontario GeoHub	2021-12-09	MNRF												
UTM (Universal Transverse Mercator) 100 KM Grid	Basemap Layer	Shapefile	Ontario GeoHub	2020-05-02	MNRF												
Wetlands	Aquatic Habitat; Basemap Layer	Geodatabase	Ontario GeoHub	2019-12-02	MNRF	1	1 (OWES) and 2 (non-OWES)	1	1	3	1 (OWES) and 5 (non-OWES)	5	No	This dataset was created by MNRF using OWES wetland assessments data and other government wetland datasets to fill remaining gaps. Reliability and quality of methods for a given polygon will depend on whether it was assessed under OWES (highest quality ranked 1) or from a different dataset (ranked 5). Expertise and review process unknown.	No limitations as a basemap layer. When used to delineate habitat, it should be noted that most polygons have not been field verified. Ideally, should be replaced with verified ecosite information when available.	Open Government Licence – Ontario	From User Guide: The Wetland data are managed independently from the Ontario Hydro Network (OHN) layers and may overlap waterbodies or other OHN data.
Wildlife Management Unit	Basemap Layer	Shapefile	Ontario GeoHub	2019-12-02	MNRF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence – Ontario	None
Ontario Breeding Bird Atlas Squares	Basemap Layer	Shapefile	BirdsOntario.org	2022-10-13	Bird Studies Canada	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	None	None
Indexes of the National Topographic System of Canada	Basemap Layer	Shapefile	Federal Open Data Portal	2020-01-17	NRCan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	Open Government Licence - Canada	None
Provinces/Territories, Cartographic Boundary File - 2016 Census	Basemap Layer	Shapefile	Federal Open Data Portal	2020-05-05	StatCan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	Shows the Canadian boundary using land mass and may not reflect the true US/Canada border over waterbodies.	None	None
World Database on Protected Areas (WDPA)	Basemap Layer	Shapefile	IBAT	2020-03-10	UNEP-WCMC and IUCN	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	Does not include local protections (e.g., municipal parks).	None	None
Great Lakes (Hydro)	Basemap Layer	Shapefile	USGS ScienceBase Catalog	2021-11-05	USGS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	None	None	None	None

Dataset Details						Quality Assessment							Assessment Results				
Layer Official Name	**Layer Type**	**Dataset Format**	**Received From**	**Received Date**	**Source**	**Likelihood of Bias**	**Reliability**	**Temporal Relevance**	**Geographic Relevance**	**Expertise[1]**	**Data Collection Methods**	**Review**	**Is the Data Considered Sensitive?**	**Assessed Cautions**	**Assessed Limitations**	**Source Caution or Use Limitation[2]**	**Other Notes**
Abandoned Mines Information System	Habitat	Geodatabase	OGSEarth	2020-03-09	MNRF	1	1	1	1	3	5	5	No	Limited methods information is available. Expertise and review process unknown.	None	Completeness of data not guaranteed; coordinates not intended for navigational, survey, or land title determination.	None
Wooded Area	Habitat	Shapefile	Ontario GeoHub	2019-12-02	MNRF	1	2	1	1	3	5	5	No	Limited methods information is available. Expertise and review process unknown.	None	Open Government Licence – Ontario	None
Ecosite Classification Dataset	Habitat	Shapefile	Sumac Geomatics	2022-03-29	Sumac Geomatics	1	1	1	1	1	1	3	No	The minimum polygon size is 0.5 ha, so smaller units would not be included. Not field verified.	None	None	None
NHIC PC Observation	BV - Veg	Geodatabase	NWMO	2020-02-14; 2020-12-21	MNRF	2	2	1	1	3	1	3	Yes	Observations can be from MNRF staff or submitted to MNRF and reviewed by staff. Observations can include random incidentals and may not indicate a species uses that space (e.g., bird flying overhead)	Cannot prove absence.	See Ministry of Natural Resources Sensitive Data Use Licence Agreement for full limitations. Can only be used for NWMO project. Showing data must follow "Sensitive Data Location Standards". Can only be used by employees who have completed the Data Sensitivity Training. When data are reproduced, should include the text in Other Notes.	Produced under Licence with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.
NHIC Species Observation	BV - Various	Geodatabase	NWMO	2020-02-14; 2020-12-21	MNRF												
NHIC PC Occurrence	BV - Veg	Geodatabase	NWMO	2020-02-14; 2020-12-21	MNRF	2	1	1	1	1	1	1	Yes	Occurrences are derived from observations and follow NatureServe guidelines for creation. These represent areas used by the species (e.g., bird nest) and can be considered more 'permanent' than the observations.	Cannot prove absence.	See Ministry of Natural Resources Sensitive Data Use Licence Agreement for full limitations. Can only be used for NWMO project. Showing data must follow "Sensitive Data Location Standards". Can only be used by employees who have completed the Data Sensitivity Training. When data are reproduced, should include the text in Other Notes.	Produced under Licence with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.
NHIC Species Occurrence	BV - Various	Geodatabase	NWMO	2020-02-14; 2020-12-21	MNRF												
NHIC WCA Observation	BV - Various	Geodatabase	NWMO	2020-02-14; 2020-12-21	MNRF												
Medium_Sensitive - Wildlife_Activity_Area	BV - Various	Geodatabase	NWMO	2020-12-21	MNRF	2	1	1	1	3	5	5	Yes	Limited methods information is available. Expertise and review process unknown.	None	See "Ontario Ministry of Natural Resources and Forestry ELECTRONIC INTELLECTUAL PROPERTY End-User Licence Agreement" for full limitations. Reproductions should include the text in Other Notes.	Produced under Licence with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.
Medium_Sensitive - Wildlife_Activity_Site	BV - Various	Geodatabase	NWMO	2020-12-21	MNRF												
Non_Sensitive - Wildlife_Activity_Area	BV - Various	Geodatabase	NWMO	2020-12-21	MNRF	2	1	1	1	3	5	5	No	Limited methods information is available. Expertise and review process unknown.	None	See "Ontario Ministry of Natural Resources and Forestry ELECTRONIC INTELLECTUAL PROPERTY End-User Licence Agreement" for full limitations. Reproductions should include the text in Other Notes.	Produced under Licence with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.
Non_Sensitive - Wildlife_Activity_Site	BV - Various	Geodatabase	NWMO	2020-12-21	MNRF												
Ontario Species List	BV - Various	Excel file	NHIC	2023-05-17	MNRF	1	1	1	1	3	1	5	No	Data includes (internal) review date for S-Rank. Other parts of data may or may not be reviewed.	Includes most up to date subnational, national, and global ranks; however, may not be updated to current SARO, SARA, or COSEWIC statuses.	None	None
Provincially Tracked Species 1km grid	BV - Various	Shapefile	Ontario GeoHub	2019-11-29	MNRF	1	1	1	2	3	1	5	No	As this files is a masked version of NHIC observations data, see relevant rows for quality	Cannot prove absence.	Open Government Licence – Ontario	None

Dataset Details						Quality Assessment							Assessment Results				
Layer Official Name	**Layer Type**	**Dataset Format**	**Received From**	**Received Date**	**Source**	**Likelihood of Bias**	**Reliability**	**Temporal Relevance**	**Geographic Relevance**	**Expertise[1]**	**Data Collection Methods**	**Review**	**Is the Data Considered Sensitive?**	**Assessed Cautions**	**Assessed Limitations**	**Source Caution or Use Limitation[2]**	**Other Notes**
														assessment. No information on review process.			
Karst	BV - Various	PDF Map	OGSEarth	2022-08-19	Ministry of Mines	1	2	3	3	3	5	5	No	The study area overlaps the boundary between inferred and potential karst, so it is not based on measurements and instead based on calculations.	Data only indicates potential for karst, does not confirm presence in the study area.	Information from this publication may be quoted if credit is given.	None
Physiography	BV - Various	Shapefile	OGSEarth	2022-08-19	Ministry of Mines	1	3	1	3	3	5	5	No	Data created at a large scale and may not be detailed enough.	Unclear what methods used and if systematic.	See Metadata.	None
Surficial Geology	BV - Various	Shapefile	OGSEarth	2022-08-19	Ministry of Mines	1	3	1	3	3	5	5	No	Data created at a large scale and may not be detailed enough.	Unclear what methods used and if systematic.	See Metadata	None
EDDMapS Ontario Observations	BV - Various	Geopackage	EDDMapS Ontario	2022-01-12	EDDMapS Ontario	1	1	1	1	3	4	2	No	Not systematically collected, so may not be exhaustive.	Cannot prove absence.	None	None
Global Biodiversity Information Facility Observations	BV - Various	CSV	GBIF.org	2021-10-19	GBIF.org	1	2	1	1	3	5	5	No	Limited methods information is available, so may not be exhaustive. Expertise and review process unknown.	Cannot prove absence.	None	None
Beaver Dam - Discontinued	BV - SAM	Shapefile	Ontario Geohub	2021-10-05	MNRF	1	2	2	1	3	5	5	No	Dataset was retired in 2014 and no longer maintained or supported. No information on expertise, methods, and review. With no methods information, it cannot be determined if data was collected systematically or opportunistically.	This dataset should not be considered extensive or complete, only that it shows beaver dams known to the MNRF in 2014. Dams from before 2014 might be missing, in addition to any changes that occurred after the dataset was retired. Ideally will be replaced with verified field data.	Open Government Licence – Ontario; 2014 Retired – no longer maintained or supported	When using this dataset, a warning of its 2014 retirement should be made.
Aquatic resource area polygon segment	BV - Fish	Geodatabase	Ontario GeoHub	2021-09-07	MNRF	1	1	1	1	3	5	5	No	No information on data collection methods, assumed not systematically collected. Expertise and review process unknown.	Cannot prove absence.	There are additional sensitive data related to provincially tracked species and species at risk that are not available as part of this open data package. Open Government Licence – Ontario	None
Fish Activity Area	BV - Fish	Shapefile	Ontario GeoHub	2021-10-21	MNRF	1	1	1	1	3	5	5	No	Limited methods information is available, so may not be exhaustive. Expertise and review process unknown.	Cannot prove absence.	Open Government Licence – Ontario	None
Fish ON-Line	BV - Fish	Webmap	MNRF	2021-04-15	MNRF	1	1	5	1	3	5	5	No	May only include species relevant to fishing. No information on age of data. Aquatic resource area dataset likely more comprehensive. Methods and review not clear.	Cannot prove absence.	The MNRF makes no guarantee concerning the data's content, accuracy, completeness, or the results obtained from queries or use of the data. MNRF takes no warranty of fitness for a particular purpose, no representation as to the quality of any data, and assumes no liability for the data represented here. These data do not represent exhaustive inventories, but are compilations of existing knowledge from field biologists that are updated periodically as knowledge improves. The content may be used and reproduced only in accordance with	None

Dataset Details						Quality Assessment							Assessment Results				
Layer Official Name	**Layer Type**	**Dataset Format**	**Received From**	**Received Date**	**Source**	**Likelihood of Bias**	**Reliability**	**Temporal Relevance**	**Geographic Relevance**	**Expertise[1]**	**Data Collection Methods**	**Review**	**Is the Data Considered Sensitive?**	**Assessed Cautions**	**Assessed Limitations**	**Source Caution or Use Limitation[2]**	**Other Notes**
																applicable intellectual property laws. Non-commercial use of non-substantial excerpts from the content is permitted provided that appropriate credit is given and Crown copyright is acknowledged.	
Ontario Dam Inventory	BV - Fish	Shapefile	Ontario GeoHub	2021-10-15	MNRF	1	1	1	1	3	1	5	No	None	None	Open Government Licence – Ontario	None
Ontario Benthos Biomonitoring Network (OBBN)	BV - Fish	Excel file	Ontario Data Catalogue	2021-12-08	MECP	1	1	Varies 1-5	1	1	1	2	No	Data ranges in age depending on time of field survey.	None	Open Government Licence – Ontario	None
Ontario Freshwater Fishes Life History Database	BV - Fish	Web Database	ontariofishes.ca	2021-09-21; 2021-09-22; 2022-06-28; 2022-10-31	ontariofishes.ca	1	1	1	1	1	1	5	No	Data are collated from a variety of reputable sources by a subject matter expert; however, it appears to be the work of one person, so it is not clear if there are any reviews or verification that the data collation has been done correctly. Also, cannot tell the age of the source for specific information and if it is still considered valid (e.g., if a new book version is released with updated information, it is hard to tell if everything gets updated correctly). Review process unknown.	None	None	None
Critical Habitat of Species at Risk	BV - Fish	Geodatabase	Federal Open Data Portal	2022-03-03	DFO	1	1	1	1	1	1	3	No	No information on review process. Not systematically collected in study area, so other habitat that meets the criteria may exist in our study area.	Only depicts known critical habitat. Species may use other areas as habitat.	None	None
Canadian Aquatic Biomonitoring Network (CABIN)	BV - Fish	Webmap	ECCC	2021-12-08	ECCC	1	1	Varies 1-5	1	1	1	2	No	Data ranges in age depending on time of field survey.	None	None	None

Notes:
See the Glossary on page ii for abbreviations used in the table.

1. Expertise for the MNRF was assumed to be a 3 (Data collected by a mix of intermediate and junior scientists in a relevant field) since information on specific staff involved with the data was not available.
2. All datasets received or downloaded for the BIS should only be used for the BIS and other NWMO-related work, so this use limitation was not specified for every file. Also, no files can be shared outside of Zoetica or the NWMO without permission from the original data owner, specified in the received from column.

A.1 Data Quality Scoring

The following data quality rubric was originally presented in Appendix B of Zoetica's *Biodiversity Impact Studies Work Approach* (Zoetica 2021). This rubric provides an explanation of each of the Quality Assessment indicators used in **Table A-1**.

Example of a scoring table adapted for use in evaluating "big data" obtainable from third-party sources for a biodiversity impact assessment (adapted from (UNEP and SETAC 2011). The table may be modified based on the need/use of the data source, and biodiversity value or valued component). The colour coding is as follows: If data are scored with any field that is Red, they could be considered for use (depending on the purpose) but will be interpreted with extreme caution. If data are scored with any field that is Yellow, they will be interpreted and used with caution. Data scored with only Green fields will be used with higher confidence. The data quality scoring for large data collected by third parties will help Zoetica determine the data sources that should be relied on for various purposes. This scoring may lead to the prioritization of certain data sets over others.

Highest ◄——————————————————► Lowest

Data Quality Indicator	1	2	3	4	5 (default)
Likelihood of Bias	Extremely low likelihood of bias[1]	Small possibility of bias	Moderate risk of bias	High risk of bias	Risk of bias cannot be estimated
Reliability	Verified[2] data based on measurements	Verified data based on calculation or non-verified data based on measurements	Non-verified data based on a calculation	Documented estimate (e.g., bin data)	Undocumented estimate
Temporal Relevance[3]	Less than 5 years old (or high relevance)	5-10 years old (high-moderate relevance)	11-15 years old (moderate relevance)	16-20 years old (low relevance)	Age of data unknown or more than 20 years
Geographic relevance	Data from same resolution and same area of study[4]	Within one level of resolution and a related area of study (e.g., if Ground Sample Distance (GSD) uses a pixel size that corresponds to 15x15 m area on the ground, data may be at 30x30 m GSD)	Within two levels of resolution and a related area of study	Outside of two levels of resolution by a related area of study	From a different or unknown area of study
Expertise	Data collected by highly skilled, competent senior researchers in a relevant field	Data collected by a mix of senior and intermediate or senior paired with junior scientists in a relevant field	Data collected by a mix of intermediate and junior scientists in a relevant field	Data collected by junior or inexperienced scientists or other inexperienced personnel in the field	Data collector expertise unavailable, inappropriate, unreported, untrained, or unknown
Data collection methods[5]	Data collection uses a best practice methodology over	Data collection uses a best practice method	Data collection uses a justified methodology that is not considered	Data collected using qualitative, or opportunistic methods	Unknown data collection methods, or data from a small number of sites and

	an adequate period[6]	over a shorter period of time	best practice over a shorter period of time		collected over short periods
Review	Documented reviews by a minimum of two third-party reviewer	Documented reviews by a minimum of one third-party reviewer	Documented review by an internal third-party review		No documented review or unknown

Notes:

[1]Likelihood of bias is qualitatively assessed via a careful consideration of the intended purpose of data collection and presentation and the mandates of groups responsible for data collection. For example, if data are collected and presented by a non-governmental organization with a mandate of stopping development in the boreal forest, might they exaggerate the number of rare species or ecosystem sensitivity in their data presentation? If data are collected by a pro-development organization, might results downplay the ecological importance of an area?

[2]Verification may take place in several ways, e.g. by on-site checking, by recalculation, through crosschecks with other sources.

[3]Temporal age refers to the difference between date of data generation and the date of representativeness as defined by the scope of the project. These definitions may be modified based on the biodiversity value or valued component of interest (and how quickly its distribution changes over time) and the time period that the researchers wish to examine (e.g., if considering past conditions, older data may be more appropriate).

[4]A related area of study is defined by the user and should be documented in the geographical metadata.

[5]Data collection methods include sampling design, study methodology, data (type) collected, technology used, and process of data collection.

[6]Adequate time period can be evaluated as a time period long enough to even out the natural range of variation in the value. The default time is >3 years but will vary based on the biodiversity value being examined.

A.2 References

UNEP, and SETAC. 2011. Global Guidance Principles for Life Cycle Assessment Databases: A Basis for Greener Processes and Products. Page UNEP/SETAC Life Cycle Initiative. United Nations Environment Programme.

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Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 ECOLOGICAL LAND CLASSIFICATION AND TERRESTRIAL ECOSYSTEM MAPPING REPORT

December 13, 2023

SUBMITTED TO

Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

PREPARED BY

Zoetica Environmental Consulting Services

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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GLOSSARY AND ABBREVIATIONS

A layer	Tree layer. Divided into three sublayers (A1, A2, and A3).
AOI	Area of Interest
B layer	Shrub layer. B1 = tall shrub layer; B2 = low shrub layer.
BBD	Beech Bark Disease
BIS	Biodiversity Impact Studies
BPD Report	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA Report	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
BV	Biodiversity Value
C layer	Herb layer
CWD	Coarse Woody Debris
D layer	Moss, lichen, and seedling layer
DBH	Diameter at Breast Height
E layer	Epiphyte layer
EAB	Emeral Ash Borer
Ecoregion	Second highest level of the ELC hierarchy (Crins et al. 2009). Large geographic areas primarily identified by sub-continental climatic regimes and bedrock geology.
Ecosite	Second lowest level of the Ecological Land Classification (ELC) hierarchy. The land within an ecosite will generally contain similar substrate and vegetation.
Ecosite Grouping	Categorization of ecosites into groups with similar characteristics and habitat function (e.g., conifer forest, hardwood swamp, marsh).
ELC	Ecological Land Classification
Forb	A herbaceous flowering plant that is not a grass, sedge, or rush.
FRI / eFRI	Forest Resources Inventory / Enhanced Forest Resources Inventory
GLSE	Great Lakes Shoreline Ecosystems
GRTS	Generalized Random Tessellation Stratified
GSWC	Greenock Swamp Wetland Complex
IA	Impact Assessment
LSA	Local Study Area LSA_{TER}: Terrestrial Local Study Area LSA_{ECO}: Ecosystem Function and Services Local Study Area

MNRF	Ontario Ministry of Natural Resources and Forestry
NWMO	Nuclear Waste Management Organization
Plantation	Refers to treed plantation for monoculture harvest. A naturalized plantation refers to a treed plantation with >30% ingress and no clear evidence that the site is still being maintained.
RIC / RISC	Resources Inventory Committee / Resources Information Standards Committee
RSA	Regional Study Area RSA_{ECO}: Ecosystem Function and Services Regional Study Area
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SOP	Standard Operating Procedures
SS	Structural Stage
Sumac	Sumac Geomatics; air photo interpreter for the Project at SON-South Bruce
SWH	Significant Wildlife Habitat; Defined in the Ontario Provincial Policy Statement, 2020 as: Wildlife habitat – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. Significant – in regard to wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system.
SWOOP 2020	South Western Ontario Orthophotography Project 2020
TEM	Terrestrial Ecosystem Mapping
The Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
Tulloch	Tulloch Engineering Inc.; field work contractors for the Project at SON-South Bruce
TWC	Teeswater Wetland Complex
WWC	Wingham Wetland Complex

1.0 OVERVIEW

To categorize and classify the terrestrial landscape within the Biodiversity Impact Studies (BIS) study areas, Zoetica™ used a combination of Ecological Land Classification (ELC) mapping and Terrestrial Ecosystem Mapping (TEM). Desk-based mapping followed by field surveys will aid our understanding of biodiversity in the terrestrial areas that may be impacted by the Project, if the Saugeen Ojibway Nation (SON)-South Bruce siting area is selected. This Appendix B to Chapter 1 of the 2023 BIS Baseline Report outlines the TEM protocols and preliminary desk- and field- based results.

ELC mapping, developed by the Ministry of Natural Resources and Forestry (MNRF), is Ontario's method for standardized stratification of the landscape into similar units based on ecological features such as terrain, soil, and vegetation communities. Ecosystem maps form the basis for interpreting biological and ecological interactions on the landscape and can provide a means for analyzing the distribution and diversity of ecosystems within a study area. The ELC system classifies Ontario into ecosystem types at various levels of detail and scale (see Figure 2-2 in the *Biodiversity Impact Studies - Southwestern Ontario Region: Baseline Program Design - 2022 Update* (2022 BPD Report; (Zoetica 2022)). The ELC system is divided into four geographic ranges (ELC Working Group 2009). The SON-South Bruce siting area for the Project falls within Ecoregion 6E (Lake Simcoe-Rideau), which is contained within the Southern ELC geographic range.

Mapping ELC data (see Section 3.1.1) can identify potentially limiting/rare ecological features, features of high ecological and human value, and those with sensitivities to anthropogenic changes on the landscape. ELC mapping can also be used to predict interactions between abiotic and biotic ecosystem components. Data created from ELC mapping is then ground-truthed to render it more precise and accurate. Additional valuable information can be gleaned from ecosystem maps, including the application of biodiversity guidelines, riparian guidelines, and various proposed wildlife management strategies.

TEM was outlined by the Resources Inventory Committee (RIC) in British Columbia (RIC 1998), and allows for further refinement of landcover data by including both desk-based mapping products derived from aerial imagery and field-based observations of vegetation and vegetation characteristics at the ground level. It is often difficult to determine understory cover from aerial imagery alone, so combining it with ground-based observations of vegetation structure can give a more detailed overview of vegetation characteristics and homogeneity within a polygon. TEM allows for collecting vegetation attributes (e.g., structural stage and structural composition) that may influence vegetation communities on the landscape and habitat used by wildlife. TEM also allows for the planning of studies to identify rare vegetation communities and wildlife habitats by identifying vegetation attributes that can influence the presence of these values.

1.1 Objectives

The objectives of ecological land classification and TEM mapping for the Project are to:

1. Provide information about the quantity and distribution of different ecosites within the various study areas of relevance (see Section 2.0). These data are used to determine the quantities of

different ecosystem units that may be directly lost[1] in the Area of Interest (AOI) and lost or indirectly impacted within the terrestrial Local Study Area (LSA_{TER}) due to the Project[2].

2. Inform habitat groupings and spatial survey efforts for field surveys of other biodiversity values and statistical survey designs (e.g., selecting randomized, stratified survey locations for use in collecting data via a Generalized Random Tessellation Stratified (GRTS) design for Tier 2 studies).
3. Allow for the future identification of potential associations between habitat features and the presence of terrestrial species and communities detected in Tier 2 baseline studies.
4. Provide additional baseline data to inform infrastructure siting and a potential future Impact Assessment (IA), mitigation measures, and associated monitoring program(s) to address the environmental, regulatory, and stakeholder/rights-holder concerns relevant to the Project.

The initial desk-based ecosite mapping was conducted to provide draft ecosite delineations to identify areas where rare ecosites may be located, provide an overview of habitat for wildlife to complete various life history stages, and identify potentially sensitive habitats (e.g., Significant Wildlife Habitat – see Appendix C, Chapter 1). Initial desk-based ecosystem mapping was also used to select field survey sites for Tier 1 baseline studies by grouping sites by ecosite and randomly assigning survey type to each ecosite polygon (see Section 3.2). Field surveys were conducted to improve desk-based mapping by verifying ecosite characterization using soil and/or vegetation characteristics at surveyed plots that are representative of the overall ecosite polygon.

1.2 Best Practice Guidance

A full description of best practices considered for the TEM study design is available in the *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approaches* (BPPA) *Report* (Zoetica 2021). The *Great Lakes Shoreline Ecosystem Ecosite Keys* (Lee et al. 2021) and *Field Guide to the Substrates of Ontario* (OMNR 2015) were used as best practice guidance for interpreting air photos to classify polygons based on ecosites, and while in the field to re-classify ecosites, where necessary. The *Field Guide to the Substrates of Ontario* was also used as best practice guidance when completing the site and soils description of each survey plot location. The *Standard for Terrestrial Ecosystem Mapping* (RIC 1998) was used as overall guidance for planning ecosystem mapping studies and for overall study design, including both desk-based and field-based mapping. The *Field Manual for Describing Terrestrial Ecosystems 2nd Edition* (BC MFR and BC MOE 2010) was used for determining field methods and protocols.

2.0 STUDY AREAS

The BIS study areas for TEM include the AOI, LSA_{TER}, LSA_{ECO}, and RSA_{ECO} (see Section 3.0, Chapter 1 for study area delineation). The BPPA Report (Zoetica 2021) contains additional details on the rationale for delineating study areas. TEM work done to date has focused only on the AOI, LSA_{TER}, and LSA_{ECO}. Once a site has been selected and a Project Description is available, TEM studies may be extended to the RSA_{ECO}, where relevant, to understand habitat availability for larger ranging species.

[1] Some losses due to Project infrastructure may be permanent and occur during construction of the Project, while other losses may be temporary and occur because of disturbance (e.g., dust, noise, vibration).

[2] Amounts of habitats (ha and %) in the AOI can be compared to amounts in the LSA_{TER} and ecological services and function Local Study Area (LSA_{ECO}), and eventually the Regional Study Area for ecological function and services (RSA_{ECO}), to contextualize the uniqueness and rarity of ecosystems in the AOI relative to the larger local (LSA_{ECO}) and regional areas (RSA_{ECO}).

3.0 METHODS

3.1 Desk-Based Ecosite Refinement and Preliminary Ecological Land Classification Mapping

3.1.1 ELC Classification System and Data Sources

There are various systems used for ELC mapping in southern Ontario. The first ELC system released for southern Ontario was *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee et al. 1998). This system was based on the principle that ecosites could be derived by establishing recurring patterns among vegetation, soil, and hydrology. The first approximation utilized keys containing nested statements to differentiate and identify ecological communities, which guided the user to the Community Unit. The Community Unit can be further refined to the ecosite and/or vegetation type using the ELC Community Tables.

In 2008, the ELC system was updated to the second approximation: the *Southern Ontario Ecological Land Classification Vegetation Type List* (Lee 2008). The second approximation presents a table that combines the keys and Community Tables into a series of nested categories. The classification is generally the same as the first approximation, with slight changes to the included ecosites and reformatting of all codes.

The Great Lakes Shoreline Ecosystems (GLSE) system was recently introduced as an update to the second approximation (Lee et al. 2021). The GLSE bring in more clear dichotomous keys and are better suited for air photo interpretation. The GLSE are still in draft form but since it is anticipated to be the new ELC system for southern Ontario, and since the Project will extend into the far future and will need to be interpreted over an extended period, the GLSE system was used for ELC mapping in the SON-South Bruce siting area.

The primary data source for ecosystem information in Ontario is the Enhanced Forest Resource Inventory (eFRI) produced by the MNRF; however, this data source is restricted to the Area of the Undertaking in northern Ontario. There are no known ecosite-level data sources that cover the SON-South Bruce siting area. In 2020, the South Western Ontario Orthophotography Project (SWOOP 2020) was flown over areas in southwestern Ontario, including the portions of Ecoregion 6E where the SON-South Bruce siting area is located. These orthophotos were used for air photo interpretation to delineate ELC polygons, which consist of uniform vegetation and soil characteristics.

SWOOP 2020 imagery was captured during spring leaf-off conditions. The air photo interpreter, Sumac Geomatics, classified the ecosites to the finest level of the GLSE system possible with the condition of the imagery. Air photo interpretation was completed with a minimum polygon size of 0.5 ha within the LSA_{ECO}. The classification was limited to the natural and naturalized areas of the LSA_{ECO} and was not completed in anthropogenic areas (e.g., agriculture, roads, dense development). ELC mapping in the BIS RSAs may be conducted in future years once more is known about the project, including valued components that are likely to be considered in the IA. ELC maps in relevant RSAs could then be compared to the LSA_{ECO} map to determine rarity and relative uniqueness of ecosystems within the SON-South Bruce siting area. For the 2023 BIS Baseline Report, Zoetica only presented ecosites that constituted ≥1% of the mapped area within the LSA_{ECO} independently in figures and grouped the remaining ecosites representing <1% of the mapped area within the LSA_{ECO} by ecosite groupings for display in figures. This version of the Baseline Report presents the proportion and distribution of ecosites where mapping has been completed.

See Appendix A, Chapter 1 for data quality scoring.

3.2 Study Design and Survey Site Selection

Zoetica selected refined ecosite polygons for field-verification of ecosites based on land access, either through publicly accessible land or private land with agreements to allow fieldwork (see **Figure B-1**a-f). There was not sufficient land access to randomize the polygons, so all accessible polygons of a suitable size were selected. TEM standards (RIC 1998) guidance recommends that survey intensity be set based on both considerations of the size of the study area and necessity for accuracy in various areas. Typically, the size of the LSA_{ECO} at a survey intensity level 2 would require visitation of 51-75% of polygons with a ratio of 1:17:90 for full, ground, and visual plots, respectively. However, in 2022 access to survey sites was limited to public areas and private land with landowner permission. Within the accessible parcels, Zoetica planned for visits to 100% of polygons for most ecosite types. One ecosite (SWT-Ho2) was overrepresented in the LSA_{ECO} compared to the AOI (0 polygons in the AOI and 72 in the LSA_{ECO}), so only 10 polygons of this ecosite in the LSA_{ECO} were selected for survey. The final number of polygons selected for survey was 538 plots (25% of polygons in the LSA_{ECO}), at a ratio of 9:11:80 full:ground:visual plots (see **Figure B-1**a-f for distribution of full:ground:visual plots). However, field crews were not able to visit all plots planned for survey in 2022 (see **Table 3-1**). Survey intensity may be improved and brought closer to TEM standards in future years, should the SON-South Bruce siting area be selected for the Project and as more sites may become accessible for surveys through land access permits. Of the polygons selected, a total of 102 plots were in the AOI, 20 were in the LSA_{TER} outside of the AOI, and the remaining 416 were outside the LSA_{TER} but within in the LSA_{ECO}. Appendix A, the *Standard Operating Procedure for Terrestrial Ecosystem Mapping and Identification of Significant Wildlife Habitat – Southwestern Ontario Site* (TEM and SWH SOP) in the 2022 BPD Report (Zoetica 2022) depicts the location of plots planned for TEM surveys. Zoetica recommends that, in future years of study following site selection, all potentially affected plots within the AOI be surveyed, and 15 – 24% of the RSA_{ECO} be randomly surveyed at a ratio of 5:20:75 full:ground:visual plots.

3.3 Field Survey Methods

3.3.1.1 Survey Timing

TEM field work is generally conducted in July or August when vegetation is the most visible. RIC standards recommend considering local conditions when determining the optimal survey window for vegetation identification (RIC 1998). Based on these considerations, field crews conducted 2022 TEM field work between July 18 and September 29. Field crews completed as much of the field program as possible within the planned timing window.

3.3.1.2 Field Crew

Field survey crews for TEM consisted of two to four team members, with the most crews consisting of three. Field crews were required to have enough staff to cover the following roles: experienced ecosystem biologist (terrestrial vegetation specialist), experienced soil specialist, and wildlife biologist. Some modifications to this arrangement were acceptable if the skillset of the field crew covered all necessary requirements for TEM mapping and identification of Significant Wildlife Habitat (SWH; for further details see the 2022 BPD Report (Zoetica 2022)).

3.3.1.3 Field Protocol and Data Recording

Field-based TEM data collection was conducted by field staff from Tulloch Engineering Inc. (Tulloch) and their subconsultants (North South Environmental, Natural Resource Solutions Inc., SLR Consulting and Stantec) using methods outlined in the TEM and SWH SOP in the 2022 BPD Report; (Zoetica 2022). These

methods primarily followed those outlined in the *Field Manual for Describing Terrestrial Ecosystems 2nd Edition* (BC MRF and BC MOE 2010) and included details on plot size and placement, terrain classification, structural stage identification, wildlife habitat attributes, coarse woody debris, and unique features. This manual was adapted using Ontario specific guidelines. For example, for soil classification, field crews followed the *Field Guide to the Substrates of Ontario* (OMNR 2015). Field staff were provided training consisting of one classroom day to review the TEM and SWH protocols and two field days to go over methods detailed in the TEM and SWH SOP and to answer questions from the field crews. Digital form testing was also conducted during field training days. In addition to field training, five audits were conducted (two of which were in the field) by Tulloch to determine quality control of ecosite classifications determined by field staff. Bi-weekly meetings between Tulloch and Zoetica were conducted to monitor field data collection progress. A brief summary of field methods is included below, with more details found in Appendix A (TEM and SWH SOP) of the 2022 BPD Report (Zoetica 2022).

As outlined in RIC (RIC 1998), there are three survey types (full, ground, and visual) with varying levels of detail required. This system allows for highly detailed information to be collected at fewer "full" plots per ecosite and with a larger number of "ground" or "visual" plots used to confirm the desk-based ecosite classification quickly, to increase the overall accuracy of ELC maps. For vegetation surveys within full plots, field crews recorded all observed vegetation within a 400 m^2 plot, completing two transects within the plot to record coarse woody debris, and recording all trees within the plot and noting attributes for wildlife. For ground plots, field crews recorded only the dominant and indicator vegetation species. For visual plots, field crews only confirmed the ecosite code, and did not record any vegetation information. Incidental identification of SWH was completed at all survey types (see Appendix C, Chapter 1).

For soil descriptions at full plots, field crews recorded details on site topography and completed a general soil profile by auguring. At ground plots, crews recorded the site topography details, with reduced details for the soil profile (see 2022 BPD Report; (Zoetica 2022)). At visual plots, field crews only confirmed the ecosite code, and did not record any site topography or soil information.

3.4 Data Analysis

Zoetica used desk-based maps provided by SUMAC as a starting place to plan fieldwork (see Section 3.1). Data are summarized by the amount and proportion of each ecosite within each study area, and ecosite groupings are mapped to understand patterns on the landscape (see **Appendix B**). **Table 3-1** summarizes the total number of sites planned for field work after considering access and downgrading certain full and ground plots to visual plots. Vegetation attributes for ecosite classification could not always be determined because SWOOP 2020 imagery was taken in the leaf-off season and in those cases, plots were downgraded to visual. After the first season of field work in 2022, Zoetica updated desk-based maps by joining the fieldwork results with the desk-based ecosite mapping based on the polygon ID. Polygons within which fieldwork was completed were updated to the ecosite determined in the field. Data were re-summarized and mapped, with results reported in Section 4.0. Due to the differences in habitat distribution on the landscape between the portion of the LSA_{ECO} north of the AOI and the portion of the LSA_{ECO} south of the AOI (see Section 3.0, Chapter 1), further analyses focused on the LSA_{ECO} subdivided into portions north and south of the AOI. Habitat variables (e.g., soil, vegetation), habitat information (e.g., coarse woody debris, tree attributes) and forest health data are summarized and mapped where relevant.

Table 3-1. Number of planned sites for fieldwork and actual number of sites surveyed within each survey category.

Survey Type	Planned Fieldwork Locations					Actual Fieldwork Locations					Percent Completed
	AOI	LSA_{TER}	North LSA_{ECO}	South LSA_{ECO}	Total	AOI	LSA_{TER}	North LSA_{ECO}	South LSA_{ECO}	Total	
Full	5	-	32	13	*50*	1	-	28	4	*33*	66%
Ground	13	2	33	11	*59*	10	2	31	9	*52*	88%
Visual	84	18	251	76	*429*	79	18	225	67	*389*	91%
Total	*102*	*20*	*316*	*100*	*538*	*90*	*20*	*284*	*80*	*474*	88%

For the vegetation layers, Zoetica summarized the number of sites, including: the presence of each species in any layer; the number of veteran trees of each species (tree species in the A layer only); the number of sites where each species occurs as trace only; the number of sites where each species occurs as more than trace amounts; the number of sites where each species occurs within a layer or sublayer; the median percent composition of each species for sites where present; and the maximum percent composition for each species. Zoetica also calculated the number of sites including A- or B- sublayers, veteran trees, and C-, D-, and E-layers by location (in this case, the AOI and LSA_{TER} were grouped together, LSA_{ECO} north of the AOI, and LSA_{ECO} south of the AOI). Lastly, Zoetica calculated the number of sites with overall percent cover of a layer falling into bins of 0%, 1-25%, 26-50%, 51-75%, 76-99%, and 100%.

Coarse woody debris (CWD) recorded along transects and piles of CWD within each plot were summarized by site ID. For sites with reported CWD on transects, Zoetica calculated the number of pieces of CWD, number of CWD pieces with species identified, number of the pieces in each decay class, and the minimum, mean, standard error, and maximum diameter and length of pieces. For sites with reported CWD piles, Zoetica calculated the number of piles, number of piles within each category of size of interstitial spaces, and the minimum, mean, standard error, and maximum average diameter of pieces in the pile and for pile dimensions (length, width, height).

For tree attributes, Zoetica summarized data by site ID and reported the number of trees, number of trees of known species, number of trees that were standing, total number of cavities, number of trees showing evidence of wildlife use or that could be used by wildlife, and the minimum diameter at breast height (DBH) used to select trees at the site. Zoetica also calculated the minimum, mean, standard error, and maximum reported values for each site for DBH, percent of remaining bark, tree height, height to live crown, and cavities per tree. For categorical variables of crown class, crown condition, appearance rank, bark retention, wood condition, and lichen loading, Zoetica reported the number of trees at each site assigned to the different levels within a category. For each type of wildlife user and use (i.e., bird species perching, bird species feeding), Zoetica calculated the number of trees at each site.

For forest health, Zoetica counted the number of sites and calculated the proportion of sites ranked as good, fair, or poor for each location (in AOI and LSA_{TER} combined, LSA_{ECO} north of the AOI, and LSA_{ECO} south of the AOI). Zoetica determined the count and proportion of sites in each location and ranking category and reasons for the ranking (i.e., fair – 10-25% trees have severe canopy decline; poor – >25% trees have severe canopy decline).

For site disturbances, Zoetica reported the number and proportion of sites by location (AOI, LSA_{TER}, LSA_{ECO} north of the AOI, and LSA_{ECO} south of the AOI) with evidence for each disturbance type. Zoetica also

prepared an overall table including the evidence, intensity, and extent rankings for each site and disturbance type.

All calculations were performed in R (version 4.2.3). Data were formatted in Excel.

4.0 RESULTS

4.1 Ecosite Classification

Desk-based ecosite mapping prior to field verification is summarized in **Table C-1** and **Figure C-1** in **Appendix C**. Field verification commenced in June of 2022 to refine desk-based mapped ecosites based on attributes, such as soil and vegetation properties, that are difficult to interpret from aerial imagery alone. Thus, field verification was expected to refine ecosite mapping. In 2022, field crews conducted verification surveys of dominant ecosites within 474 polygons. Ecosite mapping with updates from field-verified sites is summarized in **Table C-2**. Ecosites that changed following field verification surveys are presented in **Figure C-2**, and the updated ecosite mapping is presented in **Figure C-3**. The updated mapping in **Figure C-3** only includes field-based updates, as ecosites were not updated with new desk-based information in 2023. Additional field verification is planned for the summer of 2024 to fill any data gaps identified after analyzing the data collected in 2022. Once additional field verifications and analyses of field-verified ecosite data are complete, Zoetica will include a refined ELC mapping in future iterations of the BIS Baseline Report. These updates will account for patterns in soil and vegetation attributes across the landscape observed in the field-collected data relative to desk-based mapping. Refined maps are intended to be more accurate, and may be informative for better predicting nearby polygons that have not been ground-truthed (depending on strength of patterns).

4.1.1 Comparison of Desk-based vs Field-verified Ecosites

Of the ecosite polygons surveyed during the 2022 field season (474), many (347; 73%) desk-based ecosites were reclassified or refined during field-verification (**Figure 4-1**). Of all 474 surveyed polygons, 16% changed to different habitat types (e.g., swamp, marsh, treed, thicket, meadow), 57% had less substantial changes within habitat types (e.g., Organic Hardwood Swamp to Maple Organic Hardwood Swamp) and 27% did not change. Within ecosites that were reclassified by habitat type, approximately 56% were changes from treed or marsh to swamp (52% and 4%, respectively) with smaller proportions (2 – 10%) changing to other habitat types (see **Figure C-4**). A change from treed to swamp habitat occurred primarily within and surrounding the Greenock Swamp Wetland Complex[3] (GSWC). A more detailed breakdown of ecosite changes is presented in **Table C-3**. The greatest change from treed to swamp ecosites occurred in hardwood ecosites derived from desk-based mapping. Of treed hardwood ecosites derived from desk-based mapping, 23% changed to hardwood swamp (22%) or mixedwood swamp (1%). Approximately 12% of conifer ecosites and 14% of mixedwood ecosites derived using desk-based mapping were changed to swamp ecosites. For wetland ecosites derived from desk-based mapping, the largest change to upland ecosites was 15% of field-verified marsh ecosites being reclassified as meadows. Similarly, 12% of shrub swamp ecosites and 8% of conifer swamp ecosites derived using desk-based mapping were reclassified as upland shrub and upland conifer, respectively. Smaller amounts of mixedwood swamp derived from desk-based mapping were reclassified as upland mixedwood (3%) or hardwood (2%). Ecosites were reclassified for several reasons, of which the predominant factors are discussed below (Sections 4.1.1.1 to 4.1.1.3).

[3] For delineations of the Wetland Complexes, see Figure D-2 in Chapter 3 of the 2023 BIS Baseline Report.

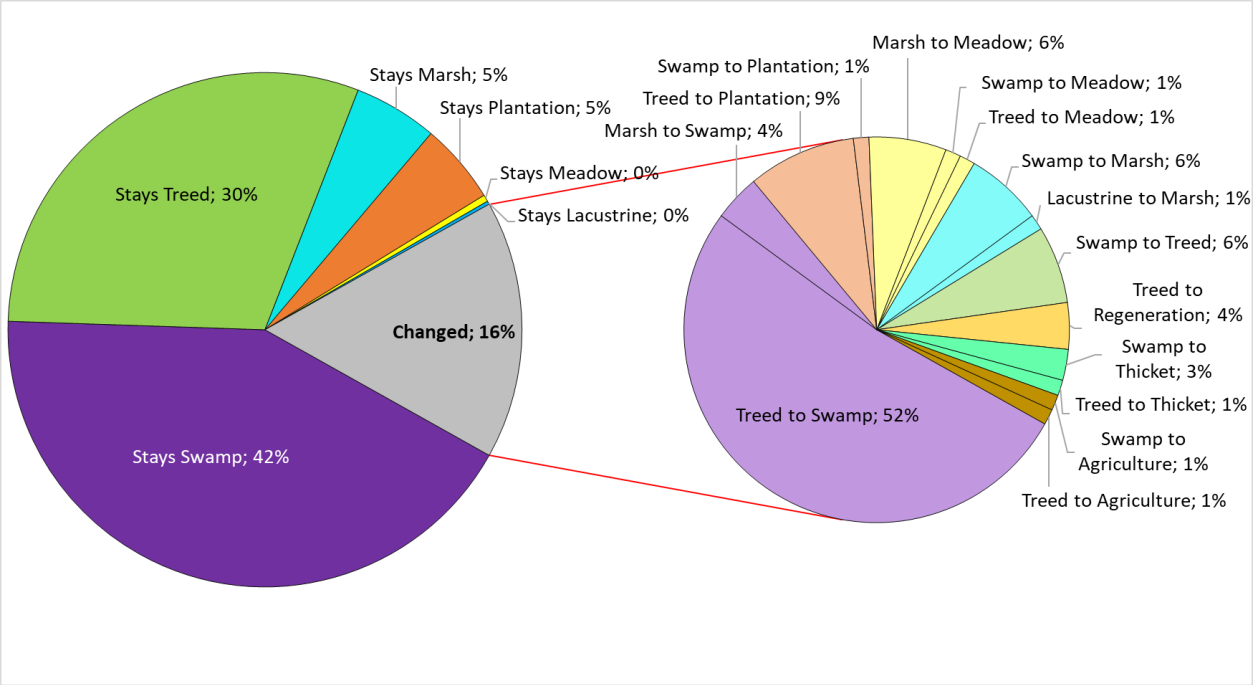


Figure 4-1. Proportions of ecosite types and ecosite type changes during TEM field studies. The pie chart on the left displays all 474 ecosites that were surveyed in 2022. The pie chart on the right displays only those 16% of ecosites that changed habitat type.

4.1.1.1 Refinement of Ecosites to Finer Categorizations

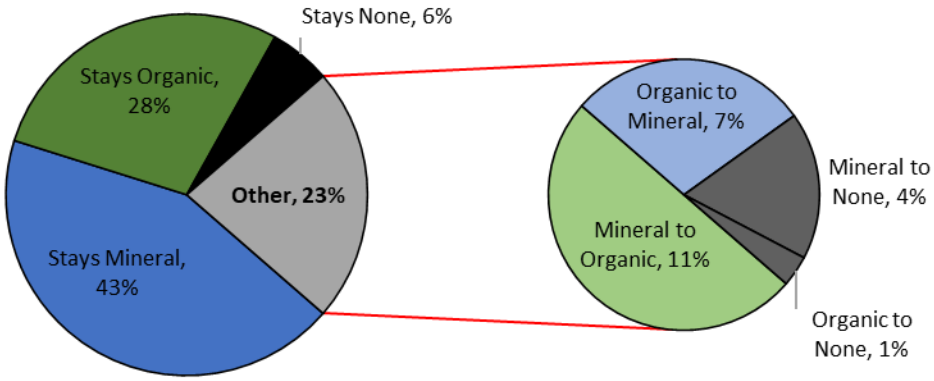
SUMAC conducted desk-based ecosite mapping using the SWOOP 2020 imagery (see Section 3.1) that was captured during early spring leaf-off conditions. Without leaves, it was often not possible to determine the dominant hardwood tree species in a polygon based on aerial imagery alone, and so many polygons were categorized into ecosites without specific vegetation information (e.g., Moist Coarse Mineral Conifer Treed). Thus, it was expected that field verification would involve refining ecosite categorizations based on tree species observed within field plots. Field crews verified ecosite ID at plots in a subsection of ecosite polygons during the leaf-on season when they were able to determine the dominant tree species in the plots and refine the ecosite accordingly. As a result, 29% of original ecosites (or 50% of changed ecosites) were refined to a finer ecosite category based on the dominant tree species in the plot. In total, 36 finer ecosite classifications (using dominant tree species) were delineated that were not possible to map during desk-based ecosite mapping using leaf-off imagery. Future field verification in the AOI and LSA_{ECO} (especially in the LSA_{ECO} south of the AOI) may result in additional ecosites that were not mapped via aerial interpretation alone. Once field verification is completed, soil and vegetation attributes will be used to update desk-based mapping of polygons that were not field-verified based on patterns of these attributes on the landscape.

4.1.1.2 Soil Properties

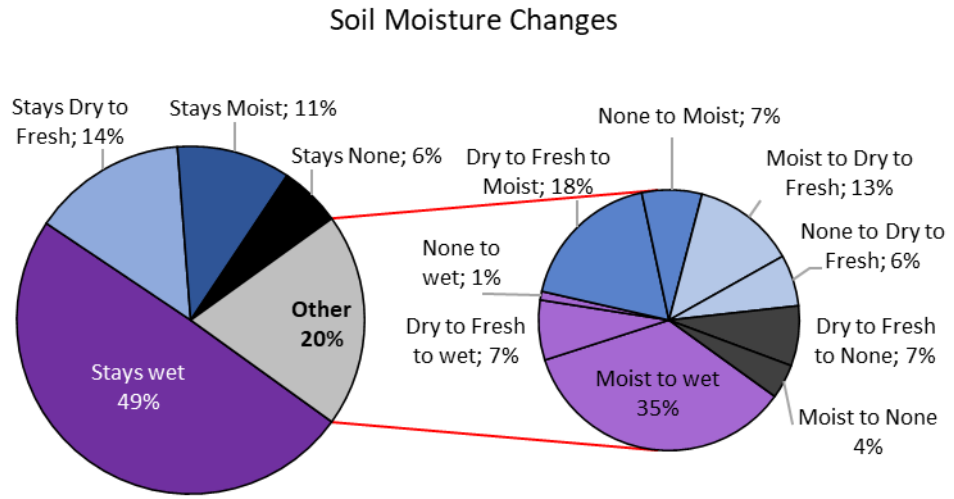
During desk-based ecosite mapping, SUMAC was not always able to determine soil conditions (soil type, texture, and moisture) from the aerial imagery used to delineate ecosite polygons. In the GLSE ecosite classification system, soil properties are one of the primary factors for defining ecosite types. Changes in

soil properties between desk-based ELC mapping and field-verified ELC classification result in larger changes in ecosite classification than in the refinement of ecosites discussed above (Section 4.1.1.1). For example, soil type and moisture can drive differences in whether an ecosite is considered an upland or wetland ecosite type, as wet mineral or organic soils often define wetlands. Approximately 23% of polygons had a change in soil type between the desk-based ELC classification and the ground-truthed classification with the most common change (50% of soil type changes) being from mineral to organic soils (**Figure 4-2**a; see Section 4.2.1.1 for further detail). Approximately 20% of polygons changed in soil moisture between desk-based and ground-truthed ELC classification (**Figure 4-2**b), with approximately 43% changing from dry or moist soils to wet soils typically found in wetlands. Approximately 24% of polygons changed in soil texture between the desk-based ELC classification and the ground-truthed classification (**Figure 4-2**c), with most changing to fine texture or no texture (note: for some wetland ecosites, e.g. those with organic soils, soil texture is not defined in the GLSE).

a)



b)



c)

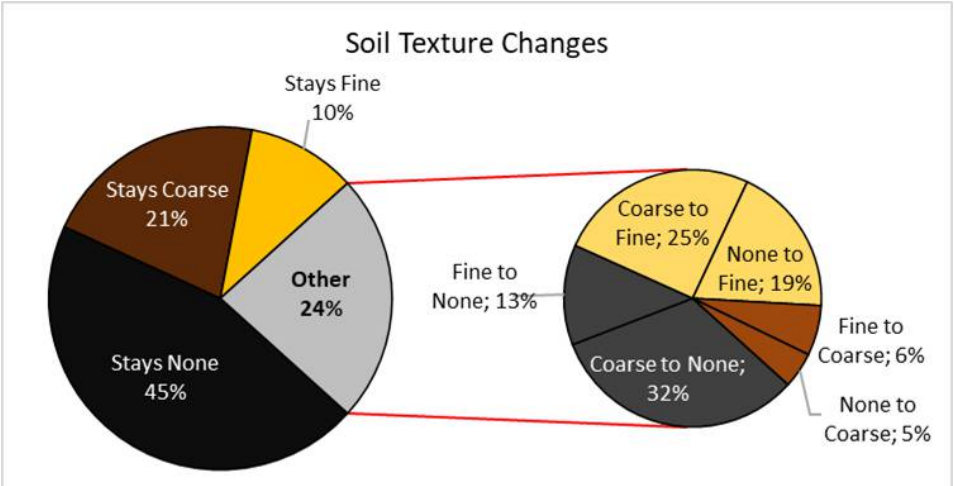


Figure 4-2. Changes in soil a) type, b) moisture, and c) texture from desk- to field-based data at surveyed plots. In each row, the pie chart on the left includes all field-assessed ecosites (*n* = 474), and the chart on the right includes only those that changed in the given soil property.

4.1.1.3 Vegetation Properties

Approximately 19% of ecosite changes (86 polygons) resulted from changes in vegetation type (conifer, hardwood, mixedwood, or none; **Figure 4-3**). Of these changes, 48% changed from mixedwood to hardwood (41 polygons) and another 2% each (2 polygons each) changed from conifer or no vegetation type to hardwood. Approximately 24% of the changes in vegetation type were from either conifer or hardwood to mixedwood (20 polygons), 12% from mixedwood to conifer (10 polygons), and 12% from hardwood or mixedwood to no vegetation type (11 polygons).

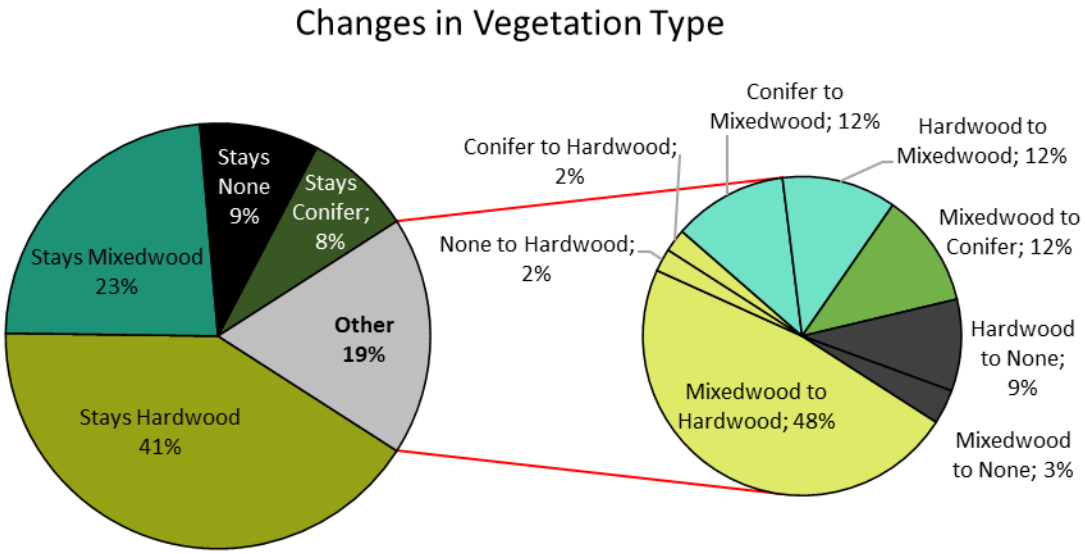


Figure 4-3. Changes in vegetation type at surveyed plots. The pie chart on the left includes all field-assessed ecosites (*n* = 474), and the chart on the right includes only those that changed vegetation type.

In addition to vegetation type changes, 59% of mapped polygons (278 polygons) changed ecosite naming due to changes in the type of vegetation or dominant tree species. Of these changes, 66% (184 polygons) were a result of refining the ecosite name by adding a tree species, with the majority (121 polygons) being maple species (e.g., sugar maple, silver maple, Freeman's maple). Five percent of changes (13 polygons) were refinements within the same genus (e.g., maple to sugar maple) and 10% of changes (27 polygons) were from an ecosite code including a species name (in desk-based mapping) to a more generic ecosite code (without species in the name). True changes among genera (e.g., white cedar to sugar maple) occurred in 11% (54 polygons) of polygons surveyed in the field. Again, in many cases tree species were not discernable during desk-based mapping due to the SWOOP imagery being collected during the leaf-off season.

Desk-based mapping was conducted only in areas within the LSA_{ECO} that were considered natural or naturalized areas. During field verification surveys, several polygons were reclassified as open agricultural areas (fields; **Table C-2**) which are not considered natural or naturalized lands but may still provide some habitat for wildlife. For example, spring flooded fields may provide stopover habitat for waterfowl and geese. Fields may also provide ecosystem services (e.g., water absorption), and so polygons reclassified as fields were included in subsequent mapping and analyses.

4.1.2 Predominant Ecosite Types

Zoetica grouped ecosites according to major categories (upland forest, wetland, plantation, shrub, meadow, field, or aquatic) and then divided them into finer groupings within these categories (e.g., wetlands grouped into conifer swamp, hardwood swamp, mixedwood swamp, shrub swamp, marsh, and fen; see **Table C-2**; **Table 4-1**; **Figure 4-4**). Ecosite groupings were mapped in the AOI, LSA_{TER}, and LSA_{ECO} (see **Figure C-3**). Distributions of these ecosite types for upland forest and wetland habitat are described in the sub-sections below and shown in **Figure C-3**, **Figure 4-5**, and **Figure 4-6**.

Within the mapped areas[4] of the AOI and LSA_{TER}, hardwood upland forests comprised the largest ecosite type covering approximately 33.2% and 34.4% of the mapped area within these study areas, respectively. Within the AOI, mixedwood upland forest ecosites were the next most dominant ecosite, followed by wetland habitat types. In the LSA_{TER}, mixedwood upland forest and hardwood swamp were the second most dominant ecosites. Within both the AOI and the LSA_{TER}, wetland ecosites comprised approximately 36% of the mapped area, both of which were 11.2 – 12.15% hardwood swamp. A similar portion of marsh habitat was mapped within the AOI (8.84%) relative to the LSA_{TER} (8.5%; **Table 4-1**; **Figure 4-4**). In addition, the LSA_{TER} contained the highest amount of fen habitat (1.1%), which was rare on the landscape (**Table 4-1**; **Figure 4-4**). There was no fen habitat within the AOI (see **Figure C-3** and **Figure 4-6**).

Within the mapped area of the LSA_{ECO}, the dominant ecosite grouping was wetlands (61.8%), with hardwood swamp comprising 39.6% of the mapped area within this study area. There was a much higher proportion of wetland ecosites in the LSA_{ECO} relative to the AOI and LSA_{TER} (**Figure 4-4**). Most of the hardwood swamps in the LSA_{ECO} were within the GSWC, north of the AOI (**Figure 4-6a** and **c**), where the landscape consists of more consolidated wetlands relative to the rest of the LSA_{ECO}. Hardwood upland forest was the next most dominant ecosite subgrouping within the $LSA_{ECO,}$ comprising 22.5% of the mapped area within this study area.

Other ecosite groupings in much smaller proportions within the natural and naturalized areas of the study areas were plantation, meadow, shrub, and polygons that accounted for watercourses and waterbodies. These ecosite groupings made up 0.1 – 4.3% of each study area with higher proportions mapped in the AOI relative to the LSA_{TER} and LSA_{ECO} (**Table 4-1**; **Figure 4-4** and **Figure C-3**). In addition, several polygons originally classified as natural or naturalized ecosites were reclassified as agricultural fields during field verification surveys.

[4] Mapped areas include natural and naturalized habitats and exclude human modified areas.

Table 4-1. Summary within the natural and naturalized areas of the AOI, LSA_{TER}, and LSA_{ECO} by ecosite grouping.

Study Area[1]	AOI			LSA_{TER}			LSA_{ECO}		
Mapped Area (ha)	643.78			1,272.25			12,696.68		
Total Study Area (ha)	1,827.41			3,840.21			27,879.50		
Ecosite Group	**Area (ha)**	**Percent Mapped Area**	**Percent Total**	**Area (ha)**	**Percent Mapped Area**	**Percent Total**	**Area (ha)**	**Percent Mapped Area**	**Percent Total**
Upland Forest - Hardwood	213.98	33.24%	11.71%	438.17	34.44%	11.41%	2853.17	22.47%	10.23%
Upland Forest - Mixedwood	89.50	13.90%	4.90%	152.96	12.02%	3.98%	917.72	7.23%	3.29%
Upland Forest - Conifer	39.49	6.13%	2.16%	87.60	6.89%	2.28%	524.17	4.13%	1.88%
Plantation	22.43	3.48%	1.23%	55.19	4.34%	1.44%	136.08	1.07%	0.49%
Wetland – Hardwood Swamp	72.11	11.20%	3.95%	154.54	12.15%	4.02%	5022.63	39.56%	18.02%
Wetland – Mixedwood Swamp	55.65	8.64%	3.05%	120.82	9.50%	3.15%	1927.29	15.18%	6.91%
Wetland – Conifer Swamp	26.27	4.08%	1.44%	56.18	4.42%	1.46%	239.25	1.88%	0.86%
Wetland – Shrub Swamp	20.23	3.14%	1.11%	22.97	1.81%	0.60%	245.49	1.93%	0.88%
Wetland – Marsh	56.91	8.84%	3.11%	108.19	8.50%	2.82%	388.16	3.06%	1.39%
Wetland – Fen	-	-	-	13.81	1.09%	0.36%	17.90	0.14%	0.06%
Shrub	2.03	0.32%	0.11%	2.03	0.16%	0.05%	7.91	0.06%	0.03%
Meadow	24.04	3.73%	1.32%	29.91	2.35%	0.78%	164.75	1.30%	0.59%
Field	-	-	-	-	-	-	7.21	0.06%	0.03%
Aquatic – Water	21.15	3.28%	1.16%	29.88	2.35%	0.78%	244.95	1.93%	0.88%
Total Area (ha)	***643.78***	***100%***	***35%***	***1,272.25***	***100%***	***33%***	***12,696.68***	***100%***	***46%***

Notes:
1. For the purposes of this table, the indicated study area includes overlap with other study areas that may be encompassed within its boundaries.

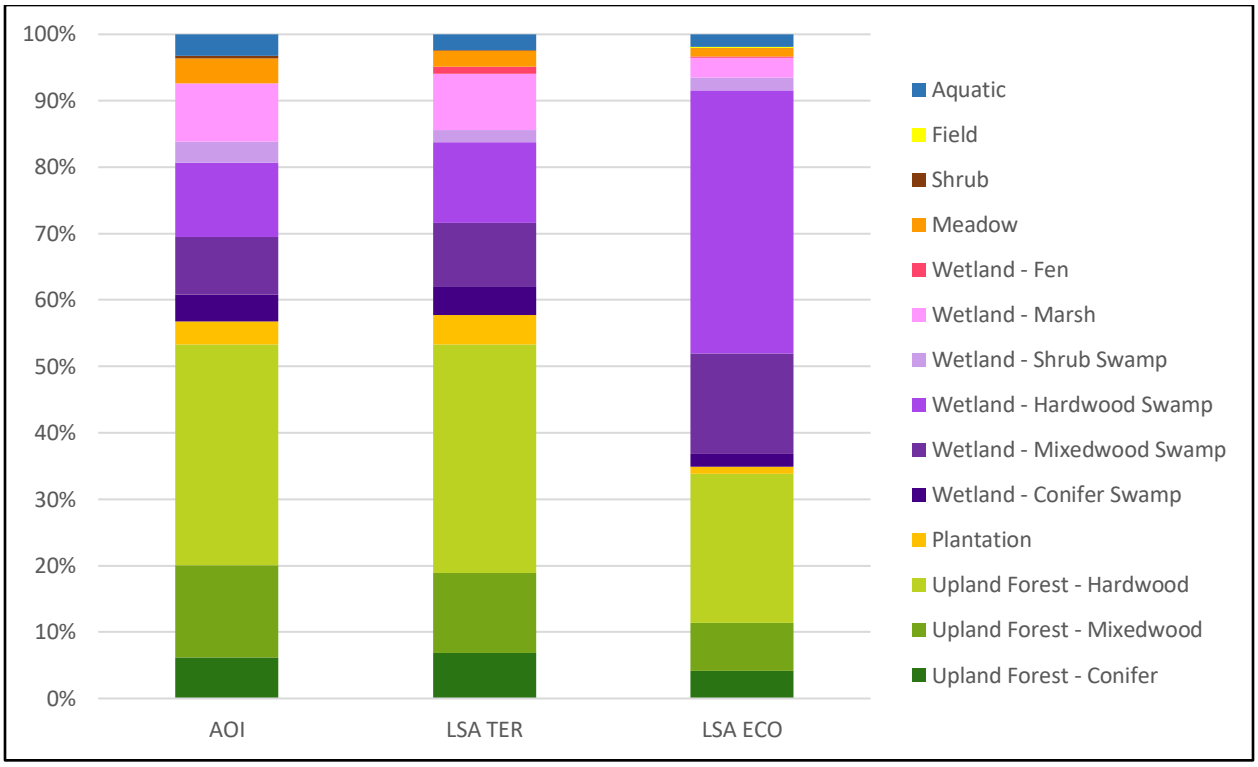


Figure 4-4. Proportions of ecosite grouping within the AOI, LSA_{TER}, and LSA_{ECO}.

4.1.2.1 Upland Forest

Hardwood Ecosites: Hardwood ecosites dominated all study areas and made up over half of upland forest in the AOI, LSA_{TER}, and LSA_{ECO} (**Table 4-2**; **Figure 4-5**). Dry to Fresh Coarse Mineral Hardwood Treed (TRT-HNd1) was the dominant hardwood ecosite, constituting approximately 17-25% of upland forest in the AOI, LSA_{TER}, and LSA_{ECO} (**Table 4-2**; **Figure 4-5**). Other hardwood ecosites that make up at least 1% of the total mapped area in each study area are Moist Fine Mineral Hardwood Treed (TRT-HNf11), Dry to Fresh Sugar Maple Coarse Mineral Hardwood Treed (TRT-HNd3), Moist Coarse Mineral Hardwood Treed (TRT-HNf1), Dry to Fresh Fine Mineral Hardwood Treed (TRT-HNd8), Dry to Fresh Sugar Maple Fine Mineral Hardwood Treed (TRT-HNd10), and Moist Sugar Maple Coarse Mineral Hardwood Treed (TRT-HNf8). However, proportions of these ecosites vary by study area (**Table C-2**).

Within the AOI, mapped hardwood ecosites occurred in patches throughout the study area (**Figure C-4**a). In the LSA_{TER}, outside of the AOI, hardwood ecosites were primarily located in the southern portion of the study area with small patches on the east and west sides of the study area (**Figure C-4a**). Hardwood ecosites in the LSA_{ECO} were located primarily along the eastern and western sides of the GSWC (**Figure C-4b**). In the LSA_{ECO} south of the AOI, small patches of hardwood ecosites were scattered throughout the study area (**Figure C-4c**). Hardwood ecosites in the AOI and the LSA_{ECO} south of the AOI tend to occur in horizontal bands running in a west-east direction and occur between the road allowances (**Figure C-4c**).

Mixedwood Ecosites: Mixedwood ecosites were the second-most dominant upland ecosite category, comprising approximately 20-25% of upland forest in the AOI, LSA_{TER}, and LSA_{ECO} (**Table 4-2**; **Figure 4-5**). In the AOI, Dry to Fresh White Cedar Coarse Mineral Mixedwood Treed (TRT-MNd5) was the dominant

mixedwood ecosite followed by Moist White Cedar Course Mineral Mixedwood Treed (TRT-MNf3) (**Table 4-2**; **Figure 4-5**). In the LSA_{TER}, Dry to Fresh White Cedar Coarse Mineral Mixedwood Treed (TRT-MNd5) and Dry to Fresh Coarse Mineral Mixedwood Treed (TRT-MNd1) were the dominant mixedwood ecosites (**Table 4-2**; **Figure 4-5**). Moist White Cedar Coarse Mineral Mixedwood Treed (TRT-MNf3) was the dominant mixedwood ecosite in the LSA_{ECO}. Other mixedwood ecosites that make up at least 1% of the total mapped area in the AOI, LSA_{TER}, or LSA_{ECO} are Moist Coarse Mineral Mixedwood Treed (TRT-MNf1), Dry to Fresh White Pine +/Red Pine Coarse Mineral Mixedwood Treed (TRT-MNd3) and Moist Hemlock Coarse Mineral Mixedwood Treed (TRT-MNf2) constituting various proportions of upland forest within each study area (**Table C-2**).

Mixedwood ecosites were scattered in patches throughout the AOI and the LSA_{TER} (**Figure C-4a**). Within the LSA_{ECO}, mixedwood ecosites were primarily in the southern portion within the Teeswater Wetland Complex[3] (TWC) and the Wingham Wetland Complex[3] (WWC) with smaller patches located primarily on the periphery of the GSWC (**Figure C-4b** and **c**). A few small patches of mixedwood ecosites were located in the northcentral portion of the GSWC (**Figure C-4c**).

Conifer Ecosites: Conifer ecosites were the third most dominant upland ecosite category, making up approximately 10-12% of upland forest in the AOI, LSA_{TER}, and LSA_{ECO} (**Table 4-2**; **Figure 4-5**). Naturalized Pine Conifer Treed Plantation (TRT-CZ1) is the dominant ecosite in the AOI, LSA_{TER}, and LSA_{ECO}. Other conifer ecosites comprising at least 1% of the total area mapped were Dry to Fresh White Cedar Coarse Mineral Conifer Treed (TRT-CNd4), and Dry to Fresh White Pine +/ Red Pine Coarse Mineral Conifer Treed (TRT-CNd3) in the AOI and LSA_{TER} (**Table 4-2**; **Figure 4-5**).

In the AOI, small patches of conifer ecosites were located primarily on the western side with smaller amounts of conifer ecosites on the north and south edges of the AOI and a small patch within the eastern central side (**Figure C-4**a). Within the LSA_{TER}, conifer ecosites were primarily located in the southern portion of the study area adjacent to the Teeswater River, with small amounts in the northern portion of the study area (**Figure C-4**a). Conifer ecosites in the LSA_{ECO} were primarily in the southern portion of the study area within the TWC and WWC with small patches on the eastern side of GSWC north of the AOI (**Figure C-4b** and **c**).

Shrub Ecosites: Shrub ecosites comprise a small proportion (< 1%) of upland ecosites within the BIS study areas. Shrub ecosites were mapped in three small polygons: one in the central AOI along the Teeswater River (**Figure C-4a**), one along Alps Creek in the LSA_{ECO} south of the AOI (**Figure C-4b**), and one south of Cunningham Lake in the LSA_{ECO} north of the AOI (**Figure C-4c**).

Meadow Ecosites: Meadow ecosites comprise a small proportion (3-7%) of upland ecosites within the BIS study areas. Meadow ecosites were scattered in small patches within the AOI and the LSA_{TER} (**Figure C-4a**), and in the LSA_{ECO}, were primarily located in small patches in the southern portion of the LSA_{ECO} and on the west side of the GSWC (**Figure C-4b** and **c**).

Plantation Ecosites: Plantation ecosites are considered anthropogenic as they are not natural or naturalized and have active and ongoing site alterations (e.g., harrowing, tending, thinning, vegetation management) to maintain ideal growing conditions for trees. Some plantations have become naturalized and are included in the conifer and mixedwood ecosite types.

Plantation ecosites comprised 3-8% of upland forest in the AOI, LSA_{TER}, and LSA_{ECO} (**Table 4-2**; **Figure 4-5**). Conifer plantation (AGW-2) was the only type of plantation ecosite within the AOI. In the LSA_{TER} and LSA_{ECO}, conifer plantation was the dominant plantation type, but mixedwood plantation (AGW-3) also occurred in smaller amounts (**Table C-2**). In the AOI and LSA_{TER}, plantation ecosites were scattered in small polygons across the study area (**Figure C-4a**). In the LSA_{ECO}, there were a small number of plantation ecosite polygons along the perimeter of the GSWC in the northern portion of the LSA_{ECO} and on the western side of the southern LSA_{ECO} (**Figure C-4b** and **c**).

Table 4-2. Percent of each Upland Forest Ecosite of total Upland Forest Ecosite Types within the BIS Study Areas.

Upland Forest Grouping	Upland Forest Ecosite	AOI		LSA_{TER}		LSA_{ECO}	
		Area (ha)	% Upland Forest	Area (ha)	% Upland Forest	Area (ha)	% Upland Forest
Conifer	TRT-CZ1: Naturalized Pine Conifer Treed Plantation	21.88	6.0	39.88	5.4	288.72	6.5
Conifer	TRT-CNd4: Dry to Fresh White Cedar Coarse Mineral Conifer Treed	8.36	2.3	28.04	3.8	80.38	1.8
Conifer	TRT-CNd3: Dry to Fresh White Pine +/ Red Pine Coarse Mineral Conifer Treed	7.19	2.0	7.91	1.1	26.29	0.6
Conifer	**Other Conifer** (Ecosites <1% summed)	2.05	0.6	11.77	1.6	128.78	2.9
Mixedwood	TRT-MNf3: Moist White Cedar Coarse Mineral Mixedwood Treed	13.14	3.6	21.34	2.9	178.31	4.0
Mixedwood	TRT-MNd1: Dry to Fresh Coarse Mineral Mixedwood Treed	8.66	2.4	21.99	3.0	143.20	3.2
Mixedwood	TRT-MNf1: Moist Coarse Mineral Mixedwood Treed	10.13	2.8	14.37	2.0	113.52	2.6
Mixedwood	TRT-MNd5: Dry to Fresh White Cedar Coarse Mineral Mixedwood Treed	23.44	6.4	28.46	3.9	96.97	2.2
Mixedwood	TRT-MNd3: Dry to Fresh White Pine +/ Red Pine Coarse Mineral Mixedwood Treed	3.55	1.0	17.13	2.3	38.52	0.9
Mixedwood	TRT-MNf2: Moist Hemlock Coarse Mineral Mixedwood Treed	11.76	3.2	11.76	1.6	28.62	0.6
Mixedwood	**Other Mixedwood** (Ecosites <1% summed)	18.82	5.1	37.89	5.1	318.59	7.2
Hardwood	TRT-HNd1: Dry to Fresh Coarse Mineral Hardwood Treed	63.00	17.1	186.90	25.5	863.00	19.4
Hardwood	TRT-HNf11: Moist Fine Mineral Hardwood Treed	4.94	1.3	6.78	0.9	406.87	9.2
Hardwood	TRT-HNf1: Moist Coarse Mineral Hardwood Treed	5.02	1.4	22.95	3.1	390.51	8.8
Hardwood	TRT-HNd3: Dry to Fresh Sugar Maple Coarse Mineral Hardwood Treed	77.14	21.0	129.88	17.7	300.65	6.8
Hardwood	TRT-HNd8: Dry to Fresh Fine Mineral Hardwood Treed	0.00	0.0	0.00	0.0	168.55	3.8
Hardwood	TRT-HNd10: Dry to Fresh Sugar Maple Fine Mineral Hardwood Treed	51.89	14.1	64.61	8.8	161.58	3.6
Hardwood	TRT-HNf8: Moist Sugar Maple Coarse Mineral Hardwood Treed	9.06	2.5	9.06	1.2	101.27	2.3
Hardwood	**Other Hardwood** (Ecosites <1% summed)	2.93	0.8	17.99	2.4	460.74	10.4
Shrub	**Other Shrub** (Ecosites <1% summed)	2.03	0.6	2.03	0.3	7.91	0.2
Meadow	MEW-Tk1: Dry to Fresh Coarse Calcareous Treed Meadow	9.88	2.5	10.33	1.3	17.94	0.4
Meadow	**Other Meadow** (Ecosites < 1% summed)	14.16	3.6	19.58	2.6	146.81	3.2
Plantation	AGW-2: Conifer Plantation	22.43	6.1	53.51	7.3	131.10	3.0
Plantation	AGW-3: Mixed Plantation	0.00	0.0	1.68	0.2	4.99	0.1

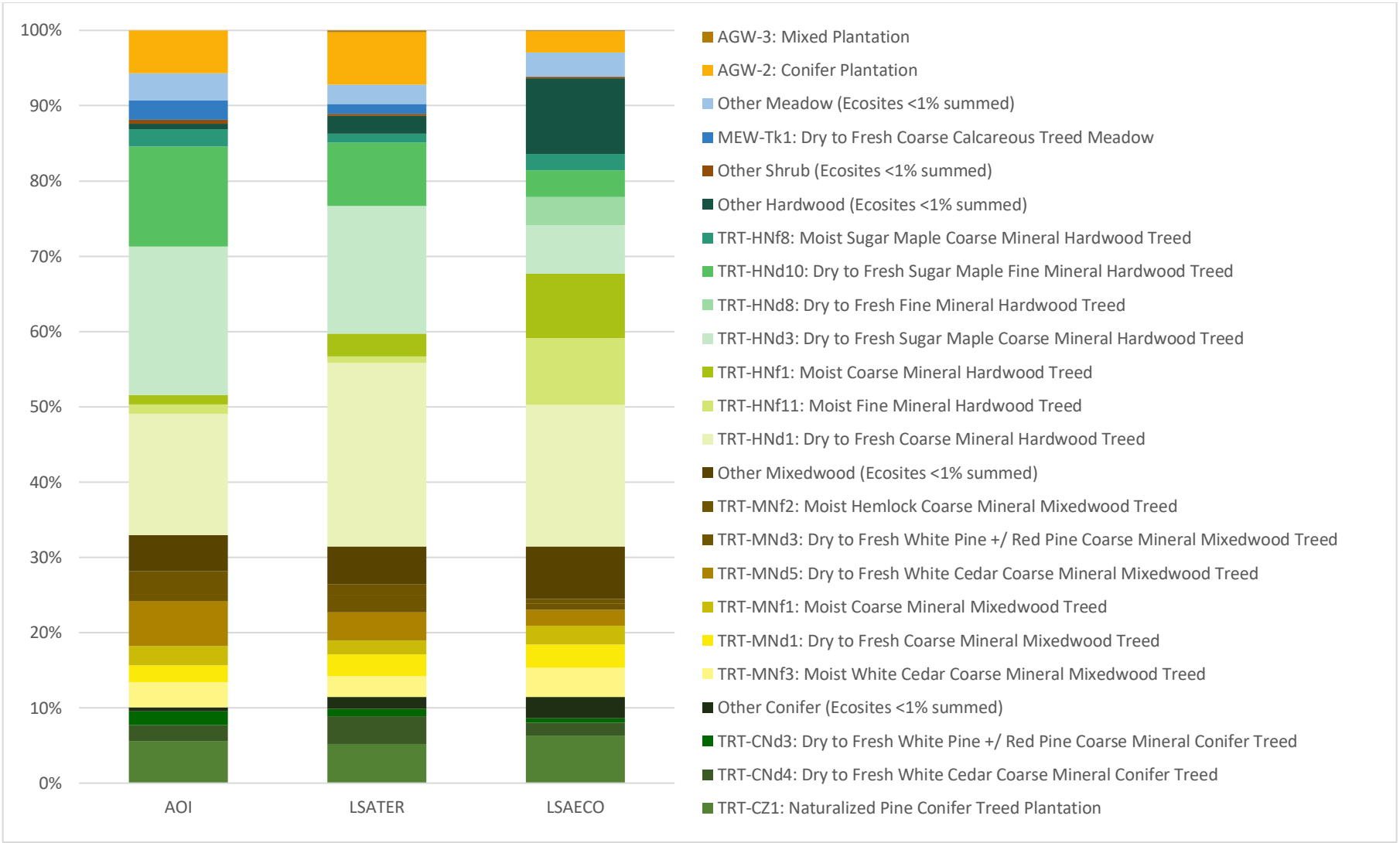


Figure 4-5. Upland forest types as percent of total upland forest within the AOI, LSA_{TER}, and LSA_{ECO}.

4.1.2.2 Wetlands

Swamp Ecosites: Swamp ecosites were prevalent in all study areas comprising over 70% of the wetland ecosites within the mapped areas of the LSA_{ECO}, LSA_{TER}, and AOI, respectively (**Table 4-1**; **Figure 4-6**).

Hardwood Swamp: Hardwood swamp ecosites were the most dominant swamp ecosite among mapped wetlands in the AOI, LSA_{TER}, and LSA_{ECO} (**Table 4-3**; **Figure 4-6**). Maple Organic Hardwood Swamp (SWT-Ho2) was the dominant hardwood swamp ecosite in the AOI and LSA_{ECO}, and the second most dominant in the LSA_{TER} after Organic Hardwood Swamp (SWT-Ho3) (**Table 4-3**; **Figure 4-6**). Other hardwood swamp ecosites that make up at least 1% of the mapped area are Coarse Mineral Hardwood Swamp (SWT-Hm1), Ash Organic Hardwood Swamp (SWT-Ho1), Silver Maple +/Freeman's Maple Fine Mineral Hardwood Swamp (SWT-Hm12), Fine Mineral Hardwood Swamp (SWT-Hm8), and Ash +/ White Elm Fine Mineral Hardwood Swamp (SWT-Hm10) (**Table C-2**).

Hardwood swamp was scattered in patches throughout the AOI and LSA_{TER} (**Figure C-5**a). Within the LSA_{ECO}, larger polygons and consolidated areas of hardwood swamp ecosites were located throughout the GSWC (**Figure C-5**b). In the southern portion of the LSA_{ECO}, smaller patches of hardwood swamp ecosites were located on the western and southern sides (**Figure C-5**c).

Mixedwood Swamp: Mixedwood swamp ecosites were the second most dominant swamp ecosite category, making up approximately 25% of wetlands in the AOI, LSA_{TER}, and LSA_{ECO} (**Table 4-3**; **Figure 4-6**). Mineral Mixedwood Swamp (SWT-Mm6) was the most dominant mixedwood swamp ecosite within the AOI and LSA_{TER}. Organic Mixedwood Swamp (SWT-Mo6) was the dominant mixedwood swamp ecosite in the LSA_{ECO} (**Table 4-3**; **Figure 4-6**). Other mixedwood swamp ecosites that make up at least 1% of the mapped area are White Cedar Organic Mixedwood Swamp (SWT-Mo1), Hemlock +/ Yellow Birch +/ Maple Organic Mixedwood Swamp (SWT-Mo2), White Cedar Mineral Mixedwood Swamp (SWT-Mm1), Maple Organic Mixedwood Swamp (SWT-Mo3), and Hemlock +/ Yellow Birch +/ Maple Mineral Mixedwood Swamp (SWT-Mm2) with varying proportions in the AOI, LSA_{TER}, and LSA_{ECO} (**Table C-2**).

Mixedwood swamp ecosites were scattered in small patches primarily within the northern and western portion of the AOI and LSA_{TER} (**Figure C-5a**). In the LSA_{ECO}, there were larger polygons and consolidated areas of mixedwood swamp ecosites in the central and northern portion of the GWWC (e.g., surrounding, east, and northeast of Cunningham Lake and south of Schmidt Lake; **Figure C-5b**). Smaller patches of mixedwood swamp ecosites were mapped in the southern LSA_{ECO} in the TWC and WWC (**Figure C-5c**).

Conifer Swamp: Conifer swamp ecosites made up 3-12% of wetlands in the AOI, LSA_{TER}, and LSA_{ECO} (**Table 4-3**; **Figure 4-6**). When considering conifer swamp ecosites that make up at least 1% of the total area mapped, White Cedar +/Larch Organic Conifer Swamp (SWT-Co5) comprised the largest conifer swamp ecosite in the AOI, LSA_{TER}, and LSA_{ECO}. White Cedar Organic Conifer Swamp (SWT-Co1) constituted approximately 4% of wetlands within the LSA_{TER} but was present in lower amounts in the AOI or LSA_{ECO} (**Table 4-3**; **Figure 4-6**).

Conifer swamp was scattered in small patches along the Teeswater River and the tributaries of the Teeswater River within the AOI and LSA_{TER} (**Figure C-5a**). Patches of conifer swamp were also located in the northern portion of the LSA_{ECO} (e.g., in the southern end of the GSWC south of Clam Lake and north of Schmidt Lake; **Figure C-5b**). In the southern portion of the LSA_{ECO}, smaller patches of conifer swamp ecosites were located along the watercourses and tributaries of the TWC (**Figure C-5c**).

Shrub Swamp: Shrub swamp ecosites made up 3-9% of wetlands in the AOI, LSA_{TER}, and LSA_{ECO} (**Table 4-3**; **Figure 4-6**). Only one shrub swamp ecosite makes up at least 1% of the total area mapped: Organic Deciduous Thicket Swamp (SST-o1) (**Table C-2**; **Table 4-3**; **Figure 4-6**).

Within the AOI, shrub swamp was identified on the western side of the Teeswater River in the northwest portion of the AOI (**Figure C-5a**). A small patch of shrub swamp also occurs in the southern portion of the LSA_{TER} (**Figure C-5a**). Within the LSA_{ECO}, shrub swamp was primarily located along Kinlough Creek, and was also scattered in small patches in the southern and eastern portions of the GSWC (**Figure C-5b**) and south of the AOI adjacent to tributaries in the TWC and WWC (**Figure C-5c**).

Marsh Ecosites: Marsh ecosites were prevalent among wetlands in the AOI and LSA_{TER} comprising 22-25% of wetlands, but less common in the LSA_{ECO} at 5% of wetlands (**Table 4-3**; **Figure 4-6**). Organic Meadow Marsh (MAM-o1) was the dominant marsh ecosite in the AOI (**Table 4-3**; **Figure 4-6**). Mineral Meadow Marsh (MAM-m1) was the dominant marsh ecosite in the LSA_{ECO} and LSA_{TER}, and the second most dominant in the AOI (**Table C-2**).

In the AOI, marsh ecosites primarily surround the Teeswater River and in the LSA_{TER} occur in several patches isolated from main watercourses (**Figure C-5a**). In the LSA_{ECO}, marsh ecosites occur along the edges of lakes (e.g., Clam and Schmidt Lakes), in small patches along watercourses in the GSWC[3] and near the tributaries of the TWC and WWC (**Figure C-5b** and **c**). The mapping results indicate that marsh habitat may be particularly rare on the landscape, yet more prevalent within the AOI (**Figure C-5**).

Fen Ecosites: Fen ecosites were only mapped in the LSA_{TER} and LSA_{ECO} and comprised < 3% of wetlands in these areas (**Table 4-3**; **Figure 4-6**). Treed Fen (FEW-T1) was the only fen ecosite identified and was located primarily within the LSA_{TER} outside and to the north of the AOI (**Table C-2**; **Figure C-5**).

Bog Ecosites: No Bog ecosites were mapped within any of the study areas (**Table C-2**; **Table 4-3**; **Figure C-5**).

Table 4-3. Area of each wetland ecosite and percent of the total wetland ecosite types within the BIS study areas.

Wetland Grouping	Wetland Ecosite	AOI		LSA_{TER}		LSA_{ECO}	
		Area (ha)	% Wetland	Area (ha)	% Wetland	Area (ha)	% Wetland
Conifer Swamp	SWT-Co5: White Cedar +/ Larch Organic Conifer Swamp	15.02	6.5	24.59	5.2	113.60	1.4
Conifer Swamp	SWT-Co1: White Cedar Organic Conifer Swamp	4.44	1.9	17.51	3.7	77.52	1.0
Conifer Swamp	**Other Conifer Swamp** (Ecosites <1% summed)	6.82	2.9	14.08	3.0	48.12	0.6
Mixedwood Swamp	SWT-Mo6: Organic Mixedwood Swamp	0.00	0.0	29.32	6.2	540.52	6.9
Mixedwood Swamp	SWT-Mo1: White Cedar Organic Mixedwood Swamp	15.25	6.6	19.28	4.0	531.18	6.8
Mixedwood Swamp	SWT-Mo2: Hemlock +/ Yellow Birch +/ Maple Organic Mixedwood Swamp	3.14	1.4	3.47	0.7	229.55	2.9
Mixedwood Swamp	SWT-Mm1: White Cedar Mineral Mixedwood Swamp	6.84	3.0	24.16	5.1	212.44	2.7
Mixedwood Swamp	SWT-Mm6: Mineral Mixedwood Swamp	23.57	10.2	37.73	7.9	146.42	1.9
Mixedwood Swamp	SWT-Mm2: Hemlock +/ Yellow Birch +/ Maple Mineral Mixedwood Swamp	0.00	0.0	0.00	0.0	134.88	1.7
Mixedwood Swamp	SWT-Mo3: Maple Organic Mixedwood Swamp	6.85	3.0	6.85	1.4	114.19	1.5
Mixedwood Swamp	**Other Mixedwood Swamp** (Ecosites <1% summed)	0.00	0.0	0.00	0.0	18.11	0.2
Hardwood Swamp	SWT-Ho2: Maple Organic Hardwood Swamp	38.01	16.4	53.70	11.3	1979.55	25.2
Hardwood Swamp	SWT-Ho3: Organic Hardwood Swamp	9.84	4.3	64.38	13.5	1550.63	19.8
Hardwood Swamp	SWT-Hm1: Coarse Mineral Hardwood Swamp	6.30	2.7	17.23	3.6	330.64	4.2
Hardwood Swamp	SWT-Ho1: Ash Organic Hardwood Swamp	2.71	1.2	2.71	0.6	319.43	4.1
Hardwood Swamp	SWT-Hm12: Silver Maple +/ Freeman's Maple Fine Mineral Hardwood Swamp	7.07	3.1	7.07	1.5	287.42	3.7
Hardwood Swamp	SWT-Hm8: Fine Mineral Hardwood Swamp	4.66	2.0	4.66	1.0	185.28	2.4
Hardwood Swamp	SWT-Hm10: Ash +/ White Elm Fine Mineral Hardwood Swamp	1.81	0.8	2.10	0.4	139.17	1.8
Hardwood Swamp	**Other Hardwood Swamp** (Ecosites <1% summed)	1.71	0.7	2.68	0.6	230.52	2.9
Shrub Swamp	SST-o1: Organic Deciduous Thicket Swamp	15.99	6.9	18.72	3.9	192.93	2.5
Shrub Swamp	**Other Shrub Swamp** (Ecosites <1% summed)	4.25	1.8	4.25	0.9	52.56	0.7
Marsh	MAM-m1: Mineral Meadow Marsh	25.17	10.9	55.84	11.7	183.20	2.3
Marsh	MAM-o1: Organic Meadow Marsh	29.97	13.0	50.57	10.6	138.38	1.8
Marsh	**Other Marsh** (Ecosites <1% summed)	1.78	0.8	1.78	0.4	66.58	0.8
Fen	FEW-T1: Treed Fen	0.00	0.0	13.81	2.9	17.90	0.2

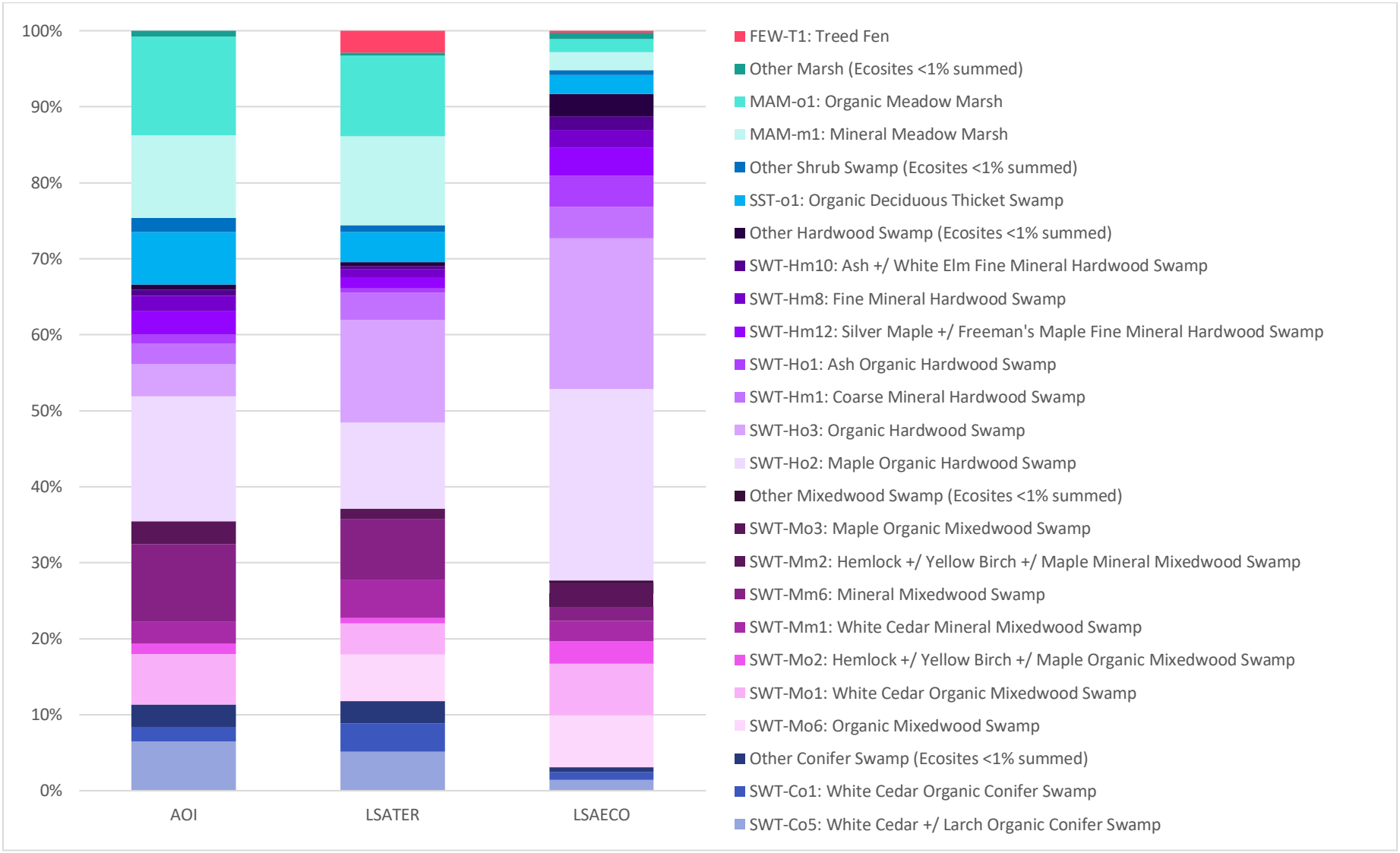


Figure 4-6. Wetland ecosite types as percentages of total mapped wetlands within the AOI, LSA_{TER}, and LSA_{ECO}.

4.1.3 Sensitive and Rare Ecosites

Several ecosites are associated with rare vegetation communities, which may be considered SWH (see Appendix C, Chapter 1) in the SON-South Bruce siting area if additional criteria are met (e.g., confirmation of ELC vegetation types or indicator vegetation species). Other ecosites can be used for initial screening of other types of candidate SWH (e.g., seasonal concentration areas, specialized habitat for wildlife, animal movement corridors) to inform future field investigations. SWH analyses are presented in Appendix C, Chapter 1 and are summarized in the Biodiversity Values (BV) sections in this 2023 BIS Baseline Report (Chapters 2-9), where applicable.

Six ecosite groupings were found to be rare on the landscape within mapped areas in the BIS study areas including shrub (ca. 8 ha; 0.06% of mapped area), wetland fen (ca. 18 ha; 0.14% of mapped area), meadow (ca. 165 ha; 1.30% of mapped area), conifer swamp (ca. 239 ha; 1.88% of mapped area), shrub swamp (ca. 245 ha; 1.93% of mapped area), and marsh (ca. 388 ha; 3.06% of mapped area). Proportions of ecosites within each of these ecosite groupings are in **Table 4-1**. A brief description of the distribution of each ecosite grouping is given in Sections 4.1.2.1 and 4.1.2.2.

Rare ecosites that are more common in the AOI and surrounding LSA_{TER} than the broader LSA_{ECO} may require consideration regarding potential Project effects, because they are rarer on the broader landscape than within the potential project siting area. Within the rare ecosite groupings, a total of 13 rare ecosites, representing <1% of the mapped area within the BIS study areas, were found in greater proportions in the AOI and/or the LSA_{TER} compared to the LSA_{ECO} (**Table 4-4**). **Figure C-6** includes the distribution of rare ecosites identified in **Table 4-4** within the BIS study areas. Of the rare ecosites in **Table 4-4**, all but one was located within the AOI. Treed fen (FEW-T1) was the sole rare ecosite that was only found outside of the AOI, treed fen was within the LSA_{TER} with a small proportion in the LSA_{ECO} north of the AOI (**Figure C-6**c). This ecosite covered approximately 0.14% of the mapped area within the BIS study areas and occurred mostly within the LSA_{TER} (**Table C-2**; **Figure C-6**). Two ecosites, Dry to Fresh Pine Coarse Mineral Mixedwood Treed (TRT-MNd4) and Dry to Fresh Fine Non-Calcareous Shrub Meadow (MEW-Sn2) were only found within the AOI and were not present in any other study areas. A single polygon of Dry to Fresh Pine Coarse Mineral Mixedwood Treed polygons occurred in the northeastern quadrant of the AOI (**Figure C-6a**). A single polygon of Dry to Fresh Fine Non-Calcareous Shrub Meadow was located in the central portion of the AOI (**Figure C-6a**). In addition, Larch Organic Conifer Swamp (SWT-Co4) and Dry to Fresh Coarse Non-Calcareous Shrub Meadow (MEW-Sn1) were primarily found within the AOI relative to other study areas (**Table 4-4**). Larch Organic Conifer Swamp (SWT-Co4) was mapped in a single polygon in the northwestern quadrant of the AOI (**Figure C-6a**) as well as in a small polygon west of Clam Lake in the LSA_{ECO} north of the AOI (**Figure C-6c**). Dry to Fresh Coarse Non-Calcareous Shrub Meadow (MEW-Sn1) was mapped in a single polygon along the Teeswater River in the northwestern quadrant of the AOI (**Figure C-6a**) as well as in a single polygon south of Schmidt Lake and west of Schmidt Creek (**Figure C-6c**). The other rare ecosites listed in **Table 4-4** range in proportion between 24.17% and 55.05% of their area being within the AOI relative to other BIS study areas (**Figure C-6a**, **b**, and **c**).

Table 4-4. Rare ecosites found within the AOI, LSA_{TER}, and LSA_{ECO}. Percent total is the percent of the study area covered by each ecosite; percent mapped is the percent of the mapped area of the study area that is covered by each ecosite; percent in each study area is the percent of the mapped ecosite that was in each study area (excluding the areas covered by nested study areas that are encompassed within its boundaries).

Study Area		AOI				LSA_{TER}				LSA_{ECO}			
Total Study Area (ha)		1,827.41				3,840.21				27,879.50			
Mapped Study Area (ha)		643.78				1,272.25				126,867,946.94			
Ecosite Name	**Ecosite Code**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**% in the AOI**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**% in the LSA_{TER}**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**% in the LSA_{ECO}**
Dry to Fresh White Pine +/ Red Pine Coarse Mineral Conifer Treed	TRT-CNd3	7.19	0.39%	1.12%	27.35%	7.91	0.21%	0.62%	2.75%	26.29	0.09%	0.21%	69.90%
Naturalized Black Walnut Hardwood Treed Plantation	TRT-HZ6	1.79	0.10%	0.28%	53.04%	3.37	0.09%	0.26%	46.96%	3.37	0.01%	0.03%	0.00%
Dry to Fresh White Cedar Coarse Mineral Mixedwood Treed	TRT-MNd5	23.44	1.28%	3.64%	24.17%	28.46	0.74%	2.24%	5.18%	96.97	0.35%	0.76%	70.65%
Moist Hemlock Coarse Mineral Mixedwood Treed	TRT-MNf2	11.76	0.64%	1.83%	41.10%	11.76	0.31%	0.92%	0.00%	28.62	0.10%	0.23%	58.90%
Dry to Fresh Sugar Maple Coarse Mineral Mixedwood Treed	TRT-MNd8	5.23	0.29%	0.81%	42.98%	5.23	0.14%	0.41%	0.00%	12.18	0.04%	0.10%	57.02%
Dry to Fresh Pine Coarse Mineral Mixedwood Treed	TRT-MNd4	4.84	0.26%	0.75%	100.00%	4.84	0.13%	0.38%	0.00%	4.84	0.02%	0.04%	0.00%
Dry to Fresh Hemlock Coarse Mineral Mixedwood Treed	TRT-MNd2	0.83	0.05%	0.13%	26.59%	0.83	0.02%	0.07%	0.00%	3.12	0.01%	0.02%	73.41%
Larch Organic Conifer Swamp	SWT-Co4	5.08	0.28%	0.79%	83.45%	5.08	0.13%	0.40%	0.00%	6.08	0.02%	0.05%	16.55%
Treed Fen	FEW-T1	-	-	-	0.00%	13.81	0.36%	1.09%	0.00%	17.90	0.06%	0.14%	22.85%
Dry to Fresh Coarse Calcareous Treed Meadow	MEW-Tk1	9.88	0.54%	1.53%	55.05%	10.33	0.27%	0.81%	2.50%	17.94	0.06%	0.14%	42.44%
Dry to Fresh Coarse Non-Calcareous Shrub Meadow	MEW-Sn1	5.32	0.29%	0.83%	73.70%	5.32	0.14%	0.42%	0.00%	7.22	0.03%	0.06%	26.30%
Dry to Fresh Fine Non-Calcareous Shrub Meadow	MEW-Sn2	5.40	0.30%	0.84%	100.00%	5.40	0.14%	0.42%	0.00%	5.40	0.02%	0.04%	0.00%
Dry to Fresh Non-Calcareous Deciduous Thicket	SLT-Dn1	2.03	0.11%	0.32%	34.92%	2.03	0.05%	0.16%	0.00%	5.82	0.02%	0.05%	65.08%

4.2 Soil and Vegetation Attributes

4.2.1 Soil Conditions

Soil texture and moisture regimes were determined by digging soil pits at full plot survey sites. Soil conditions are a primary driver in the ecosite determination, thus at ground and visual plots, soil condition is inferred from the ecosite code.

4.2.1.1 Soil Moisture Regime

Dry to Fresh Soils: Dry to Fresh moisture regime is typically affiliated with upland forest, and meadow ecosites. A greater portion of soils with dry to fresh moisture regime were located within the AOI, LSA_{TER} and southern portion of the LSA_{ECO} relative to the northern portion of the LSA_{ECO} (**Table 4-5**; **Figure D-1**). In the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI, dry to fresh soils were distributed in small patches throughout these study areas. In the LSA_{ECO} north of the AOI, dry to fresh soils were predominantly found on the outer edges of the GSWC along the eastern and northwestern side (**Figure D-1**).

Moist Soils: Moist soil moisture regime comprised a larger portion of the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI relative to the LSA_{ECO} north of the AOI (**Table 4-5**; **Figure D-1a** and **b**). Moist soils within the AOI, LSA_{TER}, and LSA_{ECO} were mapped in horizontal east to west bands along the property lines dividing properties between roadways (**Figure D-1b**). These polygons were primarily comprised of hardwood ecosites (see Section 4.1.2.1) with some mixedwood ecosites. In the LSA_{ECO}, plots with a moist soil regime were primarily located north of the AOI on the outside perimeter of the GSWC in hardwood and mixedwood ecosites, especially along the northern and northwestern portion of the LSA_{ECO} (**Figure D-1a**).

Wet Soils: Wet soils were proportionally far more prevalent in the LSA_{ECO} north of the AOI relative to the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI (**Table 4-5**). Wet soils are typically affiliated with wetland ecosite types and, within the AOI and LSA_{TER}, were predominantly found within wetter areas adjacent to the Teeswater River and its tributaries (**Figure D-1b**). Within the LSA_{ECO}, wet soils were also found within the more consolidated wetland polygons in the GSWC in the northern LSA_{ECO} (**Figure D-1a**) and the TWC and WWC in the southern LSA_{ECO} (**Figure D-1b**).

No Moisture Category: Some ecosites (e.g., plantations and agriculture) do not have defined soil attributes associated with them. Soils with no moisture information were in small polygons scattered throughout the AOI and LSA_{TER} and in polygons in the southern portion of the LSA_{ECO} south of the AOI (**Figure D-1a**). In the LSA_{ECO} north of the AOI, soils with no moisture information were in polygons scattered along the outer edge of the GSWC (**Figure D-1b**).

Table 4-5. Proportion of each soil moisture regime in mapped areas within the BIS study areas.

Moisture Regime	AOI		LSA_{TER}		North LSA_{ECO}		South LSA_{ECO}		All Study Areas Combined	
	Count	Area (ha)	Count	Area (ha)	Count	Area (ha)	Count	Area (ha)	Count	Area (ha)
Dry to Fresh	58.0	279.6	81.0	263.0	183.0	915.2	192.0	715.3	514.0	2,173.1
Moist	23.0	60.3	29.0	55.5	308.0	1,528.1	93.0	232.2	453.0	1,876.0
Wet	96.0	231.2	120.0	245.3	633.0	6,482.5	253.0	881.8	1,102.0	7,840.7
Aquatic	5.0	21.1	7.0	8.7	21.0	206.5	6.0	8.6	39.0	245.0
None	29.0	51.6	26.0	55.9	74.0	209.7	63.0	244.6	192.0	561.9
Total	211.0	643.8	263.0	628.5	1,219.0	9,342.0	607.0	2,082.4	2,300.0	12,696.7

4.2.1.1 Soil Texture

Organic Soils: Organic soils were proportionally more prevalent in the LSA_{ECO} north of the AOI relative to the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI (**Table 4-6**). Organic soils were typically associated with marsh and swamp ecosites although some marshes and swamps had mineral soils. In the AOI and LSA_{TER}, organic soils were located primarily along the Teeswater River and tributaries (**Figure D-2a**). Similarly, in the LSA_{ECO} south of the AOI, organic soils were found along watercourses and in larger polygons in the wetland complexes[3] in the southern portion of the LSA_{ECO}. In the LSA_{ECO} north of the AOI, organic soils were predominant in the GSWC comprising large contiguous sections of the swamp (**Figure D-2b**).

Mineral Soils: Soil texture for some polygons containing mineral soils were not defined. These soils were typically found in marshes and some swamps. Small patches of mineral soils without texture definition were scattered throughout the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI (**Figure D-2a**). In the LSA_{ECO} north of the AOI, several larger patches of mineral soil without texture definition were located within the more central portions of the GSWC (**Figure D-2b**).

Fine Mineral Soils: Fine mineral soils are proportionally more prevalent in the LSA_{ECO} north of the AOI relative to the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI (**Table 4-6**). Within the AOI, fine mineral soils were in larger polygons on the northwestern side and on the eastern side. There were several smaller polygons containing fine mineral soils in the central portion of the AOI. South of the AOI in the LSA_{TER} and LSA_{ECO}, fine mineral soils were found in a few smaller polygons scattered throughout these study areas (**Figure D-2a**). In the LSA_{ECO} north of the AOI, fine mineral soils were located primarily along the outer perimeter of the GSWC (**Figure D-2b**).

Coarse Mineral Soils: Coarse mineral soils were proportionally more prevalent in the AOI, LSA_{TER} and LSA_{ECO} south of the AOI relative to the LSA_{ECO} north of the AOI (**Table 4-6**). Within the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI, coarse mineral soils were predominantly mapped in horizontal east to west bands along the property lines between roadways (**Figure D-2a**). Within the LSA_{ECO} north of the AOI, coarse mineral soils were mapped predominantly on the eastern side of the GSWC with smaller patches located along the western side of the central portions of the GSWC (**Figure D-2b**).

No Texture Category: In some polygons the ecosite was not defined as having either an organic or mineral soil type (**Table 4-6**). These polygons were typically plantations, hedgerows, and agriculture but also included thicket and fen ecosites. Many of the polygons that did not have texture information also did not have moisture information (see Section 4.2.1.1). Soils with no texture information were in small polygons scattered throughout the AOI and LSA_{TER} and in polygons in the southern portion of the LSA_{ECO} south of the AOI (**Figure D-2a**). In the LSA_{ECO} north of the AOI, polygons with soils with no texture information were scattered along the outer edge of the GSWC (**Figure D-2b**).

Table 4-6. Proportion of each soil texture regime in mapped areas within the BIS study areas.

Type and Texture	AOI		LSA_{TER}		North LSA_{ECO}		South LSA_{ECO}		All Study Areas Combined	
	Count	Area (ha)	Count	Area (ha)	Count	Area (ha)	Count	Area (ha)	Count	Area (ha)
Organic	54.0	148.1	61.0	149.9	416.0	5,059.4	141.0	533.3	672.0	5,890.7
Mineral	32.0	61.6	44.0	69.4	84.0	388.2	76.0	239.9	236.0	759.1
Fine	17.0	80.2	16.0	55.6	267.0	1,776.4	14.0	59.3	314.0	1,971.4
Coarse	73.0	279.2	107.0	275.1	354.0	1,693.9	306.0	994.6	840.0	3,242.9

None	30.0	53.6	28.0	69.8	77.0	217.6	64.0	246.7	199.0	587.7
Aquatic	5.0	21.1	7.0	8.7	21.0	206.5	6.0	8.6	39.0	245.0
Total	211.0	643.8	263.0	628.5	1,219.0	9,342.0	607.0	2,082.4	2,300.0	12,696.7

4.2.2 Vegetation Attributes

4.2.2.1 Vegetation Structure

Structural stage (SS) represents the stage of forest succession, or the different stages a habitat goes through after disturbance. Structural stages range from the grass and forbs stage (combined as herb layer) through to mature forest. In general, greater average stand heights were correlated with higher structural stages (SS 5 – 7; **Figure D-3a**, **b**, and **c**). Plots visited within the AOI consisted primarily of lower structural stages (SS 2 – 4) on the north and west sides and higher structural stages (SS 5 – 6) on the east side. South of the AOI, structural stage was slightly higher at most surveyed plots relative to the western portion of the AOI and LSA_{TER}. Several plots with structural stages of 2 or 3 were located near waterbodies. A structural stage of 2 represents an early successional stage maintained by environmental conditions or disturbance and generally dominated by herbs. A few plots in the LSA_{ECO} north of the AOI had a structural stage of 2 and stand heights of less than 5 m, primarily on the edges of waterbodies. A structural stage of 3 represents an early successional or shrub stage with generally sparse tree cover, where tree seedlings and advance regeneration may be abundant. Structural stage and stand height in the LSA_{ECO} were greater (SS 5 or 6 and stand height of ≥ 15 m) at most plots surveyed in the GSWC north of the AOI. A structural stage of 5 represents young forest where self-thinning has become evident, and the forest canopy has started to differentiate into distinct layers. Structural stage 6 represents mature forest with mature trees that established after the last stand-replacing disturbance and established shade tolerant trees.

4.2.2.2 Vegetation Cover

Vegetation cover is the percentage of soil cover which is provided by vegetation. Vegetation cover within the AOI and LSA_{TER} was generally low relative to other areas in the LSA_{ECO} (**Table 4-7**; **Figure D-4**). Within the AOI, the greatest vegetation cover was generally found within the herb layer (75 – 100%) with lower cover values (0 – 50%) in the shrub and tree layers. A few plots on the eastern and southern side of the AOI had greater cover (51 – 99%) in the tree layers. Most sites had very low cover in the moss, lichen, and seedling layers. Across the LSA_{ECO}, vegetation cover varied substantially with greater cover in the northern portion of the LSA_{ECO} than the central and southern portions. In the northern portion of the LSA_{ECO}, the tree layer provided higher cover (50 – 99%) than other layers. However, the herb layer at many plots in the northern LSA_{ECO} also had high cover (>50%). Lower cover <50% was typically found in the shrub layer and the moss, lichen, and seedling layer north of the AOI. Vegetation cover in the different structural layers south of the AOI varied, with some sites having greater cover in the tree layer and others in the herb layer. The moss, lichen, and seedling layer was consistently low in cover percentage (<25%) throughout the study areas.

Table 4-7. Number of sites in each cover percentage class within each study area and vegetation layer.

Cover Percent	AOI and LSA_{TER}				North of the AOI				South of the AOI			
	Tree	Shrub	Herb	Moss/ Lichen	Tree	Shrub	Herb	Moss/ Lichen	Tree	Shrub	Herb	Moss/ Lichen
0	5	3	0	10	6	4	2	19	4	3	1	10
1-25	2	5	1	2	2	21	5	28	0	8	2	2
26-50	1	2	0	1	2	21	11	6	1	1	2	0
51-75	4	2	2	0	19	7	8	5	3	0	1	1
76-99	1	1	3	0	29	5	27	0	5	1	5	0
100	0	0	7	0	0	0	5	0	0	0	2	0

4.2.2.1 Dominant Vegetation

Dominant vegetation and species of interest were recorded in the tree (A), shrub (B), herb (C), moss, lichen, and seedling (D), and epiphyte (E) layers at ground plots and full vegetation profiles were recorded for these layers in full plots during TEM surveys. **Appendix D** summarizes all vegetation recorded during TEM surveys in each layer by study area. **Table D-1** summarizes all plots by vegetation layer type and **Table D-2** summarize all plots by vegetation species.

4.2.2.1.1 Tree Layer (A Layer)

The most reported tree species include red maple, green ash, white elm, yellow birch, black ash, eastern white cedar, sugar maple, and balsam fir (see **Table D-2**). However, species differed by study area. In the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI, the most reported tree species were eastern white cedar and white elm, though white elm was reported in trace quantities (<5%) in three of the four plots where it was detected (see **Table D-2**).

The tree layer is divided into sublayers 1-3, and the species making up the sub-layers differed by study area (see **Table D-2**). In the AOI and LSA_{TER}, only four plots had trees within the A1 layer, which are the dominant (tallest) trees of the main canopy usually constituting a minor portion of overall stand composition (see **Table D-1**). In the AOI and LSA_{TER}, A1 sublayer trees were silver maple and basswood. Only one plot in the in AOI and LSA_{TER} study area had veteran trees in the A1 layer; this plot also contained the basswood stand. A2 layer trees are the main canopy whose crowns comprise the upper layer of foliage and typically constitute the major portion of the stand composition. A variety of species comprised the A2 layer in the AOI and LSA_{TER}, but the most reported trees were eastern white cedar and yellow birch (three plots each; see **Table D-2**).

South of the AOI in the LSA_{ECO}, the A1 layer had nine species detected in eight plots, of which five species had veteran trees across four plots (sugar maple, eastern white pine, eastern cottonwood, trembling aspen, and eastern hemlock). Ten tree species were recorded in the main (A2) canopy layer across 10 plots, and eight tree species were recorded in the A3 layer across 11 plots. See **Table D-1** and **Table D-2** in **Appendix D.**

In the LSA_{ECO} north of the AOI, 10 tree species were recorded in the A1 layer across a total of 33 plots. In addition, 10 species of veteran trees were recorded, of which four species (American beech, tamarack, black cherry and white elm) were not recorded in the A1 layer. Twenty tree species were recorded in the

main (A2) canopy layer across 54 plots, and 22 species were recorded in the A3 layer across 50 plots. See **Table D-1** and **Table D-2** in **Appendix D**.

4.2.2.1.2 Shrub Layer (B Layer)

The shrub layer includes all woody plants less than 10 m tall, except low (usually <15 cm tall) woody or trailing plants which are part of the herb layer. Established tree regeneration more than two years of age and less than 10 m in height is considered part of the shrub layer. There are two sublayers within the shrub vegetation category: tall shrub (B1) which includes all woody plants 2 – 10 m tall, including shrubs, advanced tree regeneration, and trees in poorly growing stands where the canopy is less than 10 m tall, and low shrub (B2) which includes all woody plants less than 2 m high, except low (<15 cm) woody or trailing plants, shrubs and established tree regeneration more than two years old, and dwarfed or immature specimens of species normally considered in the tall shrub category. The most detected shrub species varied by study location (see **Table D-3** in **Appendix D**). In the AOI and LSA_{TER}, eastern white cedar, green ash, black ash, red-osier dogwood, common elderberry, and nannyberry were most common within plots. In plots within the LSA_{ECO} south of the AOI, white elm, sugar maple and eastern white cedar were most reported. In plots within the LSA_{ECO} north of the AOI, green ash, white elm, red maple, yellow birch, black ash, and northern spicebush were most common. The total number of species recorded in the shrub layers within each study area increased moving northward. At plots within the LSA_{ECO} south of the AOI, four species were recorded in the B1 layer across 11 plots and five species were recorded in the B2 layer across 10 plots. At plots within the AOI and LSA_{TER}, nine species were recorded in the B1 layer across nine plots and 12 species were recorded in the B2 layer across 11 plots. In the LSA_{ECO} north of the AOI, 28 species were recorded in the B1 layer across 54 plots and 43 species were recorded in the B2 layer across 55 plots.

4.2.2.1.3 Herb Layer (C Layer)

The herb layer includes all herbaceous species, regardless of height, and some low woody plants less than 15 cm tall. The herb layer in all study areas had the greatest number of species relative to other vegetation layers. A summary of all herb species detected within each study area and the number of plots where they were found are provided in **Table D-1** and **Table D-4** in **Appendix D**. A total of 139 species were detected across 13 plots in the AOI and LSA_{TER}, 101 species were detected across 13 plots in the LSA_{ECO} south of the AOI, and 278 species were detected across 57 plots in the LSA_{ECO} north of the AOI. Many of the herb species were detected in trace amounts (<5%) within plots surveyed.

4.2.2.1.4 Moss, Lichen, and Seedling Layer (D Layer)

The moss, lichen, and seedling layer includes all bryophytes, terrestrial lichens, and liverworts, and tree seedlings less than two years old that occur on mineral soil and humus. A summary of all D layer species is provided in **Table D-5** in **Appendix D**. A total of 14 species were detected across seven plots in the AOI and LSA_{TER}, 13 species were detected across five plots in the LSA_{ECO} south of the AOI, and 43 species were detected across 46 plots in the LSA_{ECO} north of the AOI. Similar to the herb layer, many of the species detected in the moss, lichen, and seedling layer were in trace amounts within the plots surveyed.

4.2.2.1.5 Epiphyte Layer (E Layer)

The epiphyte layer includes all species which grow on other living plants. The epiphyte layer had the fewest species recorded across plots relative to the other vegetation layers. A summary of all E layer species is provided in **Table D-6** in **Appendix D**. Species differed in each study area. A total of two species

were recorded in the AOI and LSA_{TER}: Virginia creeper and riverbank grape. In the LSA_{ECO} south of the AOI, only unknown mosses were recorded. In the LSA_{ECO} north of the AOI, several species of moss, lichens, creepers, and grapevines were recorded.

4.2.2.2 Invasive Species

During TEM field surveys, the abundance, extent, and distribution of invasive plant species (see Table A-3 in Chapter 2) were recorded as part of the vegetation survey. Chapter 2 (Vegetation) of this 2023 BIS Baseline Report discusses invasive plant species in more detail, including the various species detected during field surveys. This section summarizes the overall distribution, abundance, and extent of invasive species within the plots surveyed.

Within the AOI, invasive species were noted to be dominant, extensive, and uniform in a plot located within the northern portion of the AOI (**Figure D-5**a). This plot was the only full survey plot within the AOI. An additional plot in the southern portion of the AOI along the Teeswater River had invasive species considered widespread and occasional with uniform distribution. A second plot along the Teeswater River towards the north of the AOI had invasive species that were considered widespread and occasional with scattered distribution (**Figure D-5**a). In the east side of the LSA_{TER}, one additional plot had invasives which were considered widespread and occasional with scattered distribution (**Figure D-5**a). At all other plots in the AOI and LSA_{TER} with invasive species, they were considered rare in abundance but local or widespread in extent.

Within the LSA_{ECO}, invasive species were considered extensive and dominant in the northern area of Schmidt Lake (**Figure D-5**b). This area is frequented by visitors. There were additional plots with invasives considered extensive or widespread and abundant on the eastern side of the LSA_{ECO}, and in the central areas of the GSWC north of the AOI. Invasive species in the LSA_{ECO} south of the AOI were predominantly considered rare or not present with only a few considered widespread and occasional in patchy or uniform distribution along the southern portion of the LSA_{ECO} near lakes (**Figure D-5**c).

4.2.3 Habitat Features for Wildlife

The sections below summarize results of vegetation that can support various habitats for wildlife. As there were not enough accessible polygons within each ecosite category in 2022 to fulfill the TEM design (see Section 3.2), summaries of habitat features could not be reported by ecosite type and are instead reported by survey location.

4.2.3.1 Coarse Woody Debris

Coarse woody debris (CWD) can provide habitat for wildlife and provides an essential nutrient source for regrowth of vegetation. Coarse woody debris was recorded along transect surveys conducted at full plots within the AOI, LSA_{TER}, and LSA_{ECO}. A summary of CWD recorded within each plot surveyed is provided in **Table D-7** in Section D.3. CWD encountered during transect surveys was ranked by decay class according to decay classes outlined in RIC (RIC 1998) and in Figure 3-3 in the TEM and SWH SOP (Appendix A in the 2022 BPD Report; Zoetica 2022). Decay classes ranged from class 1 being least decayed to class 5 being most decayed. Decay classes of CWD encountered were fairly evenly distributed with slightly fewer recorded in decay class 5 (latest stage of decay).

Field crews recorded the presence of any piles of CWD within the plots. Piles of CWD can by used by wildlife to provide shelter from the elements and predators or to carry out a particular life history stage

(e.g., rearing young/denning). Twenty-two piles of CWD were recorded during surveys (**Table 4-8**). A summary of CWD piles recorded within each plot surveyed is provided in **Table D-8** in Section D.3. The average size of the interstitial spaces in each pile were split almost equally between small (the size of or smaller than a squirrel) and medium (the size of a coyote) (**Table 4-9**). Only one pile of CWD recorded during surveys had large interstitial spaces that are the size of, or larger than, the average black bear.

Table 4-8. The number of pieces of coarse woody debris by decay class encountered during transect surveys within each full plot.

Site ID	*N*	# Coarse Woody Debris per Decay Class				
		1	**2**	**3**	**4**	**5**
TEM_006	6	2	4	0	0	0
TEM_009	2	0	0	0	0	2
TEM_010	8	1	1	2	2	2
TEM_011	3	0	0	1	1	1
TEM_012	13	0	4	4	4	1
TEM_013	6	2	2	0	1	1
TEM_014	9	1	4	2	2	0
TEM_015	18	5	6	4	3	0
TEM_016	9	4	3	2	0	0
TEM_017	9	2	2	2	3	0
TEM_018	14	1	8	1	3	1
TEM_019	4	1	0	1	0	2
TEM_020	3	1	0	2	0	0
TEM_021	7	3	2	2	0	0
TEM_022	8	2	0	1	3	2
TEM_023	5	0	1	1	1	2
TEM_024	14	1	1	6	3	3
TEM_025	9	3	1	0	4	1
TEM_026	2	0	0	2	0	0
TEM_027	9	0	5	2	2	0
TEM_028	8	3	1	2	0	2
TEM_029	4	0	0	0	4	0
TEM_030	7	0	3	2	1	1
TEM_032	8	0	3	0	2	3
TEM_033	8	1	1	2	3	1
Total	193	33	52	41	42	25

Note: See Section 4.2.3.1 for decay class definitions.

Table 4-9. Piles recorded at sites during coarse woody debris surveys.

Site ID	Habitat Type	# Piles	Interstitial Space Sizes		
			Small	Medium	Large
TEM_007	Mixedwood Swamp	2	0	2	0
TEM_008	Hardwood Swamp	6	1	5	0
TEM_009	Hardwood Swamp	2	1	1	0
TEM_010	Hardwood Swamp	1	1	0	0
TEM_011	Hardwood Swamp	4	2	1	1
TEM_013	Hardwood Swamp	1	1	0	0
TEM_021	Hardwood	3	2	1	0
TEM_022	Hardwood	1	0	1	0
TEM_023	Hardwood Swamp	1	1	0	0
TEM_033	Plantation	1	1	0	0
	Total	22	10	11	1

Wildlife users of CWD were recorded during full plot surveys when evidence of wildlife was present. A total of 10 plots had documented wildlife use of CWD with a variety of wildlife user types recorded (**Table 4-10**). Most wildlife users were birds, followed by insects. None of the species recorded were at-risk. Two plots had multiple recorded cases of wildlife use of CWD; one plot (TEM_013) had three recorded cases and one plot (TEM_029) had two cases. Plot TEM_013 is located on the western side of Schmidt Lake in the LSA_{ECO} north of the AOI and plot TEM_029 is in the southern tip of the LSA_{ECO} south of the AOI (see **Figure B-1** for locations of plots).

Table 4-10. Wildlife users of coarse woody debris encountered during TEM full plot surveys.

Site ID	CWD Species (if known)	Wildlife User	Wildlife User Species	Evidence of Wildlife use
TEM_013	Green ash / red ash	Bird	Woodpecker spp.	Woodpecker holes
TEM_013	Unknown	Snake	Eastern Gartersnake	Eastern gartersnake went under log
TEM_013	Yellow birch / swamp birch	Bird	Bird spp.	Bird feces on log; possible perch site
TEM_015	Black ash	Insect	Emerald Ash Borer	EAB evidence
TEM_017	White spruce	Insect	Insect spp.	Insect boring
TEM_022	Unknown Deciduous/Hardwood	Insect	Insect spp.	Insect boring
TEM_024	Maple spp.	Bird	Woodpecker spp.	Woodpecker holes
TEM_025	Unknown Deciduous/Hardwood	Salamander	Salamander spp.	Salamander inside
TEM_029	Eastern white pine	Bird	Woodpecker spp.	Woodpecker holes
TEM_029	Eastern white pine	Bird, Insect	Woodpecker spp., Insect spp.	Woodpecker holes; insect boring
TEM_030	Eastern cottonwood	Bird	Woodpecker spp.	Woodpecker holes
TEM_032	Unknown	Salamander	Salamander spp.	Juvenile salamander (either red-backed or blue-spotted, too young to show markings) inside log
TEM_033	Unknown Coniferous/Softwood	Bird	Pileated Woodpecker	None. Pileated woodpecker cavities present (assumed from when it was standing)

4.2.3.2 Tree Attributes

A total of 33 full plots were assessed for tree attributes during TEM field surveys. Except for hardwood swamp ecosite groupings, not enough plots in the other ecosite types were surveyed to relate data to habitat groupings. **Table D-9** in Appendix D summarizes the attributes of trees assessed within each full plot visited. Trees within full plots were also assessed for various condition attributes. **Table 4-11** summarizes the ratings for selected trees assessed within each full plot. Many of the trees assessed within each site were deemed to be healthy and in good condition (i.e., having lower rating codes in each category). All trees assessed within the only plot surveyed in the AOI were conifer trees in good condition with low ratings for all categories. However, most sites in the LSA_{ECO} contained several trees with varying condition ratings. In general, while most trees were in good condition, deciduous trees had more of a range in appearance codes than conifer trees. Bark retention in trees at most plots was good (class 1 or 2), however 10 plots had some trees with >25% bark lost (classes 4-7). Crown class was most often co-dominant followed by dominant, and crown condition was considered primarily good (class 1 or 2); however, 20 plots had trees with no foliage present in the crown and with various stages of decay (classes 3-6). Lichen load was low in trees in most plots, however, nine plots had trees with more than ten 5 g clumps of lichen (classes 3-5). These trees were mostly located in the LSA_{ECO} north of the AOI. Most plots had trees with good wood condition, however, five plots had trees with decay spreading (class), and five plots had trees with at least some spongy sections of wood (classes 5-7).

Table 4-11. Tree attributes of the largest trees within each full plot surveyed. Cells are highlighted according to the proportion of trees surveyed that fell into each category (darker greens correspond to larger proportions).

Site ID	Study Area	Habitat Type	N	Appearance Conifer					Appearance Deciduous							Bark Retention							Crown Class					Crown Condition						Lichen Load						Wood Condition						
				1	2	3	4	5	1	2	3	4	7	8	9	1	2	3	4	5	6	7	D	C	I	S	N/A	1	2	3	4	5	6	0	1	2	3	4	5	1	2	3	4	5	6	7
TEM_020	LSA_{ECO} N	Conifer	10	6	-	-	-	-	1	3	-	-	-	-	-	8	2	-	-	-	-	-	5	5	-	-	-	6	4	-	-	-	-	10	-	-	-	-	-	9	1	-	-	-	-	-
TEM_031	LSA_{ECO} N	Conifer	28	25	-	-	-	-	2	1	-	-	-	-	-	28	-	-	-	-	-	-	-	28	-	-	-	26	2	-	-	-	-	28	-	-	-	-	-	28	-	-	-	-	-	-
TEM_018	LSA_{ECO} S	Conifer Swamp	10	5	2	1	-	-	2	-	-	-	-	-	-	7	3	-	-	-	-	-	3	6	-	-	1	6	3	1	-	-	-	10	-	-	-	-	-	8	2	-	-	-	-	-
TEM_021	LSA_{ECO} N	Hardwood	10	-	-	-	-	-	10	-	-	-	-	-	-	10	-	-	-	-	-	-	-	10	-	-	-	10	-	-	-	-	-	3	1	2	2	2	-	10	-	-	-	-	-	-
TEM_022	LSA_{ECO} N	Hardwood	11	-	-	-	-	-	2	8	-	-	1	-	-	10	1	-	-	-	-	-	5	5	-	-	1	4	6	-	-	-	1	-	10	1	-	-	-	7	3	-	1	-	-	-
TEM_026	LSA_{ECO} N	Hardwood	10	-	-	-	-	-	4	2	1	3	-	-	-	5	4	-	1	-	-	-	1	6	-	-	3	4	3	2	1	-	-	10	-	-	-	-	-	5	3	2	-	-	-	-
TEM_008	LSA_{ECO} N	Hardwood Swamp	15	1	-	-	-	-	9	2	3	-	-	-	-	15	-	-	-	-	-	-	2	10	3	-	-	10	5	-	-	-	-	-	15	-	-	-	-	15	-	-	-	-	-	-
TEM_009	LSA_{ECO} N	Hardwood Swamp	18	1	-	-	-	-	7	3	3	-	4	-	-	15	-	1	-	1	-	1	5	4	1	4	4	9	5	-	-	2	2	6	12	-	-	-	-	14	-	2	1	-	1	-
TEM_010	LSA_{ECO} N	Hardwood Swamp	10	-	-	1	-	-	7	-	-	2	-	-	-	10	-	-	-	-	-	-	-	8	2	-	-	1	7	1	-	1	-	-	6	4	-	-	-	8	1	1	-	-	-	-
TEM_011	LSA_{ECO} N	Hardwood Swamp	16	-	-	-	-	-	4	3	8	1	-	-	-	16	-	-	-	-	-	-	7	4	2	2	1	4	11	1	-	-	-	-	16	-	-	-	-	16	-	-	-	-	-	-
TEM_012	LSA_{ECO} N	Hardwood Swamp	10	-	-	-	-	-	7	3	-	-	-	-	-	7	3	-	-	-	-	-	-	10	-	-	-	6	4	-	-	-	-	10	-	-	-	-	-	9	1	-	-	-	-	-
TEM_013	LSA_{ECO} N	Hardwood Swamp	10	-	-	-	-	-	10	-	-	-	-	-	-	10	-	-	-	-	-	-	1	8	1	-	-	5	5	-	-	-	-	-	10	-	-	-	-	10	-	-	-	-	-	-
TEM_015	LSA_{ECO} N	Hardwood Swamp	10	-	-	-	-	-	5	2	1	1	1	-	-	6	1	2	1	-	-	-	-	8	-	-	2	6	2	-	-	-	2	10	-	-	-	-	-	7	-	1	1	1	-	-
TEM_016	LSA_{ECO} N	Hardwood Swamp	20	-	2	-	-	-	6	9	3	-	-	-	-	3	12	5	-	-	-	-	9	8	3	-	-	6	11	3	-	-	-	6	-	10	2	2	-	5	13	2	-	-	-	-
TEM_023	LSA_{ECO} N	Hardwood Swamp	10	-	-	-	-	-	6	4	-	-	-	-	-	6	4	-	-	-	-	-	1	9	-	-	-	4	6	-	-	-	-	10	-	-	-	-	-	6	4	-	-	-	-	-
TEM_024	LSA_{ECO} N	Hardwood Swamp	10	-	-	-	-	-	6	4	-	-	-	-	-	6	4	-	-	-	-	-	1	9	-	-	-	6	4	-	-	-	-	10	-	-	-	-	-	5	5	-	-	-	-	-
TEM_025	LSA_{ECO} N	Hardwood Swamp	10	-	-	-	-	-	4	5	-	-	1	-	-	6	4	-	-	-	-	-	2	5	2	-	1	5	4	-	-	-	1	10	-	-	-	-	-	6	4	-	-	-	-	-
TEM_027	LSA_{ECO} N	Hardwood Swamp	10	-	-	-	-	-	4	6	-	-	-	-	-	4	6	-	-	-	-	-	-	8	2	-	-	4	6	-	-	-	-	10	-	-	-	-	-	5	5	-	-	-	-	-
TEM_002	LSA_{ECO} S	Marsh	4	1	1	-	1	-	-	-	1	-	-	-	-	2	-	-	-	-	1	1	-	-	3	-	1	1	1	1	1	-	-	4	-	-	-	-	-	2	-	2	-	-	-	-
TEM_003	AOI	Meadow	5	5	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	5	-	-	-	5	-	-	-	-	-	5	-	-	-	-	-	5	-	-	-	-	-	-
TEM_029	LSA_{ECO} S	Mixedwood	14	5	1	-	2	-	1	1	3	-	1	-	-	10	-	1	2	-	1	-	7	3	1	3	-	7	4	2	-	-	1	7	-	1	6	-	-	9	1	2	2	-	-	-
TEM_030	LSA_{ECO} S	Mixedwood	10	-	-	1	-	-	9	-	-	-	-	-	-	8	1	1	-	-	-	-	-	9	1	-	-	8	1	1	-	-	-	10	-	-	-	-	-	8	1	1	-	-	-	-
TEM_017	LSA_{ECO} N	Mixedwood	10	3	-	-	-	-	5	1	-	-	1	-	-	8	1	-	1	-	-	-	5	3	2	-	-	6	3	-	-	-	1	10	-	-	-	-	-	8	1	-	1	-	-	-
TEM_028	LSA_{ECO} N	Mixedwood	18	-	-	-	-	-	5	11	1	-	-	-	1	16	1	-	-	-	1	-	-	14	2	1	1	6	11	-	-	-	1	-	-	12	5	1	-	5	12	-	-	-	-	1
TEM_006	LSA_{ECO} N	Mixedwood Swamp	20	-	-	-	-	-	9	7	2	1	1	-	-	11	6	3	-	-	-	-	10	9	-	1	-	8	11	1	-	-	-	-	-	-	2	8	10	16	4	-	-	-	-	-
TEM_007	LSA_{ECO} N	Mixedwood Swamp	26	4	-	-	-	2	4	8	6	-	1	1	-	24	-	-	1	-	-	1	2	18	1	1	4	10	12	2	-	-	2	-	15	10	1	-	-	24	-	-	-	1	1	-
TEM_014	LSA_{ECO} N	Mixedwood Swamp	10	3	-	-	1	-	-	6	-	-	-	-	-	4	3	3	-	-	-	-	1	7	1	-	1	3	6	1	-	-	-	10	-	-	-	-	-	4	6	-	-	-	-	-
TEM_019	LSA_{ECO} N	Mixedwood Swamp	11	3	1	-	-	-	4	-	-	1	2	-	-	7	1	3	-	-	-	-	-	9	2	-	-	1	7	-	-	2	1	-	3	4	3	1	-	8	1	1	-	-	1	-
TEM_032	LSA_{ECO} N	Mixedwood Swamp	20	-	1	1	-	-	13	1	1	2	1	-	-	7	5	6	2	-	-	-	10	4	3	3	-	13	5	2	-	-	-	1	-	1	8	7	3	16	3	1	-	-	-	-
TEM_033	LSA_{ECO} N	Plantation	10	1	3	4	-	-	1	-	1	-	-	-	-	9	-	-	1	-	-	-	2	6	2	-	-	-	9	1	-	-	-	2	8	-	-	-	-	10	-	-	-	-	-	-
TEM_005	LSA_{ECO} N	Shrub Swamp	10	-	-	-	-	-	10	-	-	-	-	-	-	10	-	-	-	-	-	-	1	2	7	-	-	8	2	-	-	-	-	3	4	2	1	-	-	10	-	-	-	-	-	-

Notes:

Appearance Conifer/Deciduous: is a rank of overall condition of the tree with the following codes: 1 = Live and healthy; 2 = Live and unhealthy, internal decay or growth deformity, broken tops, dying tree; 3 = Dead and needles and fine twigs present; 4 = dead and no needles or fine twigs only coarse limbs; 5 = Dead and most branches or bark absent; 6 = Dead and no branches or bark; 7 = Dead and extensive internal decay and half original height; 8 = Dead and extensive internal decay and 1/3 original height; 9 = Dead and downed tree or stump

Bark Retention: 1 = All bark present; 2 = Bark lost (<5%) on damaged areas only; 3 = Most bark present (5 - 25% lost), bare patches, some bark may be loose; 4 = Bare sections (26-50% lost), firm and loose bark remains; 5 = Most bark gone (51-75%), firm and loose bark remains; 6 = Trace bark remains (76-99% lost); 7 = No bark (100% lost)

Crown Class: D = Dominant trees with crown extending above the general level of the layer, well developed crowns; C = Codominant trees with crowns forming the general level of the crown canopy; I = Intermediate trees with crowns below but extending into the general level of the crown canopy and small crowns; S = Suppressed trees with crowns entirely below the general level of the crown canopy

Crown Condition: 1 = All foliage, twigs, and branches present; 2 = Some or all foliage lost, possibly some twigs lost, all branches usually present, possibly broken at the top; 3 = No foliage present, up to 50% twigs lost, most branches present, possible broken top; 4 = No foliage or twigs present, up to 50% branches lost, top usually broken; 5 = Most branches have gone, some sound branch stubs remain, top broken; 6 = No branches present, some sound and rotting branch stubs, top broken.

Lichen Load: Quantity of lichen in 5g clumps: 0 = 0; 1 = 1; 2 = 2-10; 3 = 11-50; 4 = 51-125; 5 = >125

Wood Condition: 1 = No decay; 2 = Probably limited internal decay and/or deformities; 3 = Wood essentially hard, limited decay; 4 = Wood mostly hard, but decay spreading, softwood present; 5 = Balance of hard and softwood, spongy sections; 6 = More soft and spongy wood than hardwood; 7 = No more hardwood, all soft or spongy, powdery sections; 8 = Hollow shell, outer wood mostly hard or firm.

Table 4-12 presents a summary of full plots surveyed with trees where wildlife use was recorded. The majority of wildlife user sign was from birds. However, 12 plots recorded bat species use and one plot recorded white-tailed deer use. The species of bat were not recorded, and thus it is not clear whether any bats were at-risk species; however, several at-risk bat species have been documented within the BIS study areas (see Section 6.0 of Chapter 4). Most of the wildlife activity recorded was perching or roosting by birds and bats followed by feeding by woodpecker and sapsucker species. Two plots (TEM_008 and TEM_031) contained trees used for open nests and two plots (TEM_016 and TEM_032) contained trees used for cavity nesting. One plot (TEM_024) southwest of Schmidt Lake in the LSA_{ECO} north of the AOI contained a tree used for denning, but the wildlife species was unknown, and one plot (TEM_029) in the LSA_{ECO} south of the AOI contained a tree that was marked by white-tailed deer (see **Figure B-1** for plot locations).

Table 4-12. Full survey plots with larger trees with recorded wildlife use during TEM surveys. See Figure B-1 for location of sites.

Site ID	Location	Habitat Type	Number of trees	Activity	Wildlife User
TEM_003	AOI	Meadow	5	P	Bird spp.
TEM_005	LSA_{ECO} N	Shrub Swamp	10	P	Bird spp.
TEM_005	LSA_{ECO} N	Shrub Swamp	1	F	Woodpecker spp.
TEM_006	LSA_{ECO} N	Mixedwood Swamp	17	P	Bird spp.
TEM_006	LSA_{ECO} N	Mixedwood Swamp	2	P	Bat spp.
TEM_007	LSA_{ECO} N	Mixedwood Swamp	22	P	Bird spp.
TEM_008	LSA_{ECO} N	Hardwood Swamp	15	P	Bird spp.
TEM_008	LSA_{ECO} N	Hardwood Swamp	1	O	American Robin
TEM_009	LSA_{ECO} N	Hardwood Swamp	14	P	Bird spp.
TEM_010	LSA_{ECO} N	Hardwood Swamp	8	P	Bird spp.
TEM_010	LSA_{ECO} N	Hardwood Swamp	2	P	Bat spp.
TEM_010	LSA_{ECO} N	Hardwood Swamp	1	F	Woodpecker spp.
TEM_011	LSA_{ECO} N	Hardwood Swamp	15	P	Bird spp.
TEM_012	LSA_{ECO} N	Hardwood Swamp	10	P	Bird spp.
TEM_012	LSA_{ECO} N	Hardwood Swamp	1	P	Bat spp.
TEM_013	LSA_{ECO} N	Hardwood Swamp	10	P	Bird spp.
TEM_014	LSA_{ECO} N	Mixedwood Swamp	9	P	Bird spp.
TEM_014	LSA_{ECO} N	Mixedwood Swamp	1	P	Bat spp.
TEM_015	LSA_{ECO} N	Hardwood Swamp	8	P	Bird spp.
TEM_016	LSA_{ECO} N	Hardwood Swamp	20	P	Bird spp.
TEM_016	LSA_{ECO} N	Hardwood Swamp	1	C	Woodpecker spp.
TEM_016	LSA_{ECO} N	Hardwood Swamp	1	P	Bat spp.
TEM_017	LSA_{ECO} N	Mixedwood	8	P	Bird spp.
TEM_017	LSA_{ECO} N	Mixedwood	2	F	Woodpecker spp.
TEM_017	LSA_{ECO} N	Mixedwood	2	P	Bat spp.
TEM_019	LSA_{ECO} N	Mixedwood Swamp	8	P	Bird spp.
TEM_019	LSA_{ECO} N	Mixedwood Swamp	1	F	Woodpecker spp.

Site ID	Location	Habitat Type	Number of trees	Activity	Wildlife User
TEM_019	LSA_{ECO} N	Mixedwood Swamp	1	F	Yellow bellied sapsucker
TEM_020	LSA_{ECO} N	Conifer	10	P	Bird spp.
TEM_020	LSA_{ECO} N	Conifer	1	F	Woodpecker spp.
TEM_020	LSA_{ECO} N	Conifer	1	P	Bat spp.
TEM_021	LSA_{ECO} N	Hardwood	10	P	Bird spp.
TEM_022	LSA_{ECO} N	Hardwood	10	P	Bird spp.
TEM_022	LSA_{ECO} N	Hardwood	2	F	Woodpecker spp.
TEM_023	LSA_{ECO} N	Hardwood Swamp	10	P	Bird spp.
TEM_023	LSA_{ECO} N	Hardwood Swamp	2	P	Bat spp.
TEM_024	LSA_{ECO} N	Hardwood Swamp	10	P	Bird spp.
TEM_024	LSA_{ECO} N	Hardwood Swamp	1	D	Unknown
TEM_024	LSA_{ECO} N	Hardwood Swamp	1	P	Bat spp.
TEM_025	LSA_{ECO} N	Hardwood Swamp	8	P	Bird spp.
TEM_026	LSA_{ECO} N	Hardwood	6	P	Bird spp.
TEM_026	LSA_{ECO} N	Hardwood	1	P	Bat spp.
TEM_027	LSA_{ECO} N	Hardwood Swamp	10	P	Bird spp.
TEM_028	LSA_{ECO} N	Mixedwood	16	P	Bird spp.
TEM_031	LSA_{ECO} N	Conifer	28	P	Bird spp.
TEM_031	LSA_{ECO} N	Conifer	1	O	Bird spp.
TEM_032	LSA_{ECO} N	Mixedwood Swamp	16	P	Bird spp.
TEM_032	LSA_{ECO} N	Mixedwood Swamp	3	P	Bat spp.
TEM_032	LSA_{ECO} N	Mixedwood Swamp	1	C	Bird spp.
TEM_032	LSA_{ECO} N	Mixedwood Swamp	1	F	Woodpecker spp.
TEM_033	LSA_{ECO} N	Plantation	10	P	Bird spp.
TEM_033	LSA_{ECO} N	Plantation	1	F	Woodpecker spp.
TEM_033	LSA_{ECO} N	Plantation	1	T	Woodpecker spp.
TEM_002	LSA_{ECO} S	Marsh	2	P	Bird spp.
TEM_018	LSA_{ECO} S	Conifer Swamp	9	P	Bird spp.
TEM_018	LSA_{ECO} S	Conifer Swamp	2	P	Bat spp.
TEM_029	LSA_{ECO} S	Mixedwood	10	P	Bird spp.
TEM_029	LSA_{ECO} S	Mixedwood	1	M	White-tailed deer
TEM_030	LSA_{ECO} S	Mixedwood	9	P	Bird spp.

Notes:
Wildlife Activity Codes: P = perching/roosting; F = feeding; O = open nest; C= cavity nest; D = denning/resting; T = travel; M = mark tree
For all standing trees with an effective crown, it was assumed that perching activity by bird species occurs.
For all large trees (>25 DBH) with an appearance code of 4 or less (see **Table 4-11**) with notes indicating recorded cavities, Bat spp. were assumed as the wildlife user.
For trees with field notes indicating a crevice in the roots, denning was assumed by an unknown mammal.
For trees with notes indicating a potential cavity nest, wildlife user was assumed to be an unknown bird.
Data in the table does not capture deer browsing or use of the surveyed plot by species that do not use the larger trees. Deer browsing is captured in the forest health assessment in Section 4.3.

4.3 Forest Health

Overall forest health was rated at full plots during field surveys. Forest health was rated as poor, fair, or good based on three variables: tree health, standing snags, and deer browse. In general, forest health at most plots was considered fair to poor throughout the LSA_{ECO} (**Figure E-1**; **Table 4-13**).

In most plots, tree health was rated fair. However, at the full plot in the northern portion of the AOI tree health was rated good. Tree health was also rated good at several plots in the northeastern LSA_{ECO} and at two plots in the southern LSA_{ECO} (**Figure E-1**). Ratings of fair and poor were due to several factors including evidence of emerald ash borer (EAB), evidence of beech bark disease (BBD), fungus or cankers, and severe canopy decline (**Table 4-13**).

Of the sites rated as 'fair' for tree health, all sites had signs of EAB detected in the stand with the ash component ≤30%. EAB was detected in 75% of sites rated poor, with 25% in stands constituting ≤30% ash and 50% in stands constituting >30% ash (**Table 4-14**). **Figure E-2** presents full plot sites which contain ash species and those with detected EAB. EAB was detected only at full plot sites in the LSA_{ECO} north of the AOI. Only three of the 25 sites north of the AOI containing ash species did not have evidence of EAB. Two full survey sites in the LSA_{ECO} south of the AOI contained ash species but did not have evidence of EAB. No ash species were detected in the full plot surveyed in the AOI. EAB was also recorded incidentally during other BIS field surveys, and a full overview of its detection is presented in Chapter 9.

The other factors contributing to a tree health rating of poor or fair were not as prevalent as EAB. BBD was only detected at one site in the LSA_{ECO} south of the AOI rated as poor tree health and the pathogen *Neonectria* was present at this site (**Figure E-2**). Two full survey sites in the LSA_{ECO} north of the AOI also had beech trees but did not have evidence of BBD. Fungus or cankers were present at eight sites (six rated fair and two rated poor). Severe canopy decline was detected at seven sites (six rated fair affecting 10-25% of trees and one rated poor affecting >25% of trees).

Table 4-13. Number of full survey sites in each study area ranked by forest health category.

Forest Health Attribute	Tree Health			Standing Snags			Deer Browse		
	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor
AOI (1)	1	-	-	-	-	1	-	-	1
LSA_{ECO} North (28)	5	20	3	4	12	12	2	7	19
LSA_{ECO} South (4)	2	1	1	1	1	2	-	-	4
Total (33)	8	21	4	5	13	15	2	7	24
Notes: Number in brackets is the total number of full plots assessed in each study areas.									

Table 4-14. Factors affecting condition of tree health in full plots surveyed for tree condition.

Condition	# Sites	Emerald Ash Borer detected in stand		Beech Bark Disease detected in stand		Fungus, Cankers		Severe Canopy Decline	
		≤30% ash	>30% ash	Pimples present	*Neonectria* present	5-10% trees	>10% trees	10-25% trees	>25% trees
Fair	21	21 (100%)	-	-	-	6 (29%)	-	6 (29%)	-
Poor	4	1 (25%)	2 (50%)	-	1 (25%)	1 (25%)	1 (25%)	-	1 (25%)

Standing snags are an indicator of healthy ecosystems because they can provide animals with shelter for nesting, and food (Hutto 2006). Of the 33 plots rated for forest health during TEM surveys, only 15% of plots (four plots in the LSA_{ECO} north of the AOI, and one in the LSA_{ECO} south of the AOI) were rated as "good" for standing snags (**Table 4-13**). Many (45%) plots surveyed for forest health were rated as poor for standing snags as they had less than 11% standing tree snags and less than eight snags per ha with DBH of greater than 25 cm (**Table 4-13**). Another 39% of plots were rated as fair as they had either less than 11% standing tree snags or less than eight snags per ha with DBH greater than 25 cm (**Table 4-13**). The plot surveyed in the AOI was rated as poor quality for standing snags.

Deer browsing can impact the quality of forest for other animals (Rooney and Waller 2003). Over-browsing can significantly reduce the understory cover which in turn can impact growth of new trees and the overall structure of the forest (Laurent et al. 2017). Most (73%) plots surveyed for forest health were rated as "poor" quality due to deer browsing as they had less than 225 tree seedlings per 400 m^2 (**Table 4-13**), including the plot located in the AOI and all plots surveyed in the LSA_{ECO} south of the AOI. Only two plots (6%) located in the LSA_{ECO} north of the AOI were deemed high quality and had ≥225 tree seedlings per 400 m^2 and a seedling ratio[5] of ≥0.

4.3.1 Disturbance

4.3.1.1 Logging Disturbance

Disturbance due to past logging activities was assessed as part of the overall condition of the plots. A full summary of logging damage by plot (where logging was present) is provided in **Figure E-1** in **Appendix E**. Disturbance due to logging in each study area was primarily due to past logging >30 years ago with less logging disturbance reported within each subsequent timeframe assessed (see **Table E-1** and **Figure E-3** [Maps 1 – 5]). The AOI had the highest proportion of plots with recent logging activity within the past five years (**Table 4-15**; **Figure E-3**). Recent logging activity occurred in plots scattered primarily within the northern, western, and central portions of the AOI. Intensity and extent of logging occurring within the last 15 years within the AOI was low to medium. Intensity and extent of logging was greatest in the northern portion of the AOI but primarily occurred > 30 years ago. With the exception of logging activity within the past 5 years, the LSA_{TER} and LSA_{ECO} south of the AOI were most similar to the AOI when considering logging disturbance proportions by timeframe (see **Figure E-3** [Map 1 – 5]). Plots within the LSA_{ECO} north of the AOI had the lowest proportion of plots with logging within the last 30 years (**Table 4-15**). The GSWC comprises much of the area within the LSA_{ECO} north of the AOI and is a Provincially Significant Wetland which is protected from extensive logging.

Table 4-15. Proportion of plots surveyed in each study area with logging at various time frames.

Study Area	Number of Plots	Logging: 0-5 years	Logging: 5-15 years	Logging: 15-30 years	Logging: 30+ years
AOI	90	19%	7%	11%	43%
LSA_{TER}	20	0%	10%	15%	65%
LSA_{ECO} N	283	1%	2%	5%	54%
LSA_{ECO} S	80	9%	11%	10%	56%
Notes: Field crews used clues that were visible on site to determine age of logging (e.g., apparent age of regenerating cohort, degree of stump decay, apparent freshness of logging disturbance such as skid trails).					

[5] Ratio of tall (≥ 30 cm) to short (< 30 cm) seedlings; method for assessing impact of ungulate browsing.

Damage to the remaining trees within the plot due to previous logging activities was also recorded during the assessment of the overall plot condition. The greatest damage to the trees remaining in plots where previous logging activities occurred were related to broken branches, broken stems, and leaning trees (**Table 4-16**). Uprooted trees, stem woods, root damage, tire ruts, and excessive skid trails were also recorded at some plots (**Table 4-16**). No evidence of girdled trees was present at any plots surveyed within any study area. The proportion of plots with various tree damage related to logging was highest in the AOI followed by the LSA_{TER} and LSA_{ECO} south of the AOI (**Table 4-16**).

Table 4-16. Proportion of plots surveyed in each study area with damage to trees from logging activities.

Study Area	*N* Plots	Stem Broken	Uprooted Trees	Girdled Trees	Stem Wounds	Broken Branches	Leaning Tree	Root Damage	Tire Ruts	Excessive Skid Trails	Excessive Skid Trail Width
AOI	90	13%	7%	0%	9%	14%	12%	8%	4%	6%	3%
LSA_{TER}	20	5%	0%	0%	0%	0%	0%	0%	5%	5%	0%
LSA_{ECO} N	283	1%	1%	0%	1%	2%	2%	1%	2%	1%	1%
LSA_{ECO} S	80	4%	4%	0%	4%	5%	8%	4%	0%	1%	1%

4.3.1.1 Human Disturbance

Human disturbance from several activities was assessed as part of the overall condition of the plots. A full summary of human disturbance activities by plot (where disturbance was apparent) is provided in **Table E-3** in **Appendix E**. **Table 4-17** provides the proportion of plots within each study area with various human disturbance activities. In the AOI, the highest proportion of human disturbance was related to tracks and trails followed by gaps in the canopy. Recreational use, planting (tree plantations), and earth displacement was present in >10% of plots surveyed in the AOI. Livestock grazing, dumping, and sugar bush operations were also recorded in a smaller proportion of plots in the AOI. Tracks and trails represented the highest proportion of human disturbance in the LSA_{TER} and LSA_{ECO} south of the AOI. Livestock grazing was prevalent in the highest proportion of plots within the LSA_{TER}. Recreational use was documented in the highest proportion of plots in the LSA_{ECO} south of the AOI. Gaps in the canopy, tree plantation planting, and dumping were also present in >10% of plots surveyed in the LSA_{ECO} south of the AOI. In the LSA_{ECO} north of the AOI, the most common human disturbance activity was gaps in the canopy followed by trails and tracks and recreational use.

Table 4-17. Proportion of plots surveyed in each study area with human disturbance activities.

Study Area	*N* Plots	Sugar Bush Operations	Gaps in Canopy	Livestock (Grazing)	Planting (Plantation)	Tracks and Trails	Dumping (Rubbish)	Earth Displacement	Recreational Use	Other Human Disturbance
AOI	90	1%	26%	4%	11%	34%	3%	10%	16%	9%
LSA_{TER}	20	0%	5%	15%	5%	15%	0%	0%	5%	5%
LSA_{ECO} N	283	<1%	25%	<1%	8%	12%	3%	1%	12%	2%
LSA_{ECO} S	80	1%	11%	0%	10%	23%	10%	1%	23%	3%

4.3.1.2 Natural Disturbance

Natural disturbance was assessed as part of the overall condition of the plot. A full summary of natural disturbance activities by plot (where disturbance was apparent) is provided in **Table E-4** in **Appendix E**. **Table 4-18** provides the proportion of surveyed plots within each study area with various forms of natural disturbance. Disease and pests resulting in the death of trees was prevalent in the highest proportion of plots within each study area except the LSA_{TER} relative to other natural disturbances. Damage due to browsing by deer and flooding was also prevalent in a large proportion (>40%) of plots within all study areas. Windthrow was prevalent in plots in the LSA_{ECO} both north and south of the AOI and was present in 34% and 25% of plots in the AOI and LSA_{TER}, respectively. Damage due to fire was not present in any of the plots surveyed.

Table 4-18. Proportion of plots surveyed in each study area with natural disturbance.

Study Area	*N* Plots	Disease/ Pest/ Death of Trees	Windthrow (Blowdown)	Browse (e.g., Deer)	Beaver Activity	Flooding (Pools & Puddling)	Fire	Other Natural Disturbances
AOI	90	60%	34%	59%	3%	58%	0%	2%
LSA_{TER}	20	35%	25%	50%	0%	40%	0%	0%
LSA_{ECO} N	283	83%	63%	61%	4%	76%	0%	2%
LSA_{ECO} S	80	78%	64%	56%	4%	53%	0%	1%

5.0 DISCUSSION

5.1 Presence and Distribution of Ecosite Groupings within the BIS Study Areas

When planning infrastructure placement, it is important to consider patterns of presence, sensitivity, use by biota, and relative rarity of ecosites across the landscape. Within the BIS study areas, there are differences in the patterns and distribution of ecosites. North of the AOI, polygons within the LSA_{ECO} are primarily characterized by wetlands such as hardwood swamps and have wetter organic soils throughout much of the landscape. In this northern region, smaller polygons of drier soils and ecosite types such as upland and forest habitats occur along the outer perimeter of the GSWC. A small portion of the southern GSWC protrudes into the LSA_{TER} and AOI. In these areas, the ecosites and soils are similar to the wetland ecosites found in the LSA_{ECO} north of the AOI. Aside from this small wetter region, most of the natural and naturalized lands in the AOI and LSA_{TER} consist of small polygons of dry to fresh ecosites like forests. Meadows and wetter ecosite types (such as swamps and marshes) are primarily found surrounding watercourses and aquatic areas. The LSA_{ECO} south of the AOI is more similar in ecosite distribution and polygon size to the AOI and LSA_{TER} than its northern counterpart. Most natural and naturalized lands in the LSA_{ECO} south of the AOI are comprised of moist to dry ecosite types with wetter ecosites surrounding tributaries and waterbodies and in wetland complexes.

Sensitive ecosites associated with rare vegetation communities that may be considered SWH are discussed further in Appendix C, Chapter 1 of this 2023 BIS Baseline Report. Rare ecosites may provide biota with habitat that would not otherwise be present. Avoiding such ecosites when placing infrastructure could benefit biota if these ecosites are deemed to provide important habitat. Several ecosite groupings were rare throughout the areas mapped within the BIS study areas, including shrub, wetland fen, meadow, conifer swamp, shrub swamp, and marsh ecosites. These areas may provide unique habitat for biota. Several ecosites were only found within the AOI or LSA_{TER}. Dry to Fresh Pine Coarse

Mineral Mixedwood Treed (TRT-MNd4) and Dry to Fresh Fine Non-Calcareous Shrub Meadow (MEW-Sn2) were only found within the AOI and Treed Fen (FEW-T1) was only found within the LSA_{TER} with a very small amount protruding into the LSA_{ECO} north of the AOI. Several other ecosites including Larch Organic Conifer Swamp (SWT-Co4) and Dry to Fresh Coarse Non-Calcareous Shrub Meadow (MEW-Sn1) were primarily found within the AOI with only a small amount in the LSA_{ECO} north of the AOI. These ecosites should be investigated further for their potential importance to biota to determine whether they should be avoided during infrastructure placement.

Polygon size and heterogeneity of ecosites on the landscape differed among study areas, and this impacted the distribution of rare ecosites. The LSA_{ECO} north of the AOI primarily consists of larger consolidated polygons of hardwood swamp with smaller polygons of other ecosites surrounding the swamp, whereas the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI had more even distributions of smaller polygons of various ecosites. Due to the higher variability and smaller ecosite polygons, the southern study areas (AOI, LSA_{TER}, and LSA_{ECO}) had rarer ecosites than the northern LSA_{ECO}. The patterns of ecosite types on the landscape are not surprising as the southern study areas have more human disturbance including agriculture and rural development relative to the northern LSA_{ECO}. These human practices limit the size of ecosite polygons to areas that have remaining natural habitat such as riparian zones and property lines. In addition, property owners may plant certain species (e.g., eastern white cedar) in favour of other species, which may be prevalent in the hedgerows separating properties. Conversely, the lands within the GSWC in the LSA_{ECO} north of the AOI and in the smaller wetland complexes[3] south of the AOI contain lands that have not been modified to the same extent as privately owned lands. Thus, ecosites within these areas remain as larger consolidated polygons with more naturally occurring species.

5.2 Limitations in Vegetation and Habitat Data Collection among Ecosites

Ecosite and habitat data collected during the TEM program will ultimately assist in selecting sampling sites for future Tier 2 biodiversity value community characterization studies. Zoetica's study design was to stratify and randomize field plots according to ecosite occurrence in each study area such that the number of plots by ecosite and survey type would be equally distributed within each study area by proportion of ecosites available. In 2022, field data collection was limited by access to sites within the BIS study areas. As such, the distribution of plots within the study areas was uneven as more public lands were available for survey in the northern portion of the LSA_{ECO} (particularly in the GSWC) than the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI. Surveyed areas within the AOI were comprised mainly of Nuclear Waste Management Organization (NWMO)-owned/optioned lands and private lands. Surveyed areas within the LSA_{TER} and LSA_{ECO} south of the AOI were comprised mainly of private lands with some public lands within the TWC and WWC. As access to private properties requires permission from the landowner, the NWMO focussed their efforts to gain land access to lands primarily within the AOI. Still, several properties within the AOI remained inaccessible, especially in the southern portion. Similarly, the LSA_{TER} and LSA_{ECO} had large proportions of land that were not accessible for surveys.

The limitations to accessibility resulted in Zoetica limiting the stratification of points for survey to within accessible parcels of land regardless of study area. While plots were randomized and stratified on the landscape, study area was not used as a variable because there were not enough available polygons to stratify by survey type (full, ground, or visual) within any given study area. More polygons were available in the LSA_{ECO} north of the AOI, so it was more likely for a polygon within the LSA_{ECO} to be selected. Many ecosites were limited to only one accessible polygon, which Zoetica always assigned a full survey plot. If

more than one polygon was available for a particular ecosite, Zoetica assigned additional ground and visual plots. Because desk-based mapping was limited by leaf-off conditions, many plots originally proposed as full and ground plots were downgraded to visual plots to avoid oversampling in specific hardwood ecosites. These factors combined resulted in assignment of 50 full plots, 59 ground plots and 429 visual plots, of which 5 full, 13 ground, and 84 visual plots were in the AOI. As the proportion of natural and naturalized areas within the AOI relative to the LSA_{ECO} was approximately 5%, the design was proportionally balanced. However, in 2022, only one full plot, 10 ground plots, and 79 visual plots were surveyed by field crews within the AOI. Remaining plots within the AOI were not surveyed because field crews deemed them inaccessible due to unsafe conditions (e.g., flooding of land), landowner permissions not being received in time, or not receiving a utility locate (that is required for full plots) before the end of the sampling season.

The focus of data collection at full and ground plots was to collect much of the habitat and vegetation data required to plan further Tier 2 studies, while the focus of visual plots was to verify ecosite classifications and plot condition. Eventually, the collection of vegetation and habitat data within full and ground plots could be used to make predictions about vegetation and habitat attributes in polygons not accessible or selected for survey, depending on the strength of patterns uncovered. However, as many ecosites did not have many available polygons for survey, it was not possible to determine trends of vegetation and habitat attributes by ecosite type. Instead, only general patterns across the landscape could be assessed. Additional field data collection would allow for more specific predictions in future iterations of the BIS Baseline Report.

5.3 Vegetation and Habitat Trends Across Study Areas

In general, structural stage was consistently greater in the LSA_{ECO} north of the AOI relative to other study areas. In addition, vegetation cover was greater in the tree layer in the LSA_{ECO} north of the AOI relative to other areas where the herb layer cover was greatest. This result was expected, as the GSWC comprises much of the area within the LSA_{ECO} north of the AOI, and disturbances within the GSWC are minimized due to its status as a Provincially Significant Wetland. In addition, the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI had relatively greater portions of ecosites that naturally have lower structural stages (e.g., shrub, meadow, and marsh ecosites). Within the AOI, areas with higher structural stage, stand height, and greater cover in the tree layer were found in plots along the northeastern, eastern, and southern portions of the AOI. However, only 11 plots total were assessed for structural stage and cover within the AOI. The dominant species in structural vegetation layers also differed between the AOI and LSA_{TER} relative to the LSA_{ECO}. In general, the number of species in the older vegetation layers (e.g., A1 tree layer) within the AOI and LSA_{TER} were lower than in the LSA_{ECO}, and the LSA_{ECO} north of the AOI had the most species in these older layers. A similar trend was observed within the shrub layer. The AOI and LSA_{TER} had proportionally more farmland and private properties relative to the LSA_{ECO}. Thus, it is not surprising to encounter less species variability within areas that have been altered for agricultural purposes. Many of the remaining tree stands within the AOI and LSA_{TER} are limited to the perimeter of private properties, riparian areas, and swamp lands that are unsuitable for agriculture.

Other than SWH discussed in Appendix C, Chapter 1, habitat features such as CWD piles and tree attributes for wildlife were assessed only at full plots during TEM surveys unless evidence of use was recorded as incidental observations (see Chapters 2 through 9 for incidental observations of BVs within various study areas). Only one full plot was surveyed in 2022 in the AOI, thus comparisons of these habitat features

within the AOI to other areas is not possible at this time. Habitat features for wildlife recorded during TEM surveys were primarily related to bird activity including perching, nesting, and feeding sites. Additional potential habitat was also documented for bats. Large diameter trees (> 25 cm DBH) with a decay class of 4 or less that contained cavities were recorded as potential bat roosting sites. As bat presence was not recorded it is not possible to determine if potential roosting sites were being used by bats. However, based on monitoring carried out by the Native Bats Conservation Program at the Toronto Zoo, a restricted bat species (M1) is known to be utilizing habitats within the BIS study areas (Thorne et al. 2021, Sparrow-Scinocca et al. 2022), and thus it is possible that some potential tree roosting sites could be used by at-risk bats (see Section 6.0, Chapter 4). In addition to birds and bats, one plot in the LSA_{ECO} north of the AOI had a tree containing a denning site for an unknown species, and one plot in the southern section of the LSA_{ECO} had a tree with evidence of white-tailed deer markings. These data demonstrate the potential use of the habitat in and surrounding the AOI by various wildlife species. Additional Tier 1 TEM studies, and future Tier 2 studies in the AOI and surrounding study areas will be conducted to further ascertain the value of habitats within these study areas for wildlife.

5.4 Health and Condition of Habitats Across Study Areas

Forest health was assessed at full plots for various factors including tree health, standing snags, and deer browse. At all plots visited, disturbance due to logging, human disturbance and natural disturbance were recorded. Results of tree health demonstrated that at nearly all plots that contained ash trees, evidence of emerald ash borer was present. Only four plots containing ash did not have evidence of EAB. Ash trees were more prevalent in the LSA_{ECO} north of the AOI; no full plots surveyed within the AOI or LSA_{TER} contained ash trees and only one full plot surveyed in the LSA_{ECO} south of the AOI contained ash trees. This plot did not have evidence of EAB. EAB was also recorded incidentally during other BIS field surveys within the AOI and in the LSA_{ECO} south of the AOI (see Chapter 9). Emerald ash borer is an invasive beetle native to northeastern Asia that is known to spread rapidly among ash trees to feed on them, resulting in tree death (NRCan 2020). Without control measures to manage EAB, all trees infested by EAB are expected to die within approximately 10 years (NRCan 2020). Observations of EAB are likely a concern for forest health, particularly in locations where the presence of ash species is higher. Beech bark disease was also noted in one plot in the LSA_{ECO} south of the AOI. Only three full plots were noted to contain beech trees, two of which occurred in the LSA_{ECO} north of the AOI. Additional surveys are recommended within treed plots in the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI to document the presence of ash, beech, EAB, and BBD.

Disturbance due to logging, human disturbance, and natural disturbance was prevalent in most plots surveyed. Most evidence of logging was from activities that occurred greater than 30 years ago. However, more recent logging activities (within the past 15 years) was documented in a greater proportion within the AOI and LSA_{TER} relative to the LSA_{ECO} north and south of the AOI. However, at most plots, the extent and intensity of recent logging was more localized and lighter to moderate relative to logging conducted greater than 15 years ago. The extent and intensity of logging was most extensive and heavy in plots with evidence of logging greater than 30 years ago.

5.5 Next Steps

Data collected in 2022 were limited to accessible parcels of land including publicly owned lands, NWMO-owned/optioned lands, conservation authority lands, and private lands where private property owners have granted permission. As a result, planned plots for the 2022 field season could not fulfill the TEM

recommendation to survey at a Level 2 (51-75% of polygons) within the relative study areas with a ratio of 3:17:80 for full, ground, and visual plots. Data collected at these recommended ratios can be used to further update desk-based mapping. For many of the desk-based mapped ecosites within the BIS study areas, only one or a few polygons were accessible for survey. Thus, it was not possible for Zoetica to assess trends in the data relative to ecosites and the focus of the 2023 Baseline Report shifted to look at general patterns on the landscape instead of at the ecosite level. In addition, as only one full plot and 10 ground plots were surveyed within the AOI, vegetation and habitat information within the AOI was limited to 11 polygons.

Vegetation and habitat attributes are important for planning future Tier 2 BV Studies. Ideally, vegetation and habitat attributes collected at full and ground plots can be summarized by ecosite and these attributes can be assumed at the same ecosites in polygons that have not been field-verified. However, due to the large number of ecosites (99 ecosites excluding aquatic habitat – see **Table C-2** in **Appendix C**) within the BIS study areas, many ecosites only had one full or ground plot surveyed and some only had visual plots surveyed where vegetation and habitat data are not collected; thus, it is not possible to predict relationships between ecosites and vegetation and habitat variables at this time.

Zoetica recommends continued Tier 1 TEM studies to meet the Level 2 survey recommendations prior to site selection. Since most full plots to date were located in the northern portion of the LSA_{ECO} due to the availability of accessible polygons in the GSWC, Zoetica recommends focussing additional TEM studies in the AOI and LSA_{TER} and in representative areas within the LSA_{ECO} south of the AOI using full and ground survey plots to understand vegetation and habitat information across these study areas. Zoetica understands that additional property access will likely be required to ensure enough polygons in the AOI, LSA_{TER}, and LSA_{ECO} south of the AOI can be surveyed. Additional Tier 1 TEM effort within the LSA_{ECO} north of the AOI can be limited to any remaining data gaps. Best practices also recommend surveying 100% of the area where infrastructure will be placed at a ratio of 2:15:83 full:ground:visual plots. Once an Initial Project Description including potential infrastructure placement is known, and if the SON-South Bruce site is selected, continued Tier 1 TEM studies should be conducted in 100% of the polygons overlapping with project infrastructure. This surveying will ensure adequate vegetation and habitat information is collected so that project impacts can be credibly predicted, the mitigation hierarchy applied, and opportunities for benefit/enhancement can be pursued.

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APPENDIX A – SPECIES LIST

Table A-1. Common and scientific names for species mentioned in this Appendix B, Chapter 1. Species names follow the NHIC's Ontario species lists (current to March 1, 2023).

Common Name	Scientific Name
Vegetation	
Alder	*Alnus* spp.
Alder-leaved buckthorn	*Endotropis alnifolia*
Allegheny blackberry	*Rubus allegheniensis*
Alternate-leaved dogwood	*Cornus alternifolia*
American beech	*Fagus grandifolia*
American black currant	*Ribes americanum*
American golden-saxifrage	*Chrysosplenium americanum*
American hazelnut	*Corylus americana*
American hog-peanut	*Amphicarpaea bracteata*
American hop-hornbeam	*Ostrya virginiana*
American royal fern	*Osmunda regalis var. spectabilis*
American tree moss	*Climacium americanum*
American water pennywort	*Hydrocotyle americana*
American water-horehound	*Lycopus americanus*
American woodland strawberry	*Fragaria vesca* ssp. *americana*
Andrews' bottle gentian	*Gentiana andrewsii*
Annual fleabane	*Erigeron annuus*
Arrowhead	*Sagittaria* spp.
Ash	*Fraxinus* spp.
Aspen	*Populus* spp.
Aster sp.	*Aster* sp.*; Symphyotrichum sp.*
Autumn olive	*Elaeagnus umbellata*
Avens	*Geum* sp.
Awl-fruited sedge	*Carex stipata*
Balsam fir	*Abies balsamea*
Baneberry	*Actaea* spp.
Barren strawberry	*Geum fragarioides*
Basswood	*Tilia americana*
Beaked hazelnut	*Corylus cornuta*
Bearded sedge	*Carex comosa*
Bebb's willow	*Salix bebbiana*
Bebb's sedge	*Carex bebbii*
Bedstraw	*Galium* spp.
Beech bark disease (fungus)	*Neonectria faginata; N. ditissima*
Birch	*Betula* spp.

Bird vetch	*Vicia cracca*
Bittersweet nightshade	*Solanum dulcamara*
Black ash	*Fraxinus nigra*
Black cherry	*Prunus serotina*
Black medick	*Medicago lupulina*
Black raspberry	*Rubus occidentalis*
Black walnut	*Juglans nigra*
Black-eyed Susan	*Rudbeckia hirta* var. *pulcherrima*
Bladder campion	*Silene vulgaris*
Bladder sedge	*Carex intumescens*
Blue cohosh	*Caulophyllum* sp.
Blue vervain	*Verbena hastata*
Blue-beech	*Carpinus caroliniana*
Bluejoint reedgrass	*Calamagrostis canadensis*
Blunt broom sedge	*Carex tribuloides*
Bog goldenrod	*Solidago uliginosa*
Bracken fern	*Pteridium aquilinum*
Bristle-leaved sedge	*Carex eburnea*
Bristle-stalked sedge	*Carex leptalea*
Bristly black currant	*Ribes lacustre*
Bristly dewberry	*Rubus hispidus*
Bristly greenbrier	*Smilax tamnoides*
Broad-leaved cattail	*Typha latifolia*
Broad-leaved enchanter's nightshade	*Circaea canadensis*
Broad-leaved helleborine	*Epipactis helleborine*
Brownish sedge	*Carex brunnescens*
Bryophytes	*Bryophyte* sp.
Bulblet bladder fern	*Cystopteris bulbifera*
Bulbous water-hemlock	*Cicuta bulbifera*
Bull thistle	*Cirsium vulgare*
Bunchberry	*Cornus canadensis*
Bur oak	*Quercus macrocarpa*
Calico aster	*Symphyotrichum lateriflorum*
Callicladium moss	*Callicladium* sp.
Canada anemone	*Anemonastrum canadense*
Canada avens	*Geum canadense*
Canada fly honeysuckle	*Lonicera canadensis*
Canada goldenrod	*Solidago canadensis* var. *canadensis*
Canada lettuce	*Lactuca canadensis*
Canada mint	*Mentha canadensis*

Canada moonseed	*Menispermum canadense*
Canada thistle	*Cirsium arvense*
Canada yew	*Taxus canadensis*
Canadian wild-ginger	*Asarum canadense*
Canadian wood nettle	*Laportea canadensis*
Cardinal flower	*Lobelia cardinalis*
Cattail	*Typha* spp.
Cedar	*Thuja* spp.
Cherry	*Prunus* spp.
Chokecherry	*Prunus virginiana*
Christmas fern	*Polystichum acrostichoides*
Cinnamon fern	*Osmundastrum cinnamomeum*
Coltsfoot	*Tussilago farfara*
Common apple	*Malus pumila*
Common boneset	*Eupatorium perfoliatum*
Common burdock	*Arctium minus*
Common buttercup	*Ranunculus acris*
Common dandelion	*Taraxacum officinale*
Common elderberry	*Sambucus canadensis*
Common hackberry	*Celtis occidentalis*
Common hawkweed	*Hieracium lachenalii*
Common hemp-nettle	*Galeopsis tetrahit*
Common Labrador tea	*Rhododendron groenlandicum*
Common marsh bedstraw	*Galium palustre*
Common milkweed	*Asclepias syriaca*
Common mullein	*Verbascum thapsus*
Common oak fern	*Gymnocarpium dryopteris*
Common speedwell	*Veronica officinalis*
Common St. John's-wort	*Hypericum perforatum*
Common reed	*Phragmites australis; Phragmites spp.*
Common timothy	*Phleum pratense*
Common water-parsnip	*Sium suave*
Common water-plantain	*Alisma plantago-aquatica*
Common winterberry	*Ilex verticillata*
Common woolly bulrush	*Scirpus cyperinus*
Common yarrow	*Achillea millefolium*
Cottony willow	*Salix eriocephala*
Creeping bentgrass	*Agrostis stolonifera*
Creeping Foamflower	*Tiarella stolonifera*
Crested sedge	*Carex cristatella*

Crested wood fern	*Dryopteris cristata*
Curled dock	*Rumex crispus*
Currant	*Ribes* spp.
Cyperus-like sedge	*Carex pseudocyperus*
Dandelion sp.	*Taraxacum* sp.
Dark-green bulrush	*Scirpus atrovirens*
Delicate fern moss	*Thuidium delicatulum*
Deptford pink	*Dianthus armeria*
Devil's beggarticks	*Bidens frondosa*
Divine bogmoss	*Sphagnum divinum*
Dock	*Rumex* sp.
Dotted hawthorn	*Crataegus punctata*
Dotted leafy moss	*Rhizomnium punctatum*
Drooping woodland sedge	*Carex arctata*
Drooping woodreed	*Cinna latifolia*
Dudley's rush	*Juncus dudleyi*
Dwarf blackberry	*Rubus pubescens*
Dwarf clearweed	*Pilea pumila*
Dwarf scouring-rush	*Equisetum scirpoides*
Early meadow-rue	*Thalictrum dioicum*
Eastern cottonwood	*Populus deltoides*
Eastern hemlock	*Tsuga canadensis*
Eastern marsh fern	*Thelypteris palustris* var. *pubescens*
Eastern ninebark	*Physocarpus opulifolius*
Eastern panicled aster	*Symphyotrichum lanceolatum* ssp. *lanceolatum*
Eastern poison ivy	*Toxicodendron radicans* var. *radicans*
Eastern prickly gooseberry	*Ribes cynosbati*
Eastern riverbank wildrye	*Elymus riparius*
Eastern rough sedge	*Carex scabrata*
Eastern skunk cabbage	*Symplocarpus foetidus*
Eastern star sedge	*Carex radiata*
Eastern tall goldenrod	*Solidago altissima* var. *altissima*
Eastern teaberry	*Gaultheria procumbens*
Eastern white cedar / white cedar	*Thuja occidentalis*
Eastern white pine / white pine	*Pinus strobus*
English plantain	*Plantago lanceolata*
European buckthorn	*Rhamnus cathartica*
European red currant	*Ribes rubrum*
Evergreen wood fern	*Dryopteris intermedia*
False waterpepper	*Persicaria hydropiperoides*

Field horsetail	*Equisetum arvense*
Field pussytoes	*Antennaria neglecta*
Finely-nerved sedge	*Carex leptonervia*
Flat-branched tree-clubmoss	*Dendrolycopodium obscurum*
Flat-top white aster	*Doellingeria umbellata*
Flat-topped white aster	*Symphyotrichum umbellatum*
Forkmoss	*Dicranum* sp.
Fowl bluegrass	*Poa palustris*
Fowl mannagrass	*Glyceria striata*
Fox sedge	*Carex vulpinoidea*
Fraser's St. John's-wort	*Triadenum fraseri*
Freeman's maple	*Acer x freemanii*
Fringed milkwort	*Polygaloides paucifolia*
Fringed orchid sp.	*Platanthera* sp.
Fringed sedge	*Carex crinita*
Fringed yellow loosestrife	*Lysimachia ciliata*
Garden bird's-foot trefoil	*Lotus corniculatus*
Giant blue cohosh	*Caulophyllum giganteum*
Giant goldenrod	*Solidago gigantea*
Giant Solomon's seal	*Polygonatum biflorum*
Glossy buckthorn	*Grangula alnus*
Glossy-leaved aster	*Symphyotrichum firmum*
Goldenrod sp.	*Solidago* spp.
Goldthread	*Coptis trifolia*
Graceful sedge	*Carex gracillima*
Graminoid	*Graminoid* sp.
Grapevine sp.	*Vitis* sp.
Grass-leaved goldenrod	*Euthamia graminifolia*
Great blue lobelia	*Lobelia siphilitica*
Greater water dock	*Rumex britannica*
Green ash / red ash	*Fraxinus pennsylvanica*
Green-fruited burreed	*Sparganium emersum*
Grey dogwood	*Cornus racemosa*
Haircap moss	*Polytrichum* spp.
Hairy green sedge	*Carex hirsutella*
Hairy Solomon's seal	*Polygonatum pubescens*
Handsome woollywort	*Trichocolea tomentella*
Hard-stemmed bulrush	*Schoenoplectus acutus*
Harlequin blue flag	*Iris versicolor*
Hawkweed sp.	*Hieracium* sp.

Hawthorn	*Crataegus* spp.
Heart-leaved Foamflower	*Tiarella cordifolia*
Hemlock	*Tsuga* spp.
Hemp dogbane	*Apocynum cannabinum*
Herb-robert	*Geranium robertianum*
Hidden spikemoss	*Selaginella eclipes*
Highbush cranberry	*Viburnum opulus* var. *americanum*
Honeysuckle	*Lonicera* spp.
Hooked agrimony	*Agrimonia gryposepala*
Hooked buttercup	*Ranunculus recurvatus*
Hop sedge	*Carex lupulina*
Horsetail spp.	*Equisetum* spp.
Indian cucumber-root	*Medeola virginiana*
Indian-pipe	*Monotropa uniflora*
Inland sedge	*Carex interior*
Interrupted fern	*Osmunda claytoniana*
Iris sp.	*Iris* sp.
Jack-in-the-pulpit	*Arisaema triphyllum*
Kentucky bluegrass	*Poa pratensis*
Kidney-leaved buttercup	*Ranunculus abortivus*
Knapweed	*Centaurea* sp.
Labrador violet	*Viola labradorica*
Lake sedge	*Carex lacustris*
Lance-leaved selfheal	*Prunella vulgaris* ssp. *lanceolata*
Large false solomon's seal	*Maianthemum racemosum*
Large-toothed aspen	*Populus grandidentata*
Leafy moss	*Mnium* sp.
Leatherleaf	*Chamaedaphne calyculata*
Limber honeysuckle	*Lonicera dioica*
Long-stalked sedge	*Carex pedunculata*
Mackay's brittle fern	*Cystopteris tenuis*
Mad-dog skullcap	*Scutellaria lateriflora*
Maple	*Acer* spp.
Marginal wood fern	*Dryopteris marginalis*
Maroon cucumber	*Cucumis anguria*
Marsh bellflower	*Palustricodon aparinoides*
Marsh cinquefoil	*Comarum palustre*
Marsh grass-of-parnassus	*Parnassia palustris*
Marsh horsetail	*Equisetum palustre*
Marsh mermaidweed	*Proserpinaca palustris*

Marsh seedbox	*Ludwigia palustris*
Marsh vetchling	*Lathyrus palustris*
Maryland sanicle	*Sanicula marilandica*
Meadow ryegrass	*Lolium pratense*
Meadow willow	*Salis petiolaris*
Mexican muhly	*Muhlenbergia mexicana* var. *mexicana*
Mountain holly	*Ilex mucronata*
Mountain maple	*Acer spicatum*
Multiflora rose	*Rosa multiflora*
Naked mitrewort	*Mitella nuda*
Nannyberry	*Viburnum lentago*
Narrow-leaved cattail	*Typha angustifolia*
New England aster	*Symphyotrichum novae-angliae*
Ninebark	*Physocarpus* spp.
Nodding beggarticks	*Bidens cernua*
North American red raspberry	*Rubus idaeus* ssp. *strigosus*
Northeastern lady fern	*Athyrium filix-femina* var. *angustum*
Northern rough-stemmed goldenrod	*Solidago rugosa* ssp. *rugosa* var. *rugosa*
Northern sea oats	*Chasmanthium latifolium*
Northern shorthusk	*Brachyelytrum aristosum*
Northern spicebush	*Lindera benzoin*
Northern starflower	*Lysimachia borealis*
Northern swamp buttercup	*Ranunculus caricetorum*
Northern tree moss	*Climacium dendroides*
Northern water-horehound	*Lycopus uniflorus*
Northern willowherb	*Epilobium ciliatum*
Norway spruce	*Picea abies*
Oak	*Quercus* spp.
Old field aster	*Symphyotrichum pilosum*
Ontario aster	*Symphyotrichum ontarionis*
Orange hawkweed	*Pilosella aurantiaca*
Orchard grass	*Dactylis glomerata*
Ostrich fern	*Matteuccia struthiopteris* var. *pensylvanica*
Oval sedge	*Carex ovalis*
Oxeye daisy	*Leucanthemum vulgare*
Pale jewelweed	*Impatiens pallida*
Panicgrass	*Dichanthelium* sp.
Partridgeberry	*Mitchella repens*
Path rush	*Juncus tenuis*
Pennsylvania buttercup	*Ranunculus pensylvanicus*

Pennsylvania sedge	*Carex pensylvanica*
Philadelphia fleabane	*Erigeron philadelphicus*
Pine	*Pinus* spp.
Pink lady's-slipper	*Cypripedium acaule*
Pink pyrola	*Pyrola asarifolia*
Plantain-leaved sedge	*Carex plantaginea*
Plume moss	*Ptilium* sp.
Pocket moss	*Fissidens* sp.
Poison ivy	*Toxicodendron radicans; Toxicodendron* spp.
Poplar	*Populus* spp.
Porcupine sedge	*Carex hystericina*
Poverty oatgrass	*Danthonia spicata*
Purple chokeberry	*Aronia x prunifolia*
Purple false medic	*Schizachne purpurascens*
Purple-stemmed angelica	*Angelica atropurpurea*
Purple-stemmed aster	*Symphyotrichum puniceum*
Purple-stemmed beggarticks	*Bidens connata*
Purple-veined willowherb	*Epilobium coloratum*
Purslane speedwell	*Veronica peregrina* ssp. *peregrina*
Pussy willow	*Salix discolor*
Red baneberry	*Actaea rubra*
Red clover	*Trifolium pratense*
Red elderberry	*Sambucus racemose*
Red maple	*Acer rubrum*
Red oak / Northern red oak	*Quercus rubra*
Red pine	*Pinus resinosa*
Red trillium	*Trillium erectum*
Red-osier dogwood	*Cornus sericea*
Red-stemmed feathermoss	*Pleurozium schreberi*
Redtop	*Agrostis gigantea*
Reed canarygrass	*Phalaris arundinacea*
Rice cutgrass	*Leersia oryzoides*
Riparian feather moss	*Leptodictyum riparium*
Riverbank grape	*Vitis riparia*
Rosy sedge	*Carex rosea*
Rough avens	*Geum laciniatum*
Rough bedstraw	*Galium asprellum*
Rough cinquefoil	*Potentilla norvegica*
Round-leaved dogwood	*Cornus rugosa*
Royal fern	*Osmunda regalis*

Sandbar willow	*Salix interior*
Sedge	*Carex* spp.
Sensitive fern	*Onoclea sensibilis*
Serviceberry	*Amelanchier* spp.
Shining firmoss	*Huperzia lucidula*
Shinleaf	*Pyrola elliptica*
Shiny golden fuzzy moss	*Tomentypnum nitens*
Shorthusk sp.	*Brachyelytrum* sp.
Showy fleabane	*Erigeron speciosus*
Silky dogwood	*Cornus obliqua*
Silver maple	*Acer saccharinum*
Slender false brome	*Brachypodium sylvaticum*
Slender stinging nettle	*Urtica gracilis*
Slender yellow woodsorrel	*Oxalis dillenii*
Small duckweed	*Lemna minor*
Small enchanter's nightshade	*Circaea alpina*
Small-spike false nettle	*Boehmeria cylindrica*
Smartweed sp.	*Persicaria* sp.
Smooth bedstraw	*Galium mollugo*
Smooth brome	*Bromus inermis*
Soft rush	*Juncus effusus*
Soft-stemmed bulrush	*Schoenoplectus tabernaemontani*
Southern shorthusk	*Brachyelytrum erectum*
Southern swamp buttercup	*Ranunculus septentrionalis*
Speckled alder	*Alnus incana* ssp. *rugosa*
Sphagnum	*Sphagnum* spp.
Spikerush sp.	*Eleocharis* sp.
Spinulose wood fern	*Dryopteris carthusiana*
Spotted geranium	*Geranium maculatum*
Spotted jewelweed	*Impatiens capensis*
Spotted joe-pye weed	*Eutrochium maculatum* var. *maculatum*
Spotted knapweed	*Centaurea stoebe ssp. micranthos*
Spotted lady's-thumb	*Persicaria maculosa*
Spotted water-hemlock	*Cicuta maculata* var. *maculata*
Spreading dogbane	*Apocynum androsaemifolium*
Spruce	*Picea* spp.
Stairstep moss	*Hylocomium splendens*
Star-flowered false solomon's seal	*Maianthemum stellatum*
Stout woodreed	*Cinna arundinacea*
Sugar maple	*Acer saccharum*

Sulphur cinquefoil	*Potentilla recta*
Swamp dodder	*Cuscuta gronovii*
Swamp milkweed	*Asclepias incarnata*
Swamp red currant	*Ribes triste*
Swamp rose	*Rosa palustris*
Swamp white oak	*Quercus bicolor*
Swamp yellow loosestrife	*Lysimachia terrestris*
Tall anemone	*Anemone virginiana* var. *virginiana*
Tall meadow-rue	*Thalictrum pubescens*
Tamarack / Larch	*Larix laricina*
Tender sedge	*Carex tenera*
Thicket creeper	*Parthenocissus vitacea*
Three-flowered bedstraw	*Galium triflorum*
Three-leaved Rattlesnake-root	*Nabalus trifoliolatus*
Three-parted beggarticks	*Bidens tripartita*
Three-seeded sedge	*Carex trisperma*
Three-way sedge	*Dulichium arundinaceum*
Trembling aspen	*Populus tremuloides*
Tufted yellow loosestrife	*Lysimachia thyrsiflora*
Tussock sedge	*Carex stricta*
Twinleaf	*Jeffersonia diphylla*
Two-leaved mitrewort	*Mitella diphylla*
Two-leaved toothwort	*Cardamine diphylla*
Two-seeded sedge	*Carex disperma*
Velvet-leaved blueberry	*Vaccinium myrtilloides*
Violet	*Viola* spp.
Virginia chain fern	*Anchistea virginica*
Virginia clematis	*Clematis virginiana*
Virginia creeper	*Parthenocissus quinquefolia*
Virginia stickseed	*Hackelia virginiana*
Virginia wildrye	*Elymus virginicus* var. *virginicus*
Water beggarticks	*Bidens beckii*
Water sedge	*Carex aquatilis*
Water smartweed	*Persicaria amphibia*
Watercress sp.	*Nasturtium* sp.
Western poison-ivy	*Toxicodendron radicans* var. *rydbergii*
White birch / paper birch	*Betula papyrifera*
White clover	*Trifolium repens*
White elm	*Ulmus americana*
White heath aster	*Symphyotrichum ericoides* var. *ericoides*

White meadowsweet	*Spiraea alba*
White oak	*Quercus alba*
White rattlesnakeroot	*Nabalus albus*
White snakeroot	*Ageratina altissima*
White spruce	*Picea glauca*
White sweet-clover	*Melilotus albus*
White trillium	*Trillium grandiflorum*
White turtlehead	*Chelone glabra*
White-fringed orchid	*Platanthera blephariglottis*
Wild basil	*Clinopodium vulgare*
Wild calla	*Calla palustris*
Wild carrot	*Daucus carota*
Wild cucumber	*Echinocystis lobata*
Wild lily-of-the-valley	*Maianthemum canadense*
Wild sarsaparilla	*Aralia nudicaulis*
Wild strawberry	*Fragaria virginiana*
Willow	*Salix* spp.
Wintergreen sp.	*Pyrola* spp.
Wood nettle	*Laportea* spp.
Woodreed	*Cinna* sp.
Woodsy leafymoss	*Plagiomnium cuspidatum*
Yellow avens	*Geum aleppicum*
Yellow birch	*Betula alleghaniensis*
Yellow clintonia	*Clintonia borealis*
Yellow marsh marigold	*Caltha palustris*
Yellow sedge	*Carex flava*
Yellow Violet	*Viola pubescens*
Mammals	
Bat	Chiroptera order
Beaver	*Castor canadensis*
Black bear	*Ursus americanus*
Cattle	*Bos taurus*
Coyote	*Canis latrans*
Little brown myotis	*Myotis lucifugus*
Squirrel	Sciuridae family
White-tailed deer / Deer	*Odocoileus virginianus*
Herpetofauna	
Eastern gartersnake	*Thamnophis sirtalis sirtalis*
Salamander	Urodela order
Terrestrial Invertebrates	

Bee hive boxes (European honeybee)	*Apis mellifera*
Emerald ash borer	*Agrilus planipennis*
Birds	
American robin	*Turdus migratorius*
Woodpecker	Picidae family
Yellow-bellied sapsucker / Sapsucker	*Sphyrapicus varius*

APPENDIX B – POLYGONS SURVEYED DURING 2022 FIELDWORK

NWMO Biodiversity Impact Studies

TEM Fieldwork Sites - Overview Map

Figure B-1a

Map 1
Map 2
Map 3
Map 4
Map 5
Map 6

Cargill Mill Pond
Schmidt Lake
Cunningham Lake
Silver Lake
Clam Lake
Hodgins Lake
McFarlane Lake
Oppleck Lake

Municipality of Kincardine
Municipality of Brockton
Township of Huron-Kinloss
Municipality of South Bruce
Township of Ashfield-Colborne-Wawanosh
Township of Howick
Municipality of Morris-Turnberry

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Municipal Boundary
- Highway
- Local Road
- Watercourse
- Lake

TEM Fieldwork Locations

- Full
- Ground
- Visual

Ecosite Polygon

- Full
- Ground
- Visual
- Not Surveyed

Ecosite polygons were derived from desk-based mapping in natural or naturalized areas and don't cover the entire LSA_{ECO}.

1:125,000

0 2 4 km

ZOETICA



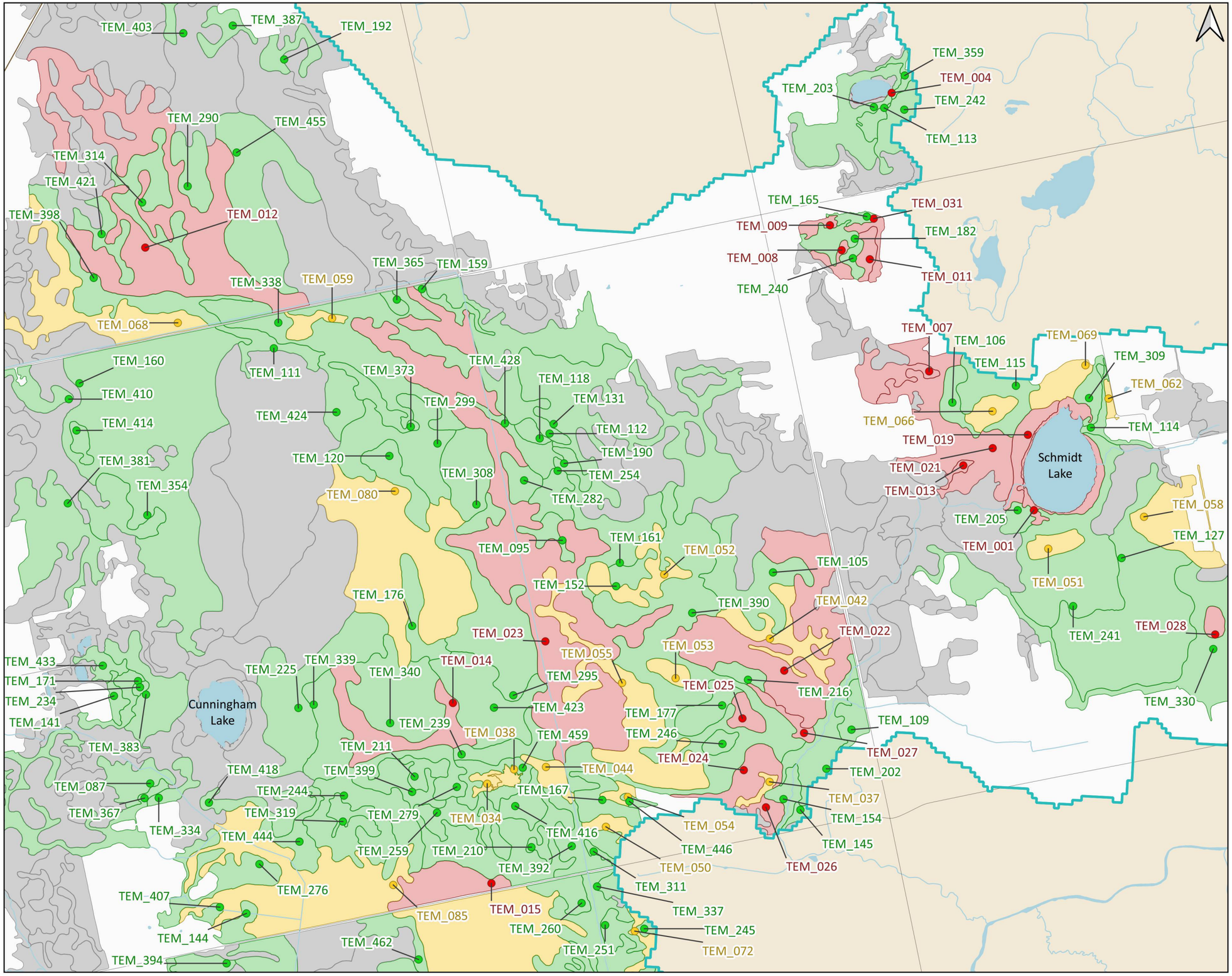
Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI; TerraNet Parcels

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D167	

NWMO Biodiversity Impact Studies

TEM Fieldwork Sites - Map 1

Figure B-1b



Local Study Area (LSA_{ECO})
Municipal Boundary
Local Road
Watercourse
Lake

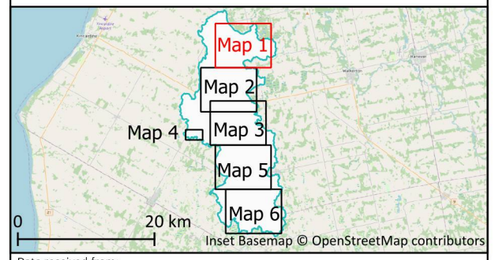
TEM Fieldwork Locations
- Full
- Ground
- Visual

Ecosite Polygon
- Full
- Ground
- Visual
- Not Surveyed

Ecosite polygons were derived from desk-based mapping in natural or naturalized areas and don't cover the entire LSA_{ECO}.

1:25,000
0 500 1,000 m

ZOETICA



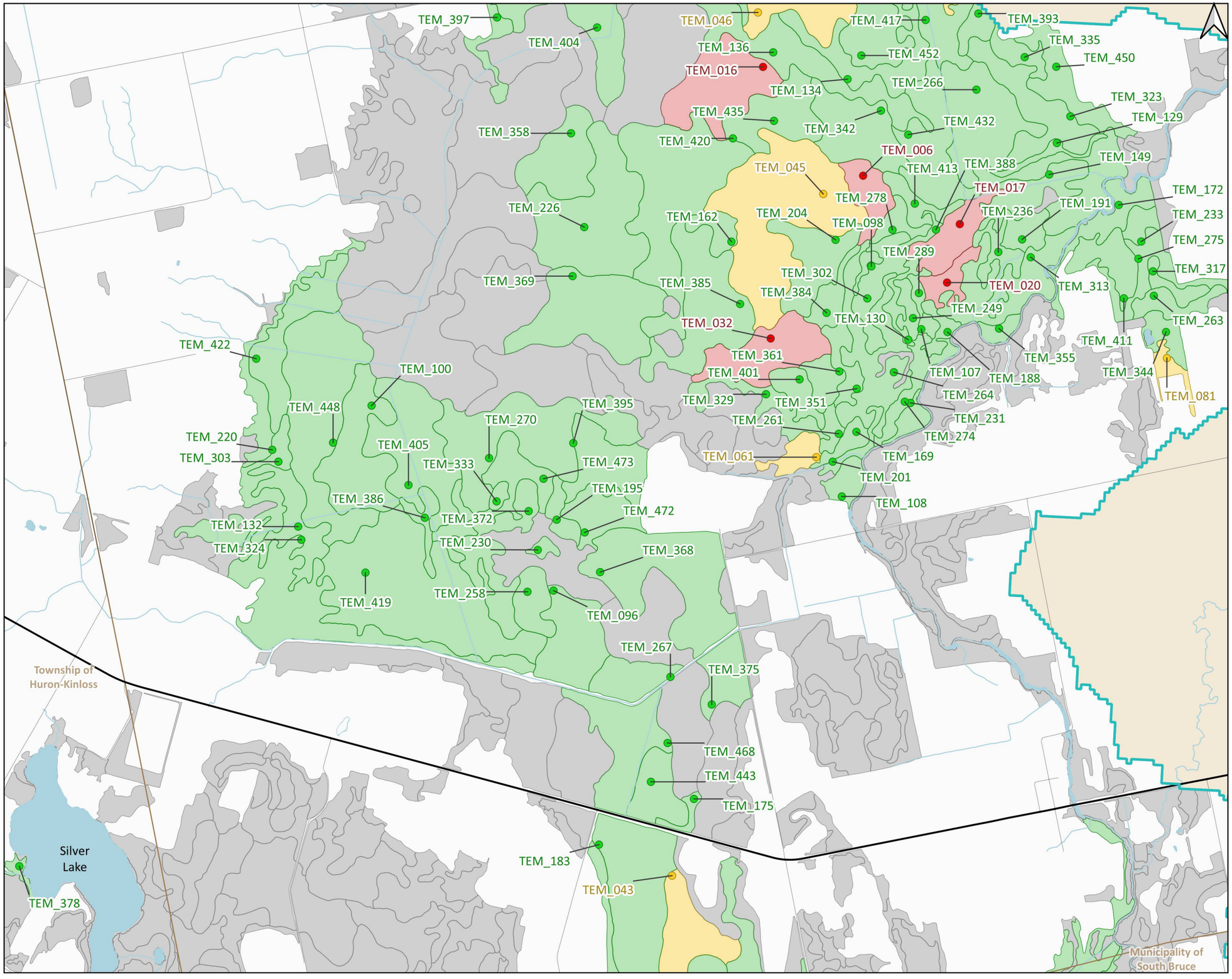
Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — TerraNet Parcels

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D167	

NWMO Biodiversity Impact Studies

TEM Fieldwork Sites - Map 2

Figure B-1c



Local Study Area (LSA_{ECO})
Municipal Boundary
Highway
Local Road
Watercourse
Lake

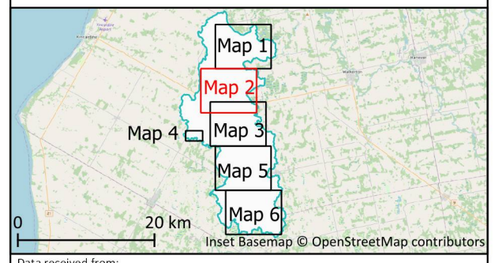
TEM Fieldwork Locations
- Full
- Ground
- Visual

Ecosite Polygon
- Full
- Ground
- Visual
- Not Surveyed

Ecosite polygons were derived from desk-based mapping in natural or naturalized areas and don't cover the entire LSA_{ECO}.

1:25,000
0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — TerraNet Parcels

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D167	

Map 3

TEM_468
TEM_443
TEM_175
TEM_183
TEM_043
Municipality of Brockton
TEM_380
TEM_474
TEM_090
TEM_447
TEM_408
TEM_110
TEM_219
TEM_415
TEM_125
TEM_466
TEM_065
TEM_005
TEM_033
TEM_437
TEM_471
TEM_409
TEM_222
TEM_273
TEM_457
TEM_256
TEM_362
TEM_345
TEM_221
TEM_102
TEM_238
TEM_010
TEM_277
TEM_200
TEM_194
TEM_126
TEM_137
TEM_296
TEM_284
Municipality of South Bruce
TEM_412
Oppleck Lake
TEM_047
TEM_391
TEM_286
TEM_430
TEM_070
TEM_253
TEM_078
TEM_281
TEM_232
TEM_158
TEM_067
TEM_285
TEM_300
TEM_449
TEM_374
TEM_193
TEM_364
TEM_297
TEM_429

Map 4

TEM_209

1:25,000
0 500 1,000 m

NWMO Biodiversity Impact Studies

TEM Fieldwork Sites - Map 3 and 4

Figure B-1d

- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Municipal Boundary
- Highway
- Local Road
- Watercourse
- Lake

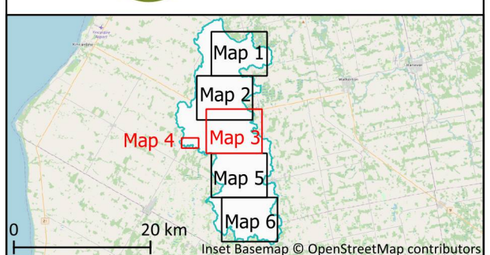
TEM Fieldwork Locations
- Full
- Ground
- Visual

Ecosite Polygon
- Full
- Ground
- Visual
- Not Surveyed

Ecosite polygons were derived from desk-based mapping in natural or naturalized areas and don't cover the entire LSA_{ECO}.

1:25,000
0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — TerraNet Parcels

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D167	

NWMO Biodiversity Impact Studies

TEM Fieldwork Sites - Map 5

Figure B-1e

Township of Huron-Kinloss

TEM_185 TEM_326 TEM_036 TEM_305 TEM_227 TEM_265 TEM_003 TEM_463 TEM_318 TEM_304 TEM_316 TEM_139 TEM_122 TEM_208 TEM_272 TEM_315 TEM_218 TEM_187 TEM_086 TEM_306 TEM_346 TEM_341 TEM_312 TEM_467 TEM_207 TEM_155 TEM_307 TEM_343 TEM_427 TEM_377 TEM_366 TEM_214 TEM_040 TEM_327 TEM_151 TEM_347 TEM_250 TEM_425 TEM_213 TEM_199 TEM_269 TEM_436 TEM_097 TEM_077 TEM_470 TEM_121 TEM_389 TEM_360 TEM_180 TEM_469 TEM_075 TEM_363 TEM_101 TEM_170 TEM_198 TEM_382 TEM_348 TEM_453 TEM_292 TEM_458 TEM_252 TEM_083 TEM_349 TEM_148 TEM_350 TEM_181 TEM_320 TEM_217 TEM_280 TEM_325 TEM_063 TEM_440 TEM_356 TEM_228 TEM_464 TEM_088 TEM_352 TEM_089 TEM_357 TEM_212 TEM_041 TEM_123 TEM_237 TEM_196 TEM_451 TEM_153 TEM_288 TEM_229 TEM_124 TEM_434 TEM_406 TEM_060 TEM_379 TEM_178 TEM_143 TEM_117 TEM_197 TEM_150 TEM_456 TEM_035 TEM_049 TEM_294 TEM_332 TEM_057 TEM_079 TEM_138 TEM_166 TEM_442 TEM_454 TEM_142 TEM_224 TEM_189 TEM_247 TEM_002 TEM_186 TEM_376 TEM_104 TEM_255 TEM_283 TEM_133

Area of Interest (AOI)
Local Study Area (LSA_{TER})
Local Study Area (LSA_{ECO})
NWMO Purchased or Optioned Land
Municipal Boundary
Local Road
Watercourse
Lake

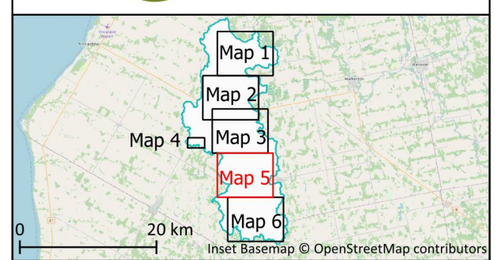
TEM Fieldwork Locations
- Full
- Ground
- Visual

Ecosite Polygon
- Full
- Ground
- Visual
- Not Surveyed

Ecosite polygons were derived from desk-based mapping in natural or naturalized areas and don't cover the entire LSA_{ECO}.

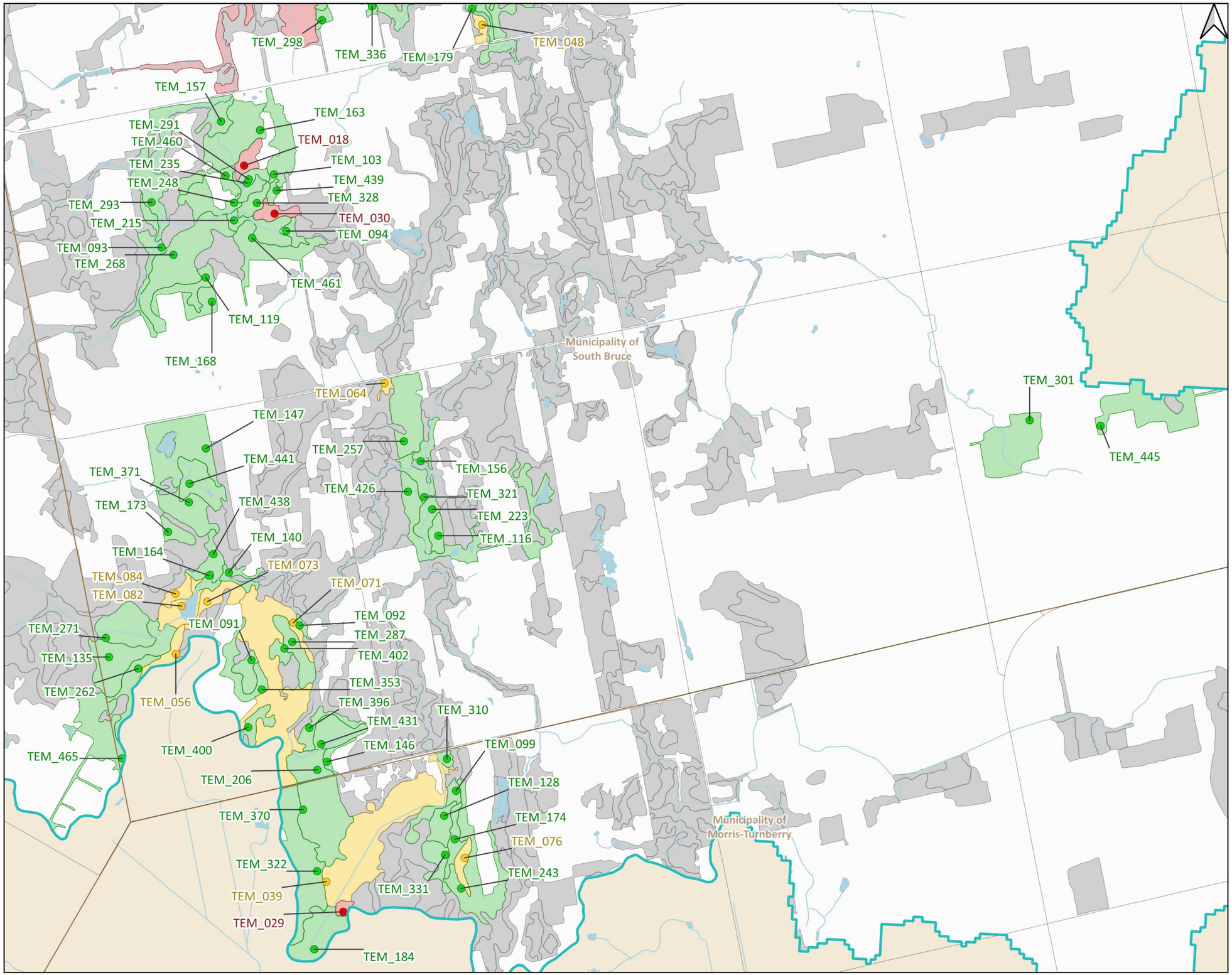
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI; TerraNet Parcels

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D167	



NWMO Biodiversity Impact Studies

TEM Fieldwork Sites - Map 6

Figure B-1f

- Local Study Area (LSA_{ECO})
- Municipal Boundary
- Local Road
- Watercourse
- Lake

TEM Fieldwork Locations

- Full
- Ground
- Visual

Ecosite Polygon

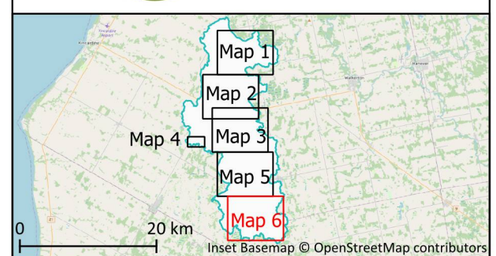
- Full
- Ground
- Visual
- Not Surveyed

Ecosite polygons were derived from desk-based mapping in natural or naturalized areas and don't cover the entire LSA_{ECO}.

1:25,000

0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — TerraNet Parcels

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D167	

APPENDIX C – ECOSITE CLASSIFICATION

C.1 Desk-based Ecosite Mapping Results

Table C-1. Desk-based ecosite summary within the naturalized areas of the AOI, LSA_{TER} and LSA_{ECO} by ecosite. Conditional formatting was used to highlight ecosites that are most prominent in each study area.

Study Area		AOI			LSA_{TER}			LSA_{ECO}		
Mapped Study Area (ha)		643.78			1,272.25			12,696.68		
Total Study Area (ha)		1,827.41			3,840.21			27,879.50		
Ecosite Name	**Code**	**Area (ha)**	**Percent Mapped**	**Percent Total**	**Area (ha)**	**Percent Mapped**	**Percent Total**	**Area (ha)**	**Percent Mapped**	**Percent Total**
Upland Forest - Conifer										
Naturalized Pine Conifer Treed Plantation	TRT-CZ1	26.40	4.10%	1.44%	48.22	3.79%	1.26%	308.46	2.43%	1.11%
Dry to Fresh White Cedar Coarse Mineral Conifer Treed	TRT-CNd4	8.35	1.30%	0.46%	26.05	2.05%	0.68%	81.97	0.65%	0.29%
Moist White Cedar Coarse Mineral Conifer Treed	TRT-CNf3	0.97	0.15%	0.05%	8.45	0.66%	0.22%	49.05	0.39%	0.18%
Dry to Fresh White Pine +/ Red Pine Coarse Mineral Conifer Treed	TRT-CNd3	7.19	1.12%	0.39%	7.91	0.62%	0.21%	27.29	0.21%	0.10%
Moist White Cedar Fine Mineral Conifer Treed	TRT-CNf6	-	-	-	2.64	0.21%	0.07%	22.11	0.17%	0.08%
Moist Fine Mineral Conifer Treed	TRT-CNf4	-	-	-	-	-	-	21.58	0.17%	0.08%
Naturalized Spruce Conifer Treed Plantation	TRT-CZ2	1.08	0.17%	0.06%	2.84	0.22%	0.07%	17.38	0.14%	0.06%
Dry to Fresh Pine Coarse Mineral Conifer Treed	TRT-CNd2	-	-	-	-	-	-	13.15	0.10%	0.05%
Dry to Fresh Coarse Mineral Conifer Treed	TRT-CNd1	-	-	-	-	-	-	8.93	0.07%	0.03%
Moist Coarse Mineral Conifer Treed	TRT-CNf1	0.01	0.00%	0.00%	1.98	0.16%	0.05%	8.63	0.07%	0.03%
Naturalized Larch Conifer Treed Plantation	TRT-CZ7	-	-	-	-	-	-	7.50	0.06%	0.03%
Dry to Fresh White Cedar Fine Mineral Conifer Treed	TRT-CNd8	-	-	-	5.21	0.41%	0.14%	5.21	0.04%	0.02%
Naturalized Conifer Treed Plantation	TRT-CZ3	-	-	-	-	-	-	4.11	0.03%	0.01%
Moist Hemlock Coarse Mineral Conifer Treed	TRT-CNf2	-	-	-	-	-	-	2.60	0.02%	0.01%
Dry to Fresh Pine Fine Mineral Conifer Treed	TRT-CNd7	-	-	-	-	-	-	1.23	0.01%	0.00%
Upland Forest - Hardwood										
Dry to Fresh Coarse Mineral Hardwood Treed	TRT-HNd1	179.48	27.88%	9.82%	381.25	29.97%	9.93%	1360.51	10.72%	4.88%
Moist Fine Mineral Hardwood Treed	TRT-HNf11	0.19	0.03%	0.01%	2.03	0.16%	0.05%	565.34	4.45%	2.03%
Moist Coarse Mineral Hardwood Treed	TRT-HNf1	13.68	2.13%	0.75%	31.62	2.49%	0.82%	537.09	4.23%	1.93%
Dry to Fresh Fine Mineral Hardwood Treed	TRT-HNd8	9.06	1.41%	0.50%	9.06	0.71%	0.24%	249.84	1.97%	0.90%
Dry to Fresh Sugar Maple Coarse Mineral Hardwood Treed	TRT-HNd3	-	-	-	-	-	-	172.29	1.36%	0.62%
Dry to Fresh Aspen +/ White Birch Fine Mineral Hardwood Treed	TRT-HNd11	-	-	-	-	-	-	60.44	0.48%	0.22%
Moist Red Maple Fine Mineral Hardwood Treed	TRT-HNf17	-	-	-	-	-	-	59.53	0.47%	0.21%
Dry to Fresh Sugar Maple Fine Mineral Hardwood Treed	TRT-HNd10	-	-	-	-	-	-	47.71	0.38%	0.17%
Moist Red Maple Coarse Mineral Hardwood Treed	TRT-HNf7	-	-	-	-	-	-	38.93	0.31%	0.14%
Dry to Fresh Red Maple Fine Mineral Hardwood Treed	TRT-HNd9	-	-	-	-	-	-	38.48	0.30%	0.14%
Moist Aspen +/ Birch Coarse Mineral Hardwood Treed	TRT-HNf5	-	-	-	-	-	-	37.20	0.29%	0.13%
Moist Aspen +/ Birch Fine Mineral Hardwood Treed	TRT-HNf15	-	-	-	-	-	-	25.76	0.20%	0.09%
Dry to Fresh Aspen +/ White Birch Coarse Mineral Hardwood Treed	TRT-HNd4	-	-	-	-	-	-	13.90	0.11%	0.05%
Naturalized Hardwood Treed Plantation	TRT-HZ1	-	-	-	1.07	0.08%	0.03%	4.55	0.04%	0.02%
Naturalized Hardwood Treed Hedgerow	TRT-HZ4	-	-	-	-	-	-	2.38	0.02%	0.01%
Upland Forest - Mixedwood										

Study Area		AOI			LSA_{TER}			LSA_{ECO}		
Mapped Study Area (ha)		643.78			1,272.25			12,696.68		
Total Study Area (ha)		1,827.41			3,840.21			27,879.50		
Ecosite Name	**Code**	**Area (ha)**	**Percent Mapped**	**Percent Total**	**Area (ha)**	**Percent Mapped**	**Percent Total**	**Area (ha)**	**Percent Mapped**	**Percent Total**
Moist White Cedar Coarse Mineral Mixedwood Treed	TRT-MNf3	17.89	2.78%	0.98%	26.09	2.05%	0.68%	238.75	1.88%	0.86%
Dry to Fresh Coarse Mineral Mixedwood Treed	TRT-MNd1	17.77	2.76%	0.97%	31.10	2.44%	0.81%	186.81	1.47%	0.67%
Moist Coarse Mineral Mixedwood Treed	TRT-MNf1	12.11	1.88%	0.66%	16.35	1.29%	0.43%	151.69	1.19%	0.54%
Dry to Fresh White Cedar Coarse Mineral Mixedwood Treed	TRT-MNd5	26.53	4.12%	1.45%	31.56	2.48%	0.82%	110.53	0.87%	0.40%
Dry to Fresh White Pine +/ Red Pine Coarse Mineral Mixedwood Treed	TRT-MNd3	3.55	0.55%	0.19%	17.13	1.35%	0.45%	58.55	0.46%	0.21%
Moist White Cedar Fine Mineral Mixedwood Treed	TRT-MNf10	0.52	0.08%	0.03%	5.44	0.43%	0.14%	55.62	0.44%	0.20%
Moist Fine Mineral Mixedwood Treed	TRT-MNf8	1.46	0.23%	0.08%	1.46	0.11%	0.04%	37.34	0.29%	0.13%
Dry to Fresh Fine Mineral Mixedwood Treed	TRT-MNd11	-	-	-	-	-	-	34.47	0.27%	0.12%
Naturalized Pine Mixedwood Treed Plantation	TRT-MZ7	1.94	0.30%	0.11%	2.70	0.21%	0.07%	27.60	0.22%	0.10%
Moist Aspen +/ Birch Coarse Mineral Mixedwood Treed	TRT-MNf4	-	-	-	-	-	-	26.23	0.21%	0.09%
Moist Hemlock Coarse Mineral Mixedwood Treed	TRT-MNf2	11.76	1.83%	0.64%	11.76	0.92%	0.31%	15.97	0.13%	0.06%
Moist Aspen +/ Birch Fine Mineral Mixedwood Treed	TRT-MNf11	-	-	-	-	-	-	14.22	0.11%	0.05%
Dry to Fresh Maple Coarse Mineral Mixedwood Treed	TRT-MNd7	-	-	-	-	-	-	10.23	0.08%	0.04%
Dry to Fresh White Cedar Fine Mineral Mixedwood Treed	TRT-MNd15	-	-	-	3.53	0.28%	0.09%	7.38	0.06%	0.03%
Dry to Fresh Pine Coarse Mineral Mixedwood Treed	TRT-MNd4	4.84	0.75%	0.26%	4.84	0.38%	0.13%	4.84	0.04%	0.02%
Dry to Fresh White Pine +/ Red Pine Fine Mineral Mixedwood Treed	TRT-MNd14	-	-	-	-	-	-	3.59	0.03%	0.01%
Dry to Fresh Aspen +/ White Birch Coarse Mineral Mixedwood Treed	TRT-MNd6	-	-	-	-	-	-	3.26	0.03%	0.01%
Moist Maple Fine Mineral Mixedwood Treed	TRT-MNf13	-	-	-	-	-	-	3.26	0.03%	0.01%
Dry to Fresh Aspen +/ White Birch Fine Mineral Mixedwood Treed	TRT-MNd16	-	-	-	-	-	-	2.78	0.02%	0.01%
Dry to Fresh Hemlock Coarse Mineral Mixedwood Treed	TRT-MNd2	-	-	-	-	-	-	2.29	0.02%	0.01%
Naturalized Spruce Mixedwood Treed Plantation	TRT-MZ6	0.90	0.14%	0.05%	0.90	0.07%	0.02%	1.92	0.02%	0.01%
Naturalized Spruce Mixedwood Treed Hedgerow	TRT-MZ21	-	-	-	-	-	-	1.54	0.01%	0.01%
Wetland - Conifer Swamp										
White Cedar Organic Conifer Swamp	SWT-Co1	4.44	0.69%	0.24%	17.51	1.38%	0.46%	151.10	1.19%	0.54%
White Cedar +/ Larch Organic Conifer Swamp	SWT-Co5	15.02	2.33%	0.82%	24.59	1.93%	0.64%	125.72	0.99%	0.45%
White Cedar Mineral Conifer Swamp	SWT-Cm1	1.74	0.27%	0.10%	5.08	0.40%	0.13%	14.65	0.12%	0.05%
White Cedar +/ White Spruce Mineral Conifer Swamp	SWT-Cm2	-	-	-	0.99	0.08%	0.03%	9.17	0.07%	0.03%
Mineral Conifer Swamp	SWT-Cm3	-	-	-	-	-	-	8.84	0.07%	0.03%
Larch Organic Conifer Swamp	SWT-Co4	5.08	0.79%	0.28%	5.08	0.40%	0.13%	6.08	0.05%	0.02%
Larch +/ Spruce Organic Conifer Swamp	SWT-Co6	-	-	-	-	-	-	3.25	0.03%	0.01%
Organic Conifer Swamp	SWT-Co8	-	-	-	-	-	-	2.30	0.02%	0.01%
Wetland - Hardwood Swamp										
Organic Hardwood Swamp	SWT-Ho3	45.63	7.09%	2.50%	100.46	7.90%	2.62%	1934.32	15.23%	6.94%
Maple Organic Hardwood Swamp	SWT-Ho2	-	-	-	11.45	0.90%	0.30%	1489.02	11.73%	5.34%
Coarse Mineral Hardwood Swamp	SWT-Hm1	22.30	3.46%	1.22%	33.23	2.61%	0.87%	380.60	3.00%	1.37%
Fine Mineral Hardwood Swamp	SWT-Hm8	4.66	0.72%	0.26%	4.66	0.37%	0.12%	176.78	1.39%	0.63%
Silver Maple +/ Freeman's Maple Coarse Mineral Hardwood Swamp	SWT-Hm5	-	-	-	0.97	0.08%	0.03%	81.07	0.64%	0.29%

	Study Area	AOI			LSA_{TER}			LSA_{ECO}		
	Mapped Study Area (ha)	**643.78**			**1,272.25**			**12,696.68**		
	Total Study Area (ha)	**1,827.41**			**3,840.21**			**27,879.50**		
Ecosite Name	**Code**	**Area (ha)**	**Percent Mapped**	**Percent Total**	**Area (ha)**	**Percent Mapped**	**Percent Total**	**Area (ha)**	**Percent Mapped**	**Percent Total**
Silver Maple +/ Freeman's Maple Fine Mineral Hardwood Swamp	SWT-Hm12	-	-	-	-	-	-	29.41	0.23%	0.11%
Poplar +/ Birch Fine Mineral Hardwood Swamp	SWT-Hm9	-	-	-	-	-	-	22.18	0.17%	0.08%
Poplar +/ Birch Coarse Mineral Hardwood Swamp	SWT-Hm2	1.71	0.27%	0.09%	1.71	0.13%	0.04%	11.54	0.09%	0.04%
Red Maple Fine Mineral Hardwood Swamp	SWT-Hm13	-	-	-	-	-	-	2.64	0.02%	0.01%
Wetland - Mixedwood Swamp										
Organic Mixedwood Swamp	SWT-Mo6	9.72	1.51%	0.53%	43.29	3.40%	1.13%	814.92	6.42%	2.92%
White Cedar Organic Mixedwood Swamp	SWT-Mo1	12.04	1.87%	0.66%	19.34	1.52%	0.50%	686.12	5.40%	2.46%
White Cedar Mineral Mixedwood Swamp	SWT-Mm1	11.54	1.79%	0.63%	28.86	2.27%	0.75%	412.98	3.25%	1.48%
Mineral Mixedwood Swamp	SWT-Mm6	23.60	3.67%	1.29%	41.13	3.23%	1.07%	279.70	2.20%	1.00%
Maple Organic Mixedwood Swamp	SWT-Mo3	-	-	-	-	-	-	129.93	1.02%	0.47%
Birch +/ Poplar Organic Mixedwood Swamp	SWT-Mo5	-	-	-	-	-	-	29.97	0.24%	0.11%
Maple Mineral Mixedwood Swamp	SWT-Mm3	-	-	-	-	-	-	1.58	0.01%	0.01%
Birch +/ Poplar Mineral Mixedwood Swamp	SWT-Mm4	-	-	-	-	-	-	0.68	0.01%	0.00%
Wetland - Shrub Swamp										
Organic Deciduous Thicket Swamp	SST-o1	7.37	1.14%	0.40%	9.09	0.71%	0.24%	169.64	1.34%	0.61%
Organic Low Shrub Swamp	SSL-o1	-	-	-	-	-	-	21.76	0.17%	0.08%
Mineral Deciduous Thicket Swamp	SST-m1	-	-	-	-	-	-	18.07	0.14%	0.06%
Mineral Low Shrub Swamp	SSL-m1	-	-	-	-	-	-	8.49	0.07%	0.03%
Wetland - Marsh										
Organic Meadow Marsh	MAM-o1	67.01	10.41%	3.67%	96.42	7.58%	2.51%	197.97	1.56%	0.71%
Mineral Meadow Marsh	MAM-m1	12.96	2.01%	0.71%	37.11	2.92%	0.97%	139.87	1.10%	0.50%
Organic Emergent Marsh	MAE-o1	0.39	0.06%	0.02%	0.39	0.03%	0.01%	65.51	0.52%	0.23%
Mineral Emergent Marsh	MAE-m1	-	-	-	-	-	-	0.92	0.01%	0.00%
Wetland - Fen										
Treed Fen	FEW-T1	-	-	-	13.81	1.09%	0.36%	17.90	0.14%	0.06%
Sparsely Vegetated/Shrub - Meadow										
Moist Coarse Calcareous Open Meadow	MEO-k3	2.16	0.34%	0.12%	5.44	0.43%	0.14%	22.47	0.18%	0.08%
Dry to Fresh Coarse Calcareous Treed Meadow	MEW-Tk1	9.88	1.53%	0.54%	10.33	0.81%	0.27%	19.84	0.16%	0.07%
Moist Coarse Calcareous Shrub Meadow	MEW-Sk3	-	-	-	-	-	-	17.23	0.14%	0.06%
Moist Coarse Calcareous Treed Meadow	MEW-Tk3	-	-	-	-	-	-	13.40	0.11%	0.05%
Dry to Fresh Coarse Calcareous Open Meadow	MEO-k1	-	-	-	-	-	-	6.36	0.05%	0.02%
Moist Fine Calcareous Treed Meadow	MEW-Tk4	-	-	-	-	-	-	6.29	0.05%	0.02%
Moist Fine Calcareous Shrub Meadow	MEW-Sk4	-	-	-	-	-	-	5.35	0.04%	0.02%
Moist Fine Calcareous Open Meadow	MEO-k4	-	-	-	-	-	-	5.02	0.04%	0.02%
Dry to Fresh Coarse Calcareous Shrub Meadow	MEW-Sk1	-	-	-	-	-	-	4.34	0.03%	0.02%
Dry to Fresh Fine Calcareous Open Meadow	MEO-k2	-	-	-	-	-	-	2.39	0.02%	0.01%
Dry to Fresh Fine Calcareous Shrub Meadow	MEW-Sk2	-	-	-	-	-	-	0.59	0.00%	0.00%

Study Area		AOI			LSA_{TER}			LSA_{ECO}		
Mapped Study Area (ha)		643.78			1,272.25			12,696.68		
Total Study Area (ha)		1,827.41			3,840.21			27,879.50		
Ecosite Name	**Code**	**Area (ha)**	**Percent Mapped**	**Percent Total**	**Area (ha)**	**Percent Mapped**	**Percent Total**	**Area (ha)**	**Percent Mapped**	**Percent Total**
Anthropogenic - Plantation										
Conifer Plantation	AGW-2	19.70	3.06%	1.08%	48.54	3.82%	1.26%	105.19	0.83%	0.38%
Mixed Plantation	AGW-3	-	-	-	1.68	0.13%	0.04%	4.99	0.04%	0.02%
Aquatic										
Organic Open Water Lacustrine	OAL-o1	-	-	-	-	-	-	156.43	1.23%	0.56%
Mineral Open Water Riverine	OAR-m1	18.85	2.93%	1.03%	26.68	2.10%	0.69%	55.66	0.44%	0.20%
Mineral Open Water Lacustrine	OAL-m1	2.30	0.36%	0.13%	3.20	0.25%	0.08%	25.70	0.20%	0.09%
Anthropogenic Open Aquatic	AOO-1	-	-	-	-	-	-	8.74	0.07%	0.03%

Notes:
1. For the purposes of this table, the study areas cover the entire study area, including any overlap with other study areas.
2. Mapping was completed in natural and naturalized areas.
3. The intensity of green shading indicate ecosites that are more prominent (darker shading) versus those that are less prominent (lighter shading) in each study area. Grey shading indicates ecosites that have not been mapped within a study area.

NWMO Biodiversity Impact Studies

Desk-Based Ecosite Data by Grouping - AOI

Figure C-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Unmapped Area
- Highway
- Local Road
- Watercourse

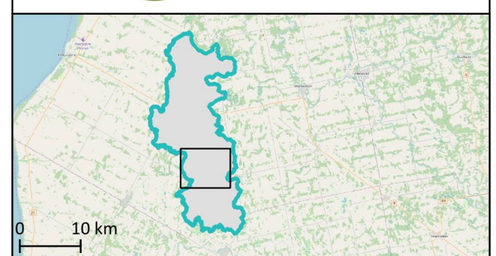
Ecosite Groups

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Meadow

1:25,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Watercourses; ORN Road Element (NDMNRF)
NWMO — AOI
Ecosite data were created for the BIS Project.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D141b	

NWMO Biodiversity Impact Studies

Desk-Based Ecosite Data by Grouping - South LSA_{ECO}

Figure C-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Unmapped Area
- Highway
- Local Road
- Watercourse

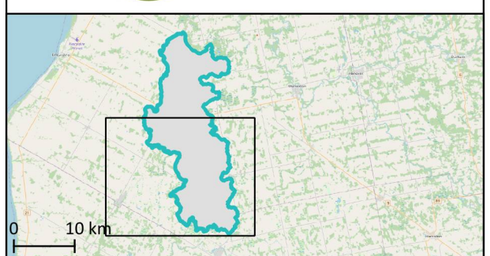
Ecosite Groups

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Meadow

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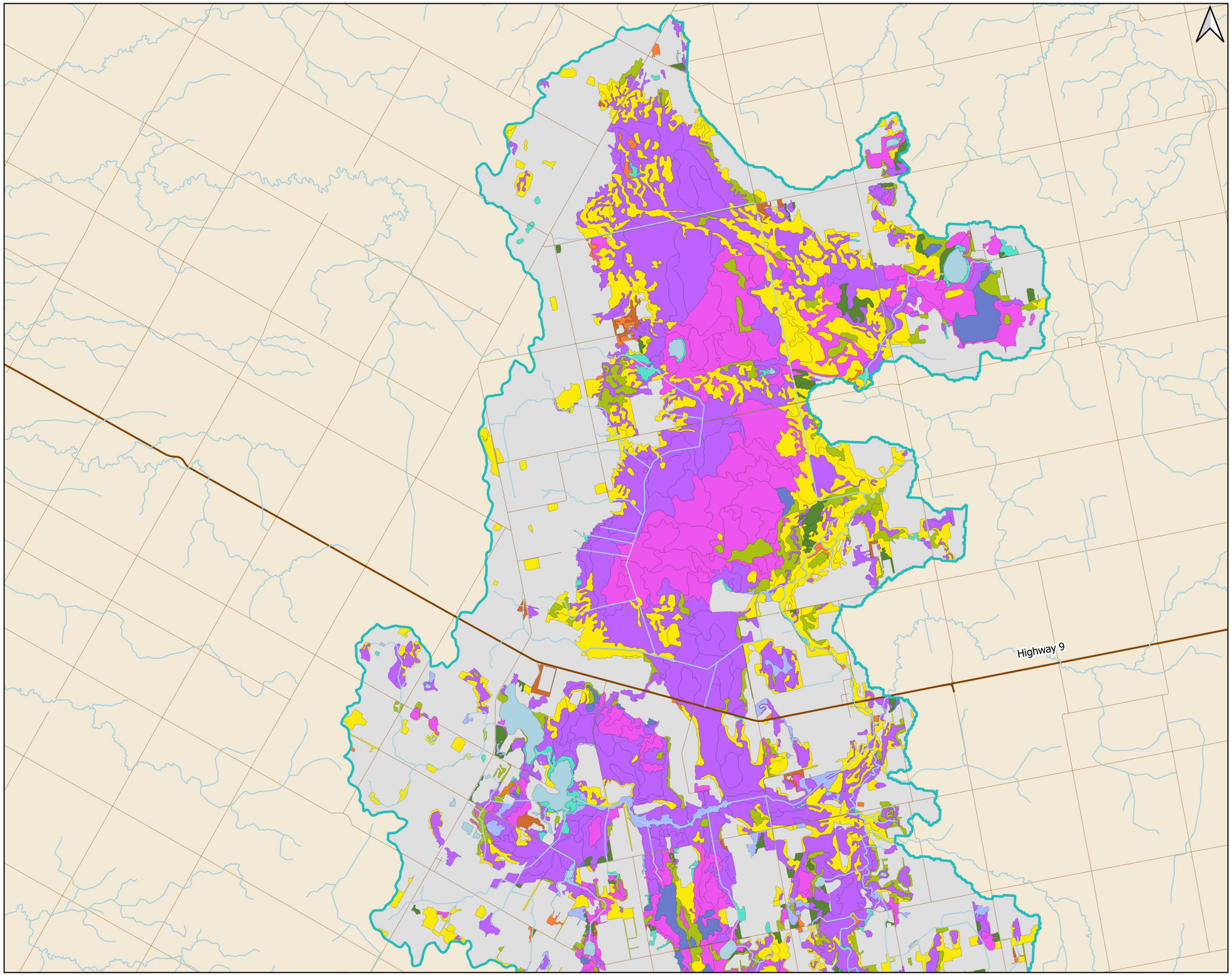
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ZOETICA



Data received from:
Ontario GeoHub — OHN Watercourses; ORN Road Element (NDMNRF)
NWMO — AOI
Ecosite data were created for the BIS Project.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D141b	



NWMO Biodiversity Impact Studies

Desk-Based Ecosite Data by Group - North LSA_{ECO}

Figure C-1c

- Local Study Area (LSA_{ECO})
- Unmapped Area
- Highway
- Local Road
- Watercourse

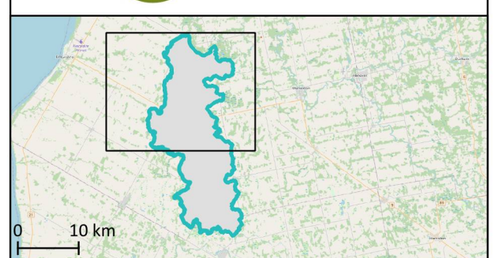
Ecosite Groups

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Meadow

1:25,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Watercourses; ORN Road Element (NDMNRF)
Ecosite data were created for the BIS Project.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D141a	

C.2 Updated ELC Mapping using 2022 Field Data

Table C-2. Ecosite summary within the naturalized areas of the AOI, LSA_{TER} and LSA_{ECO}. Conditional formatting highlights ecosites that are most prominent in each study area.

Study Area[1]		AOI			LSA_{TER}			LSA_{ECO}		
Total Study Area (ha)[2]		1,827.41			3,840.21			27,879.50		
Mapped Study Area (ha)		643.78			1,272.25			12,696.68		
Ecosite Name	**Code**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**Area (ha)**	**Percent Total**	**Percent Mapped**
Upland Forest - Hardwood										
Dry to Fresh Coarse Mineral Hardwood Treed	TRT-HNd1	63.00	3.45%	9.79%	186.90	4.87%	14.69%	863.00	3.10%	6.80%
Moist Fine Mineral Hardwood Treed	TRT-HNf11	4.94	0.27%	0.77%	6.78	0.18%	0.53%	406.87	1.46%	3.20%
Moist Coarse Mineral Hardwood Treed	TRT-HNf1	5.02	0.27%	0.78%	22.95	0.60%	1.80%	390.51	1.40%	3.08%
Dry to Fresh Sugar Maple Coarse Mineral Hardwood Treed	TRT-HNd3	77.14	4.22%	11.98%	129.88	3.38%	10.21%	300.65	1.08%	2.37%
Dry to Fresh Fine Mineral Hardwood Treed	TRT-HNd8	-	-	-	-	-	-	168.55	0.60%	1.33%
Dry to Fresh Sugar Maple Fine Mineral Hardwood Treed	TRT-HNd10	51.89	2.84%	8.06%	64.61	1.68%	5.08%	161.58	0.58%	1.27%
Moist Sugar Maple Coarse Mineral Hardwood Treed	TRT-HNf8	9.06	0.50%	1.41%	9.06	0.24%	0.71%	101.27	0.36%	0.80%
Moist Red Maple Fine Mineral Hardwood Treed	TRT-HNf17	-	-	-	-	-	-	78.13	0.28%	0.62%
Moist Sugar Maple Fine Mineral Hardwood Treed	TRT-HNf18	-	-	-	12.41	0.32%	0.98%	57.33	0.21%	0.45%
Moist Ash Fine Mineral Hardwood Treed	TRT-HNf40	1.14	0.06%	0.18%	1.14	0.03%	0.09%	48.47	0.17%	0.38%
Dry to Fresh Red Maple Fine Mineral Hardwood Treed	TRT-HNd9	-	-	-	-	-	-	42.23	0.15%	0.33%
Moist Aspen +/ Birch Coarse Mineral Hardwood Treed	TRT-HNf5	-	-	-	-	-	-	39.10	0.14%	0.31%
Moist Aspen +/ Birch Fine Mineral Hardwood Treed	TRT-HNf15	-	-	-	-	-	-	39.00	0.14%	0.31%
Dry to Fresh Oak +/ Maple Coarse Mineral Hardwood Treed	TRT-HNd7	-	-	-	-	-	-	28.29	0.10%	0.22%
Dry to Fresh Aspen +/ White Birch Fine Mineral Hardwood Treed	TRT-HNd11	-	-	-	-	-	-	26.23	0.09%	0.21%
Dry to Fresh Aspen +/ White Birch Coarse Mineral Hardwood Treed	TRT-HNd4	-	-	-	-	-	-	22.14	0.08%	0.17%
Naturalized Hardwood Treed Regeneration	TRT-HZ3	-	-	-	-	-	-	17.76	0.06%	0.14%
Moist Red Oak +/ White Oak Fine Mineral Hardwood Treed	TRT-HNf26	-	-	-	-	-	-	17.41	0.06%	0.14%
Moist Red Maple Coarse Mineral Hardwood Treed	TRT-HNf7	-	-	-	-	-	-	16.02	0.06%	0.13%
Moist Oak Fine Mineral Hardwood Treed	TRT-HNf25	-	-	-	-	-	-	11.35	0.04%	0.09%
Moist Ash Coarse Mineral Hardwood Treed	TRT-HNf39	-	-	-	-	-	-	6.99	0.03%	0.06%
Naturalized Hardwood Treed Plantation	TRT-HZ1	-	-	-	1.07	0.03%	0.08%	4.55	0.02%	0.04%
Naturalized Black Walnut Hardwood Treed Plantation	TRT-HZ6	1.79	0.10%	0.28%	3.37	0.09%	0.26%	3.37	0.01%	0.03%
Naturalized Hardwood Treed Hedgerow	TRT-HZ4	-	-	-	-	-	-	2.38	0.01%	0.02%
Upland Forest - Mixedwood										
Moist White Cedar Coarse Mineral Mixedwood Treed	TRT-MNf3	13.14	0.72%	2.04%	21.34	0.56%	1.68%	178.31	0.64%	1.40%
Dry to Fresh Coarse Mineral Mixedwood Treed	TRT-MNd1	8.66	0.47%	1.35%	21.99	0.57%	1.73%	143.20	0.51%	1.13%
Moist Coarse Mineral Mixedwood Treed	TRT-MNf1	10.13	0.55%	1.57%	14.37	0.37%	1.13%	113.52	0.41%	0.89%
Dry to Fresh White Cedar Coarse Mineral Mixedwood Treed	TRT-MNd5	23.44	1.28%	3.64%	28.46	0.74%	2.24%	96.97	0.35%	0.76%
Moist Fine Mineral Mixedwood Treed	TRT-MNf8	1.46	0.08%	0.23%	1.46	0.04%	0.11%	56.34	0.20%	0.44%
Dry to Fresh White Pine +/ Red Pine Coarse Mineral Mixedwood Treed	TRT-MNd3	3.55	0.19%	0.55%	17.13	0.45%	1.35%	38.52	0.14%	0.30%
Moist Sugar Maple Coarse Mineral Mixedwood Treed	TRT-MNf7	-	-	-	-	-	-	37.45	0.13%	0.29%
Naturalized Pine Mixedwood Treed Plantation	TRT-MZ7	3.49	0.19%	0.54%	4.25	0.11%	0.33%	29.14	0.10%	0.23%
Moist Hemlock Coarse Mineral Mixedwood Treed	TRT-MNf2	11.76	0.64%	1.83%	11.76	0.31%	0.92%	28.62	0.10%	0.23%

Study Area[1]		AOI			LSA_{TER}			LSA_{ECO}		
Total Study Area (ha)[2]		1,827.41			3,840.21			27,879.50		
Mapped Study Area (ha)		643.78			1,272.25			12,696.68		
Ecosite Name	**Code**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**Area (ha)**	**Percent Total**	**Percent Mapped**
Moist White Cedar Fine Mineral Mixedwood Treed	TRT-MNf10	0.52	0.03%	0.08%	5.44	0.14%	0.43%	26.91	0.10%	0.21%
Moist Hemlock Fine Mineral Mixedwood Treed	TRT-MNf9	-	-	-	-	-	-	25.19	0.09%	0.20%
Dry to Fresh Fine Mineral Mixedwood Treed	TRT-MNd11	-	-	-	-	-	-	22.51	0.08%	0.18%
Moist Aspen +/ Birch Coarse Mineral Mixedwood Treed	TRT-MNf4	-	-	-	-	-	-	21.03	0.08%	0.17%
Naturalized Spruce Mixedwood Treed Plantation	TRT-MZ6	0.90	0.05%	0.14%	0.90	0.02%	0.07%	16.69	0.06%	0.13%
Dry to Fresh Sugar Maple Coarse Mineral Mixedwood Treed	TRT-MNd8	5.23	0.29%	0.81%	5.23	0.14%	0.41%	12.18	0.04%	0.10%
Dry to Fresh Maple Coarse Mineral Mixedwood Treed	TRT-MNd7	1.55	0.08%	0.24%	1.55	0.04%	0.12%	11.78	0.04%	0.09%
Moist Aspen +/ Birch Fine Mineral Mixedwood Treed	TRT-MNf11	-	-	-	-	-	-	10.47	0.04%	0.08%
Dry to Fresh Sugar Maple Fine Mineral Mixedwood Treed	TRT-MNd18	-	-	-	7.37	0.19%	0.58%	10.27	0.04%	0.08%
Moist Ash Fine Mineral Mixedwood Treed	TRT-MNf12	-	-	-	2.49	0.06%	0.20%	7.25	0.03%	0.06%
Dry to Fresh White Cedar Fine Mineral Mixedwood Treed	TRT-MNd15	-	-	-	3.53	0.09%	0.28%	4.94	0.02%	0.04%
Dry to Fresh Pine Coarse Mineral Mixedwood Treed	TRT-MNd4	4.84	0.26%	0.75%	4.84	0.13%	0.38%	4.84	0.02%	0.04%
Dry to Fresh White Pine +/ Red Pine Fine Mineral Mixedwood Treed	TRT-MNd14	-	-	-	-	-	-	3.59	0.01%	0.03%
Dry to Fresh Aspen +/ White Birch Coarse Mineral Mixedwood Treed	TRT-MNd6	-	-	-	-	-	-	3.26	0.01%	0.03%
Moist Maple Fine Mineral Mixedwood Treed	TRT-MNf13	-	-	-	-	-	-	3.26	0.01%	0.03%
Dry to Fresh Hemlock Coarse Mineral Mixedwood Treed	TRT-MNd2	0.83	0.05%	0.13%	0.83	0.02%	0.07%	3.12	0.01%	0.02%
Naturalized Pine Mixedwood Treed Regeneration	TRT-MZ13	-	-	-	-	-	-	3.11	0.01%	0.02%
Dry to Fresh Aspen +/ White Birch Fine Mineral Mixedwood Treed	TRT-MNd16	-	-	-	-	-	-	2.78	0.01%	0.02%
Naturalized Spruce Mixedwood Treed Hedgerow	TRT-MZ21	-	-	-	-	-	-	1.54	0.01%	0.01%
Dry to Fresh Maple Fine Mineral Mixedwood Treed	TRT-MNd17	-	-	-	-	-	-	0.93	0.00%	0.01%
Upland Forest - Conifer										
Naturalized Pine Conifer Treed Plantation	TRT-CZ1	21.88	1.20%	3.40%	39.88	1.04%	3.13%	288.72	1.04%	2.27%
Dry to Fresh White Cedar Coarse Mineral Conifer Treed	TRT-CNd4	8.36	0.46%	1.30%	28.04	0.73%	2.20%	80.38	0.29%	0.63%
Moist White Cedar Coarse Mineral Conifer Treed	TRT-CNf3	0.97	0.05%	0.15%	1.07	0.03%	0.08%	35.21	0.13%	0.28%
Dry to Fresh White Pine +/ Red Pine Coarse Mineral Conifer Treed	TRT-CNd3	7.19	0.39%	1.12%	7.91	0.21%	0.62%	26.29	0.09%	0.21%
Naturalized Spruce Conifer Treed Plantation	TRT-CZ2	1.08	0.06%	0.17%	2.84	0.07%	0.22%	17.38	0.06%	0.14%
Naturalized Pine Conifer Treed Regeneration	TRT-CZ12	-	-	-	-	-	-	13.95	0.05%	0.11%
Dry to Fresh White Cedar Fine Mineral Conifer Treed	TRT-CNd8	-	-	-	5.21	0.14%	0.41%	12.73	0.05%	0.10%
Naturalized Conifer Treed Plantation	TRT-CZ3	-	-	-	-	-	-	12.47	0.04%	0.10%
Dry to Fresh Coarse Mineral Conifer Treed	TRT-CNd1	-	-	-	-	-	-	8.93	0.03%	0.07%
Naturalized Larch Conifer Treed Plantation	TRT-CZ7	-	-	-	-	-	-	7.50	0.03%	0.06%
Moist White Cedar Fine Mineral Conifer Treed	TRT-CNf6	-	-	-	-	-	-	7.13	0.03%	0.06%
Moist Coarse Mineral Conifer Treed	TRT-CNf1	-	-	-	-	-	-	6.65	0.02%	0.05%
Dry to Fresh Fine Mineral Conifer Treed	TRT-CNd6	-	-	-	2.64	0.07%	0.21%	5.60	0.02%	0.04%
Dry to Fresh Pine Fine Mineral Conifer Treed	TRT-CNd7	-	-	-	-	-	-	1.23	0.00%	0.01%
Plantation										
Conifer Plantation	AGW-2	22.43	1.23%	3.48%	53.51	1.39%	4.21%	131.10	0.47%	1.03%

Study Area[1]		AOI			LSA_{TER}			LSA_{ECO}		
Total Study Area (ha)[2]		1,827.41			3,840.21			27,879.50		
Mapped Study Area (ha)		643.78			1,272.25			12,696.68		
Ecosite Name	**Code**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**Area (ha)**	**Percent Total**	**Percent Mapped**
Mixed Plantation	AGW-3	-	-	-	1.68	0.04%	0.13%	4.99	0.02%	0.04%
Wetland - Hardwood Swamp										
Maple Organic Hardwood Swamp	SWT-Ho2	38.01	2.08%	5.90%	53.70	1.40%	4.22%	1979.55	7.10%	15.59%
Organic Hardwood Swamp	SWT-Ho3	9.84	0.54%	1.53%	64.38	1.68%	5.06%	1550.63	5.56%	12.21%
Coarse Mineral Hardwood Swamp	SWT-Hm1	6.30	0.34%	0.98%	17.23	0.45%	1.35%	330.64	1.19%	2.60%
Ash Organic Hardwood Swamp	SWT-Ho1	2.71	0.15%	0.42%	2.71	0.07%	0.21%	319.43	1.15%	2.52%
Silver Maple +/ Freeman's Maple Fine Mineral Hardwood Swamp	SWT-Hm12	7.07	0.39%	1.10%	7.07	0.18%	0.56%	287.42	1.03%	2.26%
Fine Mineral Hardwood Swamp	SWT-Hm8	4.66	0.26%	0.72%	4.66	0.12%	0.37%	185.28	0.66%	1.46%
Ash +/ White Elm Fine Mineral Hardwood Swamp	SWT-Hm10	1.81	0.10%	0.28%	2.10	0.05%	0.17%	139.17	0.50%	1.10%
Silver Maple +/ Freeman's Maple Coarse Mineral Hardwood Swamp	SWT-Hm5	-	-	-	0.97	0.03%	0.08%	119.75	0.43%	0.94%
Red Maple Fine Mineral Hardwood Swamp	SWT-Hm13	-	-	-	-	-	-	32.42	0.12%	0.26%
Red Maple Coarse Mineral Hardwood Swamp	SWT-Hm6	-	-	-	-	-	-	21.04	0.08%	0.17%
Poplar +/ Birch Fine Mineral Hardwood Swamp	SWT-Hm9	-	-	-	-	-	-	14.36	0.05%	0.11%
Ash +/ White Elm Coarse Mineral Hardwood Swamp	SWT-Hm3	-	-	-	-	-	-	13.81	0.05%	0.11%
Poplar +/ Birch Coarse Mineral Hardwood Swamp	SWT-Hm2	1.71	0.09%	0.27%	1.71	0.04%	0.13%	9.59	0.03%	0.08%
Oak + Maple Fine Mineral Hardwood Swamp	SWT-Hm15	-	-	-	-	-	-	7.32	0.03%	0.06%
Oak + Maple Coarse Mineral Hardwood Swamp	SWT-Hm7	-	-	-	-	-	-	6.42	0.02%	0.05%
Oak Fine Mineral Hardwood Swamp	SWT-Hm11	-	-	-	-	-	-	5.82	0.02%	0.05%
Wetland - Mixedwood Swamp										
Organic Mixedwood Swamp	SWT-Mo6	-	-	-	29.32	0.76%	2.30%	540.52	1.94%	4.26%
White Cedar Organic Mixedwood Swamp	SWT-Mo1	15.25	0.83%	2.37%	19.28	0.50%	1.52%	531.18	1.91%	4.18%
Hemlock +/ Yellow Birch +/ Maple Organic Mixedwood Swamp	SWT-Mo2	3.14	0.17%	0.49%	3.47	0.09%	0.27%	229.55	0.82%	1.81%
White Cedar Mineral Mixedwood Swamp	SWT-Mm1	6.84	0.37%	1.06%	24.16	0.63%	1.90%	212.44	0.76%	1.67%
Mineral Mixedwood Swamp	SWT-Mm6	23.57	1.29%	3.66%	37.73	0.98%	2.97%	146.42	0.53%	1.15%
Hemlock +/ Yellow Birch +/ Maple Mineral Mixedwood Swamp	SWT-Mm2	-	-	-	-	-	-	134.88	0.48%	1.06%
Maple Organic Mixedwood Swamp	SWT-Mo3	6.85	0.38%	1.06%	6.85	0.18%	0.54%	114.19	0.41%	0.90%
Ash Mineral Mixedwood Swamp	SWT-Mm5	-	-	-	-	-	-	11.47	0.04%	0.09%
Birch +/ Poplar Mineral Mixedwood Swamp	SWT-Mm4	-	-	-	-	-	-	3.42	0.01%	0.03%
Maple Mineral Mixedwood Swamp	SWT-Mm3	-	-	-	-	-	-	3.21	0.01%	0.03%
Wetland - Conifer Swamp										
White Cedar +/ Larch Organic Conifer Swamp	SWT-Co5	15.02	0.82%	2.33%	24.59	0.64%	1.93%	113.60	0.41%	0.89%
White Cedar Organic Conifer Swamp	SWT-Co1	4.44	0.24%	0.69%	17.51	0.46%	1.38%	77.52	0.28%	0.61%
White Cedar Mineral Conifer Swamp	SWT-Cm1	1.74	0.10%	0.27%	8.02	0.21%	0.63%	19.48	0.07%	0.15%
White Cedar +/ White Spruce Mineral Conifer Swamp	SWT-Cm2	-	-	-	0.99	0.03%	0.08%	9.17	0.03%	0.07%
Organic Conifer Swamp	SWT-Co8	-	-	-	-	-	-	8.01	0.03%	0.06%
Larch Organic Conifer Swamp	SWT-Co4	5.08	0.28%	0.79%	5.08	0.13%	0.40%	6.08	0.02%	0.05%
Larch +/ Spruce Organic Conifer Swamp	SWT-Co6	-	-	-	-	-	-	3.25	0.01%	0.03%

Study Area[1]		AOI			LSA_{TER}			LSA_{ECO}		
Total Study Area (ha)[2]		1,827.41			3,840.21			27,879.50		
Mapped Study Area (ha)		643.78			1,272.25			12,696.68		
Ecosite Name	**Code**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**Area (ha)**	**Percent Total**	**Percent Mapped**
Mineral Conifer Swamp	SWT-Cm3	-	-	-	-	-	-	2.13	0.01%	0.02%
Wetland - Shrub Swamp										
Organic Deciduous Thicket Swamp	SST-o1	15.99	0.87%	2.48%	18.72	0.49%	1.47%	192.93	0.69%	1.52%
Mineral Deciduous Thicket Swamp	SST-m1	4.25	0.23%	0.66%	4.25	0.11%	0.33%	22.32	0.08%	0.18%
Organic Low Shrub Swamp	SSL-o1	-	-	-	-	-	-	21.76	0.08%	0.17%
Mineral Low Shrub Swamp	SSL-m1	-	-	-	-	-	-	8.49	0.03%	0.07%
Wetland - Marsh										
Mineral Meadow Marsh	MAM-m1	25.17	1.38%	3.91%	55.84	1.45%	4.39%	183.20	0.66%	1.44%
Organic Meadow Marsh	MAM-o1	29.97	1.64%	4.66%	50.57	1.32%	3.98%	138.38	0.50%	1.09%
Organic Emergent Marsh	MAE-o1	1.78	0.10%	0.28%	1.78	0.05%	0.14%	62.34	0.22%	0.49%
Mineral Emergent Marsh	MAE-m1	-	-	-	-	-	-	2.50	0.01%	0.02%
Organic Mixed Shallow Water Marsh	MAS-o2	-	-	-	-	-	-	1.74	0.01%	0.01%
Wetland - Fen										
Treed Fen	FEW-T1	-	-	-	13.81	0.36%	1.09%	17.90	0.06%	0.14%
Sparsely Vegetated/Shrub - Meadow										
Moist Coarse Non-Calcareous Open Meadow	MEO-n3	-	-	-	-	-	-	34.43	0.12%	0.27%
Moist Coarse Calcareous Open Meadow	MEO-k3	2.16	0.12%	0.34%	5.44	0.14%	0.43%	22.47	0.08%	0.18%
Dry to Fresh Coarse Calcareous Treed Meadow	MEW-Tk1	9.88	0.54%	1.53%	10.33	0.27%	0.81%	17.94	0.06%	0.14%
Moist Coarse Calcareous Shrub Meadow	MEW-Sk3	-	-	-	-	-	-	17.23	0.06%	0.14%
Dry to Fresh Fine Non-Calcareous Open Meadow	MEO-n2	1.28	0.07%	0.20%	3.42	0.09%	0.27%	16.34	0.06%	0.13%
Moist Coarse Calcareous Treed Meadow	MEW-Tk3	-	-	-	-	-	-	13.40	0.05%	0.11%
Dry to Fresh Coarse Non-Calcareous Shrub Meadow	MEW-Sn1	5.32	0.29%	0.83%	5.32	0.14%	0.42%	7.22	0.03%	0.06%
Dry to Fresh Coarse Calcareous Open Meadow	MEO-k1	-	-	-	-	-	-	6.36	0.02%	0.05%
Moist Fine Calcareous Treed Meadow	MEW-Tk4	-	-	-	-	-	-	6.29	0.02%	0.05%
Dry to Fresh Fine Non-Calcareous Shrub Meadow	MEW-Sn2	5.40	0.30%	0.84%	5.40	0.14%	0.42%	5.40	0.02%	0.04%
Moist Fine Calcareous Shrub Meadow	MEW-Sk4	-	-	-	-	-	-	5.35	0.02%	0.04%
Moist Fine Calcareous Open Meadow	MEO-k4	-	-	-	-	-	-	5.02	0.02%	0.04%
Dry to Fresh Coarse Calcareous Shrub Meadow	MEW-Sk1	-	-	-	-	-	-	4.34	0.02%	0.03%
Dry to Fresh Fine Calcareous Open Meadow	MEO-k2	-	-	-	-	-	-	2.39	0.01%	0.02%
Dry to Fresh Fine Calcareous Shrub Meadow	MEW-Sk2	-	-	-	-	-	-	0.59	0.00%	0.00%
Sparsely Vegetated/Shrub - Shrub										
Moist Non-Calcareous Deciduous Thicket	SLT-Dn2	-	-	-	-	-	-	2.09	0.01%	0.02%
Dry to Fresh Non-Calcareous Deciduous Thicket	SLT-Dn1	2.03	0.11%	0.32%	2.03	0.05%	0.16%	5.82	0.02%	0.05%
Anthropogenic - Field										
Open Active Agriculture	AGO-1	-	-	-	-	-	-	7.21	0.03%	0.06%
Aquatic										
Organic Open Water Lacustrine	OAL-o1	-	-	-	-	-	-	154.85	0.56%	1.22%

Study Area[1]		AOI			LSA_{TER}			LSA_{ECO}		
Total Study Area (ha)[2]		1,827.41			3,840.21			27,879.50		
Mapped Study Area (ha)		643.78			1,272.25			12,696.68		
Ecosite Name	**Code**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**Area (ha)**	**Percent Total**	**Percent Mapped**	**Area (ha)**	**Percent Total**	**Percent Mapped**
Mineral Open Water Riverine	OAR-m1	18.85	1.03%	2.93%	26.68	0.69%	2.10%	55.66	0.20%	0.44%
Mineral Open Water Lacustrine	OAL-m1	2.30	0.13%	0.36%	3.20	0.08%	0.25%	25.70	0.09%	0.20%
Anthropogenic Open Aquatic	AOO-1	-	-	-	-	-	-	8.74	0.03%	0.07%

Notes:
1. For the purposes of this table, the study areas cover the entire study area, including any overlap with other study areas.
2. Mapping was completed in natural and naturalized areas.
3. The intensity of green shading indicate ecosites that are more prominent (darker shading) versus those that are less prominent (lighter shading) in each study area. Grey shading indicates ecosites that have not been mapped within a study area.

Table C-3. Comparison of ecosite groupings for sites classified in desk-based mapping versus the field-based classification. Sample sizes (*n*) are provided for the number of sites classified as each ecosite grouping in desk-based data. Numbers are the percentages of the desk-based ecosite grouping (row) that were classified as each grouping in the field. Green conditional formatting highlights highest percentage classifications. Cells outlined in black indicate desk-based classifications did not change upon field verification. Greyed headers are ecosite groupings that were recorded in the field, but not the desk-based data.

				Field-Based												
				Upland Sites							Wetland Sites					Aquatic Site
			n	Conifer	Field	Hardwood	Meadow	Mixedwood	Plantation	Shrub	Conifer Swamp	Hardwood Swamp	Marsh	Mixedwood Swamp	Shrub Swamp	Lake
Desk-based	Upland	Conifer	35	69	-	3	-	9	9	-	3	3	-	6	-	-
		Hardwood	117	-	-	72	1	3	-	1	-	22	-	1		-
		Meadow	2	-	-	-	100	-	-	-	-	-	-	-	-	-
		Mixedwood	65	8	2	14	-	60	3	-	-	5	-	9	-	-
		Plantation	4	-	-	-	-	-	100	-	-	-	-	-	-	-
	Wetland	Conifer Swamp	12	8	-	-	-	-	-	-	50	-	-	42	-	-
		Hardwood Swamp	96	-	1	-	1	-	-	1	-	89	2	5	1	-
		Marsh	33	-	-	-	15	-	-	-	-	-	76	-	9	-
		Mixedwood Swamp	100	-	-	2	-	3	-	-	3	27	2	63	-	-
		Shrub Swamp	8	-	-	-	-	-	-	12	-	25	12	-	50	-
	Aquatic	Lake	2	-	-	-	-	-	-	-	-	-	50	-	-	50

Table C-4a. Comparison of ecosites classified in desk-based mapping versus the field-based classification, for those classified as upland in the desk-based data that stayed upland in the field data. Sample sizes (*n*) are provided for the number of sites classified as each ecosite in desk-based data. Numbers are the percentages of the desk-based ecosite (row) that were classified as each ecosite in the field. Green conditional formatting highlights highest percentage classifications. Cells outlined in black indicate desk-based classifications did not change upon field verification. Greyed headers are ecosites that were recorded in either desk- or field-based data (depending on whether they are a row or column header), but not the other dataset.

| | | | | Field-based Upland | | | |

Table C-4a. Comparison of ecosites classified in desk-based mapping versus the field-based classification, for those classified as upland in the desk-based data that stayed upland in the field data. Sample sizes (n) are provided for the number of sites classified as each ecosite in desk-based data. Numbers are the percentages of the desk-based ecosite (row) that were classified as each ecosite in the field. Green conditional formatting highlights highest percentage classifications. Cells outlined in black indicate desk-based classifications did not change upon field verification. Greyed headers are ecosites that were recorded in either desk- or field-based data (depending on whether they are a row or column header), but not the other dataset.

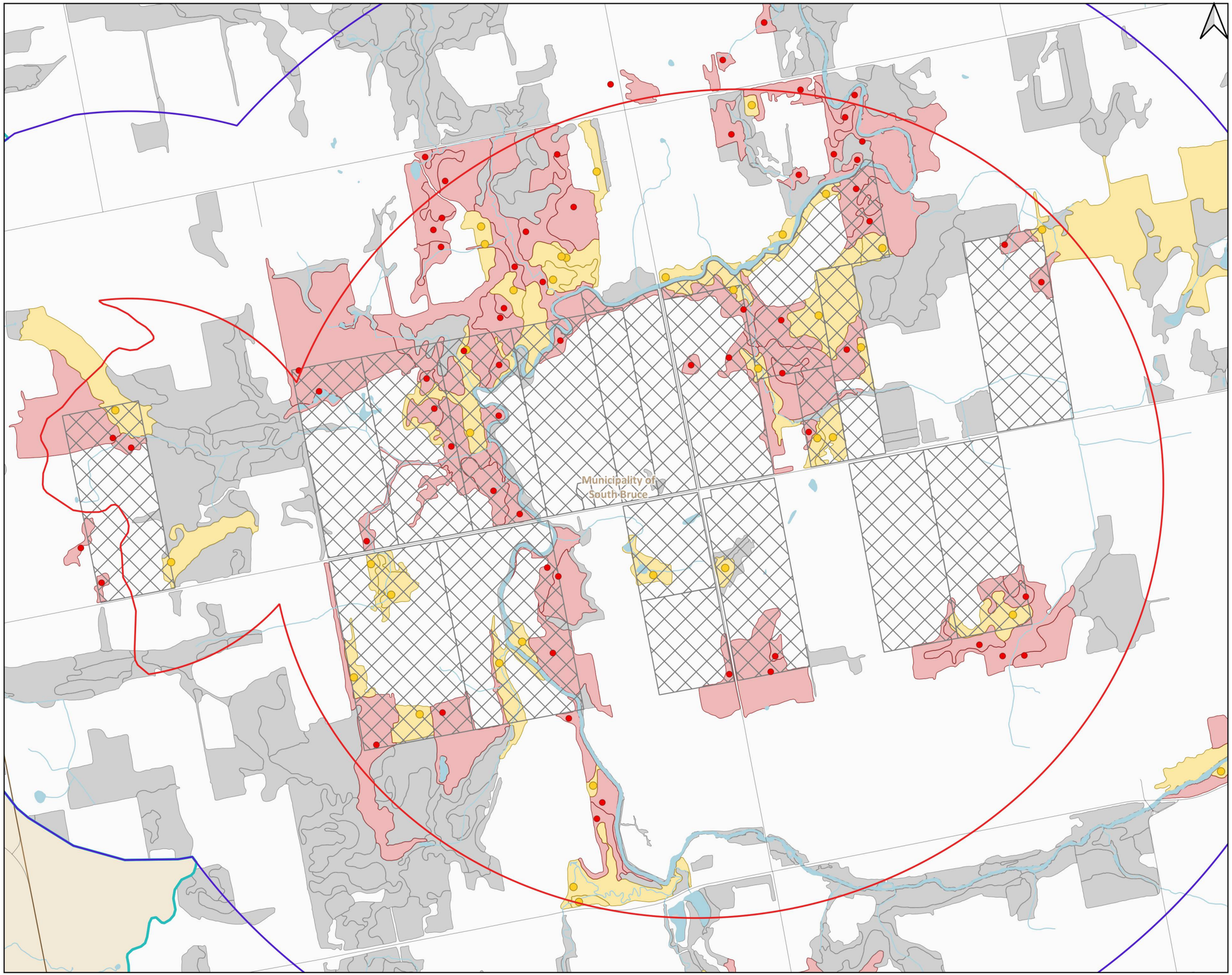
| | | | | Field-based Upland | | | |

Table C-4a. Comparison of ecosites classified in desk-based mapping versus the field-based classification, for those classified as upland in the desk-based data that stayed upland in the field data. Sample sizes (n) are provided for the number of sites classified as each ecosite in desk-based data. Numbers are the percentages of the desk-based ecosite (row) that were classified as each ecosite in the field. Green conditional formatting highlights highest percentage classifications. Cells outlined in black indicate desk-based classifications did not change upon field verification. Greyed headers are ecosites that were recorded in either desk- or field-based data (depending on whether they are a row or column header), but not the other dataset.

				Field-based Wetland																																				Field-based Aquatic
				Conifer Swamp				Hardwood Swamp														Mixedwood Swamp										Shrub Swamp			Marsh					Lake
		Desk-based Ecosite	*n*	SWT-Cm1	SWT-Co1	SWT-Co5	SWT-Co8	SWT-Hm1	SWT-Hm10	SWT-Hm11	SWT-Hm12	SWT-Hm13	SWT-Hm15	SWT-Hm3	SWT-Hm5	SWT-Hm6	SWT-Hm7	SWT-Hm8	SWT-Hm9	SWT-Ho1	SWT-Ho2	SWT-Ho3	SWT-Mm1	SWT-Mm2	SWT-Mm3	SWT-Mm4	SWT-Mm5	SWT-Mm6	SWT-Mo1	SWT-Mo2	SWT-Mo3	SWT-Mo6	SSL-o1	SST-m1	SST-o1	MAE-m1	MAE-o1	MAM-m1	MAM-o1	MAS-o2	OAL-o1
Desk-based Upland	Conifer	TRT-CNd2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-CNd3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-CNd4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-CNf1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-CNf2	1	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-CNf3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-CNf4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-CNf6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	-	-	-	-	-	-	-	-	-	-
		TRT-CZ1	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-CZ2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hardwood	TRT-HNd1	46	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-HNd10	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-HNd11	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-HNd3	2	-	-	-	-	50	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-HNd4	1	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-HNd8	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-HNf1	21	-	-	-	-	-	-	-	10	-	-	-	14	5	-	-	-	-	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-HNf11	27	-	-	-	-	-	-	-	7	-	4	-	-	-	-	-	-	-	7	4	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-HNf17	4	-	-	-	-	-	-	-	-	25	-	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-HNf5	3	-	-	-	-	-	-	-	-	-	-	-	-	33	-	-	-	-	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-HNf7	2	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mixedwood	TRT-MNd1	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-MNd11	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-MNd15	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-MNd3	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-MNd5	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-MNf1	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-MNf10	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-MNf11	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-MNf3	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	9	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-MNf4	2	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		TRT-MNf8	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	-
		TRT-MZ7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Meadow	MEW-Tk1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Plantation	AGW-2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-4a. Comparison of ecosites classified in desk-based mapping versus the field-based classification, for those classified as upland in the desk-based data that stayed upland in the field data. Sample sizes (n) are provided for the number of sites classified as each ecosite in desk-based data. Numbers are the percentages of the desk-based ecosite (row) that were classified as each ecosite in the field. Green conditional formatting highlights highest percentage classifications. Cells outlined in black indicate desk-based classifications did not change upon field verification. Greyed headers are ecosites that were recorded in either desk- or field-based data (depending on whether they are a row or column header), but not the other dataset.

				Field-based Wetland																																				Field-based Aquatic
				Conifer Swamp				Hardwood Swamp															Mixedwood Swamp										Shrub Swamp			Marsh					Lake
		Desk-based Ecosite	*n*	SWT-Cm1	SWT-Co1	SWT-Co5	SWT-Co8	SWT-Hm1	SWT-Hm10	SWT-Hm11	SWT-Hm12	SWT-Hm13	SWT-Hm15	SWT-Hm3	SWT-Hm5	SWT-Hm6	SWT-Hm7	SWT-Hm8	SWT-Hm9	SWT-Ho1	SWT-Ho2	SWT-Ho3	SWT-Mm1	SWT-Mm2	SWT-Mm3	SWT-Mm4	SWT-Mm5	SWT-Mm6	SWT-Mo1	SWT-Mo2	SWT-Mo3	SWT-Mo6	SSL-o1	SST-m1	SST-o1	MAE-m1	MAE-o1	MAM-m1	MAM-o1	MAS-o2	OAL-o1
Desk-based Wetland	Conifer Swamp	SWT-Cm3	3	-	-	-	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33	-	-	-	-	-	-	-	-	-
		SWT-Co1	5	-	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	20	-	-	-	-	-	-	-	-	-
		SWT-Co5	4	-	25	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-	-	25	-	-	-	-	-	-	-	-	-
	Hardwood Swamp	SWT-Hm1	22	-	-	-	-	-	5	-	9	-	-	9	27	-	-	-	-	5	23	5	5	-	5	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-
		SWT-Hm12	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-
		SWT-Hm13	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SWT-Hm2	1	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SWT-Hm5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SWT-Hm8	7	-	-	-	-	-	-	-	14	-	14	-	-	-	-	29	-	-	14	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SWT-Hm9	2	-	-	-	-	-	50	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SWT-Ho2	11	-	-	-	-	-	-	-	18	9	-	-	-	-	-	-	-	-	55	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SWT-Ho3	50	-	-	-	-	-	2	-	6	-	-	-	2	-	-	2	2	10	48	22	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-	2	-	-
	Mixedwood Swamp	SWT-Mm1	22	-	-	5	-	-	-	-	-	5	-	-	-	-	-	-	-	-	5	5	5	9	-	5	-	5	23	14	5	9	-	-	-	-	-	-	-	-	-
		SWT-Mm6	15	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	7	-	-	-	-	-	-	-	20	13	13	7	20	-	-	-	-	-	-	7	-	-
		SWT-Mo1	28	4	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	7	4	-	4	-	-	-	-	-	36	25	4	11	-	-	-	-	-	4	-	-	-
		SWT-Mo3	4	-	-	-	-	-	-	-	25	-	-	-	-	-	-	-	-	50	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SWT-Mo5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		SWT-Mo6	30	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	10	23	7	3	3	-	-	-	-	-	10	3	27	-	-	-	-	-	-	-	-	-
	Shrub Swamp	SSL-o1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-
		SST-o1	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	14	-	-	-	-	-	-	-	-	-	-	-	-	43	-	-	-	14	-	-
	Marsh	MAE-o1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	75	-	-	-	-
		MAM-m1	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	43	-	-	-
		MAM-o1	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	36	45	5	-
Desk-based Aquatic	Lake	OAL-o1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	50



NWMO Biodiversity Impact Studies

Desk-Based Ecosite Classifications Changed During Survey - AOI

Figure C-2a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Municipal Boundary
- Local Road

TEM Fieldwork Locations

- Changed
- No Change

Ecosite Polygon

- Ecosite Changed
- Ecosite Not Changed
- Not Surveyed

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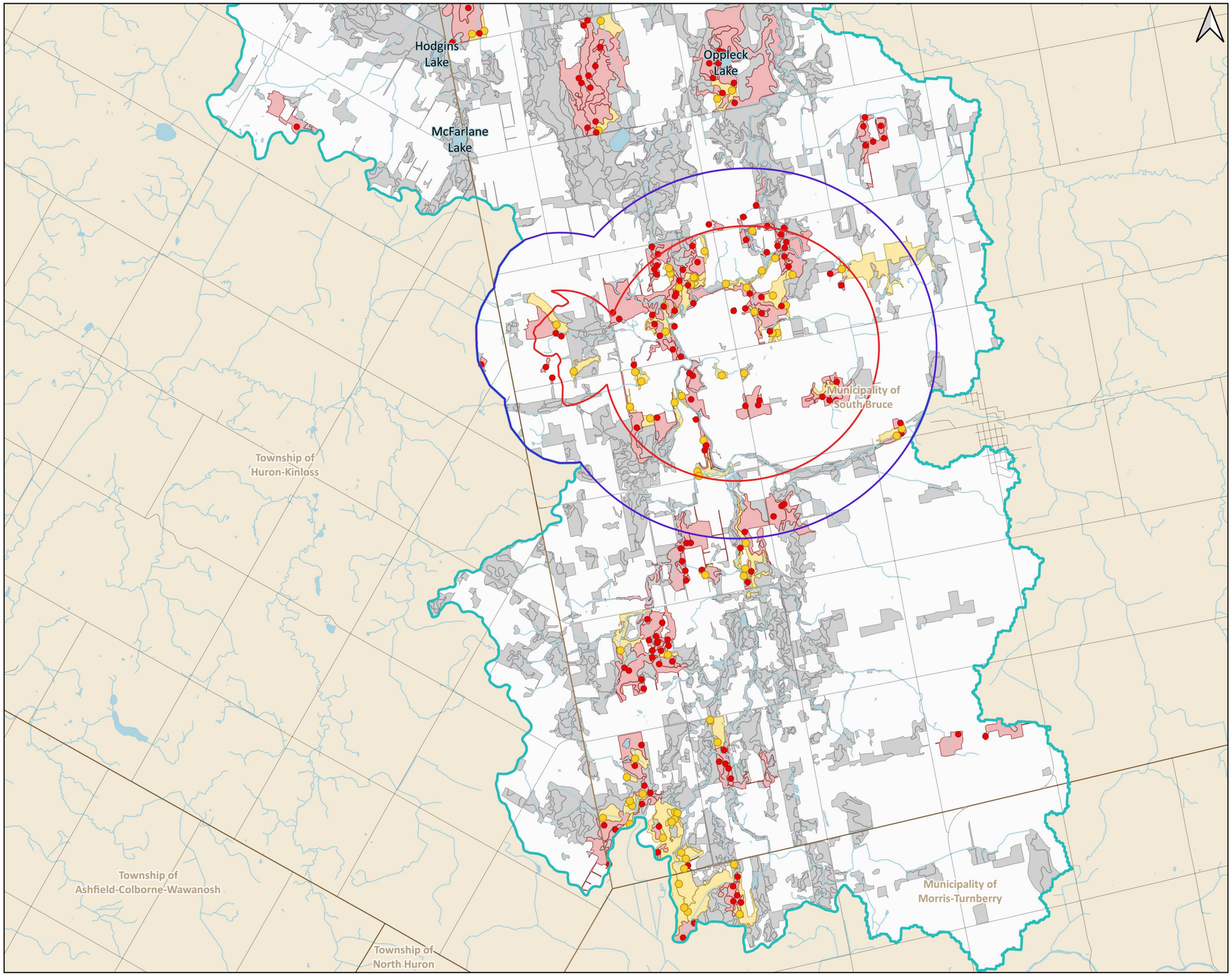
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D168	



NWMO Biodiversity Impact Studies

Desk-Based Ecosite Classifications Changed During Survey - South LSA_{ECO}

Figure C-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Municipal Boundary
- Local Road

TEM Fieldwork Locations

- Changed
- No Change

Ecosite Polygon

- Ecosite Changed
- Ecosite Not Changed
- Not Surveyed

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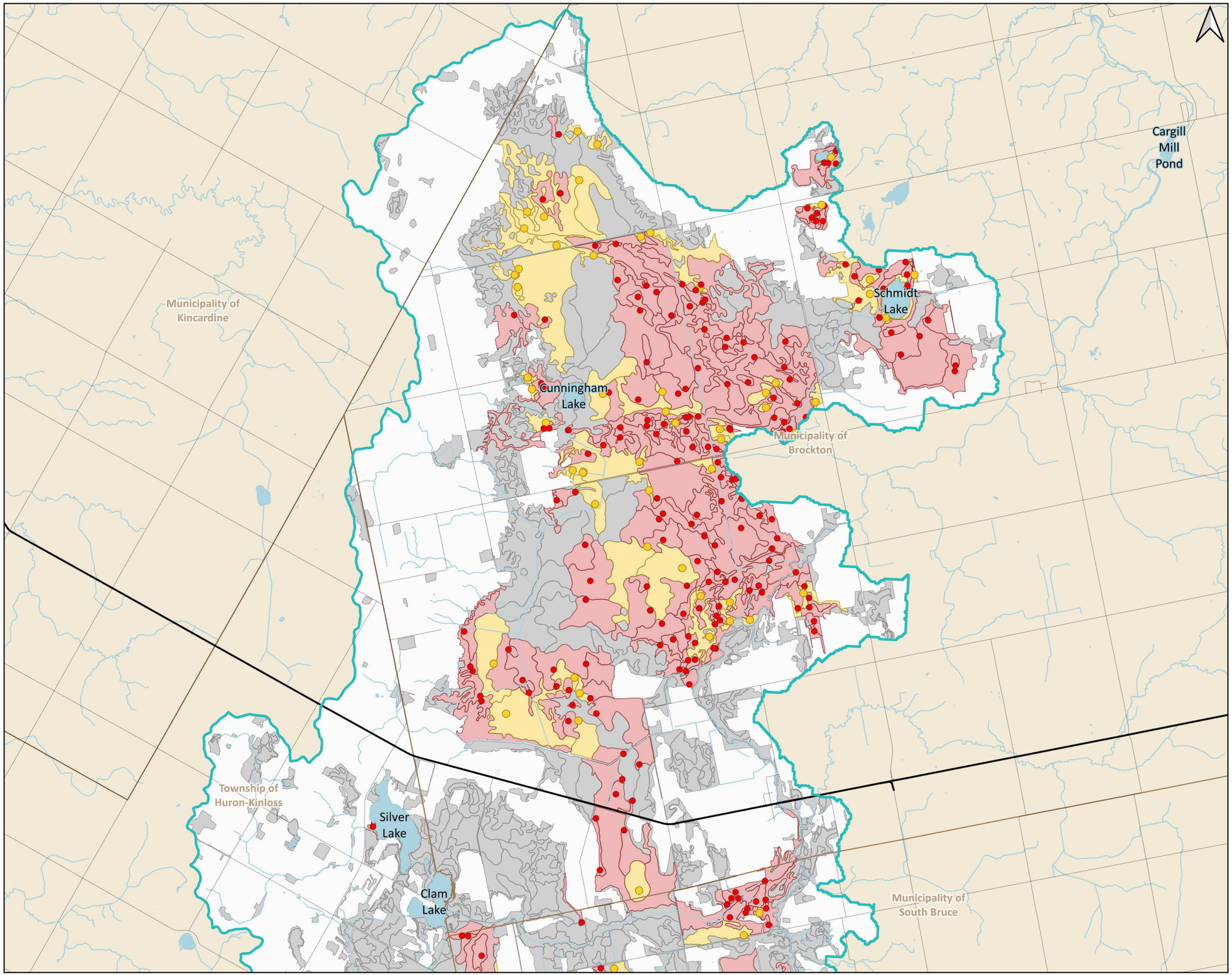
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D168	



NWMO Biodiversity Impact Studies

Desk-Based Ecosite Classifications Changed During Survey - North LSA_{ECO}

Figure C-2c

- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Municipal Boundary
- Highway
- Local Road

TEM Fieldwork Locations [474]

- Changed [347]
- No Change [127]

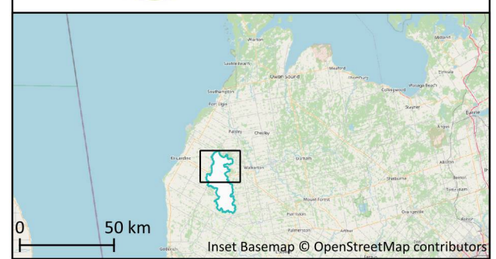
Ecosite Polygon

- Ecosite Changed
- Ecosite Not Changed
- Not Surveyed

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D168	



NWMO Biodiversity Impact Studies

Field Updated Ecosite Data by Ecosite Group - AOI

Figure C-3a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Municipal Boundary
- Local Road
- Not Surveyed

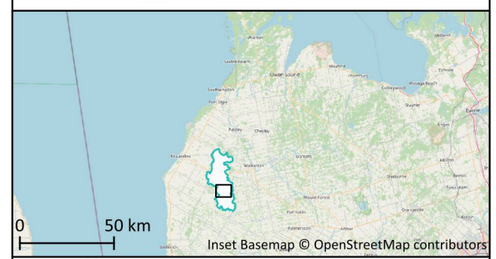
Ecosite Groups

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow

1:25,000

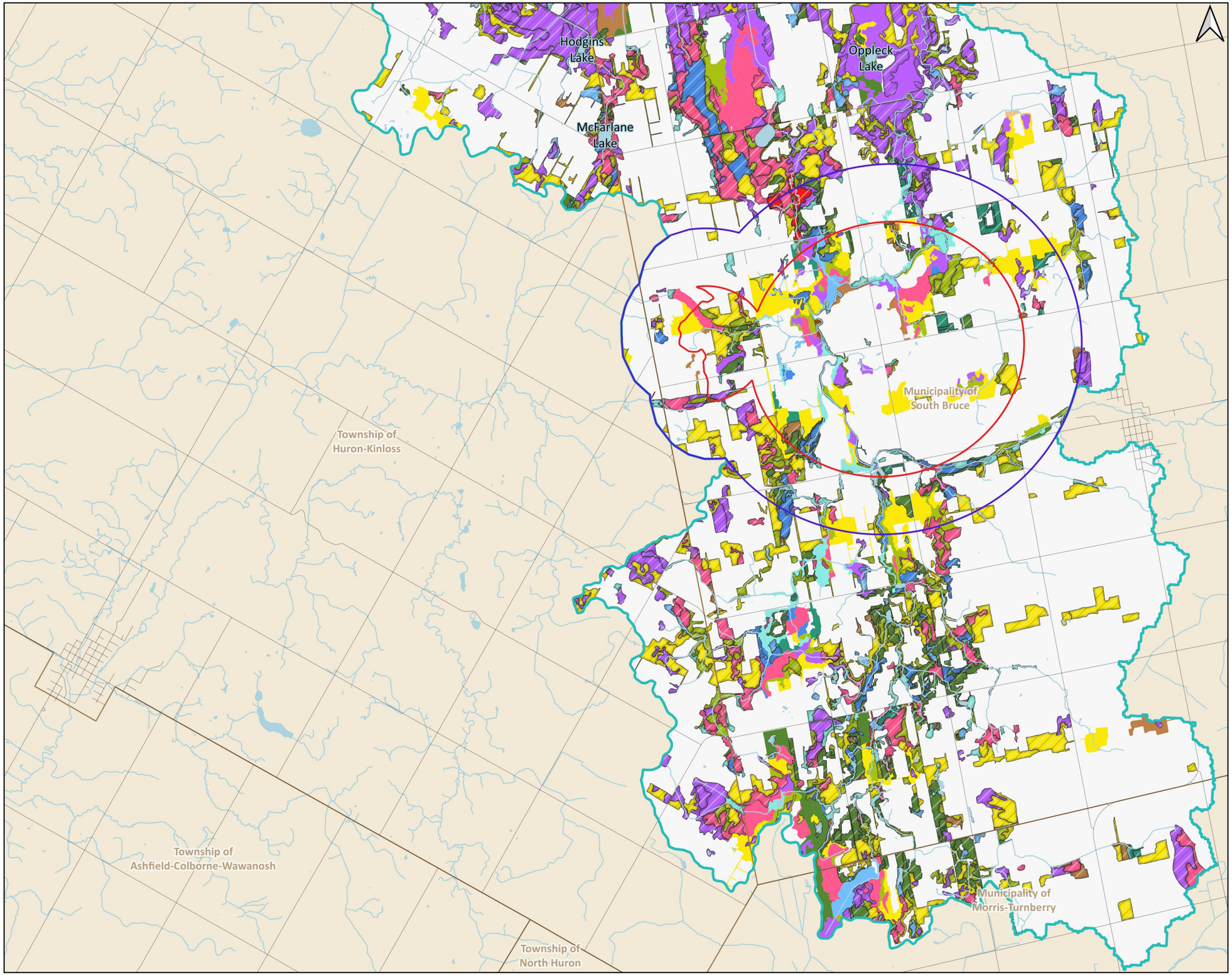
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169a	



NWMO Biodiversity Impact Studies

Field Updated Ecosite Data by Ecosite Group - South LSA_{ECO}

Figure C-3b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Municipal Boundary
- Local Road
- Not Surveyed

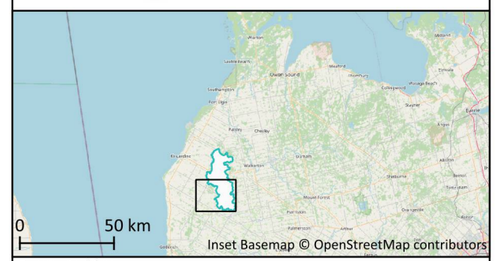
Ecosite Groups

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169a	

NWMO Biodiversity Impact Studies

Field Updated Ecosite Data by Ecosite Group - North LSA_{ECO}

Figure C-3c

- Local Study Area (LSA_{ECO})
- Watercourse
- Municipal Boundary
- Highway
- Local Road
- Not Surveyed

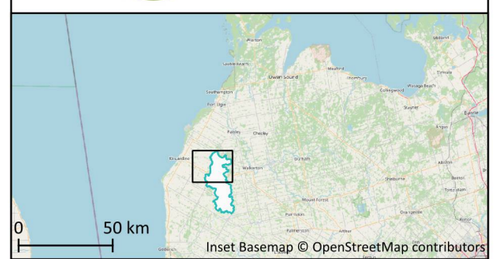
Ecosite Groups

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

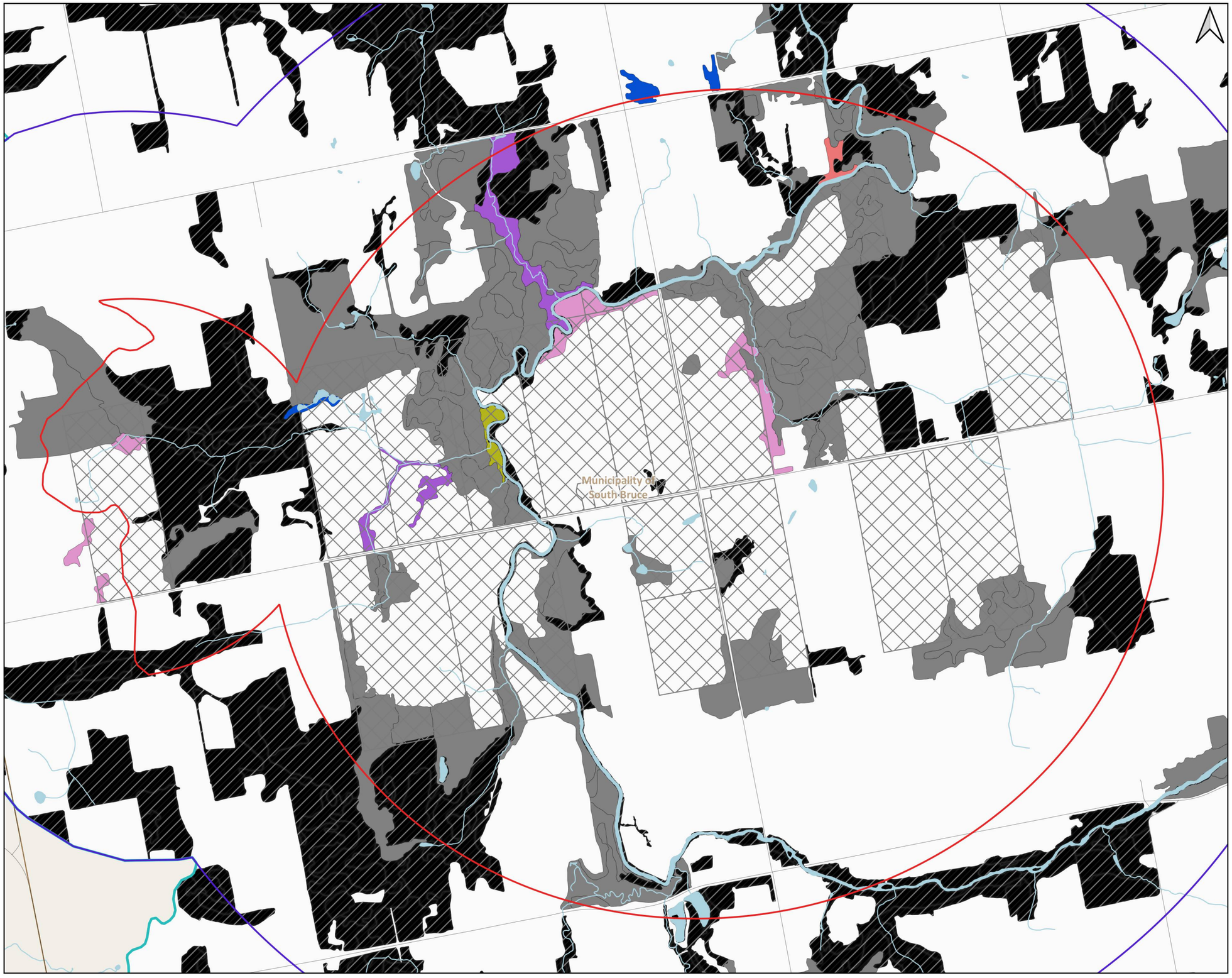
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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169a	

Municipality of Kincardine
Township of Huron-Kinloss
Municipality of Brockton
Municipality of South Bruce
Cunningham Lake
Schmidt Lake
Silver Lake
Clam Lake



NWMO Biodiversity Impact Studies

Habitat Type Change - AOI

Figure C-4a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Municipal Boundary
- Highway
- Local Road
- Watercourse
- Lake

Ecosite Polygons

- Lacustrine to Marsh [1]
- Swamp to Marsh [5]
- Marsh to Swamp [3]
- Treed to Swamp [40]
- Marsh to Meadow [5]
- Treed to Meadow [1]
- Swamp to Meadow [1]
- Swamp to Agriculture [1]
- Treed to Agriculture [1]
- Treed to Thicket [1]
- Swamp to Thicket [2]
- Treed to Plantation [7]
- Swamp to Plantation [1]
- Treed to Regeneration [3]
- Swamp to Treed [5]
- No Change [397]
- Not Surveyed [1681]

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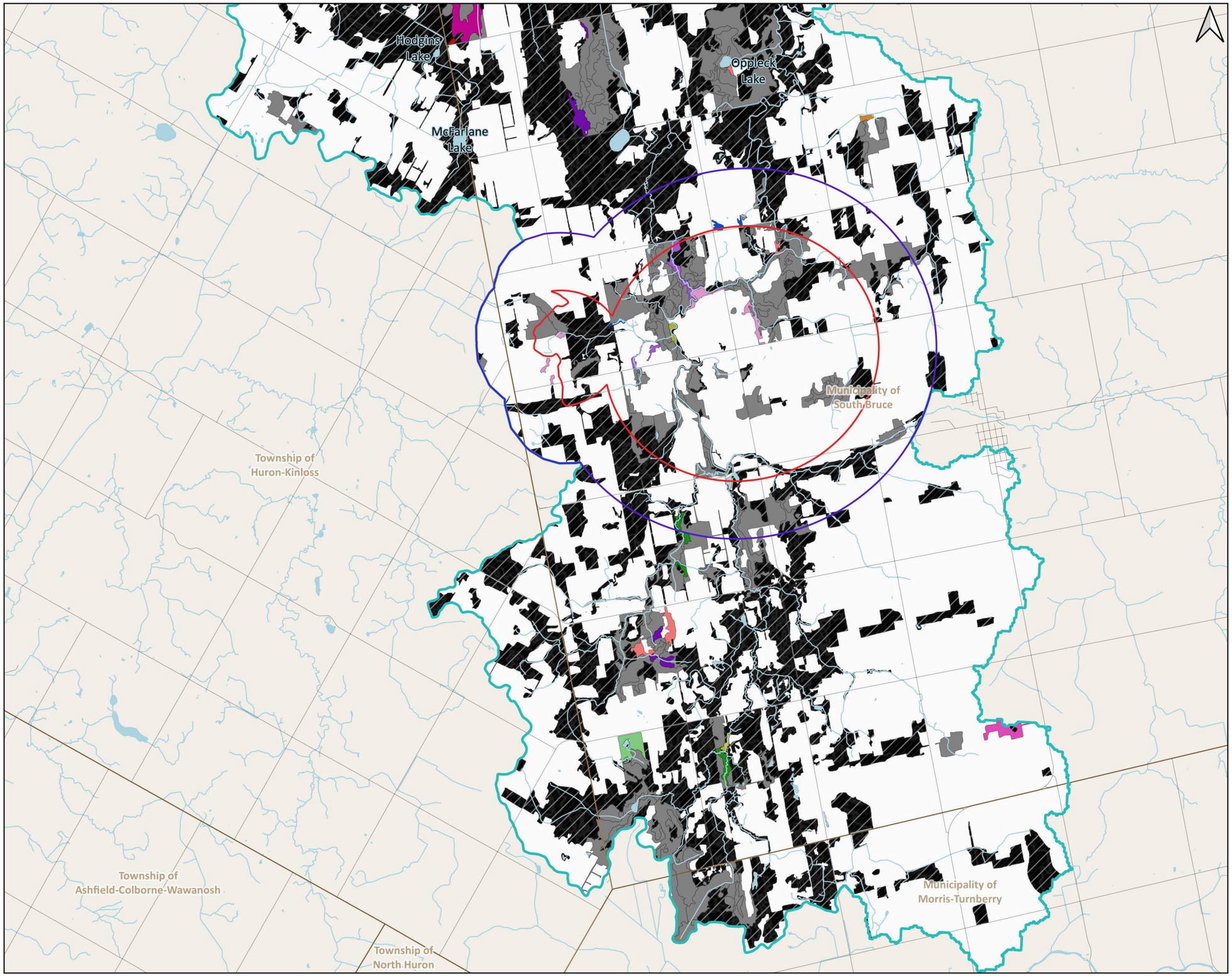
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D170a	



NWMO Biodiversity Impact Studies

Habitat Type Change - South LSA_{ECO}

Figure C-4b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Municipal Boundary
- Highway
- Local Road
- Watercourse
- Lake

Ecosite Polygons

- Lacustrine to Marsh [1]
- Swamp to Marsh [5]
- Marsh to Swamp [3]
- Treed to Swamp [40]
- Marsh to Meadow [5]
- Treed to Meadow [1]
- Swamp to Meadow [1]
- Swamp to Agriculture [1]
- Treed to Agriculture [1]
- Treed to Thicket [1]
- Swamp to Thicket [2]
- Treed to Plantation [7]
- Swamp to Plantation [1]
- Treed to Regeneration [3]
- Swamp to Treed [5]
- No Change [397]
- Not Surveyed [1681]

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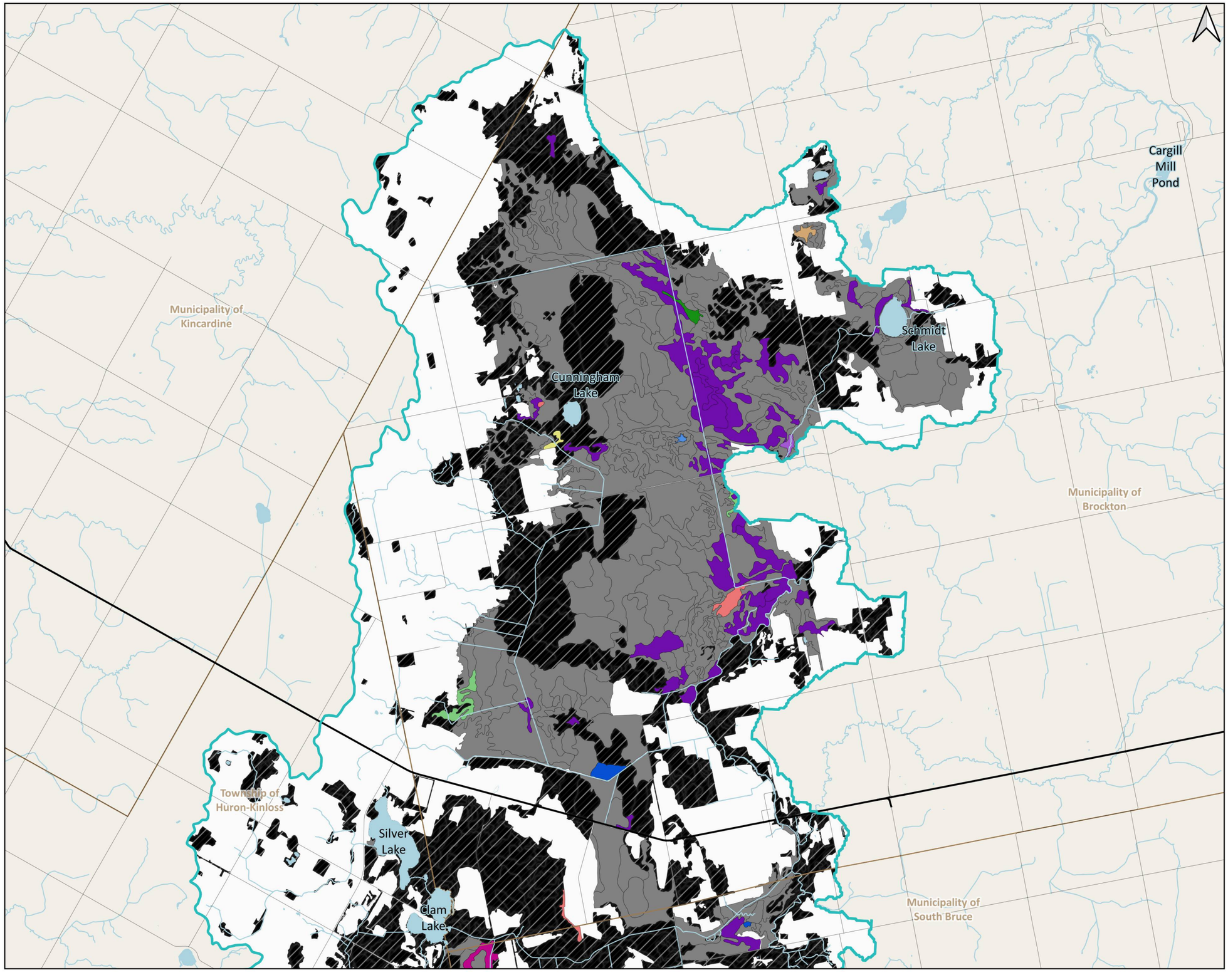
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D170a	



NWMO Biodiversity Impact Studies

Habitat Type Change - North LSA_{ECO}

Figure C-4c

- Local Study Area (LSA_{ECO})
- Municipal Boundary
- Highway
- Local Road
- Watercourse
- Lake

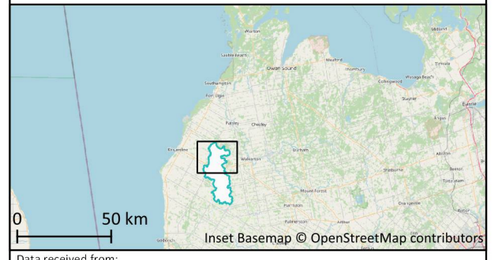
Ecosite Polygons

- Lacustrine to Marsh [1]
- Swamp to Marsh [5]
- Marsh to Swamp [3]
- Treed to Swamp [40]
- Marsh to Meadow [5]
- Treed to Meadow [1]
- Swamp to Meadow [1]
- Swamp to Agriculture [1]
- Treed to Agriculture [1]
- Treed to Thicket [1]
- Swamp to Thicket [2]
- Treed to Plantation [7]
- Swamp to Plantation [1]
- Treed to Regeneration [3]
- Swamp to Treed [5]
- No Change [397]
- Not Surveyed [1681]

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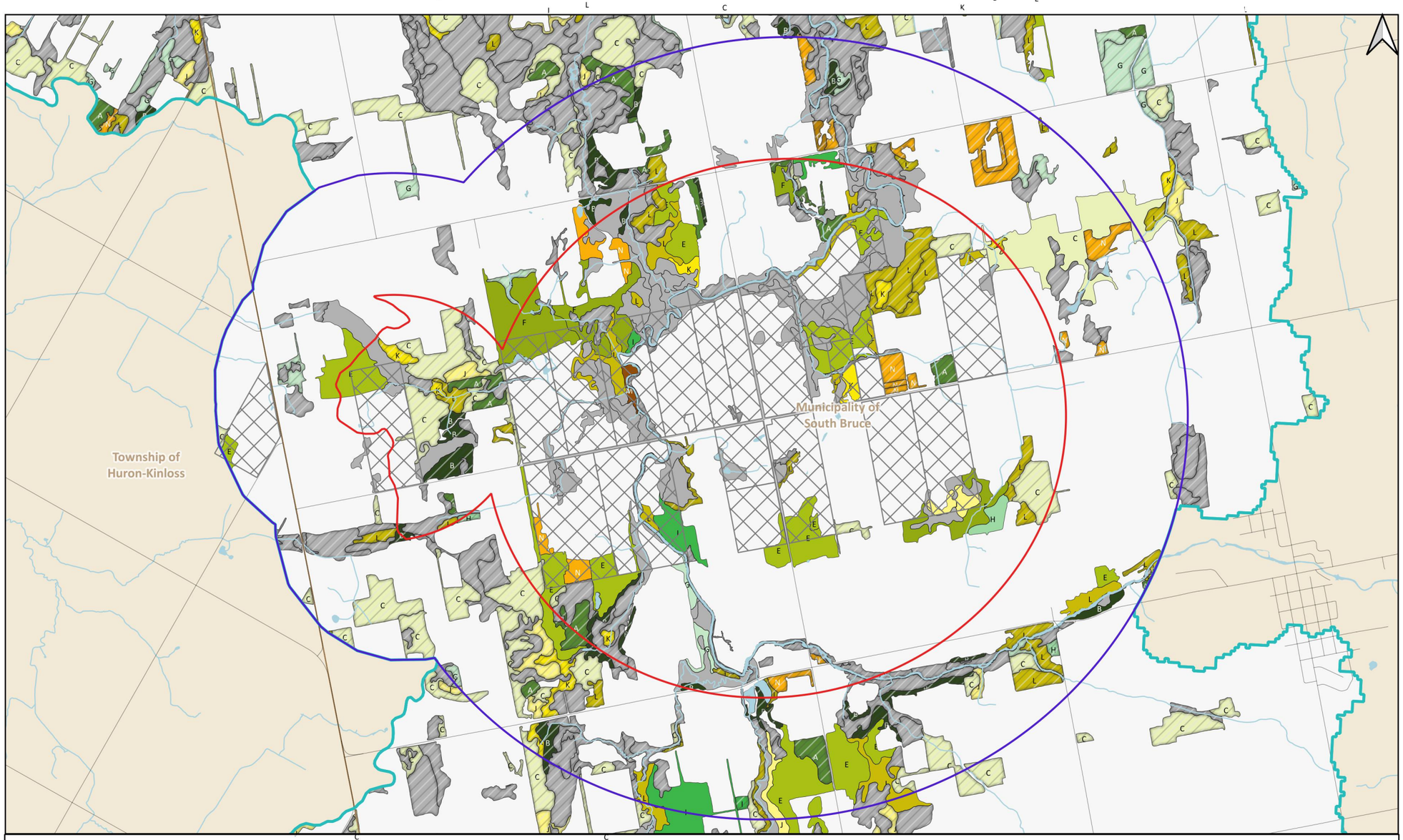
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D170a	



NWMO Biodiversity Impact Studies

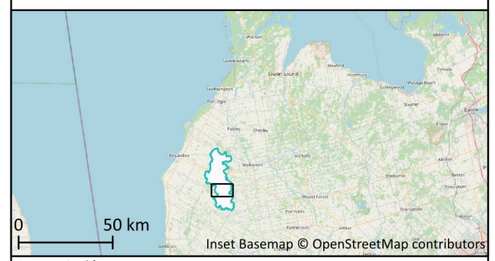
Upland Forest Ecosite Classification - AOI

Figure C-5a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Municipal Boundary
- Local Road

1:35,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169b	

Upland Forest Ecosites

- Not Surveyed
- Other Ecosites

Conifer Upland Forest

- A — Naturalized Pine Conifer Treed Plantation
- B — Upland Forest - Conifer Combined

Hardwood Upland Forest

- C — Dry to Fresh Coarse Mineral Hardwood Treed
- E — Dry to Fresh Sugar Maple Coarse Mineral Hardwood Treed
- F — Dry to Fresh Sugar Maple Fine Mineral Hardwood Treed
- G — Moist Coarse Mineral Hardwood Treed
- H — Moist Fine Mineral Hardwood Treed
- I — Upland Forest - Hardwood Combined

Mixedwood Upland Forest

- J — Dry to Fresh Coarse Mineral Mixedwood Treed
- K — Moist White Cedar Coarse Mineral Mixedwood Treed
- L — Upland Forest - Mixedwood Combined

Shrub

- M — Sparsely Vegetated/Shrub - Shrub Combined

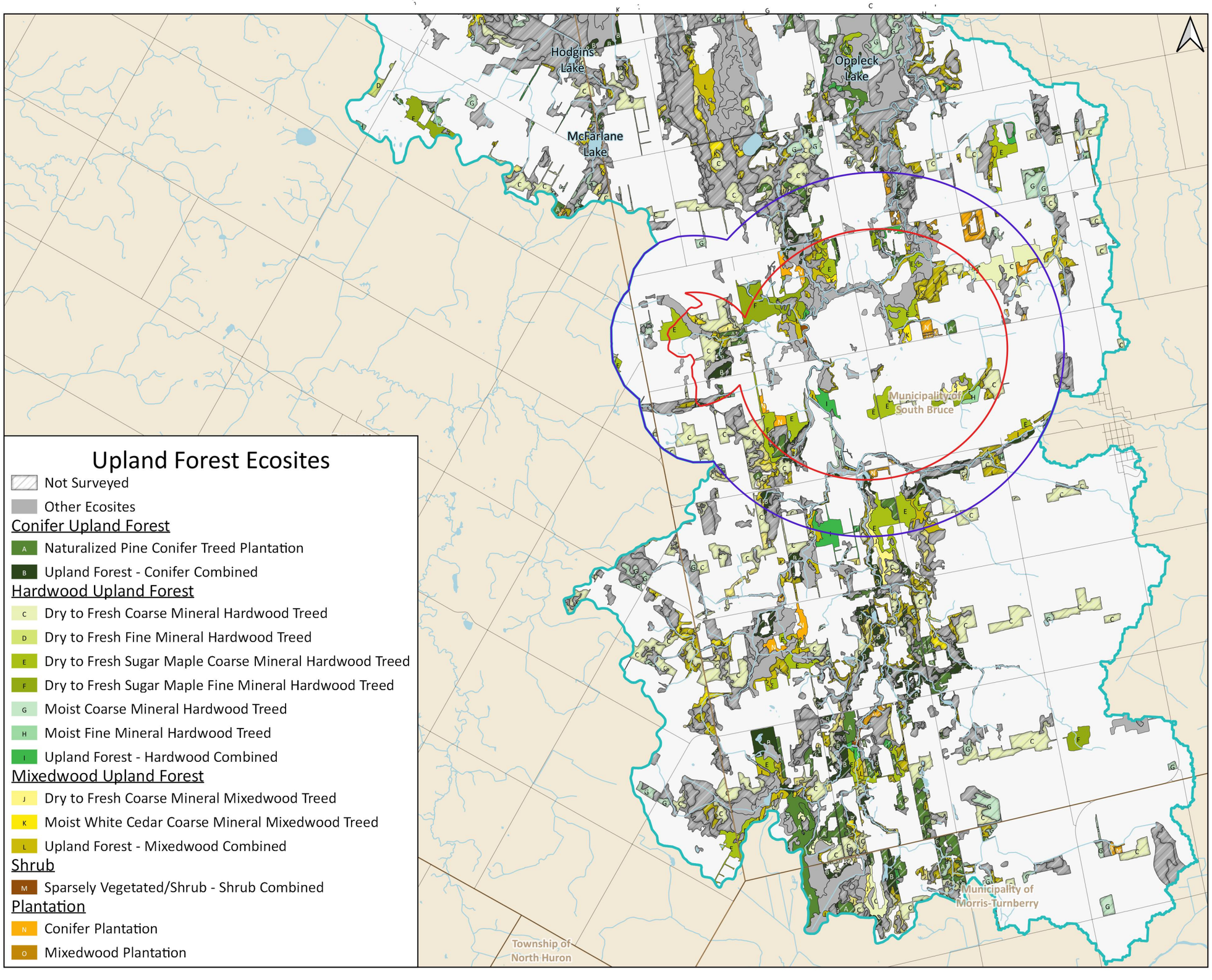
Plantation

- N — Conifer Plantation
- O — Mixedwood Plantation

NWMO Biodiversity Impact Studies

Upland Forest Ecosite Classification - South LSA_{ECO}

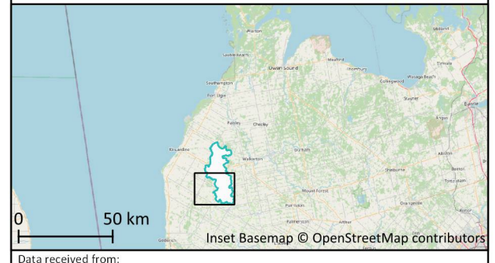
Figure C-5b



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Municipal Boundary
- Local Road

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169b	

Upland Forest Ecosites

- Not Surveyed
- Other Ecosites

Conifer Upland Forest

- A — Naturalized Pine Conifer Treed Plantation
- B — Upland Forest - Conifer Combined

Hardwood Upland Forest

- C — Dry to Fresh Coarse Mineral Hardwood Treed
- D — Dry to Fresh Fine Mineral Hardwood Treed
- E — Dry to Fresh Sugar Maple Coarse Mineral Hardwood Treed
- F — Dry to Fresh Sugar Maple Fine Mineral Hardwood Treed
- G — Moist Coarse Mineral Hardwood Treed
- H — Moist Fine Mineral Hardwood Treed
- I — Upland Forest - Hardwood Combined

Mixedwood Upland Forest

- J — Dry to Fresh Coarse Mineral Mixedwood Treed
- K — Moist White Cedar Coarse Mineral Mixedwood Treed
- L — Upland Forest - Mixedwood Combined

Shrub

- M — Sparsely Vegetated/Shrub - Shrub Combined

Plantation

- N — Conifer Plantation
- O — Mixedwood Plantation

Upland Forest Ecosites

- Not Surveyed
- Other Ecosites

Conifer Upland Forest

- A — Naturalized Pine Conifer Treed Plantation
- B — Upland Forest - Conifer Combined

Hardwood Upland Forest

- C — Dry to Fresh Coarse Mineral Hardwood Treed
- D — Dry to Fresh Fine Mineral Hardwood Treed
- E — Dry to Fresh Sugar Maple Coarse Mineral Hardwood Treed
- F — Dry to Fresh Sugar Maple Fine Mineral Hardwood Treed
- G — Moist Coarse Mineral Hardwood Treed
- H — Moist Fine Mineral Hardwood Treed
- I — Upland Forest - Hardwood Combined

Mixedwood Upland Forest

- J — Dry to Fresh Coarse Mineral Mixedwood Treed
- K — Moist White Cedar Coarse Mineral Mixedwood Treed
- L — Upland Forest - Mixedwood Combined

Shrub

- M — Sparsely Vegetated/Shrub - Shrub Combined

Plantation

- N — Conifer Plantation
- O — Mixedwood Plantation

Schmidt Lake
Cunningham Lake
Municipality of Brockton
Township of Huron-Kinloss
Silver Lake
Clam Lake
Municipality of South Bruce

NWMO Biodiversity Impact Studies

Upland Forest Ecosite Classification - North LSA_{ECO}

Figure C-5c

- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Municipal Boundary
- Highway
- Local Road

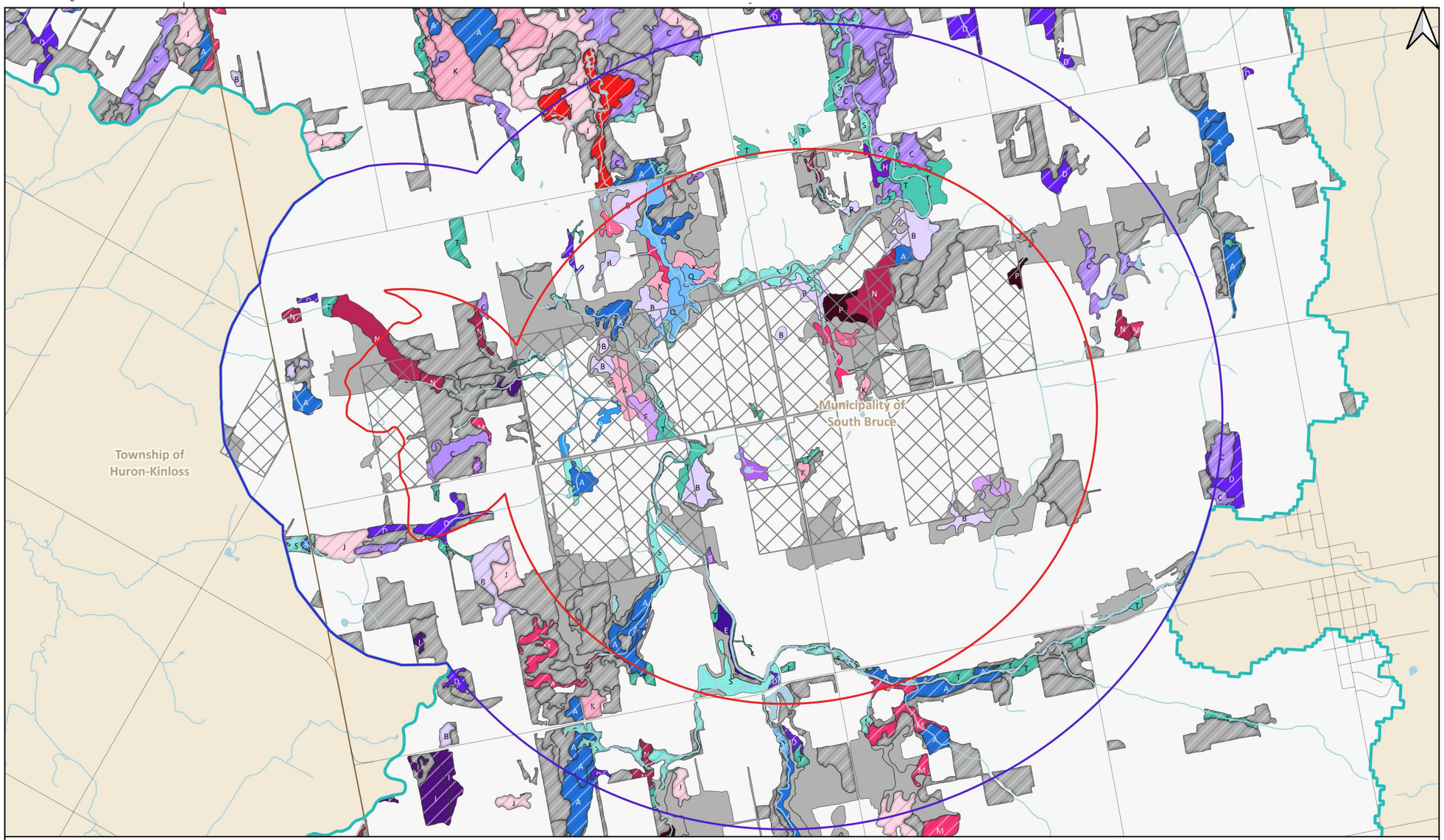
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ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169b	



NWMO Biodiversity Impact Studies

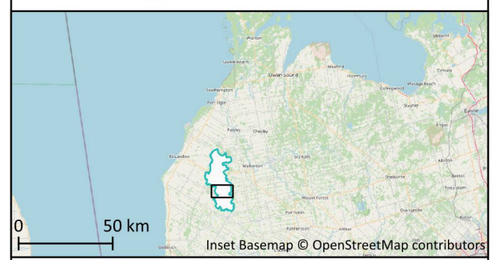
Wetland Ecosite Classification - AOI

Figure C-6a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Municipal Boundary
- Local Road

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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169c	

Wetland Ecosites

- Not Surveyed
- Other Ecosites

Conifer Swamp Wetlands

- A Wetland - Conifer Swamp Combined

Hardwood Swamp Wetlands

- B Maple Organic Hardwood Swamp
- C Organic Hardwood Swamp
- D Coarse Mineral Hardwood Swamp
- E Ash Organic Hardwood Swamp
- F Silver Maple +/ Freeman's Maple Fine Mineral Hardwood Swamp
- G Fine Mineral Hardwood Swamp
- H Ash +/ White Elm Fine Mineral Hardwood Swamp
- I Wetland - Hardwood Swamp Combined

Mixedwood Swamp Wetlands

- J Organic Mixedwood Swamp
- K White Cedar Organic Mixedwood Swamp
- L Hemlock +/ Yellow Birch +/ Maple Organic Mixedwood Swamp
- M White Cedar Mineral Mixedwood Swamp
- N Mineral Mixedwood Swamp
- P Wetland - Mixedwood Swamp Combined

Shrub Swamp Wetlands

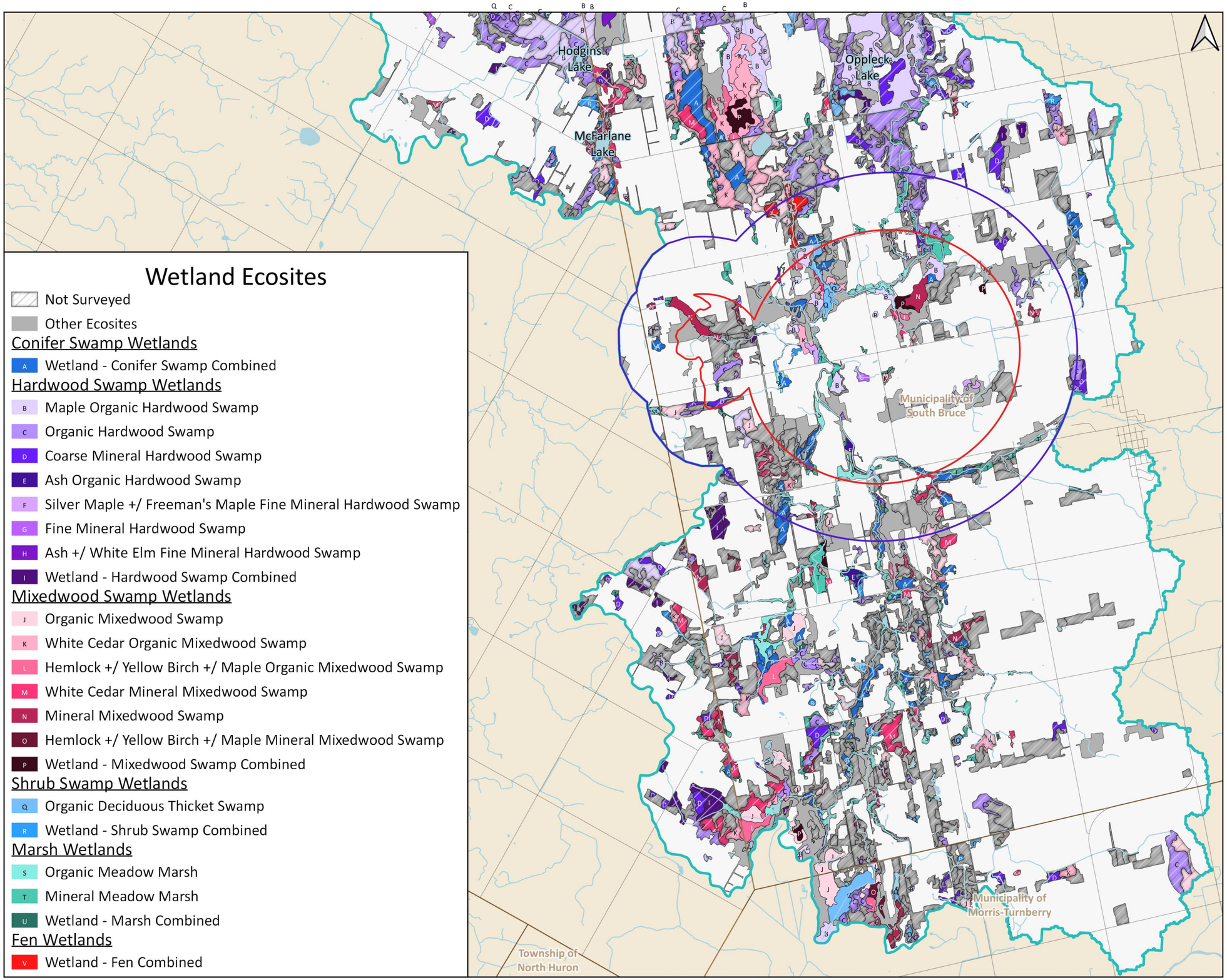
- Q Organic Deciduous Thicket Swamp
- R Wetland - Shrub Swamp Combined

Marsh Wetlands

- S Organic Meadow Marsh
- T Mineral Meadow Marsh
- U Wetland - Marsh Combined

Fen Wetlands

- V Wetland - Fen Combined



Wetland Ecosites

- Not Surveyed
- Other Ecosites

Conifer Swamp Wetlands

- A — Wetland - Conifer Swamp Combined

Hardwood Swamp Wetlands

- B — Maple Organic Hardwood Swamp
- C — Organic Hardwood Swamp
- D — Coarse Mineral Hardwood Swamp
- E — Ash Organic Hardwood Swamp
- F — Silver Maple +/ Freeman's Maple Fine Mineral Hardwood Swamp
- G — Fine Mineral Hardwood Swamp
- H — Ash +/ White Elm Fine Mineral Hardwood Swamp
- I — Wetland - Hardwood Swamp Combined

Mixedwood Swamp Wetlands

- J — Organic Mixedwood Swamp
- K — White Cedar Organic Mixedwood Swamp
- L — Hemlock +/ Yellow Birch +/ Maple Organic Mixedwood Swamp
- M — White Cedar Mineral Mixedwood Swamp
- N — Mineral Mixedwood Swamp
- O — Hemlock +/ Yellow Birch +/ Maple Mineral Mixedwood Swamp
- P — Wetland - Mixedwood Swamp Combined

Shrub Swamp Wetlands

- Q — Organic Deciduous Thicket Swamp
- R — Wetland - Shrub Swamp Combined

Marsh Wetlands

- S — Organic Meadow Marsh
- T — Mineral Meadow Marsh
- U — Wetland - Marsh Combined

Fen Wetlands

- V — Wetland - Fen Combined

NWMO Biodiversity Impact Studies

Wetland Ecosite Classification - South LSA_{ECO}

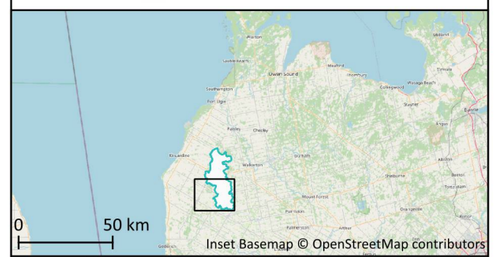
Figure C-6b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Municipal Boundary
- Local Road

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169c	

Wetland Ecosites

- Not Surveyed
- Other Ecosites

Conifer Swamp Wetlands

- A — Wetland - Conifer Swamp Combined

Hardwood Swamp Wetlands

- B — Maple Organic Hardwood Swamp
- C — Organic Hardwood Swamp
- D — Coarse Mineral Hardwood Swamp
- E — Ash Organic Hardwood Swamp
- F — Silver Maple +/ Freeman's Maple Fine Mineral Hardwood Swamp
- G — Fine Mineral Hardwood Swamp
- H — Ash +/ White Elm Fine Mineral Hardwood Swamp
- I — Wetland - Hardwood Swamp Combined

Mixedwood Swamp Wetlands

- J — Organic Mixedwood Swamp
- K — White Cedar Organic Mixedwood Swamp
- L — Hemlock +/ Yellow Birch +/ Maple Organic Mixedwood Swamp
- M — White Cedar Mineral Mixedwood Swamp
- N — Mineral Mixedwood Swamp
- O — Hemlock +/ Yellow Birch +/ Maple Mineral Mixedwood Swamp
- P — Wetland - Mixedwood Swamp Combined

Shrub Swamp Wetlands

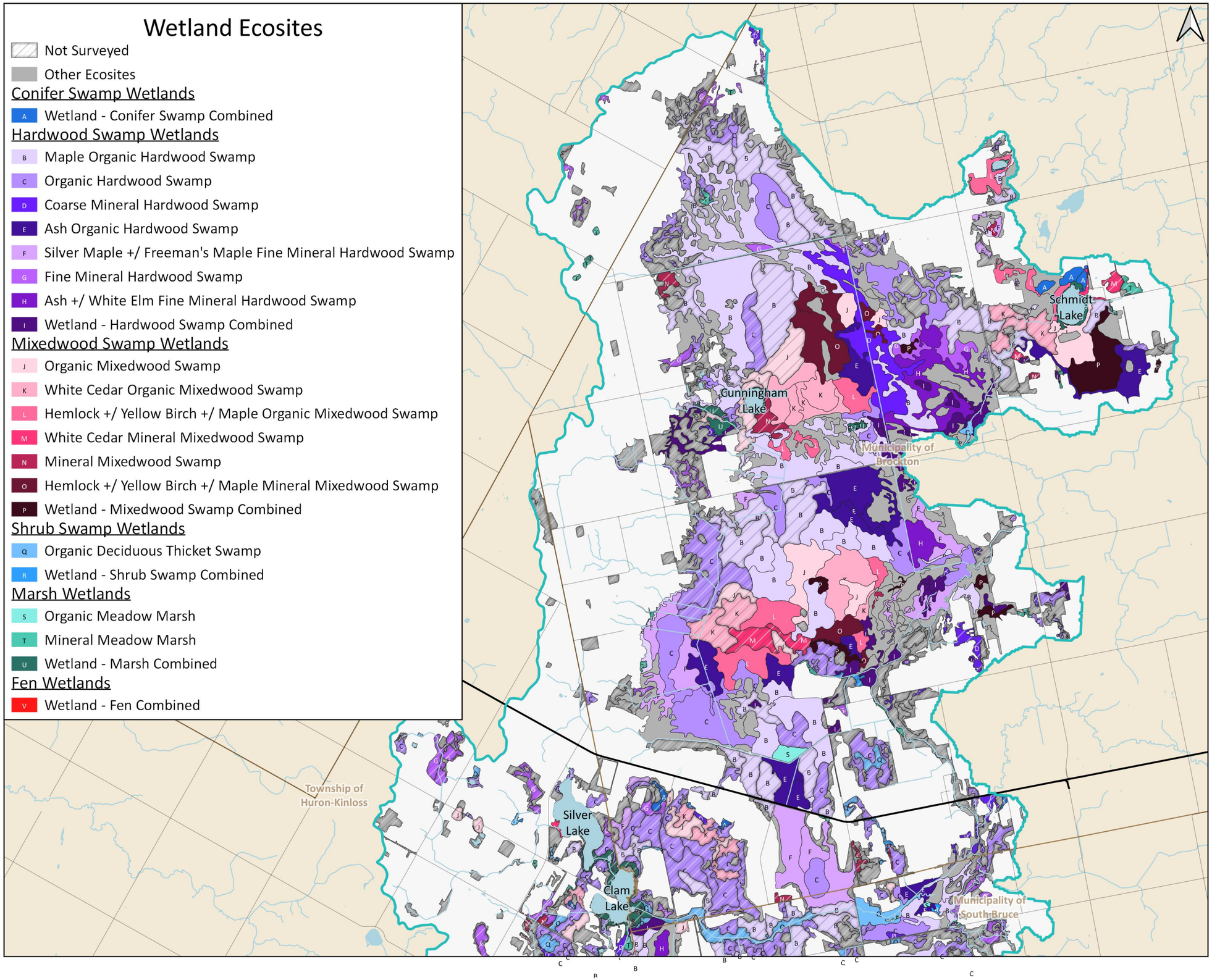
- Q — Organic Deciduous Thicket Swamp
- R — Wetland - Shrub Swamp Combined

Marsh Wetlands

- S — Organic Meadow Marsh
- T — Mineral Meadow Marsh
- U — Wetland - Marsh Combined

Fen Wetlands

- V — Wetland - Fen Combined



NWMO Biodiversity Impact Studies

Wetland Ecosite Classification - North LSA_{ECO}

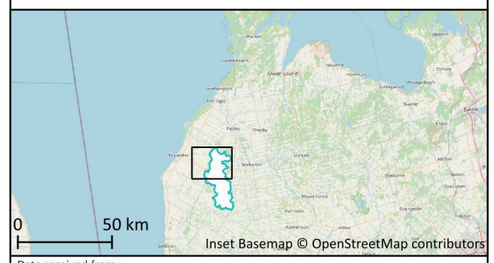
Figure C-6c

- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Municipal Boundary
- Highway
- Local Road

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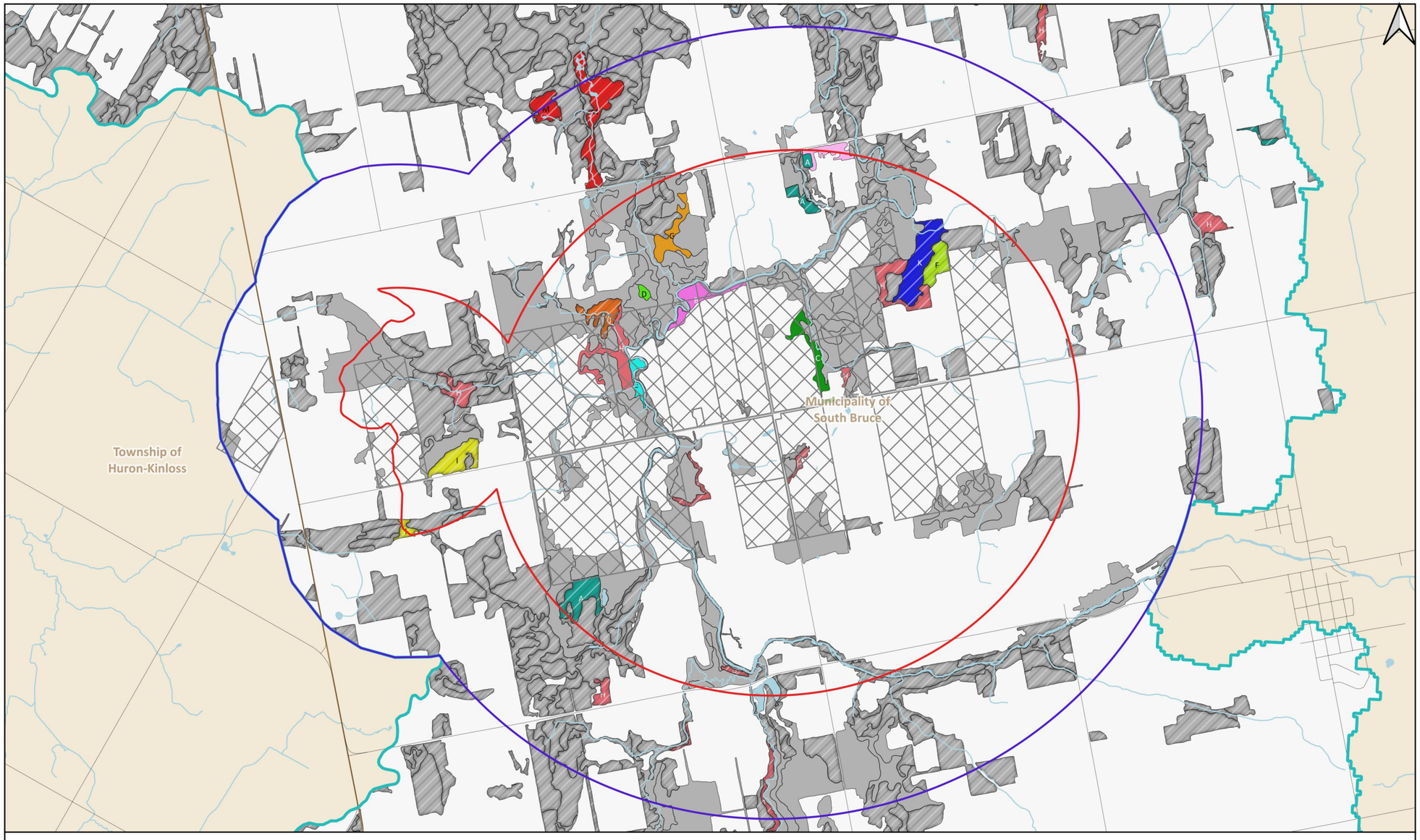
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169c	



Rare Ecosites

- Not Surveyed
- Other Ecosites

Rare Ecosites [2155]

- A — Dry to Fresh Coarse Calcareous Treed Meadow [8]
- B — Dry to Fresh Coarse Non-Calcareous Shrub Meadow [2]
- C — Dry to Fresh Fine Non-Calcareous Shrub Meadow [1]
- D — Dry to Fresh Hemlock Coarse Mineral Mixedwood Treed [2]
- E — Dry to Fresh Non-Calcareous Deciduous Thicket [2]
- F — Dry to Fresh Pine Coarse Mineral Mixedwood Treed [1]
- G — Dry to Fresh Sugar Maple Coarse Mineral Mixedwood Treed [5]
- H — Dry to Fresh White Cedar Coarse Mineral Mixedwood Treed [37]
- I — Dry to Fresh White Pine +/ Red Pine Coarse Mineral Conifer Treed [13]
- J — Larch Organic Conifer Swamp [2]
- K — Moist Hemlock Coarse Mineral Mixedwood Treed [4]
- L — Naturalized Black Walnut Hardwood Treed Plantation [1]
- M — Treed Fen [2]

NWMO Biodiversity Impact Studies

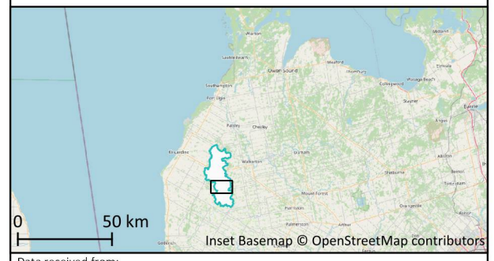
Rare Ecosite Classification - AOI

Figure C-7a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Municipal Boundary
- Local Road

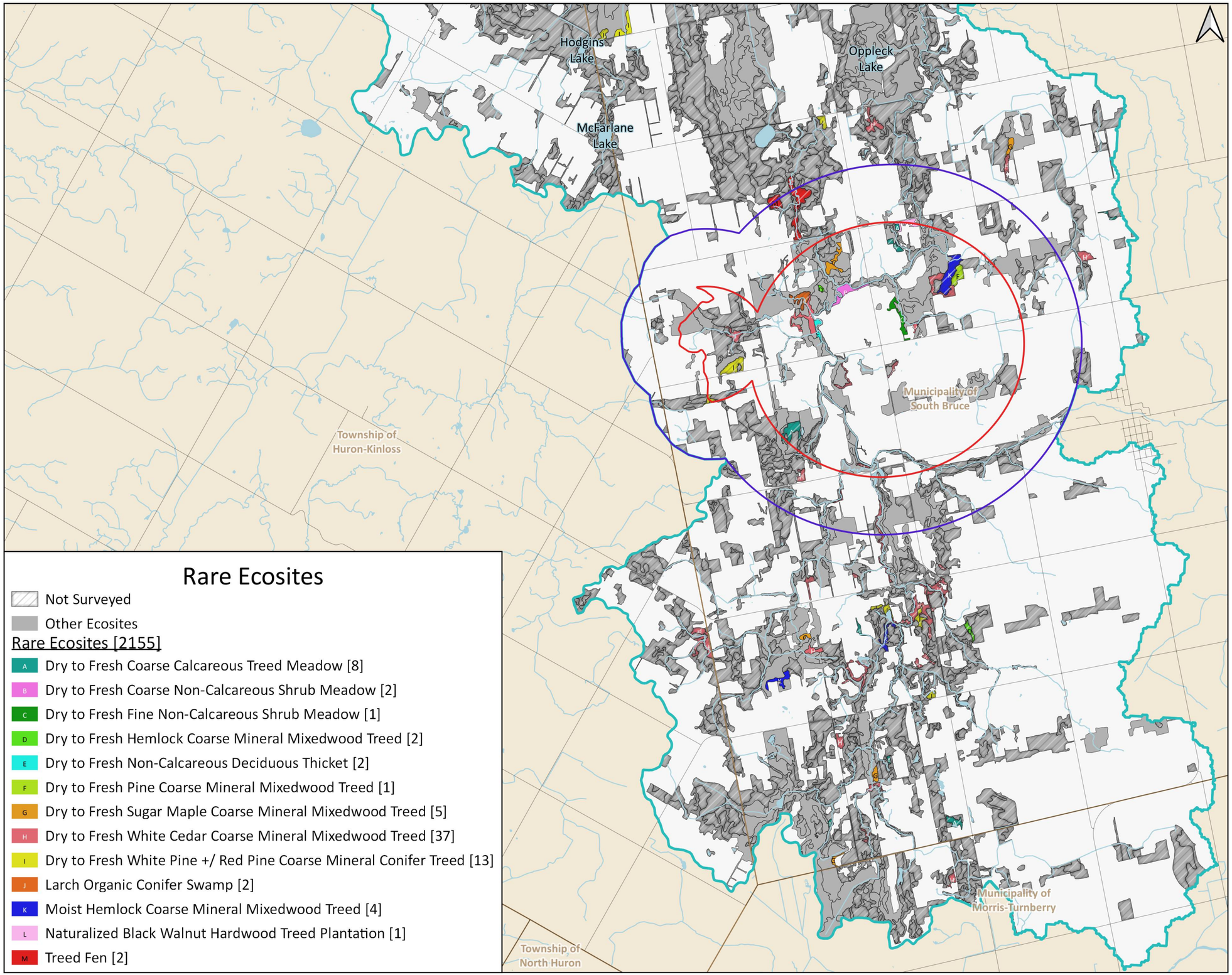
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169d	



Rare Ecosites

- Not Surveyed
- Other Ecosites

Rare Ecosites [2155]

- A — Dry to Fresh Coarse Calcareous Treed Meadow [8]
- B — Dry to Fresh Coarse Non-Calcareous Shrub Meadow [2]
- C — Dry to Fresh Fine Non-Calcareous Shrub Meadow [1]
- D — Dry to Fresh Hemlock Coarse Mineral Mixedwood Treed [2]
- E — Dry to Fresh Non-Calcareous Deciduous Thicket [2]
- F — Dry to Fresh Pine Coarse Mineral Mixedwood Treed [1]
- G — Dry to Fresh Sugar Maple Coarse Mineral Mixedwood Treed [5]
- H — Dry to Fresh White Cedar Coarse Mineral Mixedwood Treed [37]
- I — Dry to Fresh White Pine +/ Red Pine Coarse Mineral Conifer Treed [13]
- J — Larch Organic Conifer Swamp [2]
- K — Moist Hemlock Coarse Mineral Mixedwood Treed [4]
- L — Naturalized Black Walnut Hardwood Treed Plantation [1]
- M — Treed Fen [2]

NWMO Biodiversity Impact Studies

Rare Ecosite Classification - South LSA_{ECO}

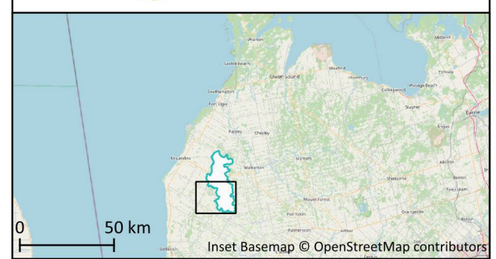
Figure C-7b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Municipal Boundary
- Local Road

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169d	

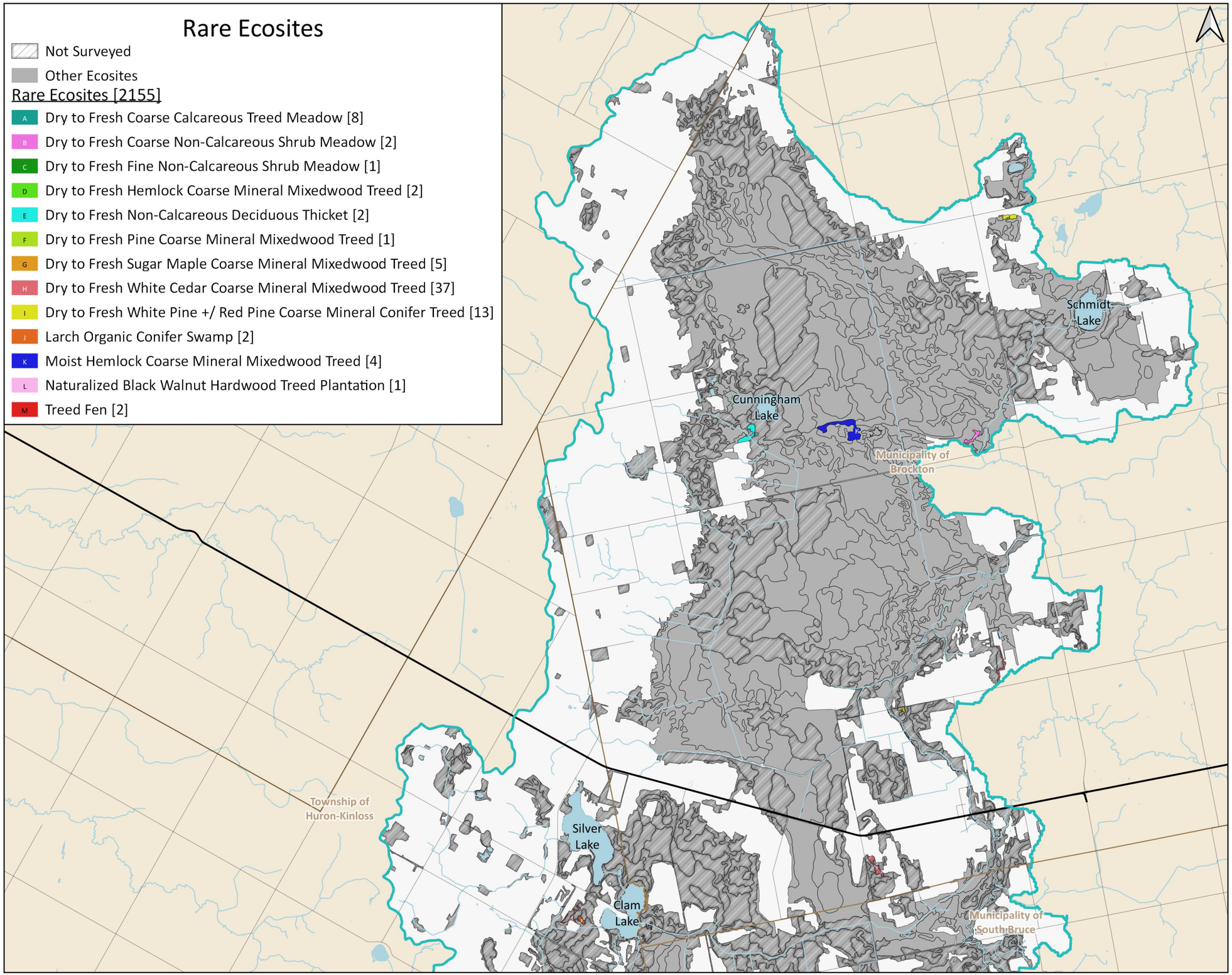
Rare Ecosites

Not Surveyed

Other Ecosites

Rare Ecosites [2155]

- A — Dry to Fresh Coarse Calcareous Treed Meadow [8]
- B — Dry to Fresh Coarse Non-Calcareous Shrub Meadow [2]
- C — Dry to Fresh Fine Non-Calcareous Shrub Meadow [1]
- D — Dry to Fresh Hemlock Coarse Mineral Mixedwood Treed [2]
- E — Dry to Fresh Non-Calcareous Deciduous Thicket [2]
- F — Dry to Fresh Pine Coarse Mineral Mixedwood Treed [1]
- G — Dry to Fresh Sugar Maple Coarse Mineral Mixedwood Treed [5]
- H — Dry to Fresh White Cedar Coarse Mineral Mixedwood Treed [37]
- I — Dry to Fresh White Pine +/ Red Pine Coarse Mineral Conifer Treed [13]
- J — Larch Organic Conifer Swamp [2]
- K — Moist Hemlock Coarse Mineral Mixedwood Treed [4]
- L — Naturalized Black Walnut Hardwood Treed Plantation [1]
- M — Treed Fen [2]



NWMO Biodiversity Impact Studies

Rare Ecosite Classification - North LSA_{ECO}

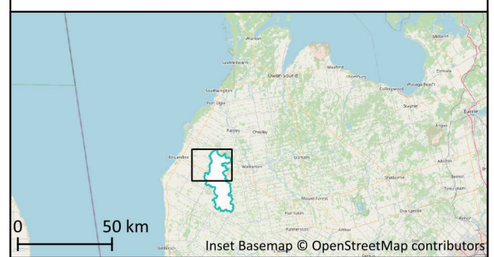
Figure C-7c

- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Municipal Boundary
- Highway
- Local Road

1:65,000

0 1 2 km

ZOETICA

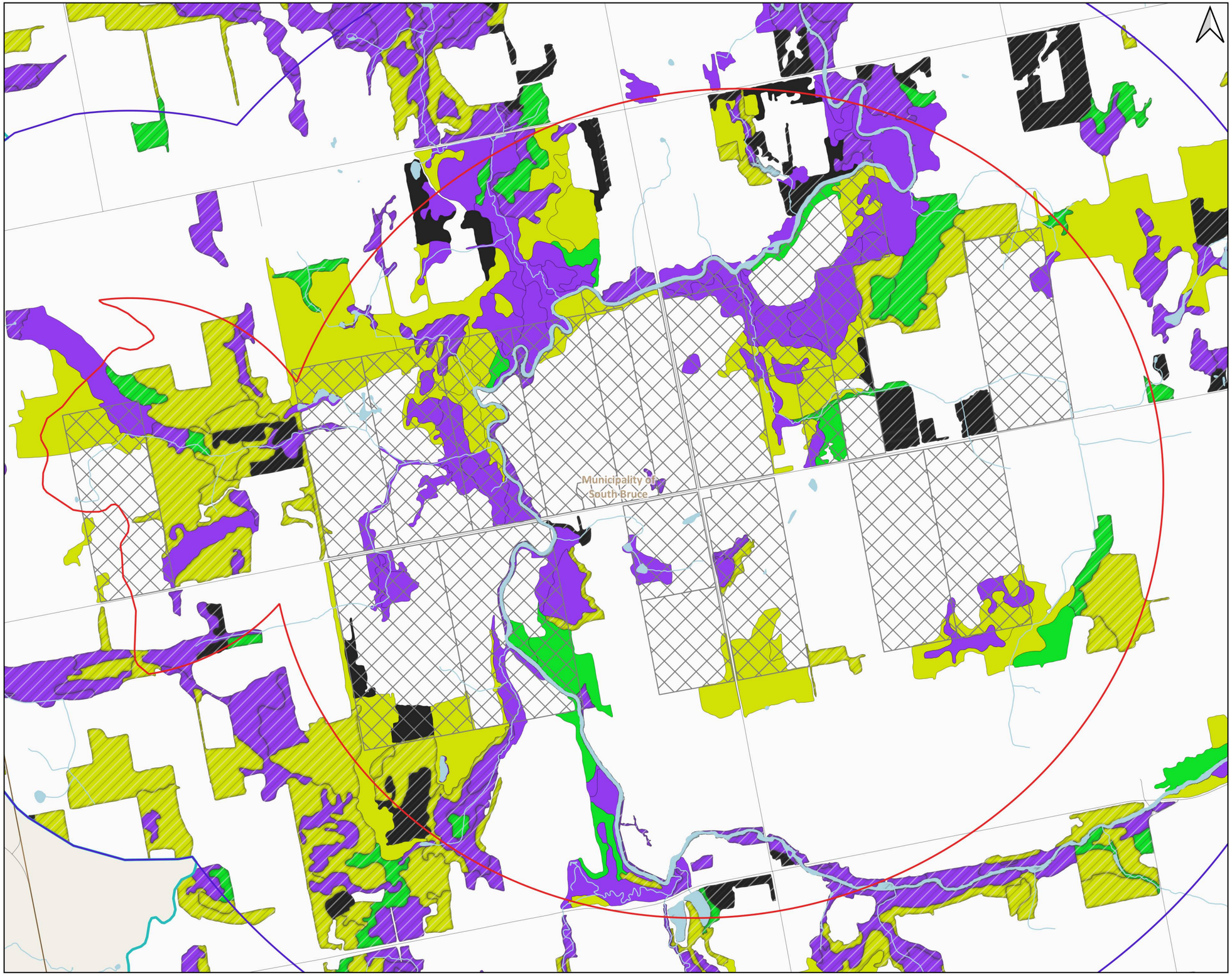


Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D169d	

APPENDIX D – SOIL AND VEGETATION ATTRIBUTES

D.1 Soil Conditions



NWMO Biodiversity Impact Studies

Soil Moisture Regime - AOI

Figure D-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Municipal Boundary
- Local Road

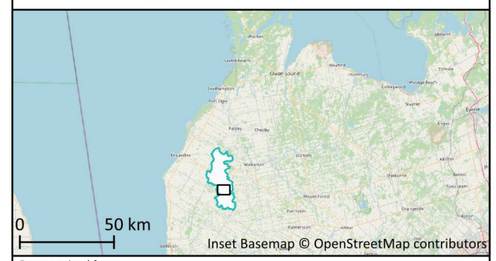
Ecosite Polygon Moisture Regime

- Aquatic
- Wet
- Moist
- Dry to Fresh
- None

1:20,000

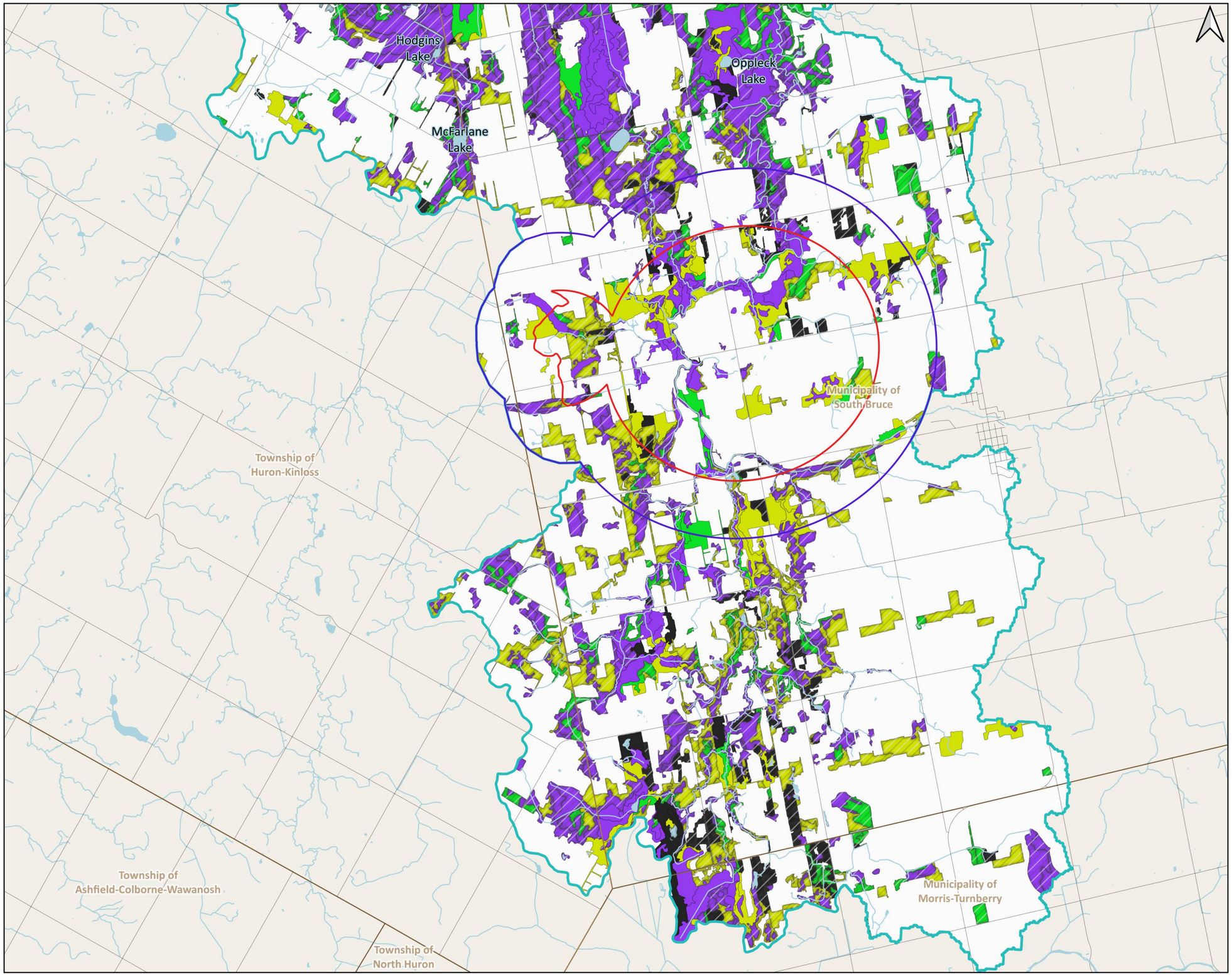
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D170a	



NWMO Biodiversity Impact Studies

Soil Moisture Regime - South LSA_{ECO}

Figure D-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Municipal Boundary
- Local Road
- Not Surveyed

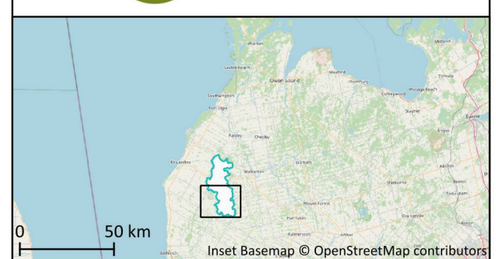
Ecosite Polygon Moisture Regime

- Aquatic
- Wet
- Moist
- Dry to Fresh
- No Moisture Regime Information

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D170a	

NWMO Biodiversity Impact Studies

Soil Moisture Regime - North LSA_{ECO}

Figure D-1c

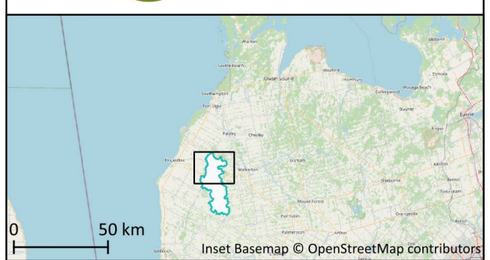
Local Study Area (LSA_{ECO})
Watercourse
Lake
Municipal Boundary
Highway
Local Road
Not Surveyed

Ecosite Polygon Moisture Regime
Wet
Moist
Dry to Fresh
No Moisture Regime Information

Municipality of Kincardine
Cargill Mill Pond
Schmidt Lake
Cunningham Lake
Municipality of Brockton
Township of Huron-Kinloss
Silver Lake
Clam Lake
Municipality of South Bruce

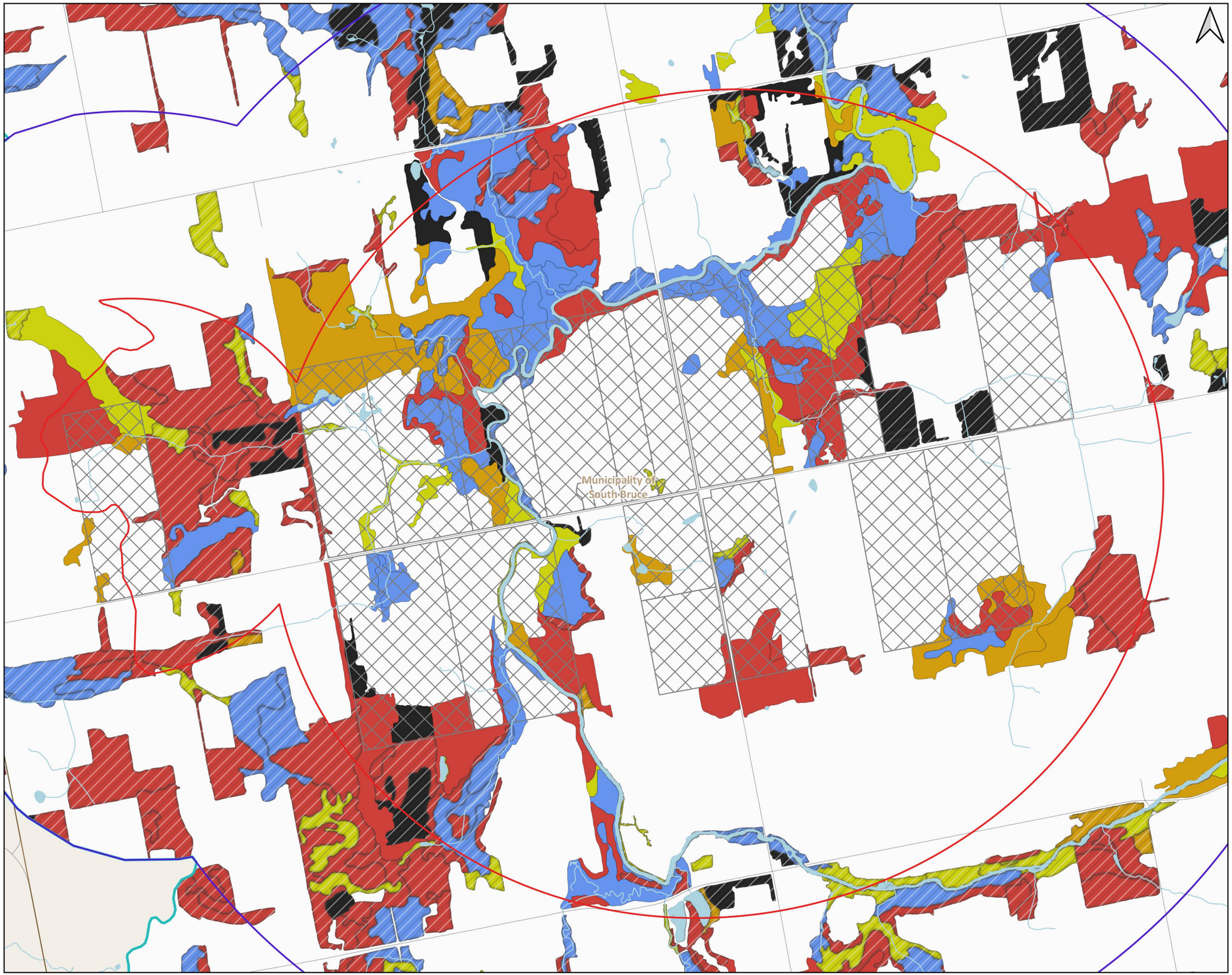
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D170a	



NWMO Biodiversity Impact Studies

Soil Texture - AOI

Figure D-2a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Municipal Boundary
- Local Road

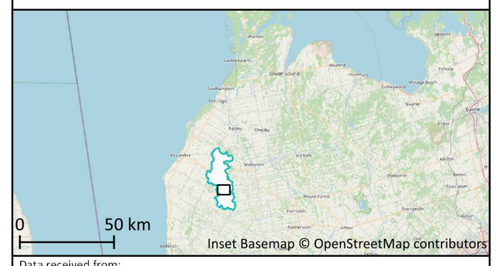
Ecosite Polygon Soil Texture

- Aquatic
- Coarse
- Fine
- Mineral
- None
- Organic

1:20,000

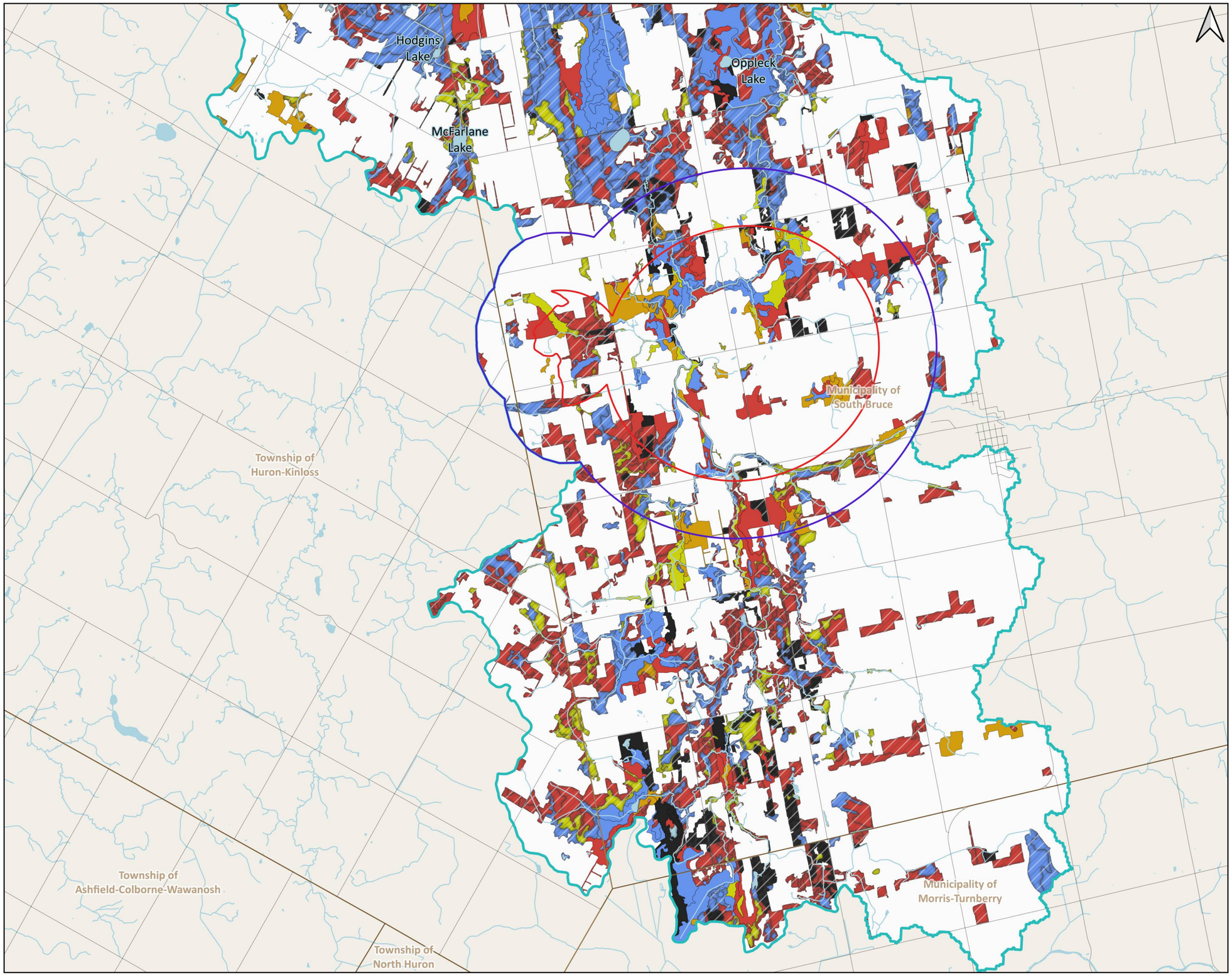
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D170b	



NWMO Biodiversity Impact Studies

Soil Texture - South LSA_{ECO}

Figure D-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Municipal Boundary
- Local Road
- Not Surveyed

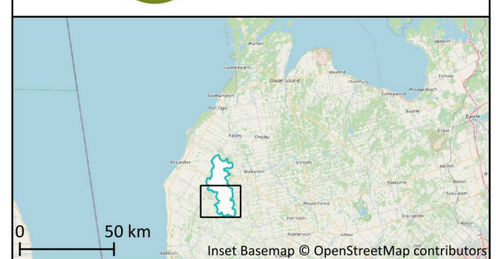
Ecosite Polygon Soil Texture

- Coarse
- Fine
- Mineral
- None
- Organic

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D170b	

NWMO Biodiversity Impact Studies

Soil Texture - North LSA_{ECO}

Figure D-2c

Local Study Area (LSA_{ECO})
Watercourse
Lake
Municipal Boundary
Highway
Local Road
Not Surveyed

Ecosite Polygon Soil Texture
Coarse Mineral
Fine Mineral
Mineral
Organic
None

Municipality of Kincardine
Cargill Mill Pond
Schmidt Lake
Cunningham Lake
Municipality of Brockton
Township of Huron-Kinloss
Silver Lake
Clam Lake
Municipality of South Bruce

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D170b	

D.2 Vegetation Attributes

Fieldwork Location

Structural Stage

- 2a
- 2b
- 2c
- 3b
- 4
- 5
- 6
- 7

Average Stand Height (m)

0 1 2 5 10 13 15 18 20 22 23 25 30

2a 0
2b 1
6 22
5 13
2a 5
6 25
4 10
5 25
2b 0
5 25
2b 0

NWMO Biodiversity Impact Studies

Structural Stage and Average Stand Height - AOI

Figure D-3a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Local Road

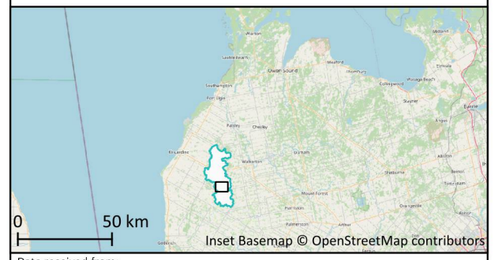
Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D176	

Fieldwork Location

Structural Stage

- 2a
- 2b
- 2c
- 3b
- 4
- 5
- 6
- 7

Average Stand Height (m)

0, 1, 2, 5, 10, 13, 15, 18, 20, 22, 23, 25, 30

NWMO Biodiversity Impact Studies

Structural Stage and Average Stand Height - South LSA_{ECO}

Figure D-3b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Local Road
- Not Surveyed

Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

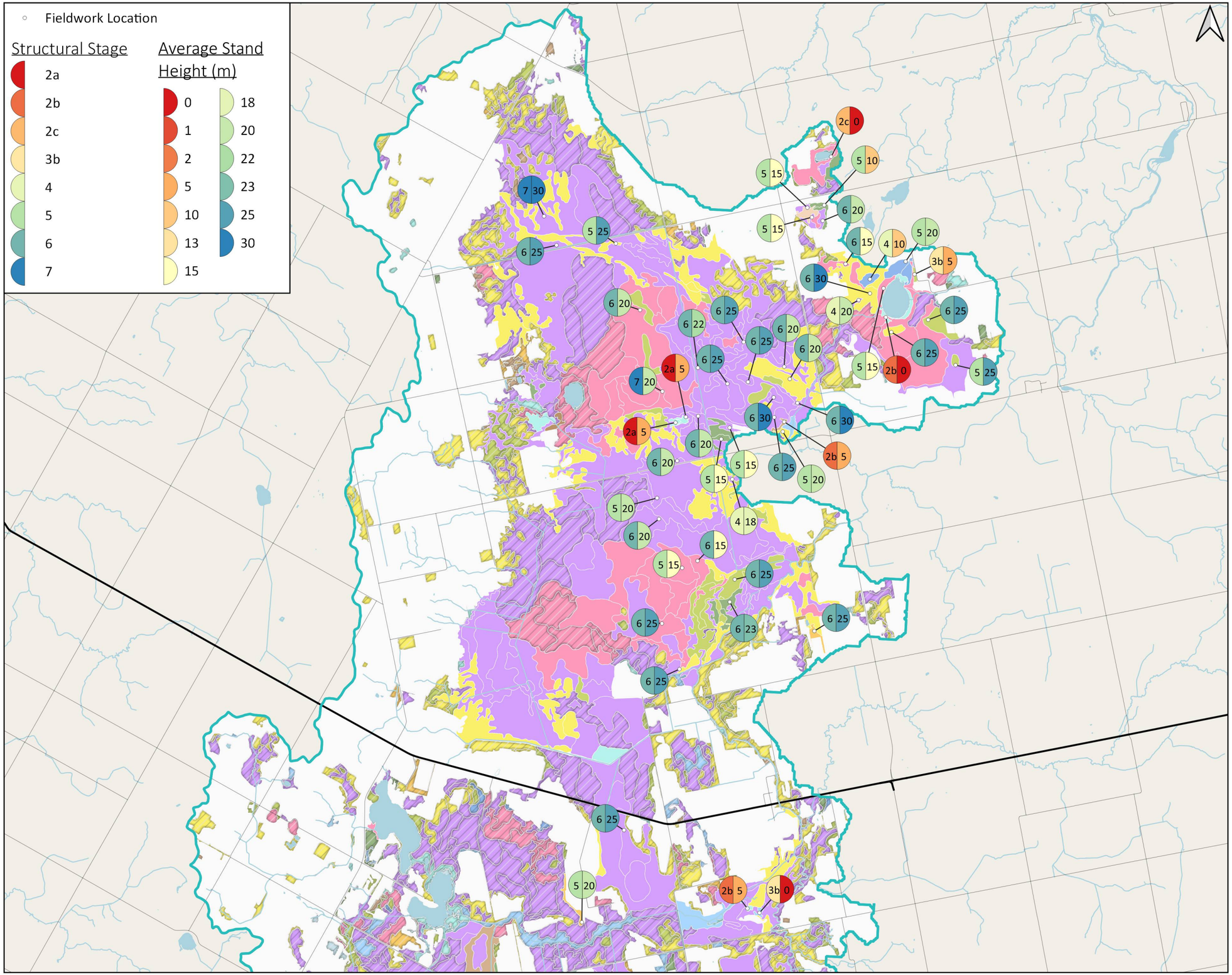
ZOETICA

0 50 km

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Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D176	



NWMO Biodiversity Impact Studies

Structural Stage and Average Stand Height - North LSA_{ECO}

Figure D-3c

- Local Study Area (LSA_{ECO})
- Watercourse
- Highway
- Local Road
- Not Surveyed

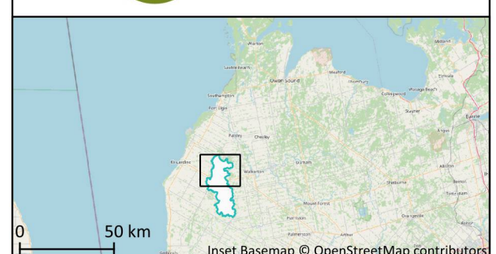
Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D176	

Fieldwork Location

Vegetation Layer

- Trees
- Shrubs
- Herbs
- Moss, Lichen, and Seedlings

Percent Cover

- 0%
- >0 to 25%
- >25 to 50%
- >50 to 75%
- >75 to <100%
- 100%

NWMO Biodiversity Impact Studies

Percent Cover of Vegetation Layers - AOI

Figure D-4a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Local Road

Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D175	

Fieldwork Location

Vegetation Layer

- Trees
- Shrubs
- Herbs
- Moss, Lichen, and Seedlings

Percent Cover

- 0%
- >0 to 25%
- >25 to 50%
- >50 to 75%
- >75 to <100%
- 100%

NWMO Biodiversity Impact Studies

Percent Cover of Vegetation Layers - South LSA_{ECO}

Figure D-4b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Local Road
- Not Surveyed

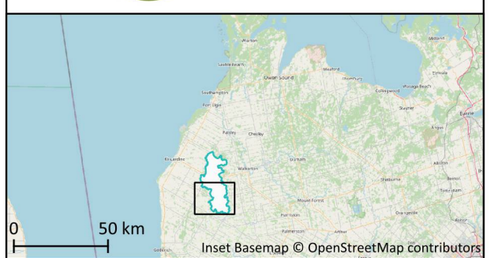
Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D175	

Fieldwork Location

Vegetation Layer

- Trees
- Shrubs
- Herbs
- Moss, Lichen, and Seedlings

Percent Cover

- 0%
- >0 to 25%
- >25 to 50%
- >50 to 75%
- >75 to <100%
- 100%

NWMO Biodiversity Impact Studies

Percent Cover of Vegetation Layers - North LSA_{ECO}

Figure D-4c

- Local Study Area (LSA_{ECO})
- Watercourse
- Highway
- Local Road
- Not Surveyed

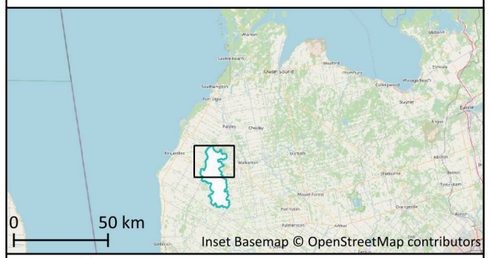
Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

ZOETICA

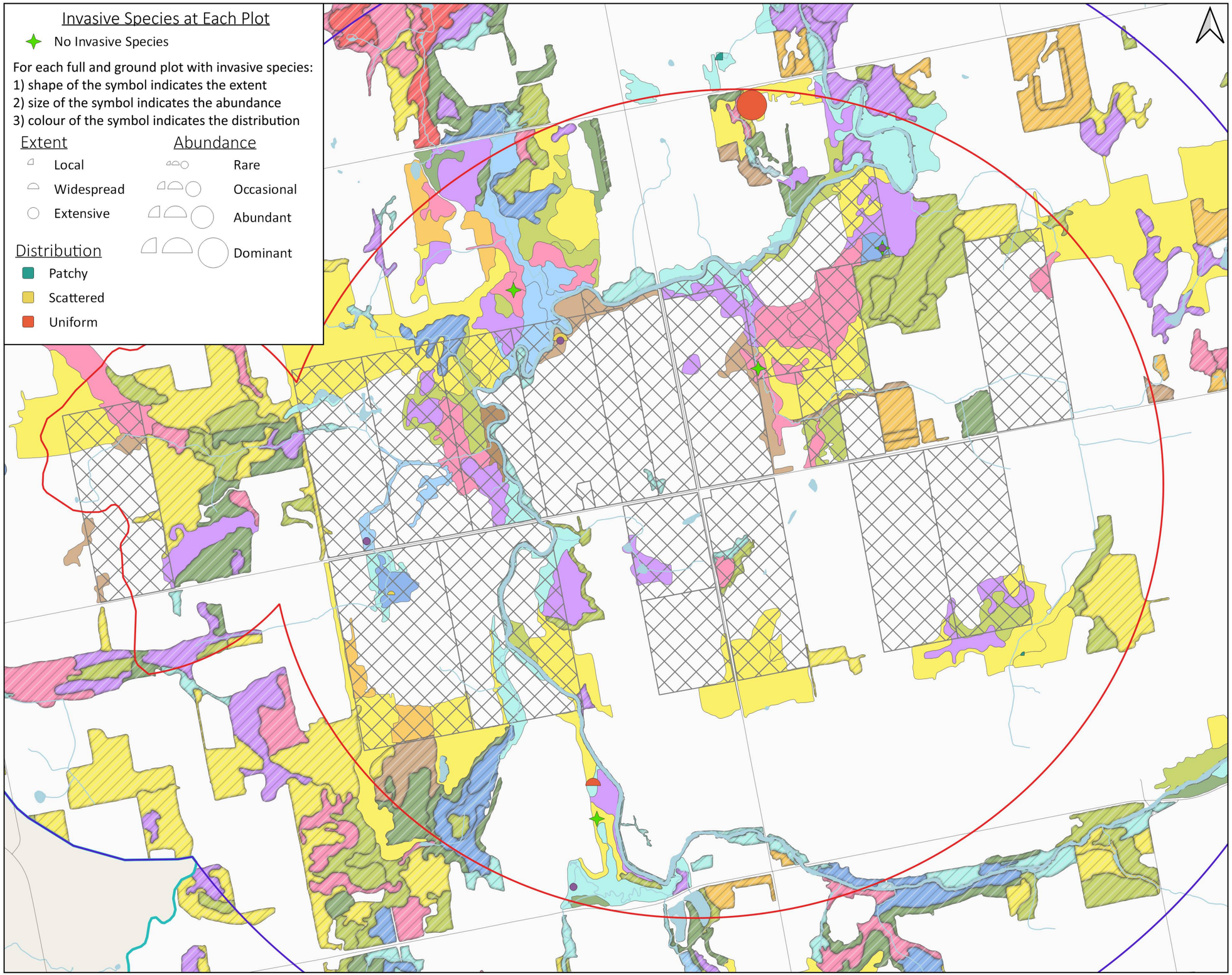


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Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D175	

Table D-1. Summary of plots for each vegetation layer within the study areas.

Layer Type	AOI and LSA_{TER}	North of the AOI	South of the AOI
Veteran Trees	1	13	4
A1 Layer	4	33	8
A2 Layer	8	54	10
A3 Layer	7	50	11
B1 Layer	9	54	11
B2 Layer	11	55	10
C Layer	13	57	13
D Layer	7	46	5
E Layer	3	15	2



NWMO Biodiversity Impact Studies

Invasive Species - AOI

Figure D-5a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Local Road

Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow

1:20,000

0 0.5 1 km

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

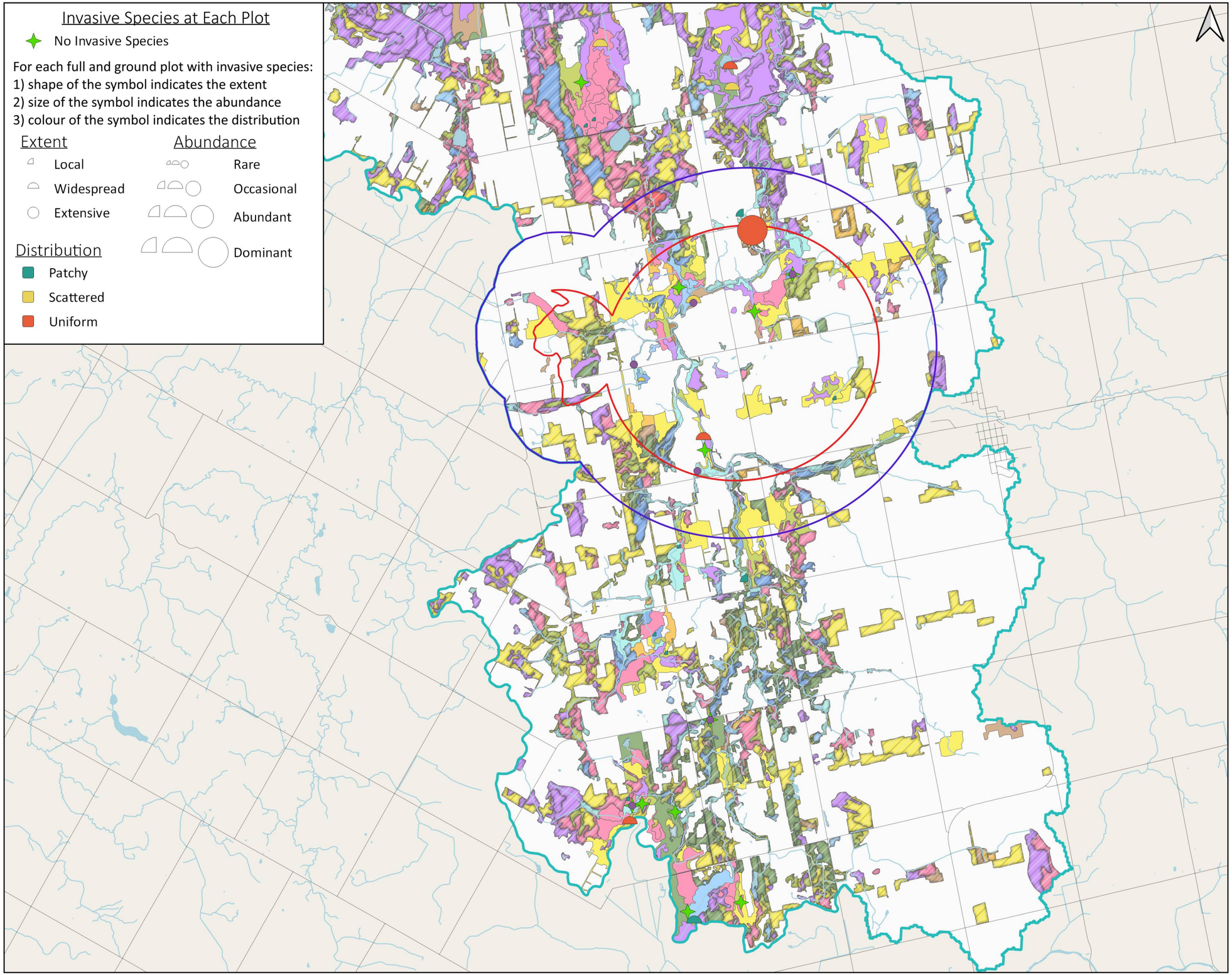
Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D177	

NWMO Biodiversity Impact Studies

Invasive Species - South

LSA_{ECO}

Figure D-5b



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Local Road
- Not Surveyed

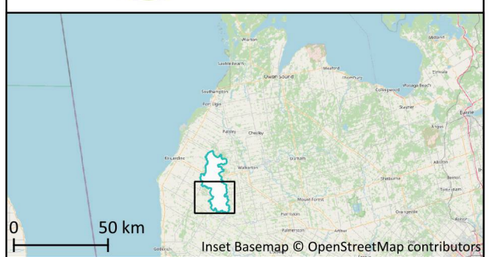
Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D177	

Invasive Species at Each Plot

No Invasive Species

For each full and ground plot with invasive species:
1) shape of the symbol indicates the extent
2) size of the symbol indicates the abundance
3) colour of the symbol indicates the distribution

Extent
- Local
- Widespread
- Extensive

Abundance
- Rare
- Occasional
- Abundant
- Dominant

Distribution
- Patchy
- Scattered
- Uniform

NWMO Biodiversity Impact Studies

Invasive Species - North
LSA_{ECO}

Figure D-5c

- Local Study Area (LSA_{ECO})
- Watercourse
- Highway
- Local Road
- Not Surveyed

Ecosite Polygon
- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Shrub
- Meadow
- Field

1:65,000
0 1 2 km

ZOETICA

0 50 km

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D177	

Table D-2. Vegetation species in the tree layer at plots surveyed within the study areas. Species of potential health concern due to disease and pests are highlighted in blue (BBD concern) and green (EAB concern). Species common and scientific names reported according to the NHIC Ontario species lists current to March 1, 2023.

Species Common Name	Species Latin Name	AOI and LSA_{TER} (*N* = 13)									LSA_{ECO} North of the AOI (*N* = 57)									LSA_{ECO} South of the AOI (*N* = 13)								
		Plots Where Present	Plots with Veteran Trees	Plots Where Present as Trace	Plots Where Present > Trace	A1[1]	A2[1]	A3[1]	Median Percent Comp.	Max Percent Comp.	Plots Where Present	Plots with Veteran Trees	Plots Where Present as Trace	Plots Where Present > Trace	A1[1]	A2[1]	A3[1]	Median Percent Comp.	Max Percent Comp.	Plots Where Present	Plots with Veteran Trees	Plots Where Present as Trace	Plots Where Present > Trace	A1[1]	A2[1]	A3[1]	Median Percent Comp.	Max Percent Comp.
Balsam fir	*Abies balsamea*	--	--	--	--	--	--	--	--	--	11	0	5	6	0	4	3	20	55	--	--	--	--	--	--	--	--	--
Red maple	*Acer rubrum*	1	0	0	1	0	1	0	15	15	37	7	8	29	9	24	18	35	85	3	0	0	3	0	1	1	10	15
Silver maple	*Acer saccharinum*	2	0	0	2	2	1	0	17.5	20	2	0	2	0	0	0	0	0	Trace	--	--	--	--	--	--	--	--	--
Sugar maple	*Acer saccharum*	3	0	2	1	0	1	0	20	20	13	0	5	8	3	6	5	57.5	90	5	1	0	5	1	3	3	20	70
Freeman maple	*Acer x freemanii*	--	--	--	--	--	--	--	--	--	9	0	1	8	3	7	7	55	90	--	--	--	--	--	--	--	--	--
Yellow birch	*Betula alleghaniensis*	3	0	0	3	0	3	1	15	15	25	2	14	11	1	8	5	15	65	4	0	2	2	1	2	1	30	30
Paper birch	*Betula papyrifera*	1	0	0	1	0	1	0	5	5	6	0	3	3	0	0	3	5	5	3	0	2	1	0	1	0	5	5
Blue-beech	*Carpinus caroliniana*	--	--	--	--	--	--	--	--	--	6	0	3	3	0	0	3	20	20	--	--	--	--	--	--	--	--	--
Hawthorns	*Crataegus* sp.	--	--	--	--	--	--	--	--	--	1	0	1	0	0	0	0	0	Trace	--	--	--	--	--	--	--	--	--
American beech	*Fagus grandifolia*	--	--	--	--	--	--	--	--	--	5	1	4	1	0	0	1	10	10	1	0	1	0	0	0	0	0	Trace
White ash	*Fraxinus americana*	--	--	--	--	--	--	--	--	--	6	0	1	5	0	2	3	5	30	2	0	1	1	1	0	0	10	10
Black ash	*Fraxinus nigra*	3	0	0	3	0	1	3	15	15	16	0	7	9	0	1	6	10	30	--	--	--	--	--	--	--	--	--
Green ash / Red ash	*Fraxinus pennsylvanica*	2	0	1	1	0	1	0	20	20	33	4	9	24	4	19	18	27.5	80	1	0	1	0	0	0	0	0	Trace
Ash sp.	*Fraxinus* sp.	--	--	--	--	--	--	--	--	--	1	0	0	1	0	0	1	10	10	--	--	--	--	--	--	--	--	--
Ash spp.	*Fraxinus* spp.	--	--	--	--	--	--	--	--	--	1	0	0	1	0	1	1	35	35	--	--	--	--	--	--	--	--	--
Black walnut	*Juglans nigra*	2	0	1	1	0	1	0	75	75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	*Larix laricina*	1	0	1	0	0	0	0	0	Trace	4	1	0	4	0	3	0	17.5	40	2	0	2	0	0	0	0	0	Trace
American hop-hornbeam	*Ostrya virginiana*	--	--	--	--	--	--	--	--	--	3	0	3	0	0	0	0	0	Trace	1	0	1	0	0	0	0	0	Trace
Norway spruce	*Picea abies*	1	0	1	0	0	0	0	0	Trace	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce	*Picea glauca*	2	0	1	1	0	1	0	20	20	7	0	1	6	1	4	4	45	65	2	0	0	2	0	2	0	10	10
Red pine	*Pinus resinosa*	1	0	0	1	0	1	0	45	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Eastern white pine	*Pinus strobus*	1	0	1	0	0	0	0	0	Trace	10	2	5	5	1	4	2	80	90	5	2	1	4	2	1	1	12.5	30
Balsam poplar	*Populus balsamifera*	--	--	--	--	--	--	--	--	--	2	0	1	1	0	1	0	20	20	--	--	--	--	--	--	--	--	--
Eastern cottonwood	*Populus deltoides* ssp. *deltoides*	--	--	--	--	--	--	--	--	--	2	0	2	0	0	0	0	0	Trace	1	1	1	0	0	0	0	0	Trace
Large-toothed aspen	*Populus grandidentata*	--	--	--	--	--	--	--	--	--	1	1	0	1	1	1	0	15	15	--	--	--	--	--	--	--	--	--
Trembling aspen	*Populus tremuloides*	--	--	--	--	--	--	--	--	--	9	1	5	4	1	4	1	32.5	45	1	1	1	0	0	0	0	0	Trace
Black cherry	*Prunus serotina*	1	0	1	0	0	0	0	0	Trace	10	2	7	3	0	3	1	5	10	3	0	1	2	0	2	1	17.5	30
Bur oak	*Quercus macrocarpa*	--	--	--	--	--	--	--	--	--	1	0	1	0	0	0	0	0	Trace	--	--	--	--	--	--	--	--	--
Eastern white cedar	*Thuja occidentalis*	5	0	2	3	0	3	2	25	50	15	0	6	9	0	5	7	20	75	8	0	5	3	2	2	2	30	90
Basswood	*Tilia americana*	2	1	1	1	1	1	0	10	10	5	0	2	3	1	2	2	15	20	--	--	--	--	--	--	--	--	--
Eastern hemlock	*Tsuga canadensis*	1	0	1	0	0	0	0	0	Trace	8	0	2	6	0	3	2	15	50	3	1	0	3	1	1	3	45	50
White elm	*Ulmus americana*	4	0	3	1	0	0	1	15	15	29	1	12	17	0	6	14	15	40	6	0	3	3	1	1	2	10	30
Riverbank grape	*Vitis riparia*	--	--	--	--	--	--	--	--	--	1	0	0	1	0	0	1	5	5	--	--	--	--	--	--	--	--	--

Notes:
1. For each sublayer (A1, A2, A3), the count of sites only includes sites where the species was present in more than trace amounts (> 5%).
2. The intensity of green shading indicates those species that are detected more often within surveyed plots (darker shading) versus those that were detected less often (lighter shading).
3. The intensity of orange shading indicates species that, when present within a surveyed plot, comprise a greater percentage of a vegetation layer (darker shading) relative to other species (lighter shading).

Table D-3. Vegetation species in the shrub layer at plots surveyed within the study areas. Species of potential health concern due to disease and pests are highlighted in blue (BBD concern) and green (EAB concern). Species common and scientific names reported according to the NHIC Ontario species lists current to March 1, 2023.

		AOI and LSA_{TER} (*N* = 13)							LSA_{ECO} North of the AOI (*N* = 58)							LSA_{ECO} South of the AOI (*N* = 13)						
Species Common Name	**Species Latin Name**	**Plots Where Present**	**Plots Where Present as Trace**	**Plots Where Present > Trace**	**B1[1]**	**B2[1]**	**Median Percent Comp.**	**Max Percent Comp.**	**Plots Where Present**	**Plots Where Present as Trace**	**Plots Where Present > Trace**	**B1[1]**	**B2[1]**	**Median Percent Comp.**	**Max Percent Comp.**	**Plots Where Present**	**Plots Where Present as Trace**	**Plots Where Present > Trace**	**B1[1]**	**B2[1]**	**Median Percent Comp.**	**Max Percent Comp.**
Balsam fir	*Abies balsamea*	--	--	--	--	--	--	--	7	3	4	3	4	10	10	--	--	--	--	--	--	--
Red maple	*Acer rubrum*	1	1	0	0	0	0	Trace	31	23	8	7	4	17.5	25	1	1	0	0	0	0	Trace
Silver maple	*Acer saccharinum*	1	1	0	0	0	0	Trace	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Sugar maple	*Acer saccharum*	2	2	0	0	0	0	Trace	11	4	7	5	3	10	95	6	2	4	3	1	12.5	15
Mountain maple	*Acer spicatum*	2	2	0	0	0	0	Trace	5	2	3	1	3	5	10	--	--	--	--	--	--	--
Freeman maple	*Acer x freemanii*	1	1	0	0	0	0	Trace	9	6	3	2	1	10	10	--	--	--	--	--	--	--
Speckled alder	*Alnus incana* ssp. *rugosa*	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Alder sp.	*Alnus* sp.	--	--	--	--	--	--	--	2	0	2	0	2	7.5	10	--	--	--	--	--	--	--
Serviceberry sp.	*Amelanchier* sp.	1	1	0	0	0	0	Trace	2	1	1	0	1	20	20	1	1	0	0	0	0	Trace
Serviceberry spp.	*Amelanchier* spp.	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Purple chokeberry	*Aronia x prunifolia*	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Yellow birch	*Betula alleghaniensis*	1	1	0	0	0	0	Trace	26	17	9	6	2	10	15	2	1	1	1	1	25	25
Paper birch	*Betula papyrifera*	1	1	0	0	0	0	Trace	4	1	3	3	0	5	10	--	--	--	--	--	--	--
Blue-beech	*Carpinus caroliniana*	--	--	--	--	--	--	--	9	4	5	5	2	10	30	--	--	--	--	--	--	--
Common hackberry	*Celtis occidentalis*	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Leatherleaf	*Chamaedaphne calyculata*	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Alternate-leaved dogwood	*Cornus alternifolia*	3	2	1	0	1	5	5	13	10	3	0	3	5	10	2	2	0	0	0	0	Trace
Silky dogwood	*Cornus obliqua*	1	1	0	0	0	0	Trace	5	4	1	1	1	70	70	--	--	--	--	--	--	--
Grey dogwood	*Cornus racemosa*	--	--	--	--	--	--	--	4	3	1	0	1	20	20	--	--	--	--	--	--	--
Round-leaved dogwood	*Cornus rugosa*	--	--	--	--	--	--	--	2	1	1	0	1	15	15	--	--	--	--	--	--	--
Red-osier dogwood	*Cornus sericea*	4	2	2	0	2	20	30	7	5	2	0	2	7.5	10	2	1	1	0	0	10	10
American hazelnut	*Corylus americana*	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Beaked hazelnut	*Corylus cornuta*	--	--	--	--	--	--	--	13	11	2	1	2	22.5	40	--	--	--	--	--	--	--
Dotted hawthorn	*Crataegus punctata*	3	1	2	2	0	27.5	45	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Hawthorn sp.	*Crataegus* sp.	1	1	0	0	0	0	Trace	2	2	0	0	0	0	Trace	--	--	--	--	--	--	--
Autumn olive	*Elaeagnus umbellata*	--	--	--	--	--	--	--	1	0	1	0	1	5	5	--	--	--	--	--	--	--
American beech	*Fagus grandifolia*	1	1	0	0	0	0	Trace	5	5	0	0	0	0	Trace	--	--	--	--	--	--	--
Glossy buckthorn	*Frangula alnus*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	3	0	0	0	0	Trace
White ash	*Fraxinus americana*	2	1	1	0	1	5	5	8	2	6	4	5	20	60	3	2	1	0	1	10	10
Black ash	*Fraxinus nigra*	4	2	2	2	0	10	15	25	17	8	4	5	10	40	1	1	0	0	0	0	Trace
Green ash / Red ash	*Fraxinus pennsylvanica*	5	3	2	1	2	22.5	35	41	15	26	12	21	10	60	2	2	0	0	0	0	Trace
Ash sp.	*Fraxinus* sp.	--	--	--	--	--	--	--	2	0	2	1	1	15	20	1	1	0	0	0	0	Trace
Ash spp.	*Fraxinus* spp.	--	--	--	--	--	--	--	1	0	1	1	1	20	20	--	--	--	--	--	--	--
Mountain holly	*Ilex mucronata*	--	--	--	--	--	--	--	2	2	0	0	0	0	Trace	--	--	--	--	--	--	--
Common winterberry	*Ilex verticillata*	--	--	--	--	--	--	--	12	8	4	1	4	10	30	1	0	1	0	0	10	10
Black walnut	*Juglans nigra*	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	*Larix laricina*	--	--	--	--	--	--	--	1	0	1	0	0	10	10	1	1	0	0	0	0	Trace
Northern spicebush	*Lindera benzoin*	2	0	2	2	0	7.5	10	24	13	11	2	10	10	60	1	0	1	0	1	25	25
Canada fly honeysuckle	*Lonicera canadensis*	--	--	--	--	--	--	--	11	9	2	0	2	5	5	1	1	0	0	0	0	Trace
Honeysuckle spp.	*Lonicera spp.*	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Common apple	*Malus pumila*	1	0	1	1	0	5	5	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
American hop-hornbeam	*Ostrya virginiana*	--	--	--	--	--	--	--	3	3	0	0	0	0	Trace	--	--	--	--	--	--	--
Thicket creeper	*Parthenocissus vitacea*	3	2	1	0	1	40	40	5	3	2	0	2	7.5	10	--	--	--	--	--	--	--
Eastern ninebark	*Physocarpus opulifolius*	1	1	0	0	0	0	Trace	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Ninebark sp.	*Physocarpus* sp.	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--	--	--	--	--	--	--	--

		AOI and LSA_{TER} (*N* = 13)							LSA_{ECO} North of the AOI (*N* = 58)							LSA_{ECO} South of the AOI (*N* = 13)						
Species Common Name	**Species Latin Name**	**Plots Where Present**	**Plots Where Present as Trace**	**Plots Where Present > Trace**	**B1[1]**	**B2[1]**	**Median Percent Comp.**	**Max Percent Comp.**	**Plots Where Present**	**Plots Where Present as Trace**	**Plots Where Present > Trace**	**B1[1]**	**B2[1]**	**Median Percent Comp.**	**Max Percent Comp.**	**Plots Where Present**	**Plots Where Present as Trace**	**Plots Where Present > Trace**	**B1[1]**	**B2[1]**	**Median Percent Comp.**	**Max Percent Comp.**
White spruce	*Picea glauca*	1	1	0	0	0	0	Trace	3	1	2	2	0	5	5	2	2	0	0	0	0	Trace
Red pine	*Pinus resinosa*	--	--	--	--	--	--	--	2	1	1	1	0	40	40	--	--	--	--	--	--	--
Eastern white pine	*Pinus strobus*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2	0	0	0	0	Trace
Balsam poplar	*Populus balsamifera*	--	--	--	--	--	--	--	2	2	0	0	0	0	Trace	--	--	--	--	--	--	--
Large-toothed aspen	*Populus grandidentata*	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Trembling aspen	*Populus tremuloides*	1	1	0	0	0	0	Trace	6	5	1	1	1	25	25	--	--	--	--	--	--	--
Black cherry	*Prunus serotina*	--	--	--	--	--	--	--	13	11	2	0	2	5	5	3	3	0	0	0	0	Trace
Chokecherry	*Prunus virginiana*	3	2	1	0	0	5	5	17	15	2	1	2	27.5	50	--	--	--	--	--	--	--
Bur oak	*Quercus macrocarpa*	--	--	--	--	--	--	--	3	3	0	0	0	0	Trace	--	--	--	--	--	--	--
Northern red oak	*Quercus rubra*	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Oak spp.	*Quercus* spp.	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Alder-leaved buckthorn	*Endotropis alnifolia*	1	1	0	0	0	0	Trace	4	4	0	0	0	0	Trace	--	--	--	--	--	--	--
European buckthorn	*Rhamnus cathartica*	1	1	0	0	0	0	Trace	17	12	5	1	5	5	10	2	1	1	0	0	10	10
Common Labrador tea	*Rhododendron groenlandicum*	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Eastern prickly gooseberry	*Ribes cynosbati*	2	2	0	0	0	0	Trace	3	3	0	0	0	0	Trace	--	--	--	--	--	--	--
Bristly black currant	*Ribes lacustre*	--	--	--	--	--	--	--	2	2	0	0	0	0	Trace	--	--	--	--	--	--	--
European red currant	*Ribes rubrum*	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Currant sp.	*Ribes* sp.	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Swamp red currant	*Ribes triste*	1	1	0	0	0	0	Trace	2	2	0	0	0	0	Trace	--	--	--	--	--	--	--
Multiflora rose	*Rosa multiflora*	1	1	0	0	0	0	Trace	1	0	1	0	1	30	30	--	--	--	--	--	--	--
Swamp rose	*Rosa palustris*	--	--	--	--	--	--	--	3	3	0	0	0	0	Trace	--	--	--	--	--	--	--
Allegheny blackberry	*Rubus allegheniensis*	--	--	--	--	--	--	--	2	1	1	0	1	5	5	1	1	0	0	0	0	Trace
North American red raspberry	*Rubus idaeus* ssp. *strigosus*	1	1	0	0	0	0	Trace	10	8	2	0	2	5	5	--	--	--	--	--	--	--
Black raspberry	*Rubus occidentalis*	1	0	1	0	1	5	5	5	5	0	0	0	0	Trace	--	--	--	--	--	--	--
Dwarf blackberry	*Rubus pubescens*	2	2	0	0	0	0	Trace	3	2	1	0	1	5	5	--	--	--	--	--	--	--
Bebb's willow	*Salix bebbiana*	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--	1	0	1	0	0	10	10
Pussy willow	*Salix discolor*	3	2	1	0	1	5	5	--	--	--	--	--	--	--	2	1	1	0	0	10	10
Cottony willow	*Salix eriocephala*	1	0	1	0	1	5	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sandbar willow	*Salix interior*	1	0	1	0	1	10	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meadow willow	*Salix petiolaris*	2	1	1	0	1	5	5	2	1	1	1	1	15	15	--	--	--	--	--	--	--
Willow sp.	*Salix* sp.	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	1	0	1	0	0	10	10
Common elderberry	*Sambucus canadensis*	4	3	1	1	0	10	10	6	4	2	0	2	5	5	--	--	--	--	--	--	--
Red elderberry	*Sambucus racemosa*	1	1	0	0	0	0	Trace	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Bristly greenbrier	*Smilax tamnoides*	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
White meadowsweet	*Spiraea alba*	1	1	0	0	0	0	Trace	8	6	2	0	2	10	15	--	--	--	--	--	--	--
Canada yew	*Taxus canadensis*	--	--	--	--	--	--	--	2	2	0	0	0	0	Trace	1	1	0	0	0	0	Trace
Eastern white cedar	*Thuja occidentalis*	6	1	5	5	0	15	80	13	7	6	6	2	10	50	5	5	0	0	0	0	Trace
Basswood	*Tilia americana*	3	3	0	0	0	0	Trace	8	7	1	1	0	5	5	--	--	--	--	--	--	--
Western poison ivy	*Toxicodendron radicans* var. *rydbergii*	--	--	--	--	--	--	--	4	2	2	0	2	7.5	10	--	--	--	--	--	--	--
Poison ivy	*Toxicodendron* sp.	--	--	--	--	--	--	--	1	0	1	0	1	25	25	--	--	--	--	--	--	--
Eastern hemlock	*Tsuga canadensis*	3	3	0	0	0	0	Trace	8	4	4	1	2	10	20	2	1	1	1	0	25	25
White elm	*Ulmus americana*	3	1	2	2	0	5	5	32	20	12	12	4	10	25	7	5	2	2	1	15	25
Velvet-leaved blueberry	*Vaccinium myrtilloides*	--	--	--	--	--	--	--	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--
Nannyberry	*Viburnum lentago*	4	2	2	1	1	5	5	11	9	2	1	1	7.5	10	--	--	--	--	--	--	--
Highbush cranberry	*Viburnum opulus* var. *americanum*	1	1	0	0	0	0	Trace	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Riverbank grape	*Vitis riparia*	3	2	1	0	1	5	5	7	6	1	0	1	5	5	--	--	--	--	--	--	--
Notes:																						

Species Common Name	Species Latin Name	AOI and LSA_{TER} (*N* = 13)							LSA_{ECO} North of the AOI (*N* = 58)							LSA_{ECO} South of the AOI (*N* = 13)						
		Plots Where Present	Plots Where Present as Trace	Plots Where Present > Trace	B1[1]	B2[1]	Median Percent Comp.	Max Percent Comp.	Plots Where Present	Plots Where Present as Trace	Plots Where Present > Trace	B1[1]	B2[1]	Median Percent Comp.	Max Percent Comp.	Plots Where Present	Plots Where Present as Trace	Plots Where Present > Trace	B1[1]	B2[1]	Median Percent Comp.	Max Percent Comp.

1. For each sublayer (A1, A2, A3), the count of sites only includes sites where the species was present in more than trace amounts (> 5%).
2. The intensity of green shading indicates those species that are detected more often within surveyed plots (darker shading) versus those that were detected less often (lighter shading).
3. The intensity of orange shading indicates species that, when present within a surveyed plot, comprise a greater percentage of a vegetation layer (darker shading) relative to other species (lighter shading).

Table D-4. Vegetation species in the herb layer at plots surveyed within the study areas. Species of potential health concern due to disease and pests are highlighted in blue (BBD concern) and green (EAB concern).

Species Common Name	Species Latin Name	AOI and LSA_{TER} (*N* = 13)				LSA_{ECO} North of the AOI (*N* = 58)				LSA_{ECO} South of the AOI (*N* = 13)			
		# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present >Trace	Max Percent Composition	# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present > Trace	Max Percent Composition	# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present > Trace	Max Percent Composition
Red maple	*Acer rubrum*	--	--	--	--	3	3	0	Trace	1	1	0	Trace
Sugar maple	*Acer saccharum*	--	--	--	--	3	1	2	35	--	--	--	--
Common yarrow	*Achillea millefolium*	1	1	0	Trace	1	1	0	Trace	--	--	--	--
Red baneberry	*Actaea rubra*	--	--	--	--	3	3	0	Trace	--	--	--	--
Baneberry sp.	*Actaea* sp.	--	--	--	--	3	3	0	Trace	--	--	--	--
White snakeroot	*Ageratina altissima*	3	1	2	10	1	1	0	Trace	--	--	--	--
Hooked agrimony	*Agrimonia gryposepala*	--	--	--	--	3	1	2	5	2	2	0	Trace
Redtop	*Agrostis gigantea*	1	1	0	Trace	--	--	--	--	--	--	--	--
Creeping bentgrass	*Agrostis stolonifera*	--	--	--	--	1	1	0	Trace	--	--	--	--
Common water-plantain	*Alisma plantago-aquatica*[1]	--	--	--	--	1	1	0	Trace	--	--	--	--
Serviceberry spp.	*Amelanchier* spp.	--	--	--	--	1	1	0	Trace	--	--	--	--
American hog-peanut	*Amphicarpaea bracteata*	2	1	1	5	--	--	--	--	--	--	--	--
Virginia chain fern	*Anchistea virginica*	--	--	--	--	1	0	1	20	--	--	--	--
Canada anemone	*Anemonastrum canadense*	2	1	1	15	--	--	--	--	1	0	1	40
Tall anemone	*Anemone virginiana* var. *virginiana*	--	--	--	--	1	1	0	Trace	--	--	--	--
Purple-stemmed angelica	*Angelica atropurpurea*	1	1	0	Trace	--	--	--	--	--	--	--	--
Field pussytoes	*Antennaria neglecta*	--	--	--	--	1	1	0	Trace	--	--	--	--
Spreading dogbane	*Apocynum androsaemifolium*	--	--	--	--	1	1	0	Trace	1	1	0	Trace
Hemp dogbane	*Apocynum cannabinum*	--	--	--	--	1	1	0	Trace	--	--	--	--
Wild sarsaparilla	*Aralia nudicaulis*	3	3	0	Trace	21	14	7	20	2	1	1	5
Common burdock	*Arctium minus*	1	1	0	Trace	2	2	0	Trace	--	--	--	--
Jack-in-the-pulpit	*Arisaema triphyllum*	--	--	--	--	15	15	0	Trace	6	6	0	Trace
Canadian wild-ginger	*Asarum canadense*	--	--	--	--	--	--	--	--	1	0	1	5
Swamp milkweed	*Asclepias incarnata*	1	0	1	5	3	1	2	10	2	2	0	Trace
Common milkweed	*Asclepias syriaca*	4	3	1	5	1	1	0	Trace	--	--	--	--
Aster sp.	*Aster* sp.	--	--	--	--	1	0	1	5	--	--	--	--
Northeastern lady fern	*Athyrium filix-femina* var. *angustum*	2	0	2	5	10	7	3	5	--	--	--	--
Yellow birch	*Betula alleghaniensis*	--	--	--	--	1	1	0	Trace	--	--	--	--
Paper birch	*Betula papyrifera*	--	--	--	--	--	--	--	--	1	1	0	Trace
Water beggarticks	*Bidens beckii*	--	--	--	--	--	--	--	--	1	1	0	Trace
Nodding beggarticks	*Bidens cernua*	2	2	0	Trace	--	--	--	--	--	--	--	--
Three-parted beggarticks	*Bidens tripartita*	1	1	0	Trace	--	--	--	--	--	--	--	--
Purple-stemmed beggarticks	*Bidens connata*	1	1	0	Trace	--	--	--	--	--	--	--	--
Devil's beggarticks	*Bidens frondosa*	1	1	0	Trace	1	1	0	Trace	--	--	--	--
Small-spike false nettle	*Boehmeria cylindrica*	1	0	1	5	17	7	10	75	1	0	1	5
Northern shorthusk	*Brachyelytrum aristosum*	1	0	1	100	1	0	1	5	--	--	--	--
Southern shorthusk	*Brachyelytrum erectum*	--	--	--	--	1	1	0	Trace	1	1	0	Trace

Species Common Name	Species Latin Name	AOI and LSA_{TER} (*N* = 13)				LSA_{ECO} North of the AOI (*N* = 58)				LSA_{ECO} South of the AOI (*N* = 13)			
		# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present >Trace	Max Percent Composition	# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present > Trace	Max Percent Composition	# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present > Trace	Max Percent Composition
Shorthusk sp.	*Brachyelytrum* sp.	--	--	--	--	3	1	2	5	1	1	0	Trace
Slender false brome	*Brachypodium sylvaticum*	--	--	--	--	--	--	--	--	1	1	0	Trace
Smooth brome	*Bromus inermis*	1	0	1	5	--	--	--	--	--	--	--	--
Bluejoint reedgrass	*Calamagrostis canadensis*	1	0	1	90	5	1	4	75	3	0	3	40
Wild calla	*Calla palustris*	--	--	--	--	2	0	2	35	--	--	--	--
Yellow marsh marigold	*Caltha palustris*	2	2	0	Trace	5	5	0	Trace	--	--	--	--
Two-leaved toothwort	*Cardamine diphylla*	--	--	--	--	1	1	0	Trace	--	--	--	--
Water sedge	*Carex aquatilis*	1	1	0	Trace	3	3	0	Trace	--	--	--	--
Drooping woodland sedge	*Carex arctata*	--	--	--	--	4	4	0	Trace	1	1	0	Trace
Bebb's sedge	*Carex bebbii*	--	--	--	--	--	--	--	--	1	1	0	Trace
Brownish sedge	*Carex brunnescens*	--	--	--	--	1	1	0	Trace	--	--	--	--
Bearded sedge	*Carex comosa*	--	--	--	--	1	1	0	Trace	--	--	--	--
Fringed sedge	*Carex crinita*	1	0	1	5	15	9	6	15	--	--	--	--
Crested sedge	*Carex cristatella*	--	--	--	--	1	1	0	Trace	--	--	--	--
Two-seeded sedge	*Carex disperma*	--	--	--	--	2	1	1	10	--	--	--	--
Bristle-leaved sedge	*Carex eburnea*	--	--	--	--	3	1	2	60	--	--	--	--
Yellow sedge	*Carex flava*	--	--	--	--	1	1	0	Trace	--	--	--	--
Graceful sedge	*Carex gracillima*	--	--	--	--	5	5	0	Trace	--	--	--	--
Hairy green sedge	*Carex hirsutella*	--	--	--	--	1	1	0	Trace	--	--	--	--
Porcupine sedge	*Carex hystericina*	1	1	0	Trace	2	2	0	Trace	2	1	1	10
Inland sedge	*Carex interior*	--	--	--	--	1	1	0	Trace	--	--	--	--
Bladder sedge	*Carex intumescens*	--	--	--	--	17	17	0	Trace	3	2	1	10
Lake sedge	*Carex lacustris*	3	0	3	95	2	1	1	95	1	0	1	40
Bristle-stalked sedge	*Carex leptalea*	--	--	--	--	2	2	0	Trace	1	1	0	Trace
Finely-nerved sedge	*Carex leptonervia*	--	--	--	--	1	0	1	5	--	--	--	--
Hop sedge	*Carex lupulina*	--	--	--	--	6	4	2	25	--	--	--	--
Oval sedge	*Carex ovalis*	--	--	--	--	1	1	0	Trace	--	--	--	--
Long-stalked sedge	*Carex pedunculata*	--	--	--	--	5	4	1	15	3	2	1	50
Pennsylvania sedge	*Carex pensylvanica*	--	--	--	--	3	1	2	10	--	--	--	--
Plantain-leaved sedge	*Carex plantaginea*	--	--	--	--	1	1	0	Trace	--	--	--	--
Cyperus-like sedge	*Carex pseudocyperus*	--	--	--	--	2	0	2	75	1	0	1	10
Eastern star sedge	*Carex radiata*	--	--	--	--	1	1	0	Trace	--	--	--	--
Rosy sedge	*Carex rosea*	--	--	--	--	3	3	0	Trace	--	--	--	--
Eastern rough sedge	*Carex scabrata*	--	--	--	--	--	--	--	--	1	1	0	Trace
Sedge sp.	*Carex* sp.	4	2	2	40	5	4	1	15	--	--	--	--
Sedge spp.	*Carex* spp.	--	--	--	--	9	5	4	25	5	1	4	45
Awl-fruited sedge	*Carex stipata*	--	--	--	--	3	3	0	Trace	--	--	--	--
Tussock sedge	*Carex stricta*	3	0	3	45	--	--	--	--	1	0	1	50
Tender sedge	*Carex tenera*	--	--	--	--	1	1	0	Trace	--	--	--	--
Blunt broom sedge	*Carex tribuloides*	--	--	--	--	1	1	0	Trace	--	--	--	--
Three-seeded sedge	*Carex trisperma*	--	--	--	--	--	--	--	--	1	1	0	Trace
Fox sedge	*Carex vulpinoidea*	1	1	0	Trace	1	1	0	Trace	--	--	--	--
Giant blue cohosh	*Caulophyllum giganteum*	--	--	--	--	1	1	0	Trace	1	1	0	Trace
Blue cohosh sp.	*Caulophyllum* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Spotted knapweed	*Centaurea stoebe ssp. micranthos*	--	--	--	--	1	1	0	Trace	--	--	--	--
Knapweed sp.	*Centaurea* sp.	1	1	0	Trace	1	0	1	60	--	--	--	--
Northern sea oats	*Chasmanthium latifolium*	--	--	--	--	1	0	1	5	--	--	--	--
White turtlehead	*Chelone glabra*	4	4	0	Trace	2	2	0	Trace	--	--	--	--

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American golden-saxifrage	*Chrysosplenium americanum*	1	1	0	Trace	--	--	--	--	--	--	--	--
Bulbous water-hemlock	*Cicuta bulbifera*	3	3	0	Trace	3	2	1	10	--	--	--	--
Spotted water-hemlock	*Cicuta maculata* var. *maculata*	2	1	1	5	2	2	0	Trace	--	--	--	--
Stout woodreed	*Cinna arundinacea*	--	--	--	--	2	2	0	Trace	--	--	--	--
Drooping woodreed	*Cinna latifolia*	--	--	--	--	3	1	2	30	--	--	--	--
Woodreed sp.	*Cinna* sp.	2	2	0	Trace	--	--	--	--	--	--	--	--
Small enchanter's nightshade	*Circaea alpina*	1	1	0	Trace	4	4	0	Trace	1	1	0	Trace
Broad-leaved enchanter's nightshade	*Circaea canadensis*	4	2	2	20	15	12	3	5	1	1	0	Trace
Canada thistle	*Cirsium arvense*	--	--	--	--	1	1	0	Trace	--	--	--	--
Bull thistle	*Cirsium vulgare*	--	--	--	--	1	1	0	Trace	1	1	0	Trace
Virginia clematis	*Clematis virginiana*	--	--	--	--	1	1	0	Trace	1	1	0	Trace
Wild basil	*Clinopodium vulgare*	1	1	0	Trace	10	7	3	10	3	2	1	10
Yellow clintonia	*Clintonia borealis*	--	--	--	--	5	4	1	5	1	1	0	Trace
Marsh cinquefoil	*Comarum palustre*	--	--	--	--	1	0	1	5	--	--	--	--
Goldthread	*Coptis trifolia*	--	--	--	--	15	11	4	10	1	1	0	Trace
Alternate-leaved dogwood	*Cornus alternifolia*	--	--	--	--	1	1	0	Trace	--	--	--	--
Bunchberry	*Cornus canadensis*	--	--	--	--	3	3	0	Trace	1	1	0	Trace
Red-osier dogwood	*Cornus sericea*	--	--	--	--	1	1	0	Trace	2	2	0	Trace
Maroon cucumber	*Cucumis anguria*	1	1	0	Trace	--	--	--	--	--	--	--	--
Swamp dodder	*Cuscuta gronovii*	--	--	--	--	1	1	0	Trace	--	--	--	--
Pink lady's-slipper	*Cypripedium acaule*	--	--	--	--	1	1	0	Trace	--	--	--	--
Bulblet bladder fern	*Cystopteris bulbifera*	3	3	0	Trace	--	--	--	--	--	--	--	--
Mackay's brittle fern	*Cystopteris tenuis*	--	--	--	--	3	3	0	Trace	--	--	--	--
Orchard grass	*Dactylis glomerata*	1	1	0	Trace	2	0	2	10	--	--	--	--
Poverty oatgrass	*Danthonia spicata*	--	--	--	--	1	0	1	55	--	--	--	--
Wild carrot	*Daucus carota*	3	2	1	10	2	1	1	5	1	1	0	Trace
Flat-branched tree-clubmoss	*Dendrolycopodium obscurum*	--	--	--	--	1	1	0	Trace	--	--	--	--
Deptford pink	*Dianthus armeria*	--	--	--	--	1	1	0	Trace	--	--	--	--
Panicgrass sp.	*Dichanthelium* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Flat-top white aster	*Doellingeria umbellata*	--	--	--	--	3	2	1	10	--	--	--	--
Spinulose wood fern	*Dryopteris carthusiana*	4	3	1	10	26	17	9	30	2	1	1	20
Crested wood fern	*Dryopteris cristata*	2	2	0	Trace	9	9	0	Trace	--	--	--	--
Evergreen wood fern	*Dryopteris intermedia*	--	--	--	--	8	8	0	Trace	1	1	0	Trace
Marginal wood fern	*Dryopteris marginalis*	1	0	1	10	1	1	0	Trace	--	--	--	--
Three-way sedge	*Dulichium arundinaceum*	--	--	--	--	2	1	1	5	--	--	--	--
Wild cucumber	*Echinocystis lobata*	--	--	--	--	1	1	0	Trace	--	--	--	--
Autumn olive	*Elaeagnus umbellata*	--	--	--	--	--	--	--	--	1	1	0	Trace
Spikerush sp.	*Eleocharis* sp.	--	--	--	--	1	0	1	15	--	--	--	--
Eastern riverbank wildrye	*Elymus riparius*	--	--	--	--	1	1	0	Trace	--	--	--	--
Virginia wildrye	*Elymus virginicus* var. *virginicus*	--	--	--	--	--	--	--	--	1	1	0	Trace
Northern willowherb	*Epilobium ciliatum*	3	3	0	Trace	1	1	0	Trace	--	--	--	--
Purple-veined willowherb	*Epilobium coloratum*	--	--	--	--	2	2	0	Trace	--	--	--	--
Broad-leaved helleborine	*Epipactis helleborine*	2	2	0	Trace	12	12	0	Trace	3	3	0	Trace
Field horsetail	*Equisetum arvense*	3	3	0	Trace	8	6	2	20	1	1	0	Trace
Marsh horsetail	*Equisetum palustre*	1	1	0	Trace	--	--	--	--	--	--	--	--
Dwarf scouring-rush	*Equisetum scirpoides*	--	--	--	--	1	0	1	35	--	--	--	--
Horsetail spp.	*Equisetum* spp.	--	--	--	--	3	2	1	10	1	0	1	20
Annual fleabane	*Erigeron annuus*	--	--	--	--	3	3	0	Trace	--	--	--	--

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Philadelphia fleabane	*Erigeron philadelphicus*	1	1	0	Trace	1	1	0	Trace	--	--	--	--
Showy fleabane	*Erigeron speciosus*[2]	--	--	--	--	1	1	0	Trace	--	--	--	--
Common boneset	*Eupatorium perfoliatum*	2	1	1	5	1	1	0	Trace	3	2	1	10
Grass-leaved goldenrod	*Euthamia graminifolia*	2	1	1	5	3	1	2	5	1	0	1	20
Spotted joe-pye weed	*Eutrochium maculatum* var. *maculatum*	7	3	4	10	9	7	2	15	3	2	1	10
American beech	*Fagus grandifolia*	--	--	--	--	--	--	--	--	1	1	0	Trace
American woodland strawberry	*Fragaria vesca* ssp. *americana*	--	--	--	--	3	3	0	Trace	--	--	--	--
Wild strawberry	*Fragaria virginiana*	3	3	0	Trace	12	9	3	35	--	--	--	--
White ash	*Fraxinus americana*	--	--	--	--	--	--	--	--	2	0	2	55
Black ash	*Fraxinus nigra*	--	--	--	--	3	1	2	10	--	--	--	--
Green ash / Red ash	*Fraxinus pennsylvanica*	--	--	--	--	5	1	4	20	--	--	--	--
Ash sp.	*Fraxinus* sp.	--	--	--	--	1	0	1	10	1	1	0	Trace
Ash sp.	*Fraxinus* spp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Common hemp-nettle	*Galeopsis tetrahit*	--	--	--	--	1	1	0	Trace	--	--	--	--
Rough bedstraw	*Galium asprellum*	--	--	--	--	4	2	2	10	--	--	--	--
Smooth bedstraw	*Galium mollugo*	1	0	1	10	--	--	--	--	--	--	--	--
Common marsh bedstraw	*Galium palustre*	1	1	0	Trace	6	6	0	Trace	--	--	--	--
Bedstraw sp.	*Galium* spp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Three-flowered bedstraw	*Galium triflorum*	2	2	0	Trace	10	10	0	Trace	--	--	--	--
Eastern teaberry	*Gaultheria procumbens*	--	--	--	--	6	4	2	10	--	--	--	--
Andrews' bottle gentian	*Gentiana andrewsii*	1	1	0	Trace	--	--	--	--	--	--	--	--
Spotted geranium	*Geranium maculatum*	--	--	--	--	1	1	0	Trace	--	--	--	--
Herb-robert	*Geranium robertianum*	--	--	--	--	7	7	0	Trace	--	--	--	--
Yellow avens	*Geum aleppicum*	1	1	0	Trace	--	--	--	--	--	--	--	--
Canada avens	*Geum canadense*	--	--	--	--	7	7	0	Trace	--	--	--	--
Barren strawberry	*Geum fragarioides*	--	--	--	--	3	1	2	15	--	--	--	--
Rough avens	*Geum laciniatum*	--	--	--	--	1	1	0	Trace	--	--	--	--
Avens sp.	*Geum* sp.	--	--	--	--	2	2	0	Trace	--	--	--	--
Fowl mannagrass	*Glyceria striata*	2	0	2	10	22	12	10	30	2	1	1	10
Graminoid sp.	*Graminoid* sp.	--	--	--	--	--	--	--	--	1	1	0	Trace
Common oak fern	*Gymnocarpium dryopteris*	--	--	--	--	1	1	0	Trace	1	1	0	Trace
Virginia stickseed	*Hackelia virginiana*	1	1	0	Trace	1	1	0	Trace	1	1	0	Trace
Hawkweed sp.	*Hieracium* sp.	--	--	--	--	2	2	0	Trace	--	--	--	--
Common hawkweed	*Hieracium lachenalii*	--	--	--	--	1	1	0	Trace	--	--	--	--
Shining firmoss	*Huperzia lucidula*	--	--	--	--	1	1	0	Trace	--	--	--	--
American water pennywort	*Hydrocotyle americana*	--	--	--	--	1	1	0	Trace	--	--	--	--
Common St. John's-wort	*Hypericum perforatum*	--	--	--	--	4	4	0	Trace	1	1	0	Trace
Spotted jewelweed	*Impatiens capensis*	4	2	2	20	19	13	6	60	1	1	0	Trace
Pale jewelweed	*Impatiens pallida*	--	--	--	--	1	1	0	Trace	--	--	--	--
Iris sp.	*Iris* sp.	--	--	--	--	1	0	1	5	--	--	--	--
Harlequin blue flag	*Iris versicolor*	4	4	0	Trace	3	3	0	Trace	2	2	0	Trace
Twinleaf	*Jeffersonia diphylla*	1	1	0	Trace	--	--	--	--	--	--	--	--
Dudley's rush	*Juncus dudleyi*	1	1	0	Trace	--	--	--	--	--	--	--	--
Soft rush	*Juncus effusus*	1	1	0	Trace	1	1	0	Trace	--	--	--	--
Path rush	*Juncus tenuis*	1	1	0	Trace	--	--	--	--	--	--	--	--
Canada lettuce	*Lactuca canadensis*	--	--	--	--	3	3	0	Trace	--	--	--	--
Canadian wood nettle	*Laportea canadensis*	2	0	2	15	--	--	--	--	--	--	--	--
Marsh vetchling	*Lathyrus palustris*	--	--	--	--	2	2	0	Trace	--	--	--	--

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Rice cutgrass	*Leersia oryzoides*	3	2	1	10	4	2	2	5	1	1	0	Trace
Small duckweed	*Lemna minor*	2	2	0	Trace	--	--	--	--	--	--	--	--
Oxeye daisy	*Leucanthemum vulgare*	--	--	--	--	2	2	0	Trace	--	--	--	--
Cardinal flower	*Lobelia cardinalis*	2	2	0	Trace	1	1	0	Trace	--	--	--	--
Great blue lobelia	*Lobelia siphilitica*	2	2	0	Trace	--	--	--	--	--	--	--	--
Meadow ryegrass	*Lolium pratense*	1	0	1	60	--	--	--	--	--	--	--	--
Canada fly honeysuckle	*Lonicera canadensis*	--	--	--	--	1	1	0	Trace	--	--	--	--
Limber honeysuckle	*Lonicera dioica*	--	--	--	--	1	1	0	Trace	--	--	--	--
Garden bird's-foot trefoil	*Lotus corniculatus*	1	0	1	10	1	1	0	Trace	--	--	--	--
Marsh seedbox	*Ludwigia palustris*	1	1	0	Trace	--	--	--	--	--	--	--	--
American water-horehound	*Lycopus americanus*	2	2	0	Trace	3	2	1	10	1	1	0	Trace
Northern water-horehound	*Lycopus uniflorus*	4	4	0	Trace	13	9	4	15	--	--	--	--
Northern starflower	*Lysimachia borealis*	--	--	--	--	16	15	1	5	1	1	0	Trace
Fringed yellow loosestrife	*Lysimachia ciliata*	2	1	1	5	2	2	0	Trace	--	--	--	--
Swamp yellow loosestrife	*Lysimachia terrestris*	--	--	--	--	3	1	2	15	--	--	--	--
Tufted yellow loosestrife	*Lysimachia thyrsiflora*	1	1	0	Trace	3	2	1	10	--	--	--	--
Wild lily-of-the-valley	*Maianthemum canadense*	2	2	0	Trace	27	19	8	20	5	3	2	10
Large false solomon's seal	*Maianthemum racemosum*	--	--	--	--	3	3	0	Trace	--	--	--	--
Star-flowered false solomon's seal	*Maianthemum stellatum*	2	2	0	Trace	3	3	0	Trace	1	1	0	Trace
Ostrich fern	*Matteuccia struthiopteris* var. *pensylvanica*	2	1	1	5	4	3	1	25	--	--	--	--
Indian cucumber-root	*Medeola virginiana*	--	--	--	--	2	2	0	Trace	--	--	--	--
Black medick	*Medicago lupulina*	--	--	--	--	1	1	0	Trace	--	--	--	--
White sweet-clover	*Melilotus albus*	2	1	1	10	1	1	0	Trace	--	--	--	--
Canada moonseed	*Menispermum canadense*	--	--	--	--	2	1	1	5	--	--	--	--
Canada mint	*Mentha canadensis*	3	3	0	Trace	2	2	0	Trace	1	1	0	Trace
Partridgeberry	*Mitchella repens*	--	--	--	--	15	13	2	10	1	1	0	Trace
Two-leaved mitrewort	*Mitella diphylla*	1	1	0	Trace	1	0	1	10	--	--	--	--
Naked mitrewort	*Mitella nuda*	2	2	0	Trace	7	7	0	Trace	--	--	--	--
Indian-pipe	*Monotropa uniflora*	--	--	--	--	1	1	0	Trace	--	--	--	--
Mexican muhly	*Muhlenbergia mexicana* var. *mexicana*	--	--	--	--	3	3	0	Trace	--	--	--	--
White rattlesnakeroot	*Nabalus albus*	--	--	--	--	1	1	0	Trace	--	--	--	--
Three-leaved Rattlesnake-root	*Nabalus trifoliolatus*	--	--	--	--	1	1	0	Trace	--	--	--	--
Watercress sp.	*Nasturtium* sp.	1	1	0	Trace	--	--	--	--	--	--	--	--
Sensitive fern	*Onoclea sensibilis*	4	2	2	20	41	13	28	75	3	2	1	30
Interrupted fern	*Osmunda claytoniana*	--	--	--	--	1	0	1	10	--	--	--	--
Royal fern	*Osmunda regalis*	1	1	0	Trace	20	7	13	70	--	--	--	--
American royal fern	*Osmunda regalis var. spectabilis*	--	--	--	--	1	0	1	10	--	--	--	--
Cinnamon fern	*Osmundastrum cinnamomeum*	1	0	1	10	9	6	3	30	1	0	1	80
Slender yellow woodsorrel	*Oxalis dillenii*	--	--	--	--	--	--	--	--	1	1	0	Trace
Marsh bellflower	*Palustricodon aparinoides*	2	2	0	Trace	2	2	0	Trace	--	--	--	--
Marsh grass-of-parnassus	*Parnassia palustris*	--	--	--	--	2	2	0	Trace	--	--	--	--
Virginia creeper	*Parthenocissus quinquefolia*	--	--	--	--	1	0	1	5	--	--	--	--
Thicket creeper	*Parthenocissus vitacea*	3	1	2	25	17	14	3	5	4	2	2	10
Water smartweed	*Persicaria amphibia*	--	--	--	--	2	1	1	20	1	1	0	Trace
False waterpepper	*Persicaria hydropiperoides*	--	--	--	--	1	0	1	10	--	--	--	--
Spotted lady's-thumb	*Persicaria maculosa*	--	--	--	--	1	0	1	25	--	--	--	--
Smartweed sp.	*Persicaria* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Reed canarygrass	*Phalaris arundinacea*	5	1	4	80	7	4	3	55	--	--	--	--

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Common timothy	*Phleum pratense*	2	2	0	Trace	1	1	0	Trace	--	--	--	--
Dwarf clearweed	*Pilea pumila*	1	1	0	Trace	1	1	0	Trace	--	--	--	--
Orange hawkweed	*Pilosella aurantiaca*	--	--	--	--	1	1	0	Trace	--	--	--	--
English plantain	*Plantago lanceolata*	3	3	0	Trace	2	2	0	Trace	1	1	0	Trace
White-fringed orchid	*Platanthera blephariglottis*	--	--	--	--	1	1	0	Trace	--	--	--	--
Fringed orchid sp.	*Platanthera* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Fowl bluegrass	*Poa palustris*	1	1	0	Trace	--	--	--	--	--	--	--	--
Kentucky bluegrass	*Poa pratensis*	2	1	1	85	1	0	1	5	--	--	--	--
Fringed milkwort	*Polygaloides paucifolia*	--	--	--	--	1	1	0	Trace	2	1	1	5
Giant Solomon's seal	*Polygonatum biflorum*	--	--	--	--	1	1	0	Trace	--	--	--	--
Hairy Solomon's seal	*Polygonatum pubescens*	--	--	--	--	1	1	0	Trace	--	--	--	--
Christmas fern	*Polystichum acrostichoides*	--	--	--	--	1	0	1	10	--	--	--	--
Rough cinquefoil	*Potentilla norvegica*	1	1	0	Trace	1	1	0	Trace	1	1	0	Trace
Sulphur cinquefoil	*Potentilla recta*	1	1	0	Trace	--	--	--	--	--	--	--	--
Marsh mermaidweed	*Proserpinaca palustris*	--	--	--	--	2	0	2	40	--	--	--	--
Lance-leaved selfheal	*Prunella vulgaris* ssp. *lanceolata*	3	3	0	Trace	10	7	3	10	--	--	--	--
Black cherry	*Prunus serotina*	--	--	--	--	1	1	0	Trace	--	--	--	--
Bracken fern	*Pteridium aquilinum*	--	--	--	--	7	3	4	25	1	1	0	Trace
Pink pyrola	*Pyrola asarifolia*	--	--	--	--	1	1	0	Trace	--	--	--	--
Shinleaf	*Pyrola elliptica*	--	--	--	--	3	3	0	Trace	--	--	--	--
Wintergreen sp.	*Pyrola* spp.	--	--	--	--	1	0	1	5	--	--	--	--
Swamp white oak	*Quercus bicolor*	--	--	--	--	1	1	0	Trace	--	--	--	--
Oak sp.	*Quercus* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Kidney-leaved buttercup	*Ranunculus abortivus*	--	--	--	--	1	1	0	Trace	--	--	--	--
Common buttercup	*Ranunculus acris*	--	--	--	--	5	5	0	Trace	--	--	--	--
Northern swamp buttercup	*Ranunculus caricetorum*	--	--	--	--	9	8	1	5	--	--	--	--
Pennsylvania buttercup	*Ranunculus pensylvanicus*	--	--	--	--	1	0	1	30	--	--	--	--
Hooked buttercup	*Ranunculus recurvatus*	--	--	--	--	3	3	0	Trace	1	1	0	Trace
Southern swamp buttercup	*Ranunculus septentrionalis*	1	1	0	Trace	--	--	--	--	--	--	--	--
European buckthorn	*Rhamnus cathartica*	--	--	--	--	1	1	0	Trace	1	0	1	15
American black currant	*Ribes americanum*	--	--	--	--	2	2	0	Trace	--	--	--	--
Eastern prickly gooseberry	*Ribes cynosbati*	--	--	--	--	2	2	0	Trace	--	--	--	--
Swamp red currant	*Ribes triste*	--	--	--	--	7	7	0	Trace	--	--	--	--
Bristly dewberry	*Rubus hispidus*	--	--	--	--	1	1	0	Trace	--	--	--	--
North American red raspberry	*Rubus idaeus* ssp. *strigosus*	--	--	--	--	3	3	0	Trace	--	--	--	--
Black raspberry	*Rubus occidentalis*	1	1	0	Trace	--	--	--	--	--	--	--	--
Dwarf raspberry	*Rubus pubescens*	1	1	0	Trace	26	11	15	80	1	1	0	Trace
Black-eyed Susan	*Rudbeckia hirta* var. *pulcherrima*	--	--	--	--	1	1	0	Trace	--	--	--	--
Curled dock	*Rumex crispus*	--	--	--	--	--	--	--	--	1	1	0	Trace
Greater water dock	*Rumex britannica*	--	--	--	--	1	1	0	Trace	--	--	--	--
Dock sp.	*Rumex* sp.	1	1	0	Trace	--	--	--	--	--	--	--	--
Arrowhead sp.	*Sagittaria* spp.	--	--	--	--	--	--	--	--	1	1	0	Trace
Willow sp.	*Salix* sp.	--	--	--	--	--	--	--	--	1	1	0	Trace
Maryland sanicle	*Sanicula marilandica*	1	1	0	Trace	--	--	--	--	--	--	--	--
Purple false medic	*Schizachne purpurascens*	--	--	--	--	1	1	0	Trace	--	--	--	--
Hard-stemmed bulrush	*Schoenoplectus acutus*	--	--	--	--	1	1	0	Trace	--	--	--	--
Soft-stemmed bulrush	*Schoenoplectus tabernaemontani*	1	1	0	Trace	--	--	--	--	--	--	--	--
Dark-green bulrush	*Scirpus atrovirens*	2	1	1	10	--	--	--	--	--	--	--	--

Species Common Name	Species Latin Name	AOI and LSA_{TER} (*N* = 13)				LSA_{ECO} North of the AOI (*N* = 58)				LSA_{ECO} South of the AOI (*N* = 13)			
		# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present >Trace	Max Percent Composition	# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present > Trace	Max Percent Composition	# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present > Trace	Max Percent Composition
Common woolly bulrush	*Scirpus cyperinus*	1	1	0	Trace	3	2	1	30	--	--	--	--
Mad-dog skullcap	*Scutellaria lateriflora*	1	1	0	Trace	9	9	0	Trace	1	1	0	Trace
Bladder campion	*Silene vulgaris*	--	--	--	--	1	0	1	5	--	--	--	--
Common water-parsnip	*Sium suave*	1	1	0	Trace	2	2	0	Trace	--	--	--	--
Bristly greenbrier	*Smilax tamnoides*	--	--	--	--	8	8	0	Trace	--	--	--	--
Bittersweet nightshade	*Solanum dulcamara*	3	2	1	5	13	11	2	20	2	2	0	Trace
Eastern tall goldenrod	*Solidago altissima* var. *altissima*	3	1	2	20	3	0	3	25	2	1	1	40
Canada goldenrod	*Solidago canadensis* var. *canadensis*	3	0	3	75	2	1	1	25	--	--	--	--
Giant goldenrod	*Solidago gigantea*	5	3	2	45	4	3	1	25	--	--	--	--
Northern rough-stemmed goldenrod	*Solidago rugosa* ssp. *rugosa* var. *rugosa*	4	2	2	5	16	13	3	25	5	5	0	Trace
Goldenrod sp.	*Solidago* spp.	1	0	1	5	4	4	0	Trace	1	1	0	Trace
Bog goldenrod	*Solidago uliginosa*	--	--	--	--	--	--	--	--	1	1	0	Trace
Green-fruited burreed	*Sparganium emersum*	--	--	--	--	2	0	2	25	--	--	--	--
White meadowsweet	*Spiraea alba*	--	--	--	--	1	1	0	Trace	--	--	--	--
White heath aster	*Symphyotrichum ericoides* var. *ericoides*	--	--	--	--	1	1	0	Trace	--	--	--	--
Glossy-leaved aster	*Symphyotrichum firmum*	--	--	--	--	1	0	1	10	--	--	--	--
Eastern panicled aster	*Symphyotrichum lanceolatum* ssp. *lanceolatum*	4	2	2	25	6	3	3	20	3	2	1	30
Calico aster	*Symphyotrichum lateriflorum*	3	1	2	15	27	12	15	35	3	2	1	5
New England aster	*Symphyotrichum novae-angliae*	1	1	0	Trace	2	2	0	Trace	1	1	0	Trace
Ontario aster	*Symphyotrichum ontarionis*	1	0	1	30	--	--	--	--	--	--	--	--
Old field aster	*Symphyotrichum pilosum*	1	0	1	20	--	--	--	--	--	--	--	--
Purple-stemmed aster	*Symphyotrichum puniceum*	4	3	1	10	4	3	1	5	3	3	0	Trace
Aster sp.	*Symphyotrichum* sp.	1	0	1	20	--	--	--	--	--	--	--	--
Flat-topped white aster	*Symphyotrichum umbellatum*	--	--	--	--	1	1	0	Trace	--	--	--	--
Eastern skunk cabbage	*Symplocarpus foetidus*	--	--	--	--	--	--	--	--	1	0	1	5
Common dandelion	*Taraxacum officinale*	2	2	0	Trace	8	8	0	Trace	1	1	0	Trace
Dandelion sp.	*Taraxacum* sp.	1	1	0	Trace	1	1	0	Trace	--	--	--	--
Early meadow-rue	*Thalictrum dioicum*	--	--	--	--	5	5	0	Trace	--	--	--	--
Tall meadow-rue	*Thalictrum pubescens*	3	2	1	5	12	9	3	15	1	1	0	Trace
Eastern marsh fern	*Thelypteris palustris* var. *pubescens*	2	1	1	15	12	10	2	10	1	0	1	10
Eastern white cedar	*Thuja occidentalis*	--	--	--	--	1	0	1	5	--	--	--	--
Heart-leaved Foamflower	*Tiarella cordifolia*[3]	--	--	--	--	3	2	1	20	1	1	0	Trace
Creeping Foamflower	*Tiarella stolonifera*	--	--	--	--	6	4	2	10	--	--	--	--
Poison ivy	*Toxicodendron radicans*	1	0	1	35	18	9	9	50	1	0	1	10
Eastern poison ivy	*Toxicodendron radicans* var. *radicans*	1	1	0	Trace	2	1	1	70	--	--	--	--
Western poison ivy	*Toxicodendron radicans* var. *rydbergii*	2	2	0	Trace	11	4	7	30	--	--	--	--
Fraser's St. John's-wort	*Triadenum fraseri*	--	--	--	--	2	0	2	5	--	--	--	--
Red clover	*Trifolium pratense*	1	1	0	Trace	2	2	0	Trace	--	--	--	--
White clover	*Trifolium repens*	1	0	1	10	1	1	0	Trace	--	--	--	--
Red trillium	*Trillium erectum*	--	--	--	--	10	10	0	Trace	--	--	--	--
White trillium	*Trillium grandiflorum*	--	--	--	--	6	6	0	Trace	--	--	--	--
Eastern hemlock	*Tsuga canadensis*	--	--	--	--	1	1	0	Trace	--	--	--	--
Coltsfoot	*Tussilago farfara*	1	0	1	20	1	1	0	Trace	--	--	--	--
Narrow-leaved cattail	*Typha angustifolia*	1	1	0	Trace	--	--	--	--	--	--	--	--
Broad-leaved cattail	*Typha latifolia*	3	0	3	30	3	2	1	40	2	1	1	95
Cattail spp.	*Typha* spp.	--	--	--	--	1	0	1	90	--	--	--	--
Unknown Fern or Fern Ally	Unknown Fern or Fern Ally	--	--	--	--	3	2	1	15	--	--	--	--

Species Common Name	Species Latin Name	AOI and LSA_{TER} (*N* = 13)				LSA_{ECO} North of the AOI (*N* = 58)				LSA_{ECO} South of the AOI (*N* = 13)			
		# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present >Trace	Max Percent Composition	# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present > Trace	Max Percent Composition	# Plots Where Present	# Plots Where Present as Trace	# Plots Where Present > Trace	Max Percent Composition
Unknown Forb	Unknown Forb	--	--	--	--	1	0	1	20	--	--	--	--
Unknown Graminoid	Unknown Graminoid	--	--	--	--	3	1	2	45	--	--	--	--
Unknown Species	Unknown Species	--	--	--	--	2	2	0	Trace	--	--	--	--
Slender stinging nettle	*Urtica gracilis*	1	0	1	10	--	--	--	--	--	--	--	--
Common mullein	*Verbascum thapsus*	--	--	--	--	1	1	0	Trace	1	1	0	Trace
Blue vervain	*Verbena hastata*	2	2	0	Trace	--	--	--	--	--	--	--	--
Common speedwell	*Veronica officinalis*	--	--	--	--	--	--	--	--	1	1	0	Trace
Purslane speedwell	*Veronica peregrina* ssp. *peregrina*	--	--	--	--	1	0	1	5	--	--	--	--
Bird vetch	*Vicia cracca*	--	--	--	--	1	1	0	Trace	--	--	--	--
Labrador violet	*Viola labradorica*	--	--	--	--	--	--	--	--	1	1	0	Trace
Yellow violet	*Viola pubescens*	--	--	--	--	1	1	0	Trace	--	--	--	--
Violet sp.	*Viola* sp.	1	1	0	Trace	6	5	1	5	1	1	0	Trace
Violet spp.	*Viola* spp.	2	1	1	5	8	7	1	10	--	--	--	--
Riverbank grape	*Vitis riparia*	3	3	0	Trace	10	9	1	5	--	--	--	--

Notes:
The intensity of green shading indicates those species that are detected more often within surveyed plots (darker shading) versus those that were detected less often (lighter shading).
The intensity of orange shading indicates species that, when present within a surveyed plot, comprise a greater percentage of a vegetation layer (darker shading) relative to other species (lighter shading).

1. *Alisma plantago-aquatica* has been divided into *Alisma subcordatum* (southern water plantain) and *Alisma triviale* (northern water-plantain) as per NHIC.
2. *Erigeron speciosus* occurs in western North America, so this is likely a record of a different *Erigeron* species.
3. *Tiarella cordifolia* changed name to *Tiarella stolonifera*, which makes it the same species as the one below.

Table D-5. Vegetation species in the moss, lichen, liverwort, and seedling layer within plots in the study areas. Species of potential health concern due to disease and pests are highlighted in blue (BBD concern) and green (EAB concern).

Species Common Name	Species Latin Name	AOI and LSA_{TER} (*N* = 13)				LSA_{ECO} North of the AOI (*N* = 58)				LSA_{ECO} South of the AOI (*N* = 13)			
		Sites where Present	Sites where Present as Trace	Sites where Present > Trace	Max Percent Comp.	Sites where Present	Sites where Present as Trace	Sites where Present > Trace	Max Percent Comp.	Sites where Present	Sites where Present as Trace	Sites where Present > Trace	Max Percent Comp.
Balsam fir	*Abies balsamea*	--	--	--	--	2	2	0	Trace	1	1	0	Trace
Red maple	*Acer rubrum*	1	1	0	Trace	12	11	1	5	2	1	1	5
Sugar maple	*Acer saccharum*	--	--	--	--	2	0	2	5	--	--	--	--
Freeman's maple	*Acer x freemanii*	--	--	--	--	2	2	0	Trace	--	--	--	--
Serviceberry spp.	*Amelanchier* spp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Yellow birch	*Betula alleghaniensis*	--	--	--	--	3	3	0	Trace	--	--	--	--
Paper birch	*Betula papyrifera*	--	--	--	--	--	--	--	--	2	2	0	Trace
Bryophytes	*Bryophyte* sp.	--	--	--	--	--	--	--	--	1	1	0	Trace
Callicladium moss	*Callicladium* sp.	2	2	0	Trace	--	--	--	--	--	--	--	--
American tree moss	*Climacium americanum*	--	--	--	--	1	1	0	Trace	--	--	--	--
Northern tree moss	*Climacium dendroides*	--	--	--	--	2	2	0	Trace	--	--	--	--
Hawthorn sp.	*Crataegus* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Forkmoss sp.	*Dicranum* sp.	1	1	0	Trace	--	--	--	--	--	--	--	--
American beech	*Fagus grandifolia*	--	--	--	--	--	--	--	--	1	1	0	Trace
Pocket moss sp.	*Fissidens* sp.	1	1	0	Trace	1	1	0	Trace	--	--	--	--
White ash	*Fraxinus americana*	--	--	--	--	4	1	3	5	1	0	1	55
Black ash	*Fraxinus nigra*	--	--	--	--	4	4	0	Trace	--	--	--	--
Green ash / Red ash	*Fraxinus pennsylvanica*	1	1	0	Trace	12	8	4	5	1	1	0	Trace
Ash sp.	*Fraxinus* sp.	1	1	0	Trace	--	--	--	--	1	1	0	Trace
Ash spp.	*Fraxinus* spp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Stairstep moss	*Hylocomium splendens*	--	--	--	--	1	1	0	Trace	--	--	--	--
Riparian feather moss	*Leptodictyum riparium*	--	--	--	--	1	1	0	Trace	--	--	--	--
Lichen	Lichen sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Leafy moss sp.	*Mnium* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Moss sp.	Moss sp.	2	1	1	5	15	4	11	75	3	1	2	50
Moss spp.	Moss spp.	--	--	--	--	5	0	5	70	--	--	--	--
Eastern white pine	*Pinus strobus*	--	--	--	--	1	1	0	Trace	--	--	--	--
Woodsy leafymoss	*Plagiomnium cuspidatum*	2	2	0	Trace	1	1	0	Trace	--	--	--	--
Red-stemmed feathermoss	*Pleurozium schreberi*	2	2	0	Trace	1	0	1	40	--	--	--	--
Haircap moss sp.	*Polytrichum* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Haircap moss spp.	*Polytrichum* spp.	--	--	--	--	3	2	1	20	--	--	--	--
Balsam poplar	*Populus balsamifera*	--	--	--	--	1	1	0	Trace	--	--	--	--
Large-toothed aspen	*Populus grandidentata*	--	--	--	--	1	1	0	Trace	--	--	--	--
Black cherry	*Prunus serotina*	--	--	--	--	1	1	0	Trace	1	1	0	Trace
Chokecherry	*Prunus virginiana*	--	--	--	--	1	1	0	Trace	--	--	--	--
Plume moss sp.	*Ptilium* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Bur oak	*Quercus macrocarpa*	--	--	--	--	1	1	0	Trace	--	--	--	--
Northern red oak	*Quercus rubra*	--	--	--	--	1	1	0	Trace	--	--	--	--
Oak sp.	*Quercus* spp.	--	--	--	--	2	2	0	Trace	--	--	--	--
European buckthorn	*Rhamnus cathartica*	--	--	--	--	1	1	0	Trace	--	--	--	--
Dotted leafy moss	*Rhizomnium punctatum*	--	--	--	--	1	1	0	Trace	--	--	--	--
Hidden spikemoss	*Selaginella eclipes*	1	1	0	Trace	--	--	--	--	--	--	--	--
Divine bogmoss	*Sphagnum divinum*	--	--	--	--	3	1	2	15	1	0	1	10
Sphagnum sp.	*Sphagnum* sp.	--	--	--	--	1	0	1	50	1	0	1	30
Sphagnum spp.	*Sphagnum* spp.	--	--	--	--	5	3	2	20	--	--	--	--

Species Common Name	Species Latin Name	AOI and LSA$_{TER}$ (*N* = 13)				LSA$_{ECO}$ North of the AOI (*N* = 58)				LSA$_{ECO}$ South of the AOI (*N* = 13)			
		Sites where Present	Sites where Present as Trace	Sites where Present > Trace	Max Percent Comp.	Sites where Present	Sites where Present as Trace	Sites where Present > Trace	Max Percent Comp.	Sites where Present	Sites where Present as Trace	Sites where Present > Trace	Max Percent Comp.
Delicate fern moss	*Thuidium delicatulum*	2	1	1	10	--	--	--	--	--	--	--	--
Eastern white cedar	*Thuja occidentalis*	1	1	0	Trace	2	2	0	Trace	--	--	--	--
Shiny golden fuzzy moss	*Tomentypnum nitens*	--	--	--	--	1	0	1	10	--	--	--	--
Handsome woollywort	*Trichocolea tomentella*	1	1	0	Trace	--	--	--	--	--	--	--	--
Eastern hemlock	*Tsuga canadensis*	--	--	--	--	1	1	0	Trace	2	2	0	Trace
White elm	*Ulmus americana*	--	--	--	--	6	6	0	Trace	--	--	--	--
Unknown species	Unknown Species	1	0	1	10	4	2	2	40	--	--	--	--

Notes:
1. The intensity of green shading indicates those species that are detected more often within surveyed plots (darker shading) versus those that were detected less often (lighter shading).
2. The intensity of orange shading indicates species that, when present within a surveyed plot, comprise a greater percentage of a vegetation layer (darker shading) relative to other species (lighter shading).

Table D-6. Vegetation species present in the epiphyte layer in plots within the study areas.

Species Common Name	Species Latin Name	AOI and LSA$_{TER}$ (*N* = 13)				LSA$_{ECO}$ North of the AOI (*N* = 58)				LSA$_{ECO}$ South of the AOI (*N* = 13)			
		Plots where Present	Plots where Present as Trace	Plots where Present > Trace	Max Percent Comp.	Plots where Present	Plots where Present as Trace	Plots where Present > Trace	Max Percent Comp.	Plots where Present	Plots where Present as Trace	Plots where Present > Trace	Max Percent Comp.
Mosses and lichens on tree trunks	Mosses and lichens on tree trunks	--	--	--	--	1	1	0	Trace	--	--	--	--
Mosses on trees	Mosses on trees	--	--	--	--	1	1	0	Trace	--	--	--	--
Thicket creeper	*Parthenocissus vitacea*	--	--	--	--	1	1	0	Trace	--	--	--	--
Virginia creeper	*Parthenocissus quinquefolia*	2	2	0	Trace	--	--	--	--	--	--	--	--
Poison oak/ivy sp.	*Toxicodendron* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--
Unknown lichens	Unknown lichens	--	--	--	--	1	1	0	Trace	--	--	--	--
Unknown mosses	Unknown mosses	--	--	--	--	2	1	1	5	1	1	0	Trace
Unknown mosses and lichens	Unknown mosses and lichens	--	--	--	--	4	2	2	5	--	--	--	--
Unknown mosses on CWD	Unknown mosses on CWD	--	--	--	--	4	0	4	5	1	1	0	Trace
Riverbank grape	*Vitis riparia*	2	2	0	Trace	--	--	--	--	--	--	--	--
Grapevine sp.	*Vitis* sp.	--	--	--	--	1	1	0	Trace	--	--	--	--

Notes:
1. The intensity of green shading indicates those species that are detected more often within surveyed plots (darker shading) versus those that were detected less often (lighter shading).

D.3 Habitat Features for Wildlife

Table D-7. Summary of coarse woody debris documented at plots during transect surveys.

Station ID/Site ID	N	Min	Mean	SE	Max
SB_F_01_SWT-Co1			TEM_006		
Number of Pieces of CWD	6				
Number of Known Species (CWD)	2				
Diameter (cm)	6	7.5	9.0	0.8	12.0
Length (m)	6	4.1	6.7	1.1	11.0
SB_F_01_SWT-Hm2			TEM_009		
Number of Pieces of CWD	2				
Number of Known Species (CWD)	0				
Diameter (cm)	2	8.0	10.0	2.0	12.0
Length (m)	2	1.5	1.8	0.3	2.0
SB_F_01_SWT-Hm5			TEM_010		
Number of Pieces of CWD	8				
Number of Known Species (CWD)	7				
Diameter (cm)	8	9.5	12.3	1.0	17.0
Length (m)	8	1.2	6.0	1.9	16.6
SB_F_01_SWT-Hm9			TEM_011		
Number of Pieces of CWD	3				
Number of Known Species (CWD)	0				
Diameter (cm)	3	9.0	11.0	1.0	12.0
Length (m)	3	2.0	4.0	1.2	6.0
SB_F_01_SWT-Ho2			TEM_012		
Number of Pieces of CWD	13				
Number of Known Species (CWD)	0				
Diameter (cm)	13	7.5	14.6	1.9	32.0
Length (m)	13	0.9	4.3	0.7	8.5
SB_F_01_SWT-Mm1			TEM_013		
Number of Pieces of CWD	6				
Number of Known Species (CWD)	3				
Diameter (cm)	6	8.0	18.2	4.2	32.5
Length (m)	6	4.1	8.6	1.8	16.9
SB_F_01_SWT-Mo1			TEM_014		
Number of Pieces of CWD	9				
Number of Known Species (CWD)	7				
Diameter (cm)	9	8.0	10.4	0.7	15.0
Length (m)	9	1.0	3.8	0.5	7.0
SB_F_01_SWT-Mo3			TEM_015		
Number of Pieces of CWD	18				
Number of Known Species (CWD)	6				
Diameter (cm)	18	7.5	19.9	4.0	80.0
Length (m)	18	1.5	9.5	1.6	20.0
SB_F_01_SWT-Mo5			TEM_016		
Number of Pieces of CWD	9				
Number of Known Species (CWD)	0				
Diameter (cm)	9	8.0	9.8	0.5	12.0
Length (m)	9	7.3	9.0	0.3	10.2
SB_F_01_TRT-CNd2			TEM_017		
Number of Pieces of CWD	9				
Number of Known Species (CWD)	3				
Diameter (cm)	9	8.0	13.2	2.2	25.0
Length (m)	9	0.7	4.4	1.6	14.5
SB_F_01_TRT-CNf2			TEM_018		
Number of Pieces of CWD	14				
Number of Known Species (CWD)	5				
Diameter (cm)	14	7.5	13.6	1.8	26.0
Length (m)	14	1.5	6.0	0.8	11.0
SB_F_01_TRT-CNf6			TEM_019		
Number of Pieces of CWD	4				
Number of Known Species (CWD)	2				
Diameter (cm)	4	7.5	14.0	4.8	28.0
Length (m)	4	4.6	6.9	1.5	11.2
SB_F_01_TRT-CZ2			TEM_020		
Number of Pieces of CWD	3				
Number of Known Species (CWD)	0				
Diameter (cm)	3	7.5	10.5	1.9	14.0
Length (m)	3	0.8	3.9	2.0	7.6

Station ID/Site ID	N	Min	Mean	SE	Max
SB_F_01_TRT-HNd10			TEM_021		
Number of Pieces of CWD	7				
Number of Known Species (CWD)	1				
Diameter (cm)	7	7.5	13.9	2.2	20.5
Length (m)	7	1.0	3.7	0.9	7.2
SB_F_01_TRT-HNd11			TEM_022		
Number of Pieces of CWD	8				
Number of Known Species (CWD)	3				
Diameter (cm)	8	9.0	26.3	4.3	44.5
Length (m)	8	0.6	9.0	2.7	19.6
SB_F_01_TRT-HNd3			TEM_023		
Number of Pieces of CWD	5				
Number of Known Species (CWD)	1				
Diameter (cm)	5	10.0	27.4	4.7	36.0
Length (m)	5	1.7	7.0	3.1	19.0
SB_F_01_TRT-HNd4			TEM_024		
Number of Pieces of CWD	14				
Number of Known Species (CWD)	2				
Diameter (cm)	14	8.0	14.5	1.6	24.0
Length (m)	14	0.5	5.7	1.7	22.0
SB_F_01_TRT-HNf17			TEM_025		
Number of Pieces of CWD	9				
Number of Known Species (CWD)	2				
Diameter (cm)	9	8.5	25.8	5.4	58.0
Length (m)	9	2.0	11.3	2.1	18.0
SB_F_01_TRT-HNf5			TEM_026		
Number of Pieces of CWD	2				
Number of Known Species (CWD)	1				
Diameter (cm)	2	9.0	9.3	0.3	9.5
Length (m)	2	0.8	1.7	0.9	2.5
SB_F_01_TRT-HNf7			TEM_027		
Number of Pieces of CWD	9				
Number of Known Species (CWD)	0				
Diameter (cm)	9	9.0	21.1	2.9	32.0
Length (m)	9	2.3	6.8	1.1	12.5
SB_F_01_TRT-MNd15			TEM_028		
Number of Pieces of CWD	8				
Number of Known Species (CWD)	4				
Diameter (cm)	8	7.5	14.5	2.4	25.0
Length (m)	8	1.8	9.1	2.0	15.1
SB_F_01_TRT-MNd3			TEM_029		
Number of Pieces of CWD	4				
Number of Known Species (CWD)	4				
Diameter (cm)	4	7.5	8.6	0.8	11.0
Length (m)	4	1.3	2.9	0.7	4.9
SB_F_01_TRT-MNd5			TEM_030		
Number of Pieces of CWD	7				
Number of Known Species (CWD)	6				
Diameter (cm)	7	8.0	20.0	5.0	47.0
Length (m)	7	0.3	5.9	2.3	17.0
SB_F_01_TRT-MNf3			TEM_032		
Number of Pieces of CWD	8				
Number of Known Species (CWD)	3				
Diameter (cm)	8	8.5	21.4	3.6	40.0
Length (m)	8	1.9	5.6	1.5	13.4
SB_F_01_TRT-MNf4			TEM_033		
Number of Pieces of CWD	8				
Number of Known Species (CWD)	2				
Diameter (cm)	8	7.5	12.2	1.4	19.0
Length (m)	8	1.3	6.7	2.2	18.1

Table D-8. Summary of coarse woody debris piles documented in surveyed plots.

Site ID / Habitat Type	N	Min	Mean	SE	Max
TEM_007	Mixedwood Swamp				
Number of Piles	2				
Length (m)	2	0.6	1.1	0.5	1.5
Width	2	0.8	0.9	0.1	1.0
Height	2	< 0.1	< 0.1	< 0.1	0.1
avg diam.	2	1.0	1.3	0.3	1.5
TEM_008	Hardwood Swamp				
Number of Piles	6				
Length (m)	6	0.4	1.5	0.6	4.0
Width	6	0.3	0.4	< 0.1	0.5
Height	6	< 0.1	0.1	< 0.1	0.2
avg diam.	6	1.0	1.2	0.2	2.0
TEM_009	Hardwood Swamp				
Number of Piles	2				
Length (m)	2	0.3	1.7	1.4	3.0
Width	2	0.2	0.4	0.2	0.5
Height	2	< 0.1	0.2	0.2	0.4
avg diam.	2	0.5	1.0	0.5	1.5
TEM_010	Hardwood Swamp				
Number of Piles	1				
Length (m)	1	6.0	6.0	NA	6.0
Width	1	2.0	2.0	NA	2.0
Height	1	0.3	0.3	NA	0.3
avg diam.	1	10.1	10.1	NA	10.1
TEM_011	Hardwood Swamp				
Number of Piles	4				
Length (m)	4	0.8	1.7	0.5	2.5
Width	4	0.2	0.3	< 0.1	0.4
Height	4	0.1	0.2	< 0.1	0.2
avg diam.	4	1.0	1.5	0.5	3.0

Site ID / Habitat Type	N	Min	Mean	SE	Max
TEM_013	Hardwood Swamp				
Number of Piles	1				
Length (m)	1	6.5	6.5	NA	6.5
Width	1	3.1	3.1	NA	3.1
Height	1	1.3	1.3	NA	1.3
avg diam.	1	1.7	1.7	NA	1.7
TEM_021	Hardwood				
Number of Piles	3				
Length (m)	3	2.2	5.8	1.8	8.1
Width	3	2.6	6.6	3.4	13.4
Height	3	0.5	0.8	0.2	1.1
avg diam.	3	10.0	10.0	0.0	10.0
TEM_022	Hardwood				
Number of Piles	1				
Length (m)	3	5.2	5.2	NA	5.2
Width	3	6.5	6.5	NA	6.5
Height	3	1.4	1.4	NA	1.4
avg diam.	3	8.0	8.0	NA	8.0
TEM_023	Hardwood Swamp				
Number of Piles	1				
Length (m)	1	2.6	2.6	NA	2.6
Width	1	2.5	2.5	NA	2.5
Height	1	1.0	1.0	NA	1.0
avg diam.	1	1.0	1.0	NA	1.0
TEM_033	Plantation				
Number of Piles	1				
Length (m)	1	3.9	3.9	NA	3.9
Width	1	2.1	2.1	NA	2.1
Height	1	0.5	0.5	NA	0.5
avg diam.	1	4.3	4.3	NA	4.3

Table D-9. Tree attribute summaries in full plots surveyed during Terrestrial Ecosystem Mapping studies.

Site ID / Habitat Type	N	Min	Mean	SE	Max
TEM_002	Marsh				
Number of Trees	4				
Number of Known Species	3				
% Standing	100				
DBH (cm)	4	15.4	16.7	0.8	19.1
% Remaining Bark	4	0.0	50.0	28.9	100.0
Length (m)	4	7.0	8.6	1.1	12.0
Height to Live Crown	2	0.5	0.75	0.25	1
Number of Cavities	4	0	0	0	0
Total Number of Cavities	0				
Wildlife Use - # of Trees	2				
Wildlife Use - # of Potential Users	2				
TEM_003	Meadow				
Number of Trees	5				
Number of Known Species	5				
% Standing	100				
DBH (cm)	5	15.0	17.9	1.9	25.5
% Remaining Bark	5	100.0	100.0	0.0	100.0
Length (m)	5	10.0	10.4	0.4	12.0
Height to Live Crown	5	0.3	0.86	0.3	1.5
Number of Cavities	5	0	0	0	0
Total Number of Cavities	0				
Wildlife Use - # of Trees	5				
Wildlife Use - # of Potential Users	5				
TEM_005	Shrub Swamp				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	3.0	7.7	2.3	27.0
% Remaining Bark	10	100.0	100.0	0.0	100.0
Length (m)	10	4.0	6.5	0.9	12.7
Height to Live Crown	10	1.0	1.5	0.3	4.0
Number of Cavities	10	0	0	0	0
Total Number of Cavities	0				
Wildlife Use - # of Trees	10				
Wildlife Use - # of Potential Users	11				
TEM_006	Mixedwood Swamp				
Number of Trees	20				
Number of Known Species	20				
% Standing	100				
DBH (cm)	20	15.0	22.4	1.7	40.0
% Remaining Bark	20	60.0	95.0	2.1	100.0
Length (m)	20	10.0	18.5	0.9	25.0
Height to Live Crown	17	8.0	13.5	0.9	20.0
Number of Cavities	20	0.0	0.55	0.32	5.0
Total Number of Cavities	11				
Wildlife Use - # of Trees	17				
Wildlife Use - # of Potential Users	19				

Site ID / Habitat Type	N	Min	Mean	SE	Max
TEM_007	Mixedwood Swamp				
Number of Trees	26				
Number of Known Species	25				
% Standing	100				
DBH (cm)	26	14.0	22.5	1.2	38.0
% Remaining Bark	26	0.0	95.0	3.9	100.0
Length (m)	26	2.0	13.2	0.6	16.0
Height to Live Crown	22	10.0	12.0	0.3	15.0
Number of Cavities	26	0.0	0.12	0.12	3.0
Total Number of Cavities	3				
Wildlife Use - # of Trees	22				
Wildlife Use - # of Potential Users	22				
TEM_008	Hardwood Swamp				
Number of Trees	15				
Number of Known Species	15				
% Standing	100				
DBH (cm)	15	11.0	17.1	1.4	30.5
% Remaining Bark	15	100.0	100.0	0.0	100.0
Length (m)	15	6.0	9.9	0.6	14.0
Height to Live Crown	15	5.0	6.9	0.4	10.0
Number of Cavities	15	0	0	0	0
Total Number of Cavities	0				
Wildlife Use - # of Trees	15				
Wildlife Use - # of Potential Users	16				
TEM_009	Hardwood Swamp				
Number of Trees	18				
Number of Known Species	18				
% Standing	100				
DBH (cm)	18	10.0	17.1	1.8	34.0
% Remaining Bark	18	0.0	90.6	6.1	100.0
Length (m)	18	1.3	8.7	0.9	13.0
Height to Live Crown	14	3.0	7.9	0.6	11.0
Number of Cavities	18	0	0	0	0
Total Number of Cavities	0				
Wildlife Use - # of Trees	14				
Wildlife Use - # of Potential Users	14				
TEM_010	Hardwood Swamp				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	16.9	29.9	3.0	45.9
% Remaining Bark	10	100.0	100.0	0.0	100.0
Length (m)	10	20.0	24.1	0.7	26.4
Height to Live Crown	8	10.0	16.4	1.3	20.0
Number of Cavities	10	0.0	0.2	0.1	1.0
Total Number of Cavities	2				
Wildlife Use - # of Trees	9				
Wildlife Use - # of Potential Users	11				

Site ID / Habitat Type	N	Min	Mean	SE	Max
TEM_011	Hardwood Swamp				
Number of Trees	16				
Number of Known Species	16				
% Standing	100				
DBH (cm)	16	12.0	23.0	1.7	36.0
% Remaining Bark	16	100.0	100.0	0.0	100.0
Length (m)	16	10.0	13.6	0.4	17.0
Height to Live Crown	15	8.0	10.6	0.4	12.0
Number of Cavities	16	0	0	0	0
Total Number of Cavities	0				
Wildlife Use - # of Trees	15				
Wildlife Use - # of Potential Users	15				
TEM_012	Hardwood Swamp				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	35.0	65.0	7.6	104.0
% Remaining Bark	10	40.0	92.0	5.9	100.0
Length (m)	10	30.0	31.3	0.4	33.0
Height to Live Crown	10	15.0	20.1	1.0	24.0
Number of Cavities	10	0	0.1	0.1	1.0
Total Number of Cavities	1				
Wildlife Use - # of Trees	10				
Wildlife Use - # of Potential Users	11				
TEM_013	Hardwood Swamp				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	16.4	27.4	2.4	43.5
% Remaining Bark	10	100.0	100.0	0.0	100.0
Length (m)	10	16.0	20.9	0.8	23.0
Height to Live Crown	10	10.0	13.2	0.6	17.0
Number of Cavities	10	0	0	0	0
Total Number of Cavities	0				
Wildlife Use - # of Trees	10				
Wildlife Use - # of Potential Users	10				
TEM_014	Mixedwood Swamp				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	23.0	31.7	3.3	55.0
% Remaining Bark	10	65.0	96.0	3.5	100.0
Length (m)	10	14.0	22.5	1.3	29.0
Height to Live Crown	9	8.0	14.9	1.1	18.0
Number of Cavities	10	0	0.1	0.1	1.0
Total Number of Cavities	1				
Wildlife Use - # of Trees	9				
Wildlife Use - # of Potential Users	10				

Site ID / Habitat Type	N	Min	Mean	SE	Max
TEM_015	Hardwood Swamp				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	15.0	23.8	4.0	58.0
% Remaining Bark	10	50.0	93.5	5.1	100.0
Length (m)	10	6.0	17.0	1.3	21.0
Height to Live Crown	8	3.0	6.25	0.8	9.0
Number of Cavities	10	0	0.1	0.1	1.0
Total Number of Cavities	1				
Wildlife Use - # of Trees	8				
Wildlife Use - # of Potential Users	8				
TEM_016	Hardwood Swamp				
Number of Trees	20				
Number of Known Species	20				
% Standing	100				
DBH (cm)	20	15.0	25.6	1.7	43.0
% Remaining Bark	20	80.0	97.5	1.2	100.0
Length (m)	20	9.0	17.8	0.8	25.0
Height to Live Crown	20	5.0	11.8	0.8	18.0
Number of Cavities	20	0	0.1	0.1	2.0
Total Number of Cavities	2				
Wildlife Use - # of Trees	20				
Wildlife Use - # of Potential Users	22				
TEM_017	Mixedwood				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	18.8	34.2	2.4	47.2
% Remaining Bark	10	50.0	93.0	5.2	100.0
Length (m)	10	9.0	23.8	1.9	30.0
Height to Live Crown	8	9.0	16.6	2.6	25.0
Number of Cavities	10	0	0	0	0
Total Number of Cavities	0				
Wildlife Use - # of Trees	9				
Wildlife Use - # of Potential Users	12				
TEM_018	Conifer Swamp				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	32.7	43.5	2.5	62.4
% Remaining Bark	10	100.0	100.0	0.0	100.0
Length (m)	10	19.0	22.8	0.9	28.0
Height to Live Crown	9	8.0	12.1	0.9	15.0
Number of Cavities	10	0	0.2	0.13	1.0
Total Number of Cavities	2				
Wildlife Use - # of Trees	9				
Wildlife Use - # of Potential Users	11				

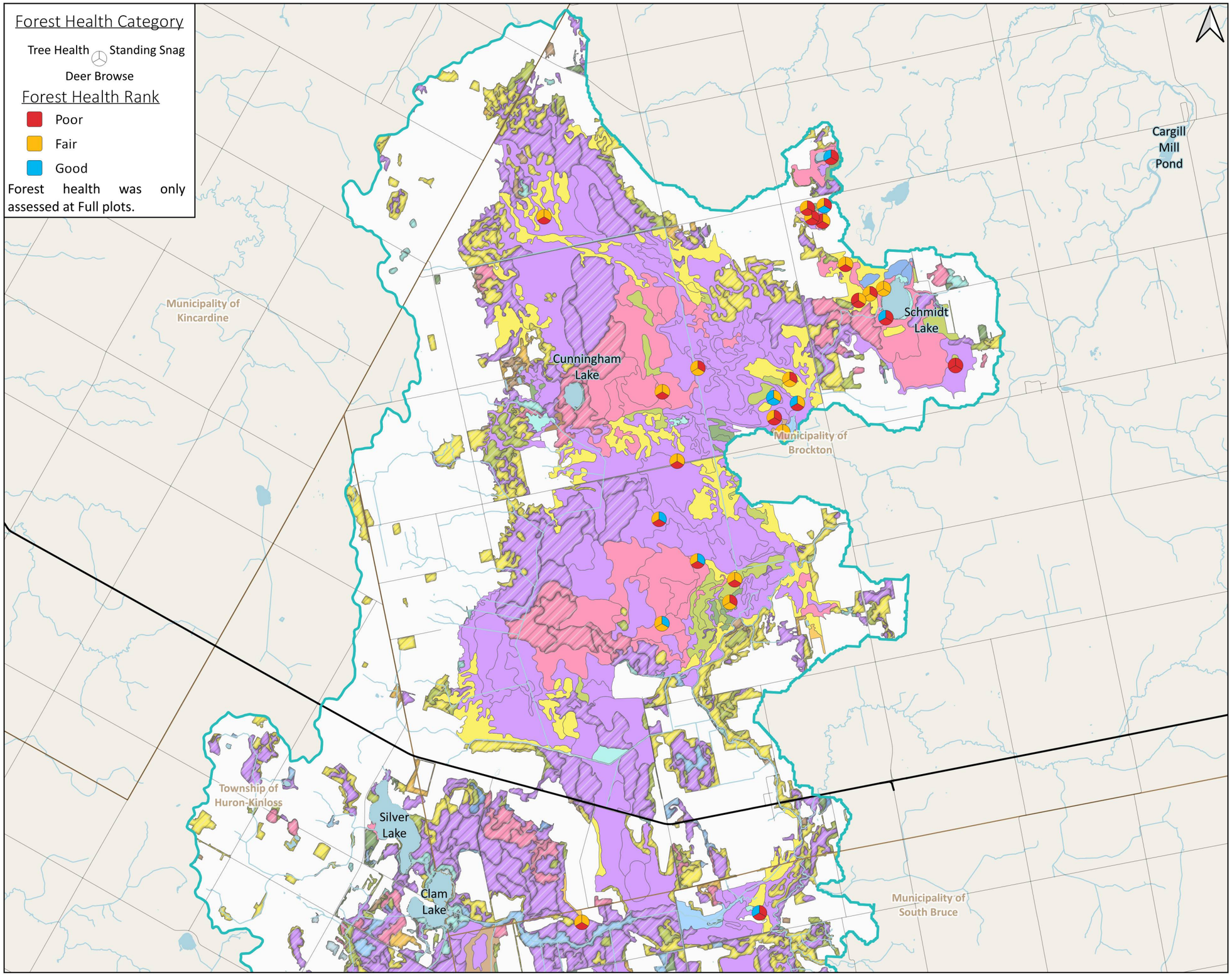
Site ID / Habitat Type	N	Min	Mean	SE	Max
TEM_019	Mixedwood Swamp				
Number of Trees	11				
Number of Known Species	11				
% Standing	100				
DBH (cm)	11	16.6	26.0	1.8	39.3
% Remaining Bark	11	75.0	95.5	3.0	100.0
Length (m)	11	5.0	12.9	1.1	16.0
Height to Live Crown	8	1.0	4.75	1.0	9.0
Number of Cavities	11	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	9				
Wildlife Use - # of Potential Users	10				
TEM_020	Conifer				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	28.5	33.3	1.9	48.0
% Remaining Bark	10	95.0	99.5	0.5	100.0
Length (m)	10	20.0	23.3	0.4	25.0
Height to Live Crown	10	15.0	17.75	0.8	21.0
Number of Cavities	10	0	0.1	0.1	1.0
Total Number of Cavities	1				
Wildlife Use - # of Trees	10				
Wildlife Use - # of Potential Users	12				
TEM_021	Hardwood				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	28.2	38.2	2.4	51.2
% Remaining Bark	10	100.0	100.0	0.0	100.0
Length (m)	10	25.0	27.8	0.5	30.0
Height to Live Crown	10	10.0	16.7	1.5	22.0
Number of Cavities	10	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	10				
Wildlife Use - # of Potential Users	10				
TEM_022	Hardwood				
Number of Trees	11				
Number of Known Species	11				
% Standing	100				
DBH (cm)	11	23.4	42.0	5.2	74.5
% Remaining Bark	11	100.0	100.0	0.0	100.0
Length (m)	11	11.0	21.2	1.2	25.1
Height to Live Crown	10	10.0	16.7	0.9	20.0
Number of Cavities	11	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	10				
Wildlife Use - # of Potential Users	12				

Site ID / Habitat Type	N	Min	Mean	SE	Max
TEM_023	Hardwood Swamp				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	15.1	29.8	4.8	60.0
% Remaining Bark	10	85.0	98.5	1.5	100.0
Length (m)	10	18.0	22.0	0.9	28.0
Height to Live Crown	10	9.0	13.65	1.5	22.0
Number of Cavities	10	0	0.2	0.13	1.0
Total Number of Cavities	2				
Wildlife Use - # of Trees	10				
Wildlife Use - # of Potential Users	12				
TEM_024	Hardwood Swamp				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	24.7	35.3	2.9	46.5
% Remaining Bark	10	100.0	100.0	0.0	100.0
Length (m)	10	22.0	24.1	0.4	26.0
Height to Live Crown	10	14.0	17.0	0.6	20.0
Number of Cavities	10	0	0.1	0.1	1.0
Total Number of Cavities	1				
Wildlife Use - # of Trees	10				
Wildlife Use - # of Potential Users	12				
TEM_025	Hardwood Swamp				
Number of Trees	10				
Number of Known Species	9				
% Standing	100				
DBH (cm)	10	14.5	33.9	4.6	61.0
% Remaining Bark	10	100.0	100.0	0.0	100.0
Length (m)	10	9.0	26.2	2.6	34.0
Height to Live Crown	8	10.0	20	2.3	28.0
Number of Cavities	10	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	8				
Wildlife Use - # of Potential Users	8				
TEM_026	Hardwood				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	29.0	32.8	1.2	39.0
% Remaining Bark	10	90.0	99.0	1.0	100.0
Length (m)	10	15.0	20.8	0.8	23.0
Height to Live Crown	6	3.0	10.33	2.2	18.0
Number of Cavities	10	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	7				
Wildlife Use - # of Potential Users	7				

Site ID / Habitat Type	N	Min	Mean	SE	Max
TEM_027	Hardwood Swamp				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	18.0	33.8	3.3	47.5
% Remaining Bark	10	100.0	100.0	0.0	100.0
Length (m)	10	24.0	28.3	0.8	30.0
Height to Live Crown	10	5.0	15.4	2.0	25.0
Number of Cavities	10	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	10				
Wildlife Use - # of Potential Users	10				
TEM_028	Mixedwood				
Number of Trees	18				
Number of Known Species	18				
% Standing	100				
DBH (cm)	18	14.6	29.5	1.8	37.8
% Remaining Bark	18	30.0	96.1	3.9	100.0
Length (m)	18	5.0	20.7	1.5	30.0
Height to Live Crown	16	5.0	10.19	0.8	18.0
Number of Cavities	18	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	16				
Wildlife Use - # of Potential Users	16				
TEM_029	Mixedwood				
Number of Trees	14				
Number of Known Species	14				
% Standing	100				
DBH (cm)	14	15.0	25.9	2.5	43.0
% Remaining Bark	14	0.0	85.0	7.9	100.0
Length (m)	14	5.0	24.7	2.3	35.0
Height to Live Crown	10	10.0	23.3	1.7	30.0
Number of Cavities	14	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	11				
Wildlife Use - # of Potential Users	11				
TEM_030	Mixedwood				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	24.0	30.3	1.3	37.0
% Remaining Bark	10	100.0	100.0	0.0	100.0
Length (m)	10	15.0	24.0	1.0	25.0
Height to Live Crown	9	10.0	13.06	0.8	18.0
Number of Cavities	10	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	9				
Wildlife Use - # of Potential Users	9				

Site ID / Habitat Type	N	Min	Mean	SE	Max
TEM_031	Conifer				
Number of Trees	28				
Number of Known Species	28				
% Standing	100				
DBH (cm)	28	15.0	21.7	1.0	33.8
% Remaining Bark	28	100.0	100.0	0.0	100.0
Length (m)	28	8.0	12.6	0.4	15.0
Height to Live Crown	28	7.0	10.57	0.3	16.0
Number of Cavities	28	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	28				
Wildlife Use - # of Potential Users	29				
TEM_032	Mixedwood Swamp				
Number of Trees	20				
Number of Known Species	20				
% Standing	100				
DBH (cm)	20	16.0	28.4	2.0	46.0
% Remaining Bark	20	40.0	87.5	3.9	100.0
Length (m)	20	5.0	22.8	1.5	30.0
Height to Live Crown	16	5.0	15.31	1.5	25.0
Number of Cavities	20	0	0.2	0.12	2.0
Total Number of Cavities	4				
Wildlife Use - # of Trees	16				
Wildlife Use - # of Potential Users	21				
TEM_033	Plantation				
Number of Trees	10				
Number of Known Species	10				
% Standing	100				
DBH (cm)	10	19.1	32.6	3.8	55.9
% Remaining Bark	10	100.0	100.0	0.0	100.0
Length (m)	10	15.0	19.9	1.0	25.0
Height to Live Crown	10	6.0	12.1	0.9	15.0
Number of Cavities	10	0	0	0	0.0
Total Number of Cavities	0				
Wildlife Use - # of Trees	10				
Wildlife Use - # of Potential Users	12				

APPENDIX E – FOREST HEALTH



NWMO Biodiversity Impact Studies

Forest Health Fieldwork Results - North LSA_{ECO}

Figure E-1a

- Local Study Area (LSA_{ECO})
- Watercourse
- Municipal Boundary
- Highway
- Local Road
- Not Surveyed

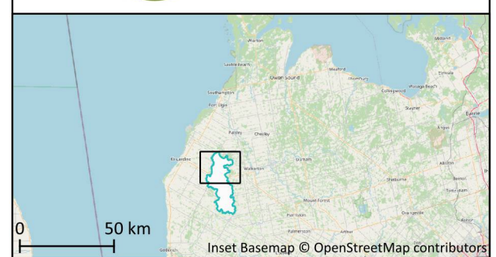
Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D171	

Forest Health Category

Tree Health | Standing Snag

Deer Browse

Forest Health Rank

- Poor
- Fair
- Good

Forest health was only assessed at Full plots.

Hodgins Lake

McFarlane Lake

Oppleck Lake

Municipality of South Bruce

Township of Huron-Kinloss

Township of Ashfield-Colborne-Wawanosh

Township of North Huron

Municipality of Morris-Turnberry

NWMO Biodiversity Impact Studies

Forest Health Fieldwork Results - South LSA_{ECO}

Figure E-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Municipal Boundary
- Local Road
- Not Surveyed

Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

ZOETICA

0 50 km

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D171	

No Ash or Beech Species Present [6]

Fieldwork Locations with Ash

Ash Disease Present [22]

No Ash Disease [5]

Fieldwork Locations with Beech

No Beech Disease [2]

Beech Disease Present [1]

Forest health was only assessed at Full plots.

Municipality of Kincardine

Cunningham Lake

Schmidt Lake

Cargill Mill Pond

Municipality of Brockton

Township of Huron-Kinloss

Silver Lake

Clam Lake

Municipality of South Bruce

NWMO Biodiversity Impact Studies

Forest Health Fieldwork Results - North LSA_{ECO}

Figure E-2a

- Local Study Area (LSA_{ECO})
- Watercourse
- Municipal Boundary
- Highway
- Local Road
- Not Surveyed

Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D179	

No Ash or Beech Species Present [6]

Fieldwork Locations with Ash

Ash Disease Present [22]

No Ash Disease [5]

Fieldwork Locations with Beech

No Beech Disease [2]

Beech Disease Present [1]

Forest health was only assessed at Full plots.

Hodgins Lake

McFarlane Lake

Oppleck Lake

Municipality of South Bruce

Township of Huron-Kinloss

Township of Ashfield-Colborne-Wawanosh

Township of North Huron

Municipality of Morris-Turnberry

NWMO Biodiversity Impact Studies

Forest Health Fieldwork Results - South LSA_{ECO}

Figure E-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Municipal Boundary
- Local Road
- Not Surveyed

Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

1:65,000

0 1 2 km

ZOETICA

0 50 km

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D179	

Table E-1. Summary of logging disturbance in plots surveyed in the BIS study areas.

Site ID	Survey Type	Overall Condition[1]	0-5 years			5-15 years			15-30 years			30 or more years			
			Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Logging Field Notes
TEM_002	Full	G	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence but area is clear and was likely logged in the past.
TEM_003	Full	F	--	--	--	--	--	--	--	--	--	yes	3	3	Area used to be pasture (landowner says until 3 years ago). No actual evidence (stumps) present but area presumed to have been logged
TEM_007	Full	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_008	Full	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_009	Full	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_010	Full	G	--	--	--	--	--	--	yes	2	2	--	--	--	Cedar stumps easily visible throughout plot
TEM_011	Full	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_012	Full	E	--	--	--	--	--	--	--	--	--	yes	1	1	A few old large stumps that look to be cut (might not be) but majority of trees are relatively mature (spared from logging)
TEM_013	Full	G	--	--	--	--	--	--	--	--	--	yes	3	3	Given young age of tree's, site was logged but >30 years ago. No logging damage on standing trees.
TEM_014	Full	G	--	--	--	--	--	--	--	--	--	yes	1	2	A few stumps that could have been cut, may have fallen due to natural causes. Area mix of more mature and younger vegetation.
TEM_015	Full	G	--	--	--	--	--	--	--	--	--	yes	2	2	A few cut stumps, area is very young so logging is assumed to have taken place
TEM_017	Full	G	--	--	--	--	--	--	--	--	--	yes	3	3	No stumps visible, but evidence of historical clearance.
TEM_018	Full	E	--	--	--	--	--	--	--	--	--	yes	2	2	A few stumps that may have been cut in the past, area mix of more mature and younger trees (suggesting selective logging in past)
TEM_019	Full	G	--	--	--	--	--	--	--	--	--	yes	3	2	Logging was probably > 100 years ago
TEM_020	Full	G	--	--	--	--	--	--	--	--	--	yes	3	3	Completely regenerated plantation, no evidence of logging since planting
TEM_021	Full	G	--	--	--	yes	1	2	--	--	--	--	--	--	Ashes cut ahead of EAB. Also historical logging evident (30+ years).
TEM_023	Full	G	--	--	--	--	--	--	--	--	--	yes	2	2	Not much evidence of logging, maybe a few cut stumps but hard to tell if cut or just fallen trees. Area not old growth so presumed to be selectively logged in the past
TEM_026	Full	G	--	--	--	--	--	--	--	--	--	yes	3	2	No evidence of stumps, but evidence of cultural disturbance
TEM_028	Full	G	--	--	--	yes	1	1	--	--	--	--	--	--	
TEM_029	Full	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_030	Full	G	--	--	--	--	--	--	--	--	--	yes	3	3	Cut at some point in the past
TEM_031	Full	F	--	--	--	--	--	--	--	--	--	yes	1	2	Plantation stand, previously forested 80+ years ago.
TEM_033	Full	F	--	--	--	--	--	--	--	--	--	yes	3	2	The monoculture of White Pine, of uniform stand age, suggests this area was cleared historically and the conifer plantation established on land that was previously meadow or agricultural field greater than 30 years ago.
TEM_036	Ground	P	--	--	--	--	--	--	--	--	--	yes	3	3	Area likely clear cut in past to make pasture
TEM_037	Ground	F	--	--	--	--	--	--	--	--	--	yes	3	3	Meadow community historically clear, no logs or stumps present
TEM_041	Ground	G	--	--	--	--	--	--	--	--	--	yes	1	2	Very old stumps from historical logging
TEM_043	Ground	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_045	Ground	E	--	--	--	--	--	--	--	--	--	yes	3	3	Visual evidence of logging such as old cut rotting stumps, it is assumed area was logged 30+ years ago
TEM_046	Ground	G	--	--	--	--	--	--	yes	2	2	--	--	--	--
TEM_047	Ground	G	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging, hard to tell if stumps were cut or fell naturally. Mature white pine all seem to be the same age and appear to be too close to be naturally occurring - appear to be in lines so probably planted
TEM_048	Ground	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_049	Ground	F	--	--	--	--	--	--	yes	2	2	--	--	--	--
TEM_055	Ground	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_056	Ground	F	--	--	--	--	--	--	yes	3	2	--	--	--	Heavy logging along certain paths within polygon
TEM_059	Ground	E	--	--	--	--	--	--	--	--	--	yes	1	1	--

Site ID	Survey Type	Overall Condition[1]	0-5 years			5-15 years			15-30 years			30 or more years			
			Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Logging Field Notes
TEM_060	Ground	F	--	--	--	yes	3	2	--	--	--	--	--	--	--
TEM_061	Ground	E	--	--	--	--	--	--	--	--	--	yes	2	3	
TEM_062	Ground	P	--	--	--	--	--	--	--	--	--	yes	3	3	Clear cut of original community; no stumps or signs of logging other than previous community no longer present
TEM_066	Ground	G	--	--	--	--	--	--	--	--	--	yes	3	3	No damage from logging to existing trees. Logging was probably >100yrs ago
TEM_069	Ground	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_071	Ground	G	--	--	--	--	--	--	yes	2	2	--	--	--	Many stumps of varying ages and sizes
TEM_072	Ground	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_073	Ground	--	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_074	Ground	G	--	--	--	--	--	--	yes	2	2	--	--	--	Clean edge on stumps, indicates logging was relatively recent.
TEM_075	Ground	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_076	Ground	G	--	--	--	--	--	--	--	--	--	yes	2	2	Few old stumps
TEM_078	Ground	F	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_081	Ground	F	--	--	--	--	--	--	--	--	--	yes	3	3	Plot is composed of plantation species
TEM_084	Ground	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_085	Oversample	E	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_086	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	No evidence of logging, but area looks to have been clear cut and planted in the past
TEM_088	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	This area would have been cleared for agriculture centuries ago and has been regularly disturbed by farming practices ever since.
TEM_091	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	No evidence of logging but area may have been selectively logged due to age of trees in polygon
TEM_094	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_097	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Evidence of logging in past (large, old stumps)
TEM_099	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	3	Appears to be logged 30+ years ago and replanted. Some evidence of logging i.e. stumps
TEM_101	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	1	No clear evidence of logging in plot. One nearby stump that appear very flat topped. Possible historic logging in polygon but likely mostly wind throw downing trees currently
TEM_102	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_103	Visual	P	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_104	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_106	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	2	Significant logging of large trees occurred likely ca. 100 yrs ago of very large diameter trees. Growth of the current tree species in this swamp is likely to be slow and composition has likely changed. Currently, trees are generally fairly small.
TEM_107	Visual	G	--	--	--	--	--	--	--	--	--	yes	3	3	Historically cleared, no remaining evidence of logging, currently a plantation
TEM_108	Visual	F	--	--	--	--	--	--	yes	2	2	--	--	--	Possible selective logging, some mature trees left. - huge cut stumps well rotted
TEM_110	Visual	F	--	--	--	--	--	--	yes	2	2	--	--	--	No stumps or skidder trails observed but stand age is young to mid-age and was presumably logged apps. 30 years ago..
TEM_111	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_114	Visual	G	--	--	--	--	--	--	--	--	--	yes	3	2	--
TEM_115	Visual	G	yes	1	1	--	--	--	--	--	--	--	--	--	Small number of cherry cut down within 5 years, stems left on ground. Previous harvesting ca. 15-30yrs ago is moderate, widespread.
TEM_116	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_119	Visual	G	yes	2	2	--	--	--	--	--	--	yes	2	2	Recent cut stumps & large wood piles provide evidence of recent logging. Old stumps show evidence of logging in past
TEM_121	Visual	G	--	--	--	--	--	--	yes	3	3	--	--	--	Likely clear cut and replanted 15-30 years ago (plantation). Regenerating now with some deciduous trees in sub canopy and scattered in canopy

Site ID	Survey Type	Overall Condition[1]	0-5 years			5-15 years			15-30 years			30 or more years			
			Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Logging Field Notes
TEM_122	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	No evidence of logging, but area is plantation so it was clear cut and planted in rows in the past trees were planted about 40 years ago according to landowner
TEM_123	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	Agricultural for long time, regularly disturbed
TEM_126	Visual	F	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_127	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	No evidence but age and composition of trees suggest logging in the past
TEM_128	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	3	Likely historical logging evidence - stumps
TEM_133	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging but area likely logged in past due to age of trees
TEM_136	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_137	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_139	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	No logging evidence, but area assumed to have been logged in past due to age and composition of trees
TEM_140	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_141	Visual	F	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_142	Visual	G	yes	2	1	--	--	--	--	--	--	yes	1	2	Recent logging in pockets, mainly ash but also some large maple, older logging throughout area (a few old stumps in and around plot). Variety of mature trees marked to be cut
TEM_143	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_147	Visual	F	yes	2	3	--	--	--	--	--	--	--	--	--	Excessive slash in plot area. Extensive.
TEM_148	Visual	F	yes	2	2	--	--	--	--	--	--	--	--	--	--
TEM_150	Visual	E	--	--	--	--	--	--	--	--	--	yes	3	1	Likely clear cut +30 years ago
TEM_151	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	No evidence on recent logging activities
TEM_152	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	Many large conifer stumps
TEM_155	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	Heavy historical clearing for agriculture
TEM_156	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_157	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_158	Visual	G	--	--	--	yes	1	1	--	--	--	--	--	--	Ash removal caused by EAB
TEM_159	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_161	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_162	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_163	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_164	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_165	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	Historical logging
TEM_166	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_168	Visual	G	yes	2	1	--	--	--	yes	2	2	--	--	--	More recent logging (piles of cut ash, likely for firewood). Older cut stumps show evidence of logging in past. Composition and age of trees also suggest logging in past
TEM_169	Visual	E	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_170	Visual	F	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_171	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_172	Visual	E	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_173	Visual	--	yes	2	2	--	--	--	--	--	--	--	--	--	--
TEM_174	Visual	F	yes	1	1	yes	1	1	--	--	--	--	--	--	Evidence of logging - stumps, potential slope for rolling logs
TEM_175	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_176	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Many large conifer (likely cedar) stumps throughout polygon
TEM_180	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_181	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	One old stump found, mixture of mature and younger trees
TEM_182	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	Heavily cleared for agriculture 50-100 yrs ago
TEM_183	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--

Site ID	Survey Type	Overall Condition[1]	0-5 years			5-15 years			15-30 years			30 or more years			
			Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Logging Field Notes
TEM_187	Visual	G	--	--	--	--	--	--	yes	1	1	yes	2	2	No evidence of logging but area presumed to have been logged due to age and composition of trees. One cut stump 15-30 years ago
TEM_188	Visual	G	--	--	--	--	--	--	--	--	--	yes	3	3	No evidence of logging, area has been clear cut in past but area was planted and is regenerating
TEM_189	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_191	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_192	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_193	Visual	G	--	--	--	--	--	--	yes	1	2	--	--	--	Stumps present throughout plot
TEM_194	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	A few old rotting stumps but hard to tell for sure
TEM_198	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	3	No evidence but area was likely treed in past
TEM_200	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	Some old rotting cut stumps. Area has mix of younger and more mature trees
TEM_201	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	1	Area on southern edge of plot previously cleared for agricultural drain - now a large swale dominated by Laportea
TEM_204	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_207	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	Area is plantation, likely clear cut and replanted in past - landowner says trees were planted about 40 years ago
TEM_208	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Limited evidence of logging (a few stumps), but area presumed to have been logged due to age and composition of trees. Trails through polygon also indicate logging, but unknown age
TEM_209	Visual	F	--	--	--	yes	3	3	--	--	--	--	--	--	Landscape is quite mounded
TEM_210	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	Appears that there was selective logging
TEM_211	Visual	G	--	--	--	--	--	--	yes	2	2	--	--	--	--
TEM_212	Visual	F	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_213	Visual	G	yes	1	1	--	--	--	--	--	--	yes	2	2	Stumps scattered across polygon, area likely selectively logged in past. Few logs more recently cut
TEM_215	Visual	F	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_217	Visual	F	--	--	--	yes	3	3	--	--	--	yes	3	1	--
TEM_218	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	No logging evidence, but area presumed to have been logged due to scarcity of trees
TEM_221	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_222	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of stumps, mid age to mature stand may suggest past logging many more than 30 years ago.
TEM_224	Visual	G	--	--	--	--	--	--	yes	2	1	yes	2	2	1 very old stump (30+ years), many newer (15-30 years) cut stumps in pockets. Many trees marked to be cut. Area likely logged in past due to age and composition on trees
TEM_225	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_226	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_227	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	Area was probably clear cut long ago and planted with black walnut which are now 15-20 cm dbh with a high canopy. No stump evidence
TEM_228	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Old rotting stumps 30+ years old (seems to all be cut around the same time), large trees selectively marked for logging
TEM_230	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	1	Few large stumps
TEM_231	Visual	E	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_232	Visual	F	--	--	--	--	--	--	yes	1	1	yes	3	2	Selective logging more recent to remove dead/dying ash, clear cut 30+ years ago
TEM_233	Visual	E	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_234	Visual	F	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_235	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--

Site ID	Survey Type	Overall Condition[1]	0-5 years			5-15 years			15-30 years			30 or more years			
			Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Logging Field Notes
TEM_237	Visual	F	yes	2	2	yes	1	1	--	--	--	--	--	--	A lot of dead ash removed over the years. Damage on smaller branches is still apparent
TEM_239	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_240	Visual	G	--	--	--	--	--	--	--	--	--	yes	3	3	Logged 50-100+ years previously across entire property
TEM_242	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	2	--
TEM_243	Visual	F	--	--	--	yes	2	2	--	--	--	--	--	--	Trail made, visible stumps
TEM_244	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_245	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_247	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_248	Visual	P	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_249	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_250	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging but area likely logged in past
TEM_252	Visual	G	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_255	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence but likely logged in past due to age of trees
TEM_256	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_257	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	2	--
TEM_258	Visual	G	yes	3	1	--	--	--	yes	1	2	--	--	--	Some fresher cut trees for firewood. Some older moss-covered stumps scattered. Includes an area cleared for deer hunting. Cabin and hide within 50 m of plot.
TEM_259	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_260	Visual	G	--	--	--	--	--	--	yes	1	2	--	--	--	Relatively young community overall with some larger trees scattered throughout
TEM_261	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	Looks to have been selectively logged in the past - not old growth- but very little sign
TEM_262	Visual	G	--	--	--	yes	2	2	--	--	--	--	--	--	Cut stumps throughout, majority old, dead ash
TEM_263	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_264	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_265	Visual	P	--	--	--	--	--	--	--	--	--	yes	3	3	Area seems to have been completely logged in the past for pasture (no current evidence)
TEM_266	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	Old logging trails are growing in but ruts still present
TEM_267	Visual	--	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_268	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Rotting stumps visible
TEM_269	Visual	F	yes	2	2	--	--	--	--	--	--	--	--	--	Active logging occurring in plot
TEM_270	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	Few broken stumps may suggest selective logging historically
TEM_272	Visual	F	--	--	--	--	--	--	yes	1	1	--	--	--	Small scale logging has occurred in previous year
TEM_274	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_277	Visual	G	yes	1	1	--	--	--	--	--	--	yes	1	2	Recent cut log near hunting stand, no stump so possibly just cut to clear trail. No evidence of logging but area is too young to be old growth. There are a decent amount of more mature trees
TEM_278	Visual	E	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_279	Visual	G	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_280	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	No actual logging evidence but assumed to have been clear cut in the past
TEM_281	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_283	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_284	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Some cuts stumps. Area not old growth so logging is assumed to have happened. Relatively high proportion of mature trees
TEM_285	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	Stumps visible but very old in appearance, may be natural.
TEM_287	Visual	G	--	--	--	--	--	--	yes	2	2	--	--	--	A few old stumps, relatively young area
TEM_288	Visual	G	--	--	--	--	--	--	yes	2	2	--	--	--	No cut stumps but very young forest
TEM_290	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_291	Visual	G	--	--	--	yes	2	2	yes	2	2	--	--	--	Likely logged between 10-20 years ago.

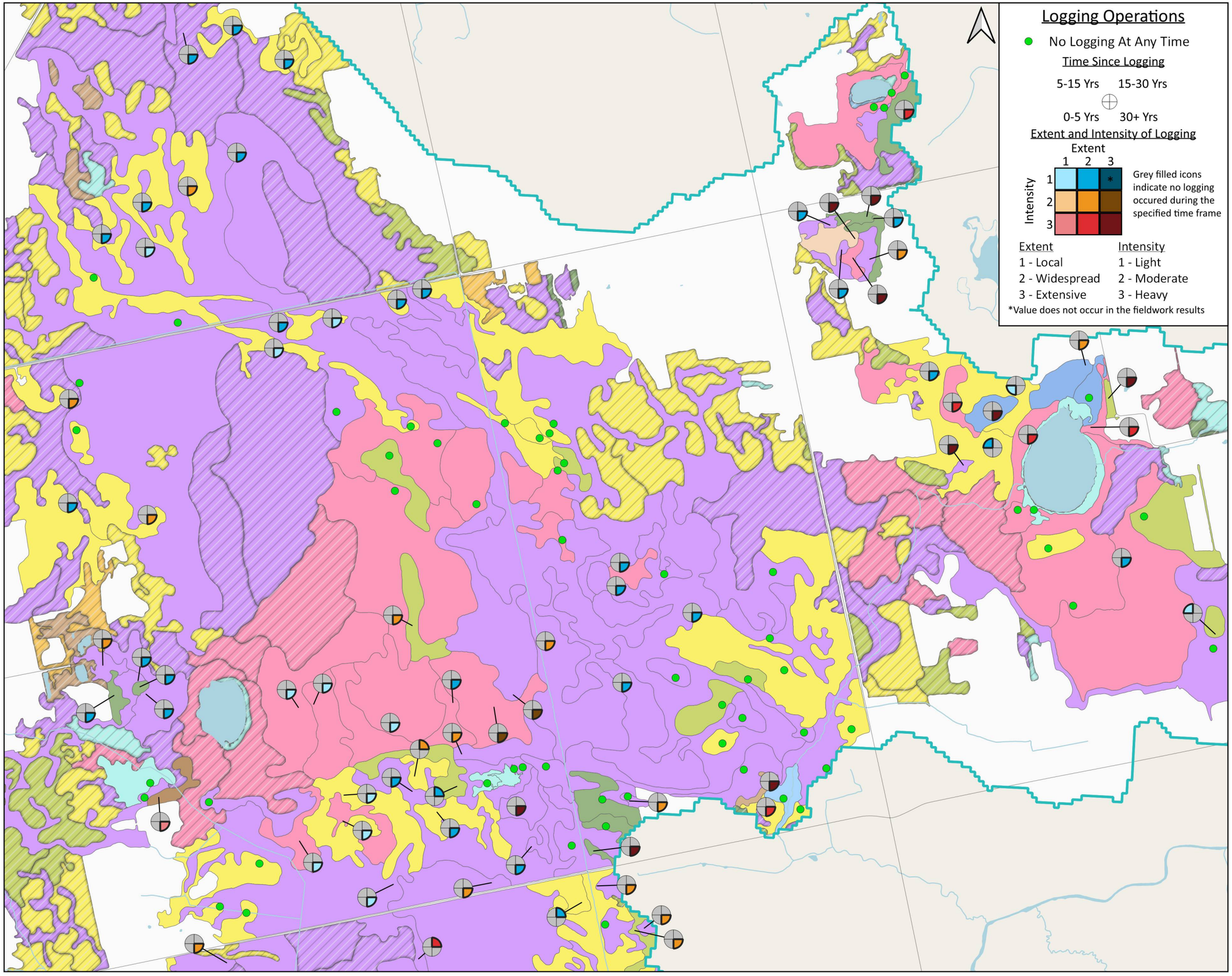
Site ID	Survey Type	Overall Condition[1]	0-5 years			5-15 years			15-30 years			30 or more years			
			Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Logging Field Notes
TEM_292	Visual	F	yes	2	1	--	--	--	--	--	--	--	--	--	Active logging occurring on site
TEM_295	Visual	E	--	--	--	--	--	--	--	--	--	yes	2	3	No evidence of logging but not old growth
TEM_296	Visual	E	--	--	--	--	--	--	--	--	--	yes	2	2	No actual evidence of logging. Area looks to be approaching older growth - scattered white pine 50-70 cm dbh
TEM_297	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_298	Visual	F	--	--	--	yes	1	1	yes	2	2	--	--	--	Not much evidence of logging, but area very young with potential more recent selective logging in polygon
TEM_300	Visual	F	yes	2	3	--	--	--	--	--	--	--	--	--	Per landowner info logged in the last couple of years
TEM_301	Visual	F	--	--	--	yes	2	2	--	--	--	yes	1	1	Recent cut logs provide evidence for more recent logging. A few old cut stumps provide evidence of logging in past. Age and composition of trees indicate logging at both timeframes
TEM_304	Visual	F	yes	2	2	--	--	--	yes	2	3	--	--	--	Area seems to have been logged recently and in the past. Recent logging looks to have been focused on ash. Some older very large stumps (not yet rotted) may have been white pine
TEM_305	Visual	P	--	--	--	--	--	--	--	--	--	yes	3	3	Assumed to have been completely clear cut to make room for cattle
TEM_306	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging, but area presumed to have been logged due to age and composition of trees
TEM_310	Visual	G	--	--	--	--	--	--	yes	3	2	--	--	--	--
TEM_311	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	Plantation must have been cleared at some point to be planted
TEM_312	Visual	G	yes	1	1	--	--	--	--	--	--	--	--	--	Small scale logging activities occurred
TEM_314	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_315	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging, but area presumed to have been logged due to age and composition of trees (thicket under plantation)
TEM_316	Visual	P	--	--	--	--	--	--	--	--	--	yes	3	3	Area looks to have been completely clear cut for pasture
TEM_318	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging but area presumed to have been logged in past due to composition of trees - very widely spaced ash now dying off
TEM_319	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_320	Visual	F	yes	2	1	yes	2	1	--	--	--	--	--	--	--
TEM_321	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_322	Visual	F	--	--	--	yes	1	2	--	--	--	--	--	--	Actively managed plantation, evidence of cutting throughout
TEM_323	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	Few cut trees observed in polygon, older and decayed
TEM_325	Visual	F	yes	2	1	--	--	--	--	--	--	--	--	--	Ongoing logging
TEM_327	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging but area likely logged in past due to young age of trees but also ash dead due to EAB and trees likely affected by periodic high water levels
TEM_328	Visual	F	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_329	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Likely clear cut in the past but younger than surrounding polygons
TEM_332	Visual	G	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_333	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	Few stumps scattered may be evidence of previous logging. Suggests selective cutting.
TEM_334	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	1	Land cleared for previous use (likely ayard or driveway)
TEM_335	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	Very few signs of logging but trees fairly uniform age and medium age
TEM_337	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_338	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_339	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_340	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_341	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	A few large stumps, area likely logged in past due to age and composition of trees
TEM_343	Visual	F	yes	2	2	--	--	--	--	--	--	--	--	--	--
TEM_345	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	Suspected clear cut and subsequent soil tilling.
TEM_346	Visual	F	yes	1	2	--	--	--	--	--	--	--	--	--	--
TEM_348	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--

Site ID	Survey Type	Overall Condition[1]	0-5 years			5-15 years			15-30 years			30 or more years			
			Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Logging Field Notes
TEM_349	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_350	Visual	G	yes	1	2	--	--	--	--	--	--	--	--	--	--
TEM_351	Visual	E	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_352	Visual	G	--	--	--	--	--	--	yes	2	1	--	--	--	1 area with evidence in polygon but not plot.
TEM_353	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	Almost no evidence of logging (1 potential stump) but area suspected to have been selectively logged in past due to age of trees
TEM_354	Visual	--	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_355	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging but area suspected to have been logged in the past due to young age of trees in the area
TEM_357	Visual	E	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_358	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_360	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_361	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	Old conifer (likely cedar) stumps around plot - cut at 1 m height and 40-50 cm dbh
TEM_362	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_363	Visual	F	yes	2	2	--	--	--	--	--	--	--	--	--	Selective cutting.
TEM_364	Visual	G	--	--	--	yes	1	1	--	--	--	--	--	--	Ash removed due to EAB
TEM_365	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_366	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	No trees, would have been logged historically to clear swamp/forest for agriculture
TEM_368	Visual	G	--	--	--	--	--	--	yes	1	2	--	--	--	Old stumps indicate potential logging in the past, hard to say for sure. Tree maturity also suggests logging in past
TEM_369	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	Very large and old conifer (most likely cedar) stump in middle of plot
TEM_371	Visual	G	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_374	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	A few old stumps here and there
TEM_375	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_376	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	2	Likely logged in past due to age of trees and species present (large trembling aspen are dominant and is successional)
TEM_377	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_378	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_379	Visual	F	--	--	--	yes	3	2	--	--	--	--	--	--	--
TEM_380	Visual	F	--	--	--	--	--	--	--	--	--	yes	2	3	Poplar age of 30-40years suggests logging occurred in 1980s/1990s.
TEM_381	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_383	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_384	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_385	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	A few old conifer stumps cut at about 1 m - some 50 m dbh
TEM_387	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_388	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_389	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_390	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_391	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	A few cut stumps. Area is not old growth so it presumably has been logged
TEM_393	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_394	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	>100 years
TEM_395	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_396	Visual	G	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_397	Visual	F	--	--	--	--	--	--	--	--	--	yes	3	3	Possible clear cutting due to early successional species: poplar, maple, cherry
TEM_399	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_400	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	No evidence of logging but are presumed to have been selectively cut in the past due to amount and age of trees

Site ID	Survey Type	Overall Condition[1]	0-5 years			5-15 years			15-30 years			30 or more years			Logging Field Notes
			Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	
TEM_401	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging but area likely logged in past
TEM_402	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging but area is very immature, likely historic clearing
TEM_403	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_406	Visual	G	--	--	--	--	--	--	yes	1	2	--	--	--	Scattered stumps
TEM_410	Visual	E	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_412	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Not much evidence of logging (1 old rotting cut stump), but area is not old growth
TEM_416	Visual	E	--	--	--	--	--	--	--	--	--	yes	3	3	Very old larger stumps, no damage from logging on existing trees
TEM_417	Visual	--	--	--	--	--	--	--	--	--	--	yes	1	2	Logging trail on the way to plot center, though no obvious signs in the plot. Trees are similar age. Below selection of skid trails are inside the ecosite, but not the polygon.
TEM_419	Visual	--	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_421	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	Likely maple and oak remanent species
TEM_422	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_423	Visual	E	--	--	--	--	--	--	--	--	--	yes	2	3	Some very old and rotten stumps that appeared cut
TEM_426	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_427	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence but area likely logged in past due to age and composition of trees
TEM_429	Visual	G	--	--	--	--	--	--	yes	1	2	--	--	--	Stumps observed
TEM_433	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	--
TEM_434	Visual	G	yes	1	1	--	--	--	--	--	--	yes	1	1	Evidence of recent cut trees, area likely cut 30+ years ago as well
TEM_436	Visual	G	--	--	--	--	--	--	yes	2	2	--	--	--	--
TEM_437	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_438	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_439	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_442	Visual	G	--	--	--	--	--	--	--	--	--	yes	3	2	--
TEM_443	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_444	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_445	Visual	P	yes	3	3	--	--	--	--	--	--	--	--	--	Area completely clear cut recently, dead ash removed (EAB)
TEM_446	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Very young trees but no signs of logging
TEM_447	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	1	Active logging occurring during sampling
TEM_450	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	No stumps but canopy trees are Mid-aged with some early successional poplar suggesting logging
TEM_451	Visual	F	--	--	--	--	--	--	yes	3	2	yes	3	2	Logging 15-30 years ago has created a very dense sub canopy of multi-stemmed young maple (5-15 cm dbh). Abundant small branches on ground but no ruts so not too recent? Large and small stems arise from same stump so high water levels may also have killed trees in some years (seems more likely than successive cuts); Very large stumps show logging from 30+ years ago, area likely clear cut
TEM_452	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Selective logging occurred over 30 years ago
TEM_453	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging but not old growth
TEM_454	Visual	F	--	--	--	yes	2	2	--	--	--	--	--	--	Evidence of logging from quite a while ago but also recently.
TEM_455	Visual	E	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_456	Visual	G	yes	2	2	--	--	--	--	--	--	--	--	--	--
TEM_458	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	1	--
TEM_460	Visual	--	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_461	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_462	Visual	G	--	--	--	--	--	--	yes	3	2	--	--	--	--
TEM_463	Visual	G	yes	1	1	--	--	--	--	--	--	--	--	--	active logging occurring on site, light logging activity
TEM_465	Visual	G	--	--	--	yes	1	1	--	--	--	yes	1	2	Some downed trees cut more recently (5-15 years). Limited logging evidence but area presumed to have been logged in past due to age of trees. Many dead ash marked to be logged

Site ID	Survey Type	Overall Condition[1]	0-5 years			5-15 years			15-30 years			30 or more years			
			Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Evidence?	Intensity	Extent	Logging Field Notes
TEM_466	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	No visible evidence of logging aside from mid age stand and general logging history within Greenock Swamp.
TEM_468	Visual	F	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_469	Visual	G	yes	1	1	--	--	--	yes	2	2	--	--	--	Evidence of recent logging locally, but area was likely clear cut in the past. Most trees mid aged to young.
TEM_470	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	No evidence of logging but not old growth
TEM_471	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_472	Visual	G	--	--	--	--	--	--	--	--	--	yes	2	2	Old stumps likely from logging in past. Trees relatively young, also suggest logging in past
TEM_473	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	--
TEM_474	Visual	G	--	--	--	--	--	--	--	--	--	yes	1	2	Evidence of logging; some forestry marks on trees and a few stumps

Notes:
1. Overall Condition Codes: E = Excellent; G = Good; F = Fair; P = Poor.



NWMO Biodiversity Impact Studies

Intensity and Extent of Logging Opperations - Map 1

Figure E-3a

- Local Study Area (LSA_{ECO})
- Local Road
- Watercourse
- Lake
- Not Surveyed

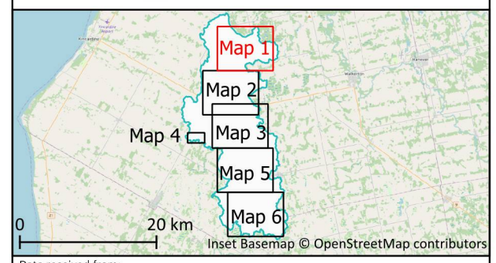
Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

1:25,000

0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D173	

Logging Operations

No Logging At Any Time

Time Since Logging

5-15 Yrs 15-30 Yrs

0-5 Yrs 30+ Yrs

Extent and Intensity of Logging

Intensity \ Extent	1	2	3
1			*
2			
3			

Grey filled icons indicate no logging occured during the specified time frame

Extent	Intensity
1 - Local	1 - Light
2 - Widespread	2 - Moderate
3 - Extensive	3 - Heavy

*Value does not occur in the fieldwork results

NWMO Biodiversity Impact Studies

Intensity and Extent of Logging Opperations - Map 2

Figure E-3b

- Local Study Area (LSA_{ECO})
- Highway
- Local Road
- Watercourse
- Lake
- Not Surveyed

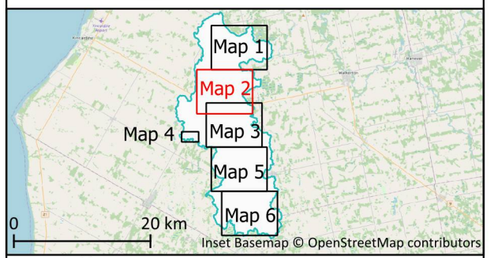
Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

1:25,000

0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D173	

Map 3

Map 4

Logging Operations

No Logging At Any Time

Time Since Logging

5-15 Yrs 15-30 Yrs

0-5 Yrs 30+ Yrs

Extent and Intensity of Logging

Intensity \ Extent	1	2	3
1			*
2			
3			

Grey filled icons indicate no logging occured during the specified time frame

Extent	Intensity
1 - Local	1 - Light
2 - Widespread	2 - Moderate
3 - Extensive	3 - Heavy

*Value does not occur in the fieldwork results

NWMO Biodiversity Impact Studies

Intensity and Extent of Logging Opperations - Map 3 and 4

Figure E-3c

- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Highway
- Local Road
- Watercourse
- Lake
- Not Surveyed

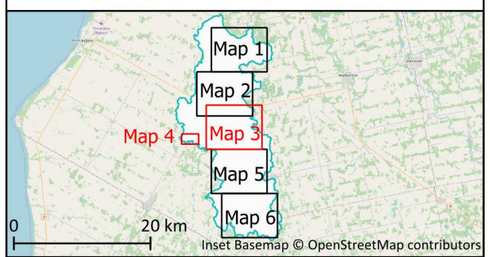
Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

1:25,000

0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D173	

NWMO Biodiversity Impact Studies

Intensity and Extent of Logging Opperations - Map 5

Figure E-3d

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Local Road
- Watercourse
- Lake
- Not Surveyed

Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

0 1:25,000 500 1,000 m

ZOETICA

Logging Operations

- No Logging At Any Time

Time Since Logging

5-15 Yrs 15-30 Yrs

0-5 Yrs 30+ Yrs

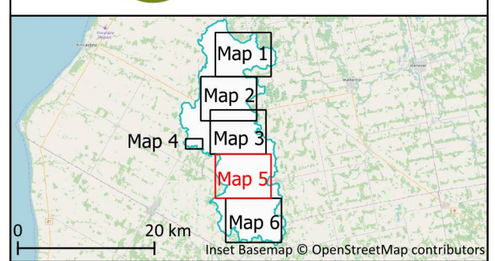
Extent and Intensity of Logging

Intensity \ Extent	1	2	3
1			*
2			
3			

Grey filled icons indicate no logging occured during the specified time frame

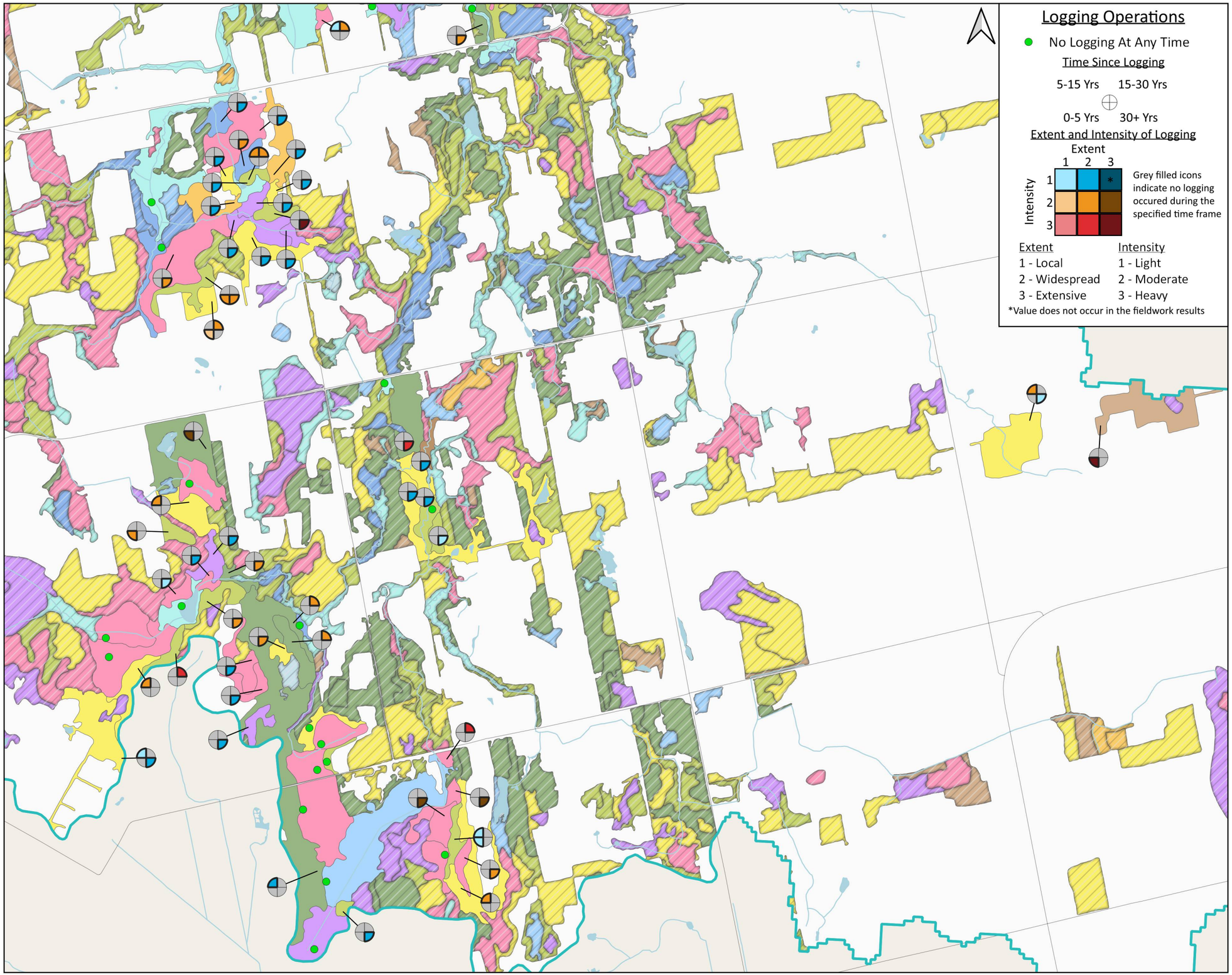
Extent	Intensity
1 - Local	1 - Light
2 - Widespread	2 - Moderate
3 - Extensive	3 - Heavy

*Value does not occur in the fieldwork results



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D173	



NWMO Biodiversity Impact Studies

Intensity and Extent of Logging Opperations - Map 6

Figure E-3e

- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Highway
- Local Road
- Watercourse
- Lake
- Not Surveyed

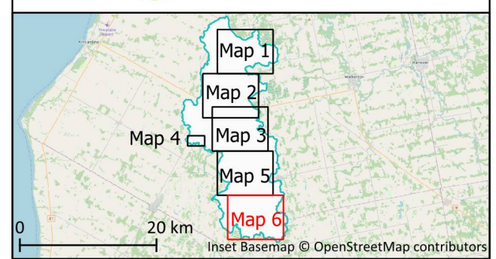
Ecosite Polygon

- Lake
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field

1:25,000

0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_D173	

Table E-2. Summary of damage to vegetation due to logging at plots surveyed within the BIS study areas.

Site ID	Survey Type	Habitat Type	Overall Condition	Broken stems			Uprooted Trees			Girdled trees (of 50% circumference)			Stem wounds (> 200 cm^2)			Broken Branches (> 7.5 cm diameter at base)			Leaning (≥10° from vertical)			Root Damage (> 25% exposed or severed)			Ruts (> 15 cm deep)			Excessive Skid Trails (< 60 m)			Excessive Skid Trails (> 3 m wide)		
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.
TEM_028	Full	Mixedwood	G	yes	1	1	yes	1	1	--	--	--	--	--	--	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--
TEM_029	Full	Mixedwood	G	yes	1	2	--	--	--	--	--	--	--	--	--	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--
TEM_045	Ground	Mixedwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	3	yes	2	3	--	--	--	--	--	--	--	--	--	--	--	--
TEM_056	Ground	Mixedwood	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	yes	1	2
TEM_061	Ground	Hardwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--
TEM_078	Ground	Conifer	F	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	2	yes	1	2
TEM_128	Visual	Mixedwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	yes	1	2	yes	1	1	--	--	--	--	--	--	--	--	--
TEM_147	Visual	Conifer	F	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_148	Visual	Mixedwood	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--
TEM_151	Visual	Mixedwood	G	yes	2	1	yes	2	1	--	--	--	--	--	--	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--
TEM_173	Visual	Mixedwood	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	2	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--
TEM_174	Visual	Mixedwood	F	yes	1	2	yes	1	1	--	--	--	yes	1	2	yes	1	3	yes	2	3	yes	2	2	--	--	--	--	--	--	--	--	--
TEM_209	Visual	Hardwood	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--
TEM_217	Visual	Meadow	F	yes	1	1	--	--	--	--	--	--	yes	1	1	yes	1	1	--	--	--	yes	1	1	yes	2	1	yes	1	1	yes	1	1
TEM_258	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	yes	3	1	--	--	--	--	--	--	yes	2	1	--	--	--	--	--	--	--	--	--
TEM_266	Visual	Hardwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--
TEM_269	Visual	Mixedwood Swamp	F	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	yes	2	2	yes	1	2	--	--	--	--	--	--	--	--	--
TEM_272	Visual	Conifer	F	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_292	Visual	Mixedwood	F	yes	1	1	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	yes	2	1	yes	2	1	yes	2	1
TEM_300	Visual	Conifer	F	yes	1	1	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	yes	2	2	yes	2	2
TEM_304	Visual	Mixedwood	F	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--
TEM_310	Visual	Mixedwood Swamp	G	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--
TEM_312	Visual	Hardwood	G	yes	1	1	--	--	--	--	--	--	yes	1	1	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--
TEM_320	Visual	Mixedwood Swamp	F	yes	1	1	yes	2	1	--	--	--	--	--	--	yes	2	1	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--
TEM_322	Visual	Conifer	F	yes	1	2	--	--	--	--	--	--	yes	1	1	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--
TEM_323	Visual	Hardwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--
TEM_325	Visual	Mixedwood	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	1	yes	2	1	yes	2	1
TEM_332	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--
TEM_334	Visual	Shrub	F	yes	2	1	--	--	--	--	--	--	yes	1	1	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--
TEM_343	Visual	Hardwood	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--
TEM_346	Visual	Mixedwood	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	yes	1	1	--	--	--	yes	1	1	--	--	--
TEM_354	Visual	Hardwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--
TEM_360	Visual	Mixedwood Swamp	G	yes	1	1	yes	2	2	--	--	--	yes	1	2	yes	1	2	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--
TEM_363	Visual	Hardwood	F	yes	1	1	--	--	--	--	--	--	yes	1	1	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--
TEM_377	Visual	Mixedwood Swamp	G	yes	1	1	yes	1	1	--	--	--	--	--	--	yes	1	1	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--
TEM_393	Visual	Hardwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--
TEM_417	Visual	Hardwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	yes	1	1
TEM_447	Visual	Hardwood	G	--	--	--	yes	2	2	--	--	--	--	--	--	yes	1	2	yes	1	2	yes	1	2	yes	1	1	yes	1	1	yes	1	1
TEM_454	Visual	Hardwood	F	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	yes	1	2	--	--	--
TEM_456	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_458	Visual	Hardwood	G	yes	1	2	--	--	--	--	--	--	yes	1	2	yes	2	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--
TEM_463	Visual	Hardwood	G	yes	1	1	--	--	--	--	--	--	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
Overall condition Codes: E = Excellent; G = Good; F = Fair.
Ev. = Evidence; Int. = Intensity; Ext. = Extent.

Table E-3. Evidence of human disturbance documented within surveyed plots in the BIS study areas.

Site ID	Survey Type	Habitat Type	Overall Condition	Sugar Bush operations			Gaps in the Canopy			Livestock Grazing			Plantation			Tracks and Trails			Rubbish Dumping			Earth Displacement			Recreational Use			Other types of human disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_002	Full	Marsh	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	1	--	--	--	--	--	--	--	--	--	--
TEM_003	Full	Meadow	F	--	--	--	--	--	--	--	--	--	yes	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_004	Full	Lake	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--
TEM_006	Full	Mixedwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_011	Full	Hardwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_016	Full	Hardwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_017	Full	Mixedwood	G	--	--	--	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_020	Full	Conifer	G	--	--	--	--	--	--	--	--	--	yes	3	3	yes	3	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_021	Full	Hardwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_022	Full	Hardwood	G	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_023	Full	Hardwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_026	Full	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_028	Full	Mixedwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	yes	1	1	--	--	--	yes	1	1	--	--	--	--
TEM_029	Full	Mixedwood	G	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_030	Full	Mixedwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--
TEM_031	Full	Conifer	F	--	--	--	--	--	--	--	--	--	yes	3	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_032	Full	Mixedwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_033	Full	Plantation	F	--	--	--	--	--	--	--	--	--	yes	2	2	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_036	Ground	Marsh	P	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_041	Ground	Conifer Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_045	Ground	Mixedwood Swamp	E	--	--	--	yes	1	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_047	Ground	Conifer	G	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_050	Ground	Conifer	E	--	--	--	--	--	--	--	--	--	yes	2	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_056	Ground	Mixedwood	F	--	--	--	yes	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_059	Ground	Hardwood	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--
TEM_060	Ground	Hardwood	F	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_061	Ground	Hardwood Swamp	E	--	--	--	yes	1	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_062	Ground	Mixedwood	P	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_071	Ground	Conifer	G	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_072	Ground	Mixedwood	G	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_075	Ground	Meadow	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	Agricultural and livestock likely pushed to edge of creek prior to Implementation of buffers probably around 30 years ago.
TEM_078	Ground	Conifer	F	--	--	--	yes	3	2	--	--	--	yes	3	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_081	Ground	Plantation	F	--	--	--	yes	1	1	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_086	Visual	Plantation	F	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_088	Visual	Meadow	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	1	Agriculture, row crops and pasture
TEM_089	Visual	Marsh	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--
TEM_090	Visual	Hardwood Swamp	F	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_093	Visual	Conifer Swamp	G	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_094	Visual	Hardwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_095	Visual	Mixedwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_099	Visual	Mixedwood Swamp	F	--	--	--	yes	2	3	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_103	Visual	Plantation	P	--	--	--	--	--	--	--	--	--	yes	3	3	yes	2	1	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_107	Visual	Mixedwood	G	--	--	--	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_108	Visual	Hardwood Swamp	F	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Sugar Bush operations			Gaps in the Canopy			Livestock Grazing			Plantation			Tracks and Trails			Rubbish Dumping			Earth Displacement			Recreational Use			Other types of human disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_112	Visual	Hardwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_114	Visual	Mixedwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_116	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_117	Visual	Hardwood	F	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_118	Visual	Hardwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_119	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_121	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	yes	3	3	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_122	Visual	Plantation	F	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_124	Visual	Marsh	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--
TEM_126	Visual	Conifer	F	--	--	--	--	--	--	--	--	--	yes	3	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_129	Visual	Hardwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--
TEM_131	Visual	Hardwood Swamp	F	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_140	Visual	Conifer	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_141	Visual	Conifer	F	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_142	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	1	--	--	--	--	--
TEM_143	Visual	Hardwood	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_144	Visual	Hardwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--
TEM_146	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	1	--	--	--	--	--
TEM_148	Visual	Mixedwood	F	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	yes	2	3	Established roadway adjacent to polygon.
TEM_149	Visual	Mixedwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--
TEM_151	Visual	Mixedwood	G	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--	--
TEM_153	Visual	Plantation	F	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_154	Visual	Shrub Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--
TEM_159	Visual	Hardwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	Culvert that leads to a sort of drainage in transit to plot; drainage is in plot
TEM_160	Visual	Hardwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_163	Visual	Mixedwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--
TEM_165	Visual	Conifer	F	--	--	--	yes	1	2	--	--	--	yes	2	1	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--
TEM_167	Visual	Conifer	F	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_168	Visual	Hardwood	G	yes	1	2	--	--	--	--	--	--	--	--	--	yes	1	1	yes	3	1	--	--	--	--	--	--	--	--	--	--	--
TEM_169	Visual	Hardwood	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--
TEM_172	Visual	Hardwood	E	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_173	Visual	Mixedwood	--	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_174	Visual	Mixedwood	F	--	--	--	yes	1	2	--	--	--	--	--	--	yes	3	2	--	--	--	yes	2	2	yes	1	1	--	--	--	--	--
TEM_178	Visual	Plantation	F	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_182	Visual	Field	F	--	--	--	yes	3	3	--	--	--	yes	3	2	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--
TEM_188	Visual	Conifer	G	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_190	Visual	Mixedwood	E	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_191	Visual	Hardwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--
TEM_192	Visual	Hardwood	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	1	--	--	--	--	--
TEM_193	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_194	Visual	Conifer	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	yes	1	1	--	--	--	--	--	--	--	--	--	--	--
TEM_198	Visual	Meadow	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_201	Visual	Hardwood Swamp	F	--	--	--	yes	3	2	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	2	yes	2	1	--	--	--	--	--
TEM_203	Visual	Mixedwood Swamp	E	--	--	--	yes	1	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_207	Visual	Plantation	F	--	--	--	--	--	--	--	--	--	yes	3	3	yes	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Sugar Bush operations			Gaps in the Canopy			Livestock Grazing			Plantation			Tracks and Trails			Rubbish Dumping			Earth Displacement			Recreational Use			Other types of human disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_208	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_209	Visual	Hardwood	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_212	Visual	Mixedwood	F	--	--	--	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_213	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	3	1	--	--	--	--
TEM_214	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	yes	3	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_215	Visual	Hardwood Swamp	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_217	Visual	Meadow	F	--	--	--	yes	3	1	--	--	--	--	--	--	yes	1	1	--	--	--	yes	1	1	yes	1	1	yes	3	1	Farming
TEM_218	Visual	Marsh	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_219	Visual	Hardwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_220	Visual	Hardwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	Old drainage infrastructure, currently not in use
TEM_221	Visual	Hardwood Swamp	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_223	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_227	Visual	Hardwood	F	--	--	--	--	--	--	--	--	--	yes	3	3	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_229	Visual	Hardwood	E	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_231	Visual	Hardwood Swamp	E	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_232	Visual	Field	F	--	--	--	--	--	--	yes	1	3	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_233	Visual	Mixedwood Swamp	E	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_234	Visual	Conifer	F	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_235	Visual	Marsh	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_236	Visual	Hardwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_237	Visual	Hardwood Swamp	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	1	--	--	--	--	--	--	--	--	--	--
TEM_240	Visual	Mixedwood Swamp	G	--	--	--	yes	3	3	--	--	--	yes	3	3	yes	2	3	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_242	Visual	Conifer	F	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_243	Visual	Hardwood	F	--	--	--	yes	2	1	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	yes	3	3	--	--	--	--
TEM_245	Visual	Hardwood Swamp	G	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_248	Visual	Plantation	P	--	--	--	--	--	--	--	--	--	yes	3	3	yes	1	1	yes	1	1	--	--	--	yes	1	1	--	--	--	--
TEM_254	Visual	Mixedwood Swamp	E	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_255	Visual	Hardwood Swamp	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--
TEM_257	Visual	Conifer	F	--	--	--	--	--	--	--	--	--	yes	3	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_258	Visual	Hardwood	G	--	--	--	yes	3	1	--	--	--	--	--	--	yes	2	1	--	--	--	yes	3	1	yes	1	1	yes	1	1	Buildings
TEM_260	Visual	Hardwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_261	Visual	Mixedwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_262	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_263	Visual	Mixedwood Swamp	G	--	--	--	yes	2	2	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_264	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_265	Visual	Marsh	P	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_267	Visual	Marsh	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	3/3	1/3	Originally a cut roadway, now established phragmites within the last 10-15 years. Extensive phragmites stand that has taken over the roadway.
TEM_268	Visual	Mixedwood Swamp	G	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_269	Visual	Mixedwood Swamp	F	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	Active forest management
TEM_272	Visual	Conifer	F	--	--	--	yes	1	1	--	--	--	yes	3	1	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_273	Visual	Hardwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_274	Visual	Hardwood	G	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	1	--	--	--	--
TEM_276	Visual	Hardwood	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Sugar Bush operations			Gaps in the Canopy			Livestock Grazing			Plantation			Tracks and Trails			Rubbish Dumping			Earth Displacement			Recreational Use			Other types of human disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_277	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_279	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_281	Visual	Hardwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_287	Visual	Conifer	G	--	--	--	--	--	--	--	--	--	yes	2	2	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_288	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_291	Visual	Mixedwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	1	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_292	Visual	Mixedwood	F	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	yes	1	1	yes	1	1	yes	2	1	Forest management activities
TEM_293	Visual	Marsh	G	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_294	Visual	Hardwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	Very Old fence suggests pastured at one point
TEM_299	Visual	Mixedwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_300	Visual	Conifer	F	--	--	--	yes	3	3	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_301	Visual	Hardwood	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	yes	1	1	--	--	--	yes	3	1	--	--	--	--
TEM_303	Visual	Hardwood	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	Potentially farmed in last 50 years
TEM_304	Visual	Mixedwood	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_305	Visual	Marsh	P	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_306	Visual	Hardwood Swamp	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	yes	1	1	Hay bail on edge of polygon
TEM_308	Visual	Mixedwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_311	Visual	Conifer	F	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_312	Visual	Hardwood	G	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_313	Visual	Hardwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_315	Visual	Mixedwood	F	--	--	--	--	--	--	--	--	--	yes	2	3	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_316	Visual	Marsh	P	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_318	Visual	Hardwood Swamp	F	--	--	--	--	--	--	yes	3	3	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_320	Visual	Mixedwood Swamp	F	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_322	Visual	Conifer	F	--	--	--	--	--	--	--	--	--	yes	3	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_323	Visual	Hardwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_325	Visual	Mixedwood	F	--	--	--	yes	1	1	--	--	--	--	--	--	yes	2	1	--	--	--	yes	1	1	yes	1	1	yes	1	1	Active logging
TEM_328	Visual	Hardwood Swamp	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_331	Visual	Mixedwood Swamp	E	--	--	--	yes	1	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_332	Visual	Hardwood	G	--	--	--	yes	2	2	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_334	Visual	Shrub	F	--	--	--	yes	3	1	--	--	--	--	--	--	yes	2	1	yes	1	1	--	--	--	--	--	--	--	--	--	--
TEM_335	Visual	Mixedwood	G	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_337	Visual	Hardwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_342	Visual	Hardwood Swamp	G	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_343	Visual	Hardwood	F	--	--	--	yes	1	1	yes	1	3	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_345	Visual	Hardwood Swamp	F	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_346	Visual	Mixedwood	F	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_351	Visual	Hardwood Swamp	E	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_359	Visual	Mixedwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_360	Visual	Mixedwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_361	Visual	Mixedwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--
TEM_363	Visual	Hardwood	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_367	Visual	Hardwood Swamp	E	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_377	Visual	Mixedwood Swamp	G	--	--	--	yes	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_386	Visual	Hardwood Swamp	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_387	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	1	--	--	--	--
TEM_388	Visual	Mixedwood Swamp	G	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Sugar Bush operations			Gaps in the Canopy			Livestock Grazing			Plantation			Tracks and Trails			Rubbish Dumping			Earth Displacement			Recreational Use			Other types of human disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_389	Visual	Mixedwood Swamp	G	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_390	Visual	Hardwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_391	Visual	Mixedwood	G	yes	1	1	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	yes	3	1	--	--	--	--
TEM_398	Visual	Hardwood	E	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_402	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	Old house foundation
TEM_403	Visual	Hardwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_405	Visual	Hardwood Swamp	G	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_406	Visual	Hardwood	G	yes	3	1	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_407	Visual	Hardwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_408	Visual	Shrub Swamp	G	--	--	--	yes	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_409	Visual	Hardwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_413	Visual	Hardwood	E	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_415	Visual	Hardwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_418	Visual	Hardwood Swamp	E	--	--	--	yes	1	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_425	Visual	Mixedwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_426	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_428	Visual	Hardwood	F	--	--	--	yes	1	2	--	--	--	--	--	--	yes	2	1	--	--	--	--	--	--	yes	2	2	--	--	--	--
TEM_429	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_432	Visual	Hardwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_433	Visual	Hardwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_434	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	1	--	--	--	--	--	--	--
TEM_435	Visual	Hardwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_436	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_439	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--
TEM_440	Visual	Hardwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_445	Visual	Meadow	P	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_447	Visual	Hardwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_449	Visual	Hardwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--
TEM_450	Visual	Hardwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_452	Visual	Hardwood	G	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_453	Visual	Hardwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	1	--	--	--	--	--	--	--	--	--	--
TEM_454	Visual	Hardwood	F	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_456	Visual	Hardwood	G	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_457	Visual	Hardwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	1	Road proximity
TEM_458	Visual	Hardwood	G	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_460	Visual	Hardwood	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	yes	2	1	--	--	--	yes	1	2	yes	2	1	Bee hive boxes.
TEM_461	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--
TEM_463	Visual	Hardwood	G	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	yes	1	1	yes	1	1	--	--	--	--
TEM_465	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--
TEM_469	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_470	Visual	Hardwood Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--

Notes:
Overall Condition Codes: E = Excellent; G = Good; F = Fair; P = Poor
Ev. = Evidence; Int. = Intensity; Ext. = Extent.

Table E-4. Evidence of natural disturbance recorded in plots surveyed within the BIS study areas.

Site ID	Survey Type	Habitat Type	Overall Condition	Disease, Pests, Dead Trees			Windthrow/ Blowdown			Browse (e.g., deer)			Beaver Damage			Flooding (pools or puddling)			Fire			Other Types of Natural Disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_001	Full	Marsh	E	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_002	Full	Marsh	G	yes	2	2	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_004	Full	Lake	G	--	--	--	yes	1	1	--	--	--	--	--	--	yes	3	3	--	--	--	yes	1	2	Sound of distant traffic and occasional airplanes. Discarded rusty barrel at edge of water.
TEM_005	Full	Shrub Swamp	E	yes	1	1	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_006	Full	Mixedwood Swamp	E	yes	1	2	yes	2	2	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_007	Full	Mixedwood Swamp	G	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_008	Full	Hardwood Swamp	E	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_009	Full	Hardwood Swamp	G	yes	2	2	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_010	Full	Hardwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_011	Full	Hardwood Swamp	G	yes	2	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_012	Full	Hardwood Swamp	E	yes	1	1	--	--	--	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_013	Full	Hardwood Swamp	G	yes	2	2	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_014	Full	Mixedwood Swamp	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_015	Full	Hardwood Swamp	G	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_016	Full	Hardwood Swamp	E	yes	1	2	yes	2	2	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_017	Full	Mixedwood	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_018	Full	Conifer Swamp	E	--	--	--	yes	1	1	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_019	Full	Mixedwood Swamp	G	yes	3	3	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_020	Full	Conifer	G	yes	1	1	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_021	Full	Hardwood	G	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_022	Full	Hardwood	G	yes	1	1	yes	1	1	yes	1	2	--	--	--	--	--	--	--	--	--	yes	1	2	Exposed roots, fallen woody debris, minor branch dieback
TEM_023	Full	Hardwood Swamp	G	yes	2	2	yes	1	1	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_024	Full	Hardwood Swamp	E	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_025	Full	Hardwood Swamp	E	yes	1	1	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_026	Full	Hardwood	G	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_027	Full	Hardwood Swamp	E	yes	1	1	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_028	Full	Mixedwood	G	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_029	Full	Mixedwood	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_030	Full	Mixedwood	G	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_031	Full	Conifer	F	yes	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_032	Full	Mixedwood Swamp	E	yes	1	2	yes	2	1	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_033	Full	Plantation	F	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_034	Ground	Marsh	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--
TEM_035	Ground	Marsh	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_036	Ground	Marsh	P	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_038	Ground	Marsh	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--
TEM_039	Ground	Shrub Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_040	Ground	Conifer Swamp	E	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_041	Ground	Conifer Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_042	Ground	Hardwood Swamp	E	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_043	Ground	Hardwood Swamp	G	yes	1	2	--	--	--	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_044	Ground	Hardwood Swamp	E	yes	1	2	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_045	Ground	Mixedwood Swamp	E	yes	1	2	yes	2	3	yes	1	2	--	--	--	yes	3	3	--	--	--	--	--	--	--
TEM_046	Ground	Hardwood Swamp	G	yes	2	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_047	Ground	Conifer	G	yes	2	2	yes	1	1	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_048	Ground	Conifer	G	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Disease, Pests, Dead Trees			Windthrow/ Blowdown			Browse (e.g., deer)			Beaver Damage			Flooding (pools or puddling)			Fire			Other Types of Natural Disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_049	Ground	Conifer	F	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_050	Ground	Conifer	E	yes	1	1	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	yes	1	2	Self pruning, natural branch suppression.
TEM_051	Ground	Hardwood	E	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_052	Ground	Hardwood Swamp	E	yes	2	3	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_053	Ground	Hardwood Swamp	E	--	--	--	yes	1	2	--	--	--	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_054	Ground	Hardwood Swamp	E	yes	2	2	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_055	Ground	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_056	Ground	Mixedwood	F	yes	1	2	--	--	--	yes	3	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_057	Ground	Hardwood	F	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_058	Ground	Mixedwood	E	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_059	Ground	Hardwood	E	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_060	Ground	Hardwood	F	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_061	Ground	Hardwood Swamp	E	--	--	--	yes	1	2	yes	3	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_063	Ground	Shrub Swamp	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_064	Ground	Marsh	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	2	--	--	--	--	--	--	--
TEM_065	Ground	Marsh	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	yes	2	2	Invasives present: reed canary grass
TEM_066	Ground	Conifer Swamp	G	yes	1	2	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_067	Ground	Mixedwood Swamp	E	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_068	Ground	Hardwood Swamp	E	yes	1	2	yes	2	3	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_069	Ground	Conifer Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_070	Ground	Mixedwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_071	Ground	Conifer	G	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_072	Ground	Mixedwood	G	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_073	Ground	Mixedwood	--	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_074	Ground	Mixedwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_075	Ground	Meadow	G	--	--	--	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_076	Ground	Mixedwood Swamp	G	--	--	--	yes	2	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_077	Ground	Mixedwood Swamp	G	yes	1	2	--	--	--	--	--	--	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_078	Ground	Conifer	F	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_079	Ground	Marsh	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_080	Ground	Mixedwood Swamp	E	--	--	--	yes	2	3	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_082	Ground	Marsh	E	--	--	--	--	--	--	yes	1	1	--	--	--	yes	3	2	--	--	--	--	--	--	--
TEM_083	Ground	Mixedwood Swamp	G	yes	3	2	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_084	Ground	Mixedwood Swamp	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_085	Oversample	Hardwood Swamp	E	yes	1	1	yes	1	2	yes	1	1	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_086	Visual	Plantation	F	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_087	Visual	Marsh	E	--	--	--	yes	1	1	--	--	--	yes	1	1	yes	3	2	--	--	--	--	--	--	--
TEM_089	Visual	Marsh	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_090	Visual	Hardwood Swamp	F	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_091	Visual	Mixedwood Swamp	E	yes	1	1	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_092	Visual	Conifer Swamp	G	yes	2	1	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_093	Visual	Conifer Swamp	G	yes	1	1	yes	1	2	yes	1	1	yes	1	1	yes	2	2	--	--	--	--	--	--	--
TEM_094	Visual	Hardwood Swamp	G	yes	2	2	yes	1	1	yes	2	3	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_095	Visual	Mixedwood Swamp	G	yes	1	2	yes	2	2	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_096	Visual	Hardwood Swamp	--	yes	1	2	--	--	--	yes	2	3	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_097	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_098	Visual	Mixedwood Swamp	E	yes	1	1	yes	1	1	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_099	Visual	Mixedwood Swamp	F	--	--	--	yes	2	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Disease, Pests, Dead Trees			Windthrow/ Blowdown			Browse (e.g., deer)			Beaver Damage			Flooding (pools or puddling)			Fire			Other Types of Natural Disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_100	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_101	Visual	Mixedwood Swamp	E	yes	1	1	yes	1	2	yes	1	1	--	--	--	yes	3	3	--	--	--	--	--	--	--
TEM_102	Visual	Conifer	G	yes	1	1	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_103	Visual	Plantation	P	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_104	Visual	Conifer	G	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_105	Visual	Hardwood Swamp	E	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	1	Woodpecker damage to trees
TEM_106	Visual	Mixedwood Swamp	F	yes	2	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_107	Visual	Mixedwood	G	yes	1	1	yes	2	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_108	Visual	Hardwood Swamp	F	--	--	--	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_109	Visual	Hardwood	E	yes	1	2	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_110	Visual	Hardwood	F	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_111	Visual	Hardwood	E	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_112	Visual	Hardwood	G	--	--	--	yes	2	2	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_113	Visual	Hardwood Swamp	E	yes	2	2	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_114	Visual	Mixedwood Swamp	G	yes	2	2	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_115	Visual	Hardwood	G	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_116	Visual	Mixedwood	G	yes	2	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_117	Visual	Hardwood	F	yes	2	1	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_118	Visual	Hardwood	G	yes	1	1	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_119	Visual	Mixedwood	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_120	Visual	Mixedwood	E	yes	1	2	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_121	Visual	Mixedwood	G	yes	1	1	yes	1	1	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_124	Visual	Marsh	E	yes	2	2	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_125	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_126	Visual	Conifer	F	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_127	Visual	Mixedwood Swamp	G	yes	2	2	yes	1	1	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_128	Visual	Mixedwood Swamp	G	--	--	--	yes	2	3	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_129	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_130	Visual	Hardwood Swamp	E	yes	1	1	--	--	--	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_131	Visual	Hardwood Swamp	F	yes	2	2	yes	1	2	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_132	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_133	Visual	Mixedwood	F	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_134	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_135	Visual	Mixedwood Swamp	E	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	yes	1	1	Girdled birch (likely caused by some mammal, not logging)
TEM_136	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_137	Visual	Conifer	G	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_139	Visual	Conifer	F	yes	1	1	--	--	--	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_140	Visual	Conifer	G	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_141	Visual	Conifer	F	--	--	--	yes	2	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_142	Visual	Hardwood	G	yes	1	2	yes	1	1	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_143	Visual	Hardwood	F	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_144	Visual	Hardwood	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_145	Visual	Hardwood	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_146	Visual	Mixedwood	G	yes	1	1	yes	1	1	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_147	Visual	Conifer	F	yes	1	2	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_148	Visual	Mixedwood	F	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_149	Visual	Mixedwood	G	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Disease, Pests, Dead Trees			Windthrow/ Blowdown			Browse (e.g., deer)			Beaver Damage			Flooding (pools or puddling)			Fire			Other Types of Natural Disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_151	Visual	Mixedwood	G	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_152	Visual	Mixedwood Swamp	G	yes	1	2	yes	1	2	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_153	Visual	Plantation	F	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_154	Visual	Shrub Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	2	--	--	--	--	--	--	--
TEM_155	Visual	Marsh	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_156	Visual	Shrub	G	yes	1	2	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_157	Visual	Conifer Swamp	G	yes	2	2	yes	2	2	yes	1	2	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_158	Visual	Hardwood Swamp	G	yes	1	1	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_159	Visual	Hardwood Swamp	G	yes	1	1	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_160	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_161	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_162	Visual	Mixedwood Swamp	E	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_163	Visual	Mixedwood Swamp	G	yes	2	2	yes	2	2	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_164	Visual	Mixedwood Swamp	G	yes	1	1	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_166	Visual	Mixedwood	E	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_167	Visual	Conifer	F	yes	2	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_168	Visual	Hardwood	G	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_169	Visual	Hardwood	E	yes	2	2	yes	1	2	yes	3	3	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_170	Visual	Hardwood	F	yes	2	2	--	--	--	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_171	Visual	Hardwood Swamp	E	yes	1	2	--	--	--	yes	1	2	yes	1	1	yes	3	3	--	--	--	--	--	--	--
TEM_172	Visual	Hardwood	E	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_173	Visual	Mixedwood	--	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_174	Visual	Mixedwood	F	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_175	Visual	Hardwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_176	Visual	Mixedwood	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_177	Visual	Mixedwood	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_179	Visual	Marsh	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_180	Visual	Shrub Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_181	Visual	Hardwood Swamp	G	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_182	Visual	Field	F	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_183	Visual	Hardwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_184	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_185	Visual	Marsh	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_186	Visual	Conifer Swamp	G	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_187	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_188	Visual	Conifer	G	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_189	Visual	Hardwood	G	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_190	Visual	Mixedwood	E	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_191	Visual	Hardwood Swamp	G	--	--	--	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_192	Visual	Hardwood	E	yes	2	2	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_193	Visual	Mixedwood	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_194	Visual	Conifer	G	yes	1	1	yes	1	2	yes	1	2	yes	2	2	yes	1	1	--	--	--	--	--	--	--
TEM_195	Visual	Mixedwood	G	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_196	Visual	Mixedwood	E	yes	2	2	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_197	Visual	Marsh	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_198	Visual	Meadow	F	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_199	Visual	Shrub Swamp	G	yes	1	1	--	--	--	--	--	--	yes	3	1	yes	2	2	--	--	--	--	--	--	--
TEM_200	Visual	Hardwood Swamp	G	yes	1	2	yes	2	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Disease, Pests, Dead Trees			Windthrow/ Blowdown			Browse (e.g., deer)			Beaver Damage			Flooding (pools or puddling)			Fire			Other Types of Natural Disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_201	Visual	Hardwood Swamp	F	yes	3	2	yes	1	2	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_202	Visual	Hardwood Swamp	E	yes	1	1	--	--	--	--	--	--	yes	2	1	yes	3	3	--	--	--	--	--	--	--
TEM_203	Visual	Mixedwood Swamp	E	yes	1	2	yes	1	3	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_204	Visual	Mixedwood Swamp	E	yes	1	2	--	--	--	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_205	Visual	Mixedwood Swamp	E	yes	1	1	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_206	Visual	Mixedwood Swamp	G	yes	1	2	yes	1	1	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_208	Visual	Hardwood	G	yes	1	2	yes	2	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_209	Visual	Hardwood	F	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_210	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_211	Visual	Hardwood	G	--	--	--	yes	1	1	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_212	Visual	Mixedwood	F	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_213	Visual	Mixedwood	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_214	Visual	Mixedwood	G	--	--	--	--	--	--	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_215	Visual	Hardwood Swamp	F	yes	2	3	yes	1	1	yes	2	2	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_216	Visual	Mixedwood	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_217	Visual	Meadow	F	yes	1	1	--	--	--	yes	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_218	Visual	Marsh	F	yes	1	2	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_219	Visual	Hardwood Swamp	G	yes	1	2	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_220	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_221	Visual	Hardwood Swamp	F	yes	2	3	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_222	Visual	Hardwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_223	Visual	Mixedwood	G	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_224	Visual	Mixedwood	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_225	Visual	Mixedwood Swamp	E	yes	1	2	yes	1	1	yes	1	1	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_226	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_227	Visual	Hardwood	F	--	--	--	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_228	Visual	Hardwood	G	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_229	Visual	Hardwood	E	yes	1	2	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	yes	1	1	Light deer trail in plot
TEM_230	Visual	Hardwood Swamp	E	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_231	Visual	Hardwood Swamp	E	yes	1	2	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_232	Visual	Field	F	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_233	Visual	Mixedwood Swamp	E	yes	2	2	yes	2	2	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_234	Visual	Conifer	F	--	--	--	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_235	Visual	Marsh	E	--	--	--	yes	1	1	--	--	--	yes	1	2	yes	2	3	--	--	--	--	--	--	--
TEM_236	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_237	Visual	Hardwood Swamp	F	yes	1	2	--	--	--	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_238	Visual	Meadow	G	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_239	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	yes	1	2	yes	1	1	yes	2	2	--	--	--	--	--	--	--
TEM_240	Visual	Mixedwood Swamp	G	yes	1	1	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_241	Visual	Mixedwood Swamp	E	yes	1	1	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_243	Visual	Hardwood	F	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_244	Visual	Hardwood	G	yes	1	2	yes	2	2	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_245	Visual	Hardwood Swamp	G	yes	2	2	--	--	--	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_246	Visual	Hardwood	E	--	--	--	--	--	--	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_247	Visual	Mixedwood	G	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_248	Visual	Plantation	P	--	--	--	--	--	--	yes	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_249	Visual	Conifer	E	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_250	Visual	Marsh	F	--	--	--	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Disease, Pests, Dead Trees			Windthrow/ Blowdown			Browse (e.g., deer)			Beaver Damage			Flooding (pools or puddling)			Fire			Other Types of Natural Disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_251	Visual	Hardwood Swamp	G	yes	2	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_252	Visual	Hardwood Swamp	G	yes	2	2	yes	1	2	yes	1	1	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_253	Visual	Mixedwood Swamp	E	yes	2	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_254	Visual	Mixedwood Swamp	E	yes	2	3	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_255	Visual	Hardwood Swamp	F	yes	2	2	--	--	--	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_256	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_257	Visual	Conifer	F	yes	1	1	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_258	Visual	Hardwood	G	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_259	Visual	Hardwood	G	yes	1	1	yes	2	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_260	Visual	Hardwood	G	yes	1	1	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_261	Visual	Mixedwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_262	Visual	Hardwood	G	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_263	Visual	Mixedwood Swamp	G	yes	1	2	--	--	--	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_264	Visual	Mixedwood	G	yes	1	2	yes	1	1	yes	2	3	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_265	Visual	Marsh	P	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_266	Visual	Hardwood Swamp	E	yes	2	2	--	--	--	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_267	Visual	Marsh	--	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_268	Visual	Mixedwood Swamp	G	yes	2	2	yes	1	1	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_269	Visual	Mixedwood Swamp	F	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_270	Visual	Mixedwood Swamp	E	yes	2	2	yes	2	2	yes	1	1	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_271	Visual	Mixedwood Swamp	E	yes	1	2	--	--	--	--	--	--	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_273	Visual	Hardwood	G	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_274	Visual	Hardwood	G	yes	3	2	yes	2	2	yes	3	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_275	Visual	Hardwood	E	yes	1	1	--	--	--	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_276	Visual	Hardwood	E	yes	1	3	yes	1	1	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_277	Visual	Hardwood	G	yes	1	1	yes	1	1	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_278	Visual	Mixedwood	E	yes	2	2	yes	2	2	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_279	Visual	Mixedwood	G	yes	1	1	yes	1	2	yes	1	2	--	--	--	yes	2	1	--	--	--	--	--	--	--
TEM_280	Visual	Marsh	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_281	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_283	Visual	Mixedwood Swamp	G	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_284	Visual	Mixedwood Swamp	G	yes	1	2	yes	2	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_285	Visual	Mixedwood Swamp	G	yes	1	1	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_286	Visual	Hardwood Swamp	E	yes	1	1	--	--	--	yes	1	1	yes	3	3	yes	2	3	--	--	--	--	--	--	--
TEM_287	Visual	Conifer	G	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_288	Visual	Hardwood	G	yes	1	1	yes	1	1	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_289	Visual	Mixedwood	E	yes	1	1	--	--	--	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_290	Visual	Hardwood	G	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_291	Visual	Mixedwood	G	yes	1	1	--	--	--	yes	2	3	yes	1	1	yes	1	1	--	--	--	--	--	--	--
TEM_293	Visual	Marsh	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_294	Visual	Hardwood Swamp	G	yes	2	2	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_295	Visual	Hardwood Swamp	E	yes	2	2	yes	1	1	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_296	Visual	Mixedwood Swamp	E	yes	1	1	yes	2	2	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_297	Visual	Mixedwood Swamp	G	yes	1	2	yes	2	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_298	Visual	Mixedwood Swamp	F	yes	2	2	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_299	Visual	Mixedwood Swamp	E	yes	1	2	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_300	Visual	Conifer	F	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_301	Visual	Hardwood	F	yes	1	2	yes	1	1	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Disease, Pests, Dead Trees			Windthrow/ Blowdown			Browse (e.g., deer)			Beaver Damage			Flooding (pools or puddling)			Fire			Other Types of Natural Disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_302	Visual	Mixedwood	E	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_303	Visual	Hardwood	E	yes	2	2	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_304	Visual	Mixedwood	F	yes	2	2	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_305	Visual	Marsh	P	--	--	--	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_306	Visual	Hardwood Swamp	F	yes	1	1	yes	3	2	yes	2	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_307	Visual	Hardwood Swamp	E	yes	1	1	--	--	--	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_308	Visual	Mixedwood Swamp	E	yes	1	2	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_309	Visual	Conifer Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_310	Visual	Mixedwood Swamp	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_312	Visual	Hardwood	G	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_313	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_314	Visual	Hardwood	G	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_315	Visual	Mixedwood	F	--	--	--	yes	1	1	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_316	Visual	Marsh	P	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_317	Visual	Hardwood Swamp	E	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_318	Visual	Hardwood Swamp	F	yes	2	2	yes	2	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_319	Visual	Mixedwood Swamp	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_320	Visual	Mixedwood Swamp	F	--	--	--	--	--	--	yes	1	1	--	--	--	yes	2	1	--	--	--	--	--	--	--
TEM_321	Visual	Hardwood	G	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_322	Visual	Conifer	F	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_323	Visual	Hardwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_324	Visual	Hardwood	E	yes	1	2	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_326	Visual	Marsh	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_327	Visual	Mixedwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_328	Visual	Hardwood Swamp	F	yes	2	3	yes	1	1	yes	2	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_329	Visual	Mixedwood Swamp	G	yes	1	1	yes	1	1	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_330	Visual	Hardwood Swamp	E	yes	1	1	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_331	Visual	Mixedwood Swamp	E	--	--	--	yes	1	3	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_332	Visual	Hardwood	G	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_333	Visual	Hardwood	G	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_334	Visual	Shrub	F	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_335	Visual	Mixedwood	G	--	--	--	yes	2	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_336	Visual	Marsh	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--
TEM_337	Visual	Hardwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_338	Visual	Hardwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_339	Visual	Mixedwood Swamp	E	yes	1	2	yes	2	2	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_340	Visual	Mixedwood Swamp	G	yes	1	2	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_341	Visual	Mixedwood Swamp	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_342	Visual	Hardwood Swamp	G	yes	2	2	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_343	Visual	Hardwood	F	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_344	Visual	Hardwood	E	yes	1	2	yes	1	1	yes	1	1	--	--	--	yes	3	1	--	--	--	--	--	--	--
TEM_345	Visual	Hardwood Swamp	F	yes	2	2	--	--	--	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_346	Visual	Mixedwood	F	yes	2	2	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_347	Visual	Shrub Swamp	G	yes	1	1	--	--	--	--	--	--	yes	3	1	yes	2	2	--	--	--	--	--	--	--
TEM_348	Visual	Shrub	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_349	Visual	Hardwood Swamp	G	yes	1	2	yes	2	2	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_350	Visual	Mixedwood Swamp	G	yes	1	2	yes	2	2	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_351	Visual	Hardwood Swamp	E	yes	2	2	yes	2	2	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Disease, Pests, Dead Trees			Windthrow/ Blowdown			Browse (e.g., deer)			Beaver Damage			Flooding (pools or puddling)			Fire			Other Types of Natural Disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_352	Visual	Mixedwood Swamp	G	yes	1	1	yes	1	1	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_353	Visual	Mixedwood Swamp	E	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_354	Visual	Hardwood	--	yes	2	2	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_355	Visual	Hardwood	F	yes	2	2	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_356	Visual	Marsh	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_357	Visual	Hardwood Swamp	E	--	--	--	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_358	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_359	Visual	Mixedwood Swamp	E	yes	2	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_360	Visual	Mixedwood Swamp	G	yes	1	2	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_361	Visual	Mixedwood Swamp	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_362	Visual	Hardwood Swamp	F	yes	2	3	--	--	--	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_363	Visual	Hardwood	F	--	--	--	--	--	--	yes	2	3	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_364	Visual	Hardwood	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_365	Visual	Hardwood	E	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_366	Visual	Marsh	F	--	--	--	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_367	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_368	Visual	Hardwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_369	Visual	Mixedwood Swamp	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_370	Visual	Mixedwood Swamp	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_371	Visual	Hardwood	G	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_372	Visual	Hardwood	E	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_373	Visual	Hardwood	E	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_374	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_375	Visual	Hardwood Swamp	E	yes	1	2	--	--	--	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_376	Visual	Mixedwood Swamp	F	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_377	Visual	Mixedwood Swamp	G	--	--	--	yes	1	1	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_378	Visual	Mixedwood Swamp	G	yes	1	2	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_380	Visual	Hardwood	F	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_381	Visual	Hardwood	G	yes	2	2	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_382	Visual	Marsh	G	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--
TEM_383	Visual	Hardwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	3	3	--	--	--	--	--	--	--
TEM_384	Visual	Mixedwood Swamp	E	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_385	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_386	Visual	Hardwood Swamp	--	yes	2	2	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_387	Visual	Hardwood	G	yes	2	2	yes	1	1	yes	2	3	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_388	Visual	Mixedwood Swamp	G	yes	2	2	yes	2	2	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_389	Visual	Mixedwood Swamp	G	yes	1	1	yes	2	2	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_390	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_391	Visual	Mixedwood	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_392	Visual	Hardwood Swamp	E	yes	1	2	yes	1	2	yes	1	1	--	--	--	yes	1	2	--	--	--	yes	1	1	Fruiting bodies on tree
TEM_393	Visual	Hardwood Swamp	E	yes	1	1	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_394	Visual	Hardwood Swamp	G	yes	1	2	--	--	--	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_395	Visual	Hardwood Swamp	G	yes	1	3	yes	1	1	yes	2	2	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_396	Visual	Hardwood	G	yes	1	1	yes	1	1	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_397	Visual	Hardwood	F	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_398	Visual	Hardwood	E	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_399	Visual	Hardwood Swamp	G	yes	1	1	yes	2	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_400	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Disease, Pests, Dead Trees			Windthrow/ Blowdown			Browse (e.g., deer)			Beaver Damage			Flooding (pools or puddling)			Fire			Other Types of Natural Disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_401	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_402	Visual	Hardwood	G	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_403	Visual	Hardwood Swamp	G	yes	2	2	yes	1	1	yes	1	2	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_404	Visual	Hardwood Swamp	E	--	--	--	--	--	--	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_405	Visual	Hardwood Swamp	G	yes	2	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_406	Visual	Hardwood	G	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_407	Visual	Hardwood	G	--	--	--	yes	2	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_408	Visual	Shrub Swamp	G	yes	1	2	yes	1	1	--	--	--	yes	1	1	yes	2	2	--	--	--	--	--	--	--
TEM_409	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_410	Visual	Hardwood	E	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_411	Visual	Hardwood Swamp	E	yes	1	1	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_412	Visual	Hardwood Swamp	G	yes	2	2	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_413	Visual	Hardwood	E	--	--	--	yes	1	1	yes	1	1	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_414	Visual	Hardwood	E	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_415	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_416	Visual	Hardwood Swamp	E	yes	3	3	--	--	--	yes	1	2	--	--	--	yes	3	3	--	--	--	--	--	--	--
TEM_417	Visual	Hardwood	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_418	Visual	Hardwood Swamp	E	yes	1	3	yes	1	2	--	--	--	--	--	--	yes	1	3	--	--	--	--	--	--	--
TEM_419	Visual	Hardwood Swamp	--	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_420	Visual	Mixedwood Swamp	E	--	--	--	yes	1	1	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_421	Visual	Hardwood	E	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_422	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_423	Visual	Mixedwood Swamp	E	yes	2	2	yes	1	1	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_424	Visual	Hardwood Swamp	E	yes	1	2	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_425	Visual	Mixedwood Swamp	G	--	--	--	yes	2	1	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_426	Visual	Hardwood	G	yes	1	2	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_427	Visual	Hardwood Swamp	G	yes	1	2	--	--	--	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_428	Visual	Hardwood	F	yes	1	2	yes	2	2	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_429	Visual	Hardwood	G	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_430	Visual	Hardwood Swamp	E	--	--	--	yes	1	2	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_431	Visual	Mixedwood Swamp	G	yes	1	1	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_432	Visual	Hardwood Swamp	G	yes	2	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_433	Visual	Hardwood Swamp	G	yes	1	2	--	--	--	yes	1	2	yes	1	1	yes	2	2	--	--	--	--	--	--	--
TEM_434	Visual	Hardwood	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_435	Visual	Hardwood Swamp	E	yes	1	3	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_436	Visual	Hardwood	G	yes	1	2	yes	1	1	yes	2	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_437	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	yes	1	2	yes	2	1	yes	1	2	--	--	--	--	--	--	--
TEM_438	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_439	Visual	Hardwood	G	yes	1	2	yes	2	2	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_440	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_441	Visual	Mixedwood Swamp	--	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_442	Visual	Hardwood	G	yes	3	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_443	Visual	Hardwood Swamp	G	yes	2	2	--	--	--	yes	2	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_444	Visual	Mixedwood Swamp	E	yes	1	2	yes	1	1	yes	1	1	--	--	--	yes	3	3	--	--	--	--	--	--	--
TEM_446	Visual	Hardwood Swamp	G	yes	1	1	--	--	--	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_447	Visual	Hardwood	G	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_448	Visual	Hardwood Swamp	--	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_449	Visual	Hardwood Swamp	E	--	--	--	yes	1	1	yes	1	1	--	--	--	yes	3	3	--	--	--	--	--	--	--

Site ID	Survey Type	Habitat Type	Overall Condition	Disease, Pests, Dead Trees			Windthrow/ Blowdown			Browse (e.g., deer)			Beaver Damage			Flooding (pools or puddling)			Fire			Other Types of Natural Disturbance			
				Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Ev.?	Int.	Ext.	Details
TEM_450	Visual	Hardwood	G	--	--	--	yes	1	2	yes	1	2	--	--	--	yes	1	1	--	--	--	--	--	--	--
TEM_451	Visual	Hardwood Swamp	F	yes	1	1	yes	1	1	yes	1	1	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_452	Visual	Hardwood	G	--	--	--	yes	1	1	yes	3	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_453	Visual	Hardwood Swamp	G	yes	1	1	yes	2	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_454	Visual	Hardwood	F	yes	2	2	yes	1	1	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_455	Visual	Hardwood Swamp	E	yes	1	2	yes	1	1	yes	2	2	yes	2	1	yes	3	3	--	--	--	--	--	--	--
TEM_456	Visual	Hardwood	G	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_457	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	--	--	--	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_458	Visual	Hardwood	G	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_459	Visual	Hardwood Swamp	E	yes	1	2	yes	1	1	yes	1	1	yes	2	2	yes	3	2	--	--	--	--	--	--	--
TEM_460	Visual	Hardwood	--	yes	1	2	--	--	--	yes	2	3	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_461	Visual	Hardwood	G	yes	1	2	--	--	--	yes	2	3	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_462	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	--	--	--	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_463	Visual	Hardwood	G	--	--	--	--	--	--	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_464	Visual	Hardwood Swamp	E	--	--	--	yes	2	2	--	--	--	--	--	--	yes	1	2	--	--	--	yes	1	3	Site will likely flood in spring as vernal pools
TEM_465	Visual	Hardwood	G	yes	1	2	yes	1	1	yes	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_466	Visual	Hardwood Swamp	G	--	--	--	yes	1	1	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_467	Visual	Hardwood	G	yes	1	1	--	--	--	yes	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_468	Visual	Hardwood Swamp	F	yes	2	2	--	--	--	yes	2	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_469	Visual	Hardwood	G	yes	1	1	yes	1	1	yes	2	2	--	--	--	--	--	--	--	--	--	--	--	--	--
TEM_470	Visual	Hardwood Swamp	G	yes	1	2	yes	1	1	yes	1	2	yes	2	1	yes	1	2	--	--	--	--	--	--	--
TEM_471	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--
TEM_472	Visual	Hardwood Swamp	G	yes	1	2	--	--	--	yes	1	2	--	--	--	yes	2	2	--	--	--	--	--	--	--
TEM_473	Visual	Hardwood Swamp	G	yes	1	2	yes	1	2	yes	2	3	--	--	--	yes	2	3	--	--	--	--	--	--	--
TEM_474	Visual	Hardwood Swamp	G	yes	2	2	yes	2	2	yes	1	2	--	--	--	yes	1	2	--	--	--	--	--	--	--

Notes:
Overall Condition Codes: E = Excellent; G = Good; F = Fair; P = Poor.
Ev. = Evidence; Int. = Intensity; Ext. = Extent.



Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: SIGNIFICANT WILDLIFE HABITAT 2023 BASELINE REPORT

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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Glossary and Abbreviations

AHM	Aquatic Habitat Mapping
ANSI	Area of Natural and Scientific Interest
AOI	Area of Interest
BIS	Biodiversity Impact Studies
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
BV	Biodiversity Value. The biotic environmental components that will be considered for study within the Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components.
dbh	Diameter at breast height
Ecodistrict	Third highest level of the ELC hierarchy (Crins et al. 2009). Subdivisions of an ecoregion, primarily identified by patterns of relief, geology, geomorphology, and substrate parent material.
Ecoelement	Lowest level of the ELC hierarchy (Crins et al. 2009). Specific occurrences of vegetation and substrate types.
Ecoregion	Second highest level of the ELC hierarchy (Crins et al. 2009). Large geographic areas primarily identified by sub-continental climatic regimes and bedrock geology.
Ecosite	Second lowest level of the ELC hierarchy (Crins et al. 2009). The land within an ecosite will generally contain similar substrate and vegetation.
Ecosite classification dataset	The dataset of ecosite classification created for the BIS using SWOOP 2020 imagery.
ECS	Ecoregional Criterion Schedule
eDNA	Environmental DNA
ELC	Ecological Land Classification
EO	Element Occurrence. An EO is an area of land and/or water where a species or vegetation community is or was present. EOs represent areas important to the conservation of a species or vegetation community. In Ontario, the NHIC generates each EO from one or more observations, based on international standard EO specifications developed by NatureServe (NDMNRF 2021).
ESA	Ontario *Endangered Species Act*
GBIF	Global Biodiversity Information Facility
GIS	Geographic Information System
GLSE	Great Lakes Shoreline Ecosystem
GSWC	Greenock Swamp Wetland Complex
IA	Impact Assessment

Lek	A communal area where animals congregate during the breeding season and males engage in competitive displays and courtship rituals to attract females. A variety of species use a lek mating system; grouse are amongst the most well-known examples.
LSA	Local Study Area LSA_{TER} = Terrestrial Local Study Area LSA_{AQU} = Aquatic Local Study Area LSA_{ECO} = combined LSA_{TER} and LSA_{AQU} for studying ecosystem function and services
MNRF	Ontario Ministry of Natural Resources and Forestry
NBCP	Native Bat Conservation Program
NHIC	Ontario Natural Heritage Information Centre
NWMO	Nuclear Waste Management Organization
PPS	Ontario Provincial Policy Statement (under the *Planning Act*)
Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
QA/QC	Quality Assurance/Quality Control
Restricted Element	Restricted elements are species, plant communities, or wildlife concentration areas that are at high risk of exploitation, are sensitive to disturbances, and/or could be harmed if data are not appropriately protected.
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose Traditional Territories include the project location.
RSA	Regional Study Area RSA_{AVI} = Regional Study Area for Terrestrial Avifauna $RSA_{AVI-AQU}$ = Regional Study Area for Aquatic and Semi-aquatic Avifauna RSA_{BAT} = Regional Study Area for Bats RSA_{ECO} = Regional Study Area for Ecosystem Function and Services RSA_{HRP} = Regional Study Area for Terrestrial Herpetofauna $RSA_{HRP-AQU}$ = Regional Study Area for Aquatic and Semi-aquatic Herpetofauna RSA_{UNG} = Regional Study Area for Ungulates RSA_{VEG} = Regional Study Area for Vegetation
SAR	Species at Risk
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
Species of conservation concern	Includes provincially and/or federally listed SAR (Extirpated, Endangered, Threatened, Special Concern) and provincially rare (SRANK S1, S2, S3, SH) species. Regionally rare species may also be scoped in if identified by stakeholders and/or rights-holders as Valued Components.

Species of interest	Includes species of conservation concern, culturally important species, indicator species, and invasive species (where applicable).
SRANK	Subnational Rank. SRANK is the conservation status of a species or vegetation community within a particular province, territory, or state. In Ontario, the NHIC assigns SRANKs using the best available information and considering factors such as abundance, distribution, population trends, and trends (NDMNRF 2021). Species assigned S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), and SH (Possibly Extirpated) are considered provincially rare by the NHIC. See the NatureServe website for more information: https://www.natureserve.org/nsexplorer/about-the-data/statuses/conservation-status-categories
SWH	Significant Wildlife Habitat Defined in the Ontario Provincial Policy Statement, 2020 as: *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. *Significant* – in regard to wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Candidate SWH are areas that meet the ELC ecosite code(s) and/or habitat criteria outlined in the SWH ecoregional criterion schedule (ECS). Confirmed SWH are areas that meet the defining criteria outlined in the SWH ECS. Detailed field investigations are usually needed to confirm SWH.
SWHMiST	Significant Wildlife Habitat Mitigation Support Tool
TEM	Terrestrial Ecosystem Mapping

1.0 BACKGROUND

Significant Wildlife Habitat (SWH) is defined in the Ontario Provincial Policy Statement (PPS) (MMAH 2020) under the *Planning Act* as:

- *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species.
- *Significant* – in regard to wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system.

The Ontario Ministry of Natural Resources and Forestry (MNRF) has developed the *Significant Wildlife Habitat Technical Guide* (OMNR 2000) and Significant Wildlife Habitat Criteria Schedules for select ecoregions, including Ecoregion 6E, within which the Saugeen Ojibway Nation (SON)-South Bruce siting area is located (OMNRF 2015). These documents are intended to assist ecologists, biologists, environmental planners, and others involved in planning and development processes in the identification, evaluation, and ranking (i.e., prioritization) of SWH. The SWH technical guide and criteria schedules describe the criteria required for the identification of candidate SWH and confirmed SWH. Candidate SWH refers to habitat that meets the criteria outlined in the specific SWH Ecoregional Criterion Schedule (ECS), as determined through desk-based work and/or field verification. Confirmed SWH refers to candidate SWH that has been field verified and confirmed to contain the biota and defining criteria contained within the specific SWH ECS. Confirmed SWH may then become legally protected by the Ontario PPS under the provincial *Planning Act*.[1]

The 6E ECS (Ecoregion 6E – Ecoregional Criterion Schedule) includes 39 types of SWH, including 15 seasonal concentration areas, seven rare vegetation communities, eight specialized habitats for wildlife, five habitats for species of conservation concern, two animal movement corridors, and two exceptions for Ecoregion 6E (OMNRF 2015):

1. Seasonal Concentration Areas
    a. Waterfowl Stopover and Staging Areas (Terrestrial)
    b. Waterfowl Stopover and Staging Areas (Aquatic)
    c. Shorebird Migratory Stopover Area
    d. Raptor Wintering Area
    e. Bat Hibernacula
    f. Bat Maternity Colonies
    g. Turtle Wintering Areas
    h. Reptile Hibernaculum
    i. Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)

[1] The BIS Program is focused on potential impacts (including benefits) to biodiversity values (BVs) and supporting their conservation (e.g., where legal protection of SWH would be considered a benefit to biodiversity). However, Zoetica acknowledges that, for the impact assessment (IA), potentially competing interests between environment, social, and economic pillars, particularly involving values of land uses, will need to be managed using a holistic and dialogue-driven approach.

   j. Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)
   k. Colonially-Nesting Bird Breeding Habitat (Ground)
   l. Migratory Butterfly Stopover Areas
   m. Landbird Migratory Stopover Areas
   n. Deer Yarding Areas
   o. Deer Winter Congregation Areas
2. Rare Vegetation Communities
   a. Cliffs and Talus Slopes
   b. Sand Barren
   c. Alvar
   d. Old Growth Forest
   e. Savannah
   f. Tallgrass Prairie
   g. Other Rare Vegetation Communities (see Appendix M in (OMNR 2000))
3. Specialized Habitat for Wildlife
   a. Waterfowl Nesting Area
   b. Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat
   c. Woodland Raptor Nesting Habitat
   d. Turtle Nesting Areas
   e. Seeps and Springs
   f. Amphibian Breeding Habitat (Woodland)
   g. Amphibian Breeding Habitat (Wetlands)
   h. Woodland Area-Sensitive Bird Breeding Habitat
4. Habitat for Species of Conservation Concern (Not including Endangered or Threatened Species)
   a. Marsh Bird Breeding Habitat
   b. Open Country Bird Breeding Habitat
   c. Shrub/Early Successional Bird Breeding Habitat
   d. Terrestrial Crayfish
   e. Special Concern and Rare Wildlife Species
5. Animal Movement Corridors
   a. Amphibian Movement Corridors
   b. Deer Movement Corridors
6. Exceptions for Ecoregion 6E
   a. Ecodistrict 6E-14 – Mast Producing Areas
   b. Ecodistrict 6E-17 – Lek

Upon examination, four of these SWH types are not relevant to the Adaptive Phased Management Project (hereafter, 'the Project') in the SON-South Bruce siting area. To be considered as Migratory Butterfly Stopover Areas and Landbird Migratory Stopover Areas, habitats need to be located within 5 km of Lake Ontario (OMNRF 2015). Even the boundary of the greatest extent of the Biodiversity Impact Studies (BIS) study areas – the Regional Study Area (RSA) for ecosystem functions and services (RSA_{ECO}), which encompasses the RSAs for upland breeding birds and terrestrial invertebrates – is approximately 130 km from Lake Ontario. The two SWH exceptions for Ecoregion 6E (Mast Producing Areas and Lek) are also restricted to ecodistricts outside of the BIS study areas (Wester et al. 2018). The Tobermory Ecodistrict (6E-14), located at the northern end of the Bruce Peninsula, supports an isolated and distinct population

of American black bears, which rely on mast-producing trees for food in the summer and fall. The Manitoulin Ecodistrict (6E-17) includes Manitoulin Island, the only area in Ecoregion 6E where sharp-tailed grouse occur. This species uses traditional lekking sites for courtship displays. The RSA_{ECO} is located primarily within the Mount Forest Ecodistrict (6E-5) and partly within the Kincardine (6E-2) and Stratford (6E-1) ecodistricts (**Figure A-1**), south of Ecodistricts 6E-14 and 6E-17.

There may be other SWH types that are unlikely to be relevant to the SON-South Bruce siting area, such as certain rare vegetation communities that are more common in the Bruce Peninsula (e.g., Alvars), the shoreline of Lake Huron (e.g., Freshwater Coastal Dunes, included as "Other Rare Vegetation Communities"), or the Niagara Escarpment (e.g., Cliffs and Talus Slopes) within Ecoregion 6E. However, to be conservative, Zoetica™ considered the remaining 35 types of SWH during desk-based investigations of ecosites, indicator/characteristic and selected wildlife species, and other habitat features within the BIS study areas (see Section 2.0).

1.1 Objectives

The overall objectives of SWH identification for the BIS are to:

1. Identify potentially important habitats (i.e., candidate SWH) within the Area of Interest (AOI) and biodiversity value (BV)-specific local study areas (LSAs) and regional study areas (RSAs), which will assist in the selection of survey locations for more detailed Tier 2 studies, including confirmation of SWH.
2. Characterize the presence and distribution of candidate and confirmed SWH for relevant species, including species of interest (e.g., at-risk, rare, culturally important, and indicator species), within the BV-specific study areas.
3. Delineate and map candidate and confirmed SWH (including sensitivity buffers), to inform mitigation during project planning (e.g., site alignment), construction, and operations, in compliance with the Ontario PPS.
4. Provide baseline data to help inform the Project's biodiversity impact assessment (IA) and mitigation measures, and to assist in the potential development of monitoring program(s) to address environmental, regulatory, and stakeholder/rights-holder concerns.

Applying the MNRF approach of identifying SWH will capture potential significant habitat in various seasons for both at-risk and not-at-risk wildlife species (OMNRF 2015). The identification of important breeding, migration/stopover, and wintering habitats will be crucial for the Project's biodiversity IA and may also contribute to research and recovery efforts for species at risk (SAR). Zoetica can then use maps of potentially suitable habitats to direct targeted field reconnaissance surveys to confirm habitat quality for target species/species groups. Furthermore, if additional habitat suitability mapping is needed to improve the understanding of the availability and quality of habitat on the landscape for certain species, mapped SWH can be used as a starting point. Mapping SWH can also help evaluate the availability, spatial arrangement, uniqueness (compared to a regional context), and quality of habitat that could be directly or indirectly affected by the Project.

1.2 Best Practices

The general approach for identification of candidate SWH in Ontario involves first comparing species' habitat descriptions to land cover data (e.g., ecosites). Appendix G in the *Significant Wildlife Habitat Technical Guide* presents habitat matrices for all native vertebrate (amphibians, reptiles, birds, mammals)

and vascular vegetation species in Ontario (OMNR 2000). The matrices include habitat/behaviour descriptions and general habitat features associated with each species, such as wetlands, open water, riparian areas, grasslands, parklands/suburban areas, thickets and second growth, old growth and mature stands, forest edges, downed woody debris, seeps, and cliffs, talus slopes, and ravines. Dialogue with Indigenous Knowledge holders and knowledgeable stakeholders can also help to identify areas for ground-truthing. Examples of such groups include the MNRF district office, local Conservation Authorities, field naturalist clubs and landowners, municipalities, and Environment and Climate Change Canada.

Field-based surveys are then conducted to verify candidate SWH identified through desktop studies. Additional habitat criteria for the SWH need to be considered on the ground – some landscape features may be identified through desktop analysis of existing data, while other criteria will likely only be verified through field observations. Field studies are also generally needed to confirm SWH, such as by documenting the presence of target species and evidence of habitat use.

Notes: the *Significant Wildlife Habitat Technical Guide* and 6E ECS focus on terrestrial and wetland habitats for terrestrial and semi-aquatic animals and vegetation, while a separate provision exists in the Ontario PPS for the protection of fish habitat (MMAH 2020). However, important habitats for Special Concern and Rare fish species could also be interpreted as SWH. As the modernized *Fisheries Act* (last amended on 28 August 2019) protects all fish and fish habitat in Canada, this federal legislation would also protect SWH for fish. For the purposes of the BIS and to avoid redundancy in reporting on regulatory requirements, fish habitat will be discussed separately from SWH unless the *Fisheries Act* is amended again in the future to become less protective of fish habitat. Refer to the BIS Baseline sections on Aquatic Habitat Mapping (Appendix D, Chapter 1) and Fish and Fish Habitat (Chapter 8) for further details about fish habitat.

2.0 STUDY AREAS

Identification and mapping of each SWH type will occur within the relevant BV-specific study areas. See Section 3.0 in Chapter 1 of the 2023 BIS Baseline Report and Section 5.2 of Zoetica's *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach* (BPPA) Report for more details on study area descriptions (Zoetica 2021a).

For the Tier 1 baseline studies, desk-based ecosite classification and subsequent field verification were completed as part of Terrestrial Ecosystem Mapping (TEM) (see Appendix B, Chapter 1), and only covered the LSA for ecosystem functions and services (LSA_{ECO}). A map of the LSA_{ECO} and general project area, including various landscape features for reference, is available in **Figure A-2** in Appendix A. The LSA_{ECO} encompasses both the terrestrial LSA (LSA_{TER}) and aquatic LSA (LSA_{AQU}) and overlaps portions of the BV-specific RSAs. Zoetica analyzed ecosite data to identify candidate SWH for the LSA_{ECO}. However, important wildlife habitats tracked by the MNRF and relevant species observations collated from both desk- and field-based data were mapped to the BV-specific RSAs to allow for interpretation with ecosite data.

If the SON-South Bruce siting area is selected for the Project, Zoetica will expand baseline data collection for the ecosite classification dataset to the RSA for studies of vegetation (RSA_{VEG}) and complete additional ecosite analyses for candidate SWH. When the ecosite classification dataset is complete, field identification of SWH will also be expanded into the BV-specific RSAs in future years of the baseline program.

3.0 METHODS

A full list of species mentioned in this report, including common and scientific names, is available in **Table B-1** in Appendix B.

3.1 Desk-based Mapping of Candidate SWH

Zoetica documented and mapped SWH that was already identified by MNRF (e.g., from the Wildlife Activity datasets; see **Table C-1**) or encountered in the field. For the most part, candidate and confirmed SWH are not tracked in a central database by the Government of Ontario. However, the MNRF and Natural Heritage Information Centre (NHIC) manage wildlife and wildlife habitat data layers that may constitute SWH. Citizen science databases and other biodiversity databases (e.g., Global Biodiversity Information Facility [GBIF]) may contain observations that warrant further study as candidate SWH. Zoetica also investigated findings from the previous 2020 preliminary environmental studies conducted for the Project in the SON-South Bruce siting area (Tulloch Environmental 2020, 2021) and current research from the Nuclear Waste Management Organization's (NWMO) partnership with the Toronto Zoo's Native Bat Conservation Program (NBCP). While Tulloch Environmental's survey efforts do not fully coincide with the current BIS study areas, relevant data can be gleaned from their reports. The databases, data layers, and reports investigated and analyzed for the 2023 SWH baseline report are presented in **Table C-1** in Appendix C. See also Appendix A, Chapter 1 for data quality scoring.

Zoetica began desk-based identification and mapping of candidate SWH with analysis of the Ecological Land Classification (ELC) ecosites listed in the 6E ECS (OMNRF 2015). The 6E ECS references ecosites from the 1998 "first approximation" ELC system for southern Ontario (hereafter, 'ELC-1998') (Lee et al. 1998). However, the ecosite classification dataset created for the BIS used the updated draft Great Lakes Shoreline Ecosystem (GLSE) classification system (Lee et al. 2021a) (see Appendix B, Chapter 1). To support SWH analyses, Zoetica converted the GLSE assignments to the ELC-1998 system using the draft ecosite conversion tables in Lee et al. (2021b). For GLSE ecosites with no equivalent ELC-1998 code(s) in the conversion tables, one Zoetica staff member manually reviewed the vegetation types/characteristics and selected the closest ELC-1998 match, while a second staff member independently verified the conversion by repeating this process. This manual review resulted in conversions primarily at the ecosite level; however, some assignments were refined to ELC vegetation type, while others could only be resolved to the ELC community series or community class (see **Table C-2**). In addition, the ecosite classification dataset included only natural and naturalized habitats; therefore, the potential for some agricultural fields to be candidate SWH (e.g., depending on activity and crop type) could not be ascertained through desk-based analyses.

For some rare vegetation communities, such as Cliffs and Talus Slopes and Sand Barren, the ecosites listed in the 6E ECS can be directly considered strong candidate SWH. These ecosites will likely require only field investigations to confirm vegetation composition and area size to become confirmed SWH (OMNRF 2015). For other SWH types, listed ecosites (or ELC community series or community class) indicate where the habitat feature is more likely to be found. However, certain SWH types may still occur in a wide variety of habitats (e.g., "all forested ecosites") and more intensive desk- and field-based investigations are needed to confirm SWH. Where possible, Zoetica conducted additional GIS analyses using the specified habitat criteria noted in the 6E ECS, such as requirements for proximity to watercourses/waterbodies, adjacent habitats, and minimum patch size, to refine the locations of candidate SWH beyond ecosite matches. Zoetica used a conservative approach and included contiguous ecosite polygons to calculate minimum

area sizes; and considered line features (e.g., roads, trails, watercourses) that separate suitable polygons as 'breaks' to the habitat patch. However, the ecological importance of these features – i.e., whether they would be considered as disrupting the sense of continuous habitat – may depend on the BV (e.g., smaller upland breeding birds may be less tolerant than larger raptors).

The habitats of species of Special Concern (under the Ontario *Endangered Species Act* [*ESA*]) and provincially rare wildlife and vegetation species (subnational rank [SRANK] S1, S2, and S3) are also considered SWH after Element Occurrences (EOs) generated by the NHIC (which are considered candidate SWH) are spatially refined to the ecosite level through detailed field studies. Furthermore, the 6E ECS and *Significant Wildlife Habitat Technical Guide* provide lists of indicator vegetation species to identify certain rare vegetation communities, and the 6E ECS and *Significant Wildlife Habitat Mitigation Support Tool* (SWHMiST) (MNRF 2014) also list wildlife species of relevance for each SWH type. Thus, Zoetica investigated the data sources shown in **Table C-1** to collate records of at-risk[2], provincially rare, and other SWH-relevant species within the BIS study areas. See Appendix A, Chapter 1 for data quality scoring.

3.2 Field Identification of Candidate SWH

Tulloch Environmental was retained as the field data collection contractor to complete the first year of Tier 1 terrestrial studies (TEM and Identification of Candidate SWH). Tulloch Environmental conducted field studies in the summer of 2022 between July 18 and September 29, with assistance from four field subcontractors: Natural Resource Solutions Inc., North-South Environmental Inc., Stantec, and SLR Consulting. Each survey crew consisted of a wildlife biologist who identified candidate SWH, and a vegetation specialist and a soil specialist who ground-truthed the ecosite mapping.

Candidate SWH were surveyed ***opportunistically***[3] at 473 out of 474 TEM plots visited (full, ground, and visual). Zoetica originally designed the TEM/SWH studies to include 538 survey sites (Zoetica 2022). See Section 3.2 of Appendix B, Chapter 1, for further details regarding TEM study design and survey site selection. However, the field data collection contractor encountered access limitations on the ground (e.g., private land restrictions, unsafe conditions, unobtained utility locates), which resulted in the omission of 66 plots.

Surveys were focused on field-based identification of potential wildlife breeding habitats, permanent features, and other candidate SWH that are identifiable through vegetation communities and characteristics within natural/naturalized ecosites. Incidental field observations of relevant wildlife species and habitat use were also recorded to support candidate SWH identification. The wildlife biologist recorded the presence, absence, or unknown status (i.e., due to unmet seasonal requirements) of candidate SWH, following the habitat criteria outlined in the 6E ECS (OMNRF 2015). Ecosite criteria were

[2] For the purposes of this 2023 Tier 1 BIS Baseline Report, conservation statuses described in text for at-risk species refer to their Species at Risk in Ontario (SARO) listings unless otherwise indicated. Conservation statuses are from the NHIC's Ontario species list, current to March 1, 2023, and updated for any discrepancies with provincial and federal SAR listings up to August 15, 2023. As such, species and status listings may differ from those presented in Zoetica's 2021 BPPA Report (Zoetica 2021a).

[3] Zoetica acknowledges that opportunistic summer surveys at TEM plots will not capture all potentially occurring candidate SWH types listed in the 6E ECS. Therefore, Zoetica proposes additional seasonal surveys of candidate SWH within targeted areas corresponding to BV-specific study areas as part of Tier 2 studies. See Section 5.3 for further information.

not included in the scope of field work due to the complication of converting the pre-determined GLSE codes to the ELC-1998 codes listed in the 6E ECS. Rather, Zoetica completed *post hoc* ecosite analyses for SWH after the field-derived TEM data were completed, quality-checked, and transferred according to NWMO policies and procedures.

Where one or more habitat criteria were met, field teams were instructed to provide habitat details and rationale for determining that a plot contains, potentially contains (i.e., requires a more detailed survey at an appropriate time of year to confirm), or does not contain candidate SWH.[4] Site photographs were taken as additional documentation of the habitat characteristics and incidental observations. Please refer to the Standard Operating Procedure for TEM and Identification of Candidate SWH in the *Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design Report* (Zoetica 2022) for more details on the field procedures.

Tier 1 aquatic studies (Aquatic Habitat Mapping and eDNA metabarcoding) also began in the summer of 2022, with a second eDNA field campaign completed in the fall of 2022 (see Appendix D and Appendix E, Chapter 1). While these aquatic studies are not directly related to identification of candidate SWH, certain species observations and habitat assessments may provide supporting information for further study. In addition, field crews for all Tier 1 BIS baseline programs were instructed to record incidental wildlife and vegetation observations, including whether the observation is a potential indicator of SWH, at their survey plots and while traversing through the BIS study areas.

3.2.1 Data QA/QC

The field data collection contractor completed quality assurance and quality control (QA/QC) of their 2022 field data prior to submitting the dataset to the NWMO, who then provided the dataset to Zoetica for data analysis and interpretation. Data received by Zoetica were assumed to be in a cleaned, error-free, useable format. Data ambiguities, such as uncertain species identifications, were resolved between Zoetica and Tulloch Environmental prior to finalizing this SWH appendix. Further details on the field program timeline, training, sampling/surveying, project tracking, data QA/QC, internal audits, and a summary of quality issues encountered can be supplied by the NWMO upon request. Aside from the number of planned versus completed plots (described in Section 3.2), the only discrepancy between Tulloch Environmental's work plan and work conducted was the need for extensive *post hoc* data QC, rather than ongoing quality checks as the field season progressed, due to issues encountered with the digital field form and database. The NWMO, Zoetica, and the field data collection contractor will continue to discuss opportunities for improvement for future BIS baseline study design and field planning.

3.3 Species Observations Mapping and Interpretation

To protect sensitive species and ecosystems, NHIC spatial data and 2022 field data pertaining to provincially tracked (at-risk and rare) species and wildlife concentration areas (e.g., nest colonies) are represented by a 1 km grid, rather than a point or polygon, as per the NHIC's Sensitive Data Location Standards (NHIC n.d.). Descriptive reporting also follows sensitivity standards and is not detailed enough to allow for precise geolocation. In addition, data for NHIC Restricted Elements, such as Endangered bat species, are further protected by not presenting these data on maps, describing observations to the

[4] Where additional habitat details and rationale were not provided, it is assumed that the plot meets (or did not meet) the 6E ECS habitat criteria. The field data collection contractor and their subcontracted wildlife biologists are experienced and knowledgeable in the identification and evaluation of SWH in southwestern Ontario.

largest relevant BIS study area, and obscuring species names to "Restricted Species" with an alphanumeric code.

GBIF data were limited to observations from 1970 onward as older observations were considered historic and not as reliable. For wildlife species, mapping was restricted to the appropriate seasonal timing window(s) for the SWH type (see **Table C-3**). When there were multiple entries with a count of one at the same location, Zoetica assumed the entries were all the same individual to avoid double-counting and erroneously reporting that multiple individuals were present. As observations of multiple individuals are more relevant for identifying candidate SWH, group observations are further described in Section 4.0 of this SWH appendix.

Zoetica screened all incidental field observations for relevance to SWH mapping and discussion in the Results, Section 4.0, below. Observations were mapped without consideration of seasonal timing windows (see **Table C-3**) if they were 1) recorded by TEM/SWH survey crews as part of the habitat details and rationale for identifying candidate SWH, 2) recorded on the separate incidental observations data form and marked as a potential indicator of SWH, 3) Special Concern and Rare species, or 4) identified by Zoetica as potentially relevant to SWH (e.g., nesting/breeding habitats or activities, presence of young/juveniles, groups of wildlife). Other incidental species observations without additional context for SWH were filtered by the seasonal timing windows. Evidence of species habitat use (e.g., nesting) is more relevant for identifying candidate SWH than general observations of the species occurring in the area (but not using the habitat). However, the presence of SWH representative species within the BIS study areas, especially during appropriate times of the year for seasonal SWH types, may provide further support for continuing investigations of SWH.

Incidental observations were recorded during various Tier 1 baseline field programs and were noted on different data forms. Incidental observations varied in method of observation (audio, visual, etc.) and life history stage of organisms, and may have been recorded in transit to a site and thus not associated with habitat data. As well, expertise in species identification may have varied among field contractors working on different field programs. Thus, not all pertinent information may have been available (e.g., observation type, activity, demographics) or collected in a directly comparable manner (e.g., quantity).

For SWH mapping and interpretation purposes, Zoetica defaulted to 'unspecified' observation type, count of one individual, and adult organisms unless otherwise indicated. Observation types of particular relevance to candidate SWH, such as nests, eggs and young, burrows, potential breeding habitat, potential hibernacula, and other evidence of breeding, were directly reported. In contrast, Zoetica created a general "wildlife sign" observation type to encompass observations of tracks, scat, evidence of feeding (e.g., deer browse, sapsucker holes), body parts (e.g., feathers, antlers, snakeskin, carcasses), etc., that are less informative for identifying candidate SWH. Zoetica also simplified the variable quantity data from field incidental observations in 2022: numerical counts and densities (low, medium, high) were directly reported, whereas qualitative descriptions were categorized into "many", "multiple", and "several"[5]. Zoetica also assumed one individual when a singular observation (e.g., "frog") was recorded in the field notes, and more than one individual if plural observations (e.g., "frogs") were recorded.

[5] Zoetica's categorization of "many" individuals includes field incidental observation entries of "many", "large amount", "large number", "lots", and "numerous" individuals. The categories of "multiple" and "several" individuals include only entries with "multiple" and "several" individuals, respectively.

For both desk- and field-based species observation data, only the species and locations (masked for sensitive data, where needed) are presented on the maps in Appendix D. Additional information about count, observation type, and source type (i.e., which Tier 1 program the incidental observation came from) is presented in the supplemental table(s) for each map in Appendix D.

4.0 RESULTS

For this 2023 BIS Baseline Report, Zoetica produced candidate ecosite SWH mapping by updating the remotely sensed ecosite classification dataset (i.e., desk-based TEM) using the ground-truthed ecosite data (i.e., field-based TEM). Candidate SWH mapping also included field plot determinations of whether the habitat met additional criteria as outlined in the 6E ECS, and both desk- and field-based observations of relevant wildlife species.

A summary of confirmed and candidate SWH identified within the AOI and BV-specific LSAs and RSAs is presented in **Table 4-1**. Confirmed SWH includes Deer Winter Congregation Areas, Seeps and Springs, Terrestrial Crayfish, and nesting habitat for barn swallow (Special Concern). Additionally, there are 23 SWH types where candidate SWH was considered present due to ecosite matches, some or all habitat criteria being met, or records of species and/or habitat features. The following Sections 4.1 through 4.5 describe the combined desk- and field-based results for each SWH type of relevance in the SON-South Bruce siting area. All map figures showing candidate SWH and supplemental tables for observation data are presented in Appendix D. A summary of GLSE ecosite matches for each SWH type is presented in **Table E-1** in Appendix E.

Table 4-1. Summary table of candidate SWH within the BIS study areas based on desk- and field-based investigations made to date.

SWH type	Study areas[1]	Ecosite matches	Other habitat criteria met[2]	Mapped habitat or SWH species observations[3]	2023 Summary and Next Steps
SEASONAL CONCENTRATION AREAS					
Waterfowl Stopover and Staging Areas (Terrestrial) Figure D-1	AOI	✓	?	✓	*Candidate SWH* Requires spring surveys to confirm
	LSA_{TER}	✓	?	✓	
	$RSA_{AVI-AQU}$	✓	?	✓	
Waterfowl Stopover and Staging Areas (Aquatic) Figure D-2	AOI	✓	✓	✓	*Candidate SWH* Requires spring and fall surveys to confirm
	LSA_{TER}	✓	×	✓	
	$RSA_{AVI-AQU}$	✓	✓	✓	
Shorebird Migratory Stopover Area Figure D-3	AOI	✓	×	✓	*Candidate SWH* Requires spring and fall surveys to confirm
	LSA_{TER}	✓	×	×	
	$RSA_{AVI-AQU}$	✓	×	✓	
Raptor Wintering Area Figure D-4 – Bald Eagle Figure D-5 – Hawk/Owl	AOI	✓	✓	✓	*Candidate SWH* Requires winter surveys to confirm
	LSA_{TER}	✓	✓	✓	
	RSA_{AVI} / $RSA_{AVI-AQU}$	✓	✓	✓	
Bat Hibernacula	AOI	×	×	×	No evidence of candidate SWH observed to date
	LSA_{TER}	×	×	×	
	RSA_{BAT}	×	×	×	
Bat Maternity Colonies Figure D-6	AOI	✓	✓	✓	*Candidate SWH* Requires targeted surveys to confirm
	LSA_{TER}	✓	✓	✓	
	RSA_{BAT}	✓	✓	✓	
Turtle Wintering Areas Figure D-7	AOI	✓	✓	✓	*Candidate SWH* Requires spring or fall surveys to confirm
	LSA_{TER}	✓	✓	✓	
	$RSA_{HRP-AQU}$	✓	✓	✓	
Reptile Hibernaculum Figure D-8	AOI	✓	✓	×	*Candidate SWH* Requires spring or fall surveys to confirm
	LSA_{TER}	✓	?	×	
	RSA_{HRP} / $RSA_{HRP-AQU}$	✓	✓	✓	

SWH type	Study areas[1]	Ecosite matches	Other habitat criteria met[2]	Mapped habitat or SWH species observations[3]	2023 Summary and Next Steps
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) Figure D-9	AOI	✓	?	✓	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	✓	×	×	
	RSA_{AVI}	✓	×	✓	
Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs) Figure D-10	AOI	✓	✓	✓	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	✓	?	✓	
	RSA_{AVI} / $RSA_{AVI-AQU}$	✓	✓	✓	
Colonially-Nesting Bird Breeding Habitat (Ground)[4] Figure D-11 – Brewer's Blackbird	AOI	✓	✓	×	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	✓	×	×	
	RSA_{AVI}	✓	×	×	
Deer Yarding Areas Figure D-12	AOI	✓	?	×	SWH unlikely based on MNRF mapping
	LSA_{TER}	✓	?	×	
	RSA_{UNG}	✓	?	×	
Deer Winter Congregation Areas Figure D-13	AOI	✓	?	×	**Confirmed SWH in LSA_{TER} and RSA_{UNG}**
	LSA_{TER}	✓	?	✓	
	RSA_{UNG}	✓	?	✓	
RARE VEGETATION COMMUNITIES					
Cliffs and Talus Slopes	AOI	×	×	×	No evidence of SWH to date
	LSA_{TER}	×	×	×	
	RSA_{VEG}	×	×	×	
Sand Barren	AOI	×	×	×	No evidence of SWH to date
	LSA_{TER}	×	×	×	
	RSA_{VEG}	×	×	×	
Alvar Figure D-14	AOI	✓	×	×	*Candidate SWH (ecosites only)* Requires further field studies
	LSA_{TER}	✓	×	×	
	RSA_{VEG}	✓	×	×	
Old Growth Forest Figure D-15	AOI	✓	×	(✓)[5]	*Candidate SWH* Requires further desktop studies
	LSA_{TER}	✓	×	×	
	RSA_{VEG}	✓	✓	(✓)[5]	

SWH type	Study areas[1]	Ecosite matches	Other habitat criteria met[2]	Mapped habitat or SWH species observations[3]	2023 Summary and Next Steps
Savannah	AOI	×	×	×	No evidence of SWH to date
	LSA_{TER}	×	×	×	
	RSA_{VEG}	×	×	×	
Tallgrass Prairie	AOI	×	×	×	No evidence of SWH to date
	LSA_{TER}	×	×	×	
	RSA_{VEG}	×	×	×	
Other Rare Vegetation Communities	AOI	TBD	TBD	TBD	*To be determined* Requires further discussions with NHIC and MNRF
	LSA_{TER}	TBD	TBD	TBD	
	RSA_{VEG}	TBD	TBD	TBD	
SPECIALIZED HABITAT FOR WILDLIFE					
Waterfowl Nesting Area Figure D-16	AOI	✓	✓	✓	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	✓	✓	✓	
	$RSA_{AVI-AQU}$	✓	✓	✓	
Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat Figure D-17	AOI	✓	✓	×	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	✓	✓	×	
	$RSA_{AVI-AQU}$	✓	✓	✓	
Woodland Raptor Nesting Habitat Figure D-18	AOI	×	✓	✓	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	✓	✓	×	
	RSA_{AVI}	✓	✓	✓	
Turtle Nesting Areas Figure D-19	AOI	×	?	✓	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	✓	✓	✓	
	$RSA_{HRP-AQU}$	✓	✓	✓	
Seeps and Springs Figure D-20	AOI	✓	✓	✓	**Confirmed SWH in AOI and LSA_{AQU}**
	LSA_{TER}	✓	?	✓	
	RSA_{AVI} / RSA_{UNG} / $RSA_{HRP-AQU}$	✓	✓	✓	
Amphibian Breeding Habitat (Woodland) Figure D-21	AOI	✓	✓	✓	*Candidate SWH* Requires spring surveys to confirm
	LSA_{TER}	✓	✓	✓	
	$RSA_{HRP-AQU}$	✓	✓	✓	

SWH type	Study areas[1]	Ecosite matches	Other habitat criteria met[2]	Mapped habitat or SWH species observations[3]	2023 Summary and Next Steps
Amphibian Breeding Habitat (Wetlands) Figure D-22	AOI	✓	✓	✓	*Candidate SWH* Requires spring surveys to confirm
	LSA_{TER}	✓	✓	×	
	$RSA_{HRP-AQU}$	✓	✓	✓	
Woodland Area-Sensitive Bird Breeding Habitat Figure D-23	AOI	✓	✓	✓	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	✓	✓	✓	
	RSA_{AVI}	✓	✓	✓	
HABITAT FOR SPECIES OF CONSERVATION CONCERN					
Marsh Bird Breeding Habitat Figure D-24	AOI	✓	✓	✓	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	✓	?	×	
	$RSA_{AVI-AQU}$	✓	✓	✓	
Open Country Bird Breeding Habitat Figure D-25	AOI	×	✓	✓	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	×	✓	✓	
	RSA_{AVI} / $RSA_{AVI-AQU}$	×	×	✓	
Shrub/Early Successional Bird Breeding Habitat Figure D-26	AOI	×	✓	✓	*Candidate SWH* Requires breeding season surveys to confirm
	LSA_{TER}	×	?	✓	
	RSA_{AVI}	×	?	✓	
Terrestrial Crayfish Figure D-27	AOI	✓	✓	✓	**Confirmed SWH in AOI and LSA_{AQU}**
	LSA_{AQU}	✓	✓	✓	
Special Concern and Rare Wildlife Species	39 Special Concern and provincially rare species have been recorded within the AOI, LSA_{TER} or LSA_{AQU}, and/or BV-specific RSAs. See Section 4.4.5 for a detailed discussion.				**Confirmed SWH for terrestrial crayfish and barn swallow** *Candidate SWH for other species*
ANIMAL MOVEMENT CORRIDORS					
Amphibian Movement Corridors Figure D-28	AOI	✓	✓	✓	*Candidate SWH* Must be determined when Amphibian Breeding Habitat (Wetland) is confirmed as SWH.
	LSA_{TER}	✓	✓	✓	
	$RSA_{HRP-AQU}$	✓	✓	✓	

SWH type	Study areas[1]	Ecosite matches	Other habitat criteria met[2]	Mapped habitat or SWH species observations[3]	2023 Summary and Next Steps
Deer Movement Corridors Figure D-29	AOI	✓	?	×	SWH unlikely based on MNRF mapping
	LSA_{TER}	✓	?	×	
	RSA_{UNG}	✓	?	×	

Notes:

1. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed within its boundaries.
2. "?" refers to TEM plots where surveyors marked the presence of candidate SWH as "unknown".
3. See Table C-1 and References for full names of datasets and sources used in this analysis.
4. For Colonially-Nesting Bird Breeding Habitat (Ground), ecosite matches and field-identified candidate SWH plots apply to Brewer's blackbird only. There have been no observations of Brewer's blackbird within the BIS study areas. There are GBIF records for gulls and terns but information about potential nesting was not available. See Section 4.1.11 for further discussion of this SWH type.
5. Observations for Old Growth Forest refer to nesting bird species described as indicators/representatives of, or associated with, old growth forests (MNRF 2014). The presence of these birds may help identify candidate SWH; however, confirmation of Old Growth Forest requires direct assessment of forest characteristics. See Section 4.2.4 for further discussion of this SWH type.

4.1 Seasonal Concentration Areas

4.1.1 Waterfowl Stopover and Staging Areas (Terrestrial)

Out of 2,155 ecosites mapped within the $RSA_{AVI-AQU}$, Zoetica's desk-based analyses found 59 meadow and three shrub ecosites that matched 6E ECS criteria (**Figure D-1**, **Table E-1**).

Of the 473 TEM plots assessed in the field, none were identified as candidate SWH, five (1.1%) were assigned as "unknown", and the remaining 468 (98.9%) were not considered suitable Waterfowl Stopover and Staging Areas (Terrestrial) (**Figure D-1**). The five "unknown" plots – one in the AOI, two in the LSA_{TER} outside the AOI, and two in the $RSA_{AVI-AQU}$ south of the LSA_{TER} – were marked as such because these areas were surveyed in the summer but have the potential to flood in the spring and provide important invertebrate foraging habitat for migrating waterfowl. Similarly, the few field observations of waterfowl were not considered relevant to this SWH type due to the summer survey timing.

However, notable migration observations from the GBIF dataset include groups of 4-8 American wigeons and 10-30 mallards within a meadow ecosite west of the AOI that matches SWH criteria (**Figure D-1**; **Table D-1**). Other waterfowl species, including blue-winged teal (provincially rare), American black duck, green-winged teal, gadwall, northern pintail, northern shoveler, and wood duck have been observed within the $RSA_{AVI-AQU}$ outside the AOI and LSA_{TER}. These observations ranged from groups of 1-40 individuals; however, even when combined across species, there may not be high enough abundance within an area to meet the SWH criteria.

For candidate SWH to be confirmed as SWH, any mixed species aggregation of 100 or more individuals is required (OMNRF 2015). Candidate SWH areas (including "unknown" plots) should be re-assessed in the spring for the presence of sheet water and waterfowl species presence, abundance, and habitat use.

4.1.2 Waterfowl Stopover and Staging Areas (Aquatic)

Out of 2,155 ecosites mapped within the $RSA_{AVI-AQU}$, Zoetica's desk-based analyses found 521 polygons that matched 6E ECS criteria (**Figure D-2**, **Table E-1**). Ecosite matches were primarily hardwood swamps, with a few marshes also identified.

Of the 473 TEM plots assessed in the field, seven (1.5%) were identified as candidate SWH, three (0.6%) were assigned as "unknown", and the remaining 463 (97.9%) were not considered suitable Waterfowl Stopover and Staging Areas (Aquatic) (**Figure D-2**). However, at four "not suitable" plots, surveyors noted possible candidate SWH at an adjacent or nearby lake, including Schmidt Lake. The "unknown" plots were not open areas with enough standing water during the summer survey but conditions in the spring could potentially support waterfowl. One candidate SWH plot was located within the AOI while the other six plots were in the $RSA_{AVI-AQU}$ north of the LSA_{TER}.

Incidental observations of waterfowl were uncommon during the 2022 field studies. Canada geese, wood ducks, mallards[6], and unidentified duck and geese were incidentally observed on the Teeswater River and/or its tributaries within the AOI (**Figure D-2**; **Table D-2**). Wood ducks and unidentified ducks and geese were also observed at a few locations in and adjacent to the Greenock Swamp Wetland Complex (GSWC)

[6] Although wood duck and mallard are not listed in the 6E ECS for Waterfowl Stopover and Staging Areas (Aquatic), these species are included in the SWHMiST for Waterfowl Stopover and Staging Areas, which is indicated as being applicable to All of Ontario (MNRF 2014).

and Teeswater Wetland Complex within the $RSA_{AVI-AQU}$. eDNA metabarcoding analyses identified hooded merganser, mallard, and wood duck in various aquatic habitats within the AOI and/or LSA_{AQU} during summer and/or fall (see Section 4.2.4 in Appendix E, Chapter 1).

Notable migration observations from the GBIF dataset include 20 common mergansers and two Canada geese along the Teeswater River at Concession Road 8 within the AOI (**Figure D-2**; **Table D-3**); however, surveyors determined this marsh polygon to be unsuitable as SWH as it did not meet the 6E ECS habitat criteria for Waterfowl Stopover and Staging Areas (Aquatic). Similarly, a variety of waterfowl species (American wigeon, Canada goose, mallard, ring-necked duck) in groups of 4-30 were observed off Concession Road 8 within the LSA_{TER} west of the AOI. Surveyors identified this polygon as potentially meeting the 6E ECS habitat criteria for Waterfowl Stopover and Staging Areas (Terrestrial) (see Section 4.1.1) rather than as suitable aquatic habitat for migrating waterfowl. Another group of 20 Canada geese was observed outside of mapped ecosites near the southern boundary of the LSA_{TER}. The geographic coordinates are located on agricultural land and would not be suitable Waterfowl Stopover and Staging Areas (Aquatic). However, based on satellite imagery, it is possible that the geese were using the small pond within the hardwood forested ecosite west of Sideroad 25 North.

There are also numerous GBIF records of waterfowl within the $RSA_{AVI-AQU}$ outside the AOI and LSA_{TER} during the migration (**Figure D-2**; **Table D-3**). In addition to the aforementioned species, blue-winged teal (provincially rare), canvasback (provincially rare), American black duck, bufflehead, cackling goose, common goldeneye, gadwall, green-winged teal, hooded merganser, lesser scaup, long-tailed duck, northern pintail, northern shoveler, red-breasted merganser, snow goose, white-winged scoter, and wood duck[6] have been detected. There are a few areas where more than 100 individuals of a species were observed together, including south of Clam Lake (groups of 131-540 Canada geese), Riversdale (groups of 500-700 Canada geese), and two locations within the central and northern portions of the GSWC (a group of 100 Canada geese and another group of 500 red-breasted mergansers). Furthermore, other areas may have greater than 100 individuals cumulatively across multiple waterfowl species.

For candidate SWH to be confirmed as SWH, aggregations of 100 or more of the observed listed species for seven days are required (OMNRF 2015).[7] Candidate SWH areas (including unknown" and "nearby" plots and locations with notable species observations) should be re-assessed in the spring and fall for waterfowl species presence, abundance, and habitat use.

4.1.3 Shorebird Migratory Stopover Area

Out of 2,155 ecosites mapped within the $RSA_{AVI-AQU}$, Zoetica's desk-based analyses found 145 marsh ecosites that matched 6E ECS criteria (**Figure D-3**, **Table E-1**).

None of the 473 TEM plots assessed in the field were identified to be suitable Shorebird Migratory Stopover Areas. No shorebirds of relevance to this SWH type were observed during 2022 field studies. Notable migration observations from the GBIF dataset include a variety of shorebirds – including lesser yellowlegs (Threatened), dunlin, least sandpiper, pectoral sandpiper, stilt sandpiper, semipalmated plover, and semipalmated sandpiper – ranging from groups of 1-20, at the marsh ecosite northwest of the intersection of Concession Road 8 and Sideroad 25 North within the AOI (**Figure D-3**; **Table D-4**). This

[7] The defining criteria for confirmed SWH in Ecoregion 6E are not described in full in this SWH appendix; only criteria relevant to species observed to date are included. Should additional species be observed during future baseline studies, the next iterations of this SWH appendix will include the applicable defining criteria.

ecosite was not selected for Tier 1 terrestrial field studies in 2022 as it did not meet the minimum area size and/or shape requirements for TEM plots (Zoetica 2022). A group of three spotted sandpipers was also observed in a marsh ecosite approximately 600 m to the west; this polygon was deemed "not suitable" as candidate SWH during field surveys as the habitat did not meet the 6E ECS criteria for Shorebird Migratory Stopover Area. In addition to the aforementioned species, greater yellowlegs and solitary sandpiper have been observed within the $RSA_{AVI-AQU}$ outside of the AOI and LSA_{TER}. However, the number of individuals recorded in these GBIF observations (ranging from 1-5) are likely insufficient to meet the requirements for SWH.

For candidate SWH to be confirmed as SWH, the presence of three or more of the listed species and >1,000 shorebird use days during the spring or fall migration period (i.e., the cumulative number of shorebirds counted per day over the course of the migration period) is required (OMNRF 2015)[7]. Furthermore, important habitat identified for the Threatened lesser yellowlegs is protected under the Ontario *ESA*. Candidate SWH areas (including locations with notable species observations) should be surveyed during spring and fall migration to determine species presence, abundance, and habitat use.

4.1.4 Raptor Wintering Area

Zoetica's desk-based analyses identified candidate SWH ecosites only for bald eagle. No ecosite matches were found for hawks/owls after additional screening for minimum size and habitat adjacency requirements. Out of 2,155 ecosites mapped within the $RSA_{AVI-AQU}$, Zoetica's desk-based analyses found 307 ecosites that matched 6E ECS criteria for bald eagle wintering area (**Figure D-4**, **Table E-1**). Most ecosite matches consisted of hardwood swamps and forests, followed by mixedwood forests and swamps, and some conifer forests and swamps.

No candidate Raptor Wintering Areas for bald eagle were identified in the field. The following analysis of TEM plots is, therefore, only applicable to hawks/owls. Of the 169 TEM plots assessed within the RSA_{AVI} in the field, 52 (30.8%) were deemed candidate SWH, 20 (11.8%) were assigned as "unknown", and the remaining 97 (57.4%) were not considered suitable Raptor Wintering Areas for hawks/owls. Plots identified as candidate SWH typically constituted forested habitats (mature or with large trees) adjacent to upland habitats (e.g., agricultural fields) that would be suitable for hawks/owls (**Figure D-5**). Most "unknown" plots indicated a need for desk-based analyses of area size and adjacency of forest/upland polygons.

The single field observation of an unidentified hawk was not considered relevant to this SWH type due to the summer survey timing. However, notable winter observations from the GBIF dataset include four bald eagles (**Figure D-4**) and one each of red-tailed hawk and rough-legged hawk (**Figure D-5**) along the Teeswater River north of Bruce Road 6 within the AOI. Groups of 1-2 bald eagles and red-tailed hawks were also observed in the winter at another location within the LSA_{TER} south of the AOI. In addition to bald eagle, red-tailed hawk, and rough-legged hawk, other raptors observed within the RSA_{AVI} outside the AOI and LSA_{TER} include American kestrel and snowy owl (**Table D-5**).

For candidate SWH to be confirmed as SWH, one or more bald eagles, or at least 10 individuals and two of the listed hawk/owl species, must use the site regularly (three of five years) for a minimum of 20 days (OMNRF 2015).[7] Candidate SWH areas, especially those with previous observations of raptors, should be surveyed during the winter to assess species presence, abundance, and habitat use.

4.1.5 Bat Hibernacula

Zoetica's desk-based analyses did not find any ecosites within the RSA_{BAT} that matched 6E ECS criteria. Of the 473 TEM plots assessed in the field, one (0.2%) was identified as "unknown" candidate SWH due to the presence of a house less than 100 m away; the remaining 472 were not considered suitable Bat Hibernacula. Buildings are not considered to be SWH for either Bat Hibernacula or Bat Maternity Colonies (see Section 4.1.6 below) (OMNRF 2015); however, if it is confirmed that Endangered or Threatened bat species are using the house, which is located within the LSA_{TER} outside the AOI, their habitat would be protected under the Ontario *ESA*. Studies undertaken by the NBCP from 2020–2022 have not identified potential bat hibernacula within the AOI or the general SON-South Bruce siting area (Thorne et al. 2021, Sparrow-Scinocca et al. 2022, Thorne 2023). No incidental observations of hibernating bats have been recorded to date.

4.1.6 Bat Maternity Colonies

Out of 1,169 ecosites mapped within the RSA_{BAT}, Zoetica's desk-based analyses found 740 polygons that matched 6E ECS criteria (**Figure D-6**, **Table E-1**). Ecosite matches were spread across hardwood forests, hardwood swamps, mixedwood forests, and mixedwood swamps.

Of the 201 TEM plots within the RSA_{BAT} assessed in the field, 84 (41.8%) were identified as candidate SWH, 46 (22.9%) were assigned as "unknown", and the remaining 71 (35.3%) were not considered suitable Bat Maternity Colonies (**Figure D-6**). However, at six "not suitable" plots, surveyors noted that there may be candidate SWH in other areas of the ecosite or within adjacent ecosites. "Unknown" plots were often marked as such because the required snag density for this SWH type (>10 snags/ha (OMNRF 2015)) had not been assessed. Plots identified as candidate SWH typically constituted forested habitats with large (>25 cm diameter at breast height [dbh]) trees, snags, and cavities or loose bark. Cavity trees on and off survey plots, throughout the AOI, LSA_{TER}, and RSA_{BAT}, were further described as incidental observations of candidate Bat Maternity Colonies and potentially other wildlife habitat (e.g., for raccoons). Of note, surveyors recorded a high density of cavity trees in an organic ash/maple swamp within the southern portion of the AOI (**Figure D-6**; **Table D-6**). This TEM plot was marked as "unknown" candidate SWH as use by bats was not confirmed. Four other locations within the AOI had a medium density of cavity trees and were assigned as either "yes" or "unknown" candidate SWH during TEM surveys. No bat activity or use of cavity trees was recorded during 2022 field studies.

From 2020–2022, the NBCP studied bats within the BIS study areas and the greater SON-South Bruce siting area (Thorne et al. 2021, Sparrow-Scinocca et al. 2022, Thorne 2023). Five colonially-roosting bat species, including three SAR, were detected through acoustic monitoring: Restricted Species M1, Restricted Species M2, Restricted Species M3, big brown bat, and silver-haired bat[8]. Activity levels determined through acoustic monitoring triggered exploratory trap-and-release and radio-telemetry efforts for Restricted Species M1. NBCP researchers mist-netted breeding individuals of Restricted Species M1 and big brown bat within the RSA_{BAT}, and radio-tracking of a single post-parturition female Restricted Species M1 identified potential nighttime foraging habitats (marsh and forest) and daytime roosting locations. NBCP researchers concluded that it is highly probable that the tagged Restricted Species M1 was roosting in a maternity colony located in a building within the RSA_{BAT} (Sparrow-Scinocca et al. 2022). Additional

[8] Silver-haired bat is not currently listed on SARO or Schedule 1 of the federal *Species at Risk Act* (*SARA*). However, this species was recently designated as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in May 2023.

information about at-risk bat detections from the NBCP studies is presented in Section 6.3.2.1 of Chapter 4.

Although bat maternity colonies in buildings are not considered SWH (OMNRF 2015), the habitat of Threatened or Endangered bat species would be protected under the Ontario *ESA*. Furthermore, ongoing research in collaboration with the NBCP may identify maternity roosts of other bat species in natural/naturalized habitats within the BIS study areas, such as the candidate SWH ecosites identified in **Figure D-6**. For candidate SWH to be confirmed as SWH, the presence of maternity colonies with confirmed use by 10 or more big brown bats or five or more adult female silver-haired bats is required (OMNRF 2015).

4.1.7 Turtle Wintering Areas

Out of 2,155 ecosites mapped within the $RSA_{HRP-AQU}$, Zoetica's desk-based analyses found 1,068 polygons that matched 6E ECS criteria (**Figure D-7**, **Table E-1**). Most ecosite matches consisted of hardwood swamps, followed by mixedwood swamps and marshes, and then conifer swamp, shrub swamp, and lake/river ecosites.

Of the 473 TEM plots assessed in the field, 13 (2.7%) were identified as candidate SWH, eight (1.7%) were assigned as "unknown", and the remaining 452 (95.6%) were not considered suitable Turtle Wintering Areas (**Figure D-7**). However, at three "not suitable" plots, surveyors noted that there may be candidate SWH in adjacent habitats with deeper water (e.g., lakes, marshes). There is one plot identified as candidate SWH, located in a marsh polygon north of Bruce Road 6, and three "unknown" plots within the AOI. Some plots were marked "unknown" because it is unclear if the water is deep enough not to freeze to the bottom. In addition, Aquatic Habitat Mapping (AHM) surveys identified a few stream reaches within and north of the AOI with pool habitats and muck substrate (see Figures B-2 and B-3 in Appendix D, Chapter 1). These stream reaches, as well as lakes and ponds throughout the $RSA_{HRP-AQU}$, could provide suitable turtle overwintering habitat and should be further investigated.

There were two field observations of a midland painted turtle[9] (potentially the same animal) on the eastern shore of Meyer Lake at the northern portion of the $RSA_{HRP-AQU}$ (**Figure D-7**; **Table D-7**); this survey plot was also identified as candidate SWH. As wintering areas for most turtles are in the same general area as their core habitat, this turtle could remain in Meyer Lake to overwinter. Snapping turtles and a midland painted turtle were observed in the field at three locations within 200 m of each other, in the northern portion of the AOI. One surveyor noted that the snapping turtle was "resting". As the observation was made on September 29, it is possible that the turtle was basking and may overwinter in the waterbody.

The NHIC has mapped an extensive EO for snapping turtle that overlaps with the majority of the AOI, LSA_{TER}, and $RSA_{HRP-AQU}$. This EO includes 169 observations of snapping turtle from 1981 to 2004, and the EO has been designated as "Verified extant (viability not assessed)" by the NHIC. There are also two GBIF records of snapping turtle within the $RSA_{HRP-AQU}$ outside the AOI and LSA_{TER} outside the breeding season (**Figure D-7**; **Table D-8**). Depending on the life requisites that the habitat fulfils for snapping turtle, Turtle Wintering Area and/or Turtle Nesting Area (see Section 4.3.4) SWH could be identified. However, details

[9] Midland painted turtle and eastern milksnake are not currently listed on SARO but they are listed as Special Concern on Schedule 1 of *SARA* and also designated as Special Concern by COSEWIC.

regarding known or potential overwintering or nesting areas are not indicated in the EO record and further field studies and/or discussions with NHIC are needed.

For candidate SWH to be confirmed as SWH, the presence of five overwintering midland painted turtles, or one or more overwintering northern map turtle or snapping turtle (both Special Concern), is required (OMNRF 2015). Candidate SWH areas should be searched in the fall (September to October) or spring (March to May) for turtle congregations (i.e., basking areas) and to assess species presence, abundance, and habitat use.

4.1.8 Reptile Hibernaculum

Out of 2,155 ecosites mapped within the $RSA_{HRP-AQU}$, Zoetica's desk-based analyses found 784 polygons that matched 6E ECS criteria for common five-linked skink (Great Lakes/St. Lawrence population, Special Concern) (**Figure D-8**, **Table E-1**). Most ecosite matches consisted of hardwood forests, followed by mixedwood forests and some conifer forests. As hibernacula for snakes can be found in any ecosite, except for very wet ones (OMNRF 2015), other ecosites within the BIS study areas were not highlighted on **Figure D-8**. Rather, field-based identification of candidate SWH, as described below, will be more useful in determining the potential presence of Reptile Hibernacula.

Of the 473 TEM plots assessed in the field, 85 (18.0%) were identified as candidate SWH, 45 (9.5%) were assigned as "unknown", and the remaining 343 (72.5%) were not considered suitable Reptile Hibernacula (**Figure D-8**). Twenty candidate SWH and 12 "unknown" plots are located within the AOI. Some plots were noted as having a high water table and may be suitable for eastern ribbonsnake but not other reptile species; while other plots consisting of treed areas near agricultural fields were noted as possible habitat for eastern milksnake.[9] Other plots were marked "unknown" because suitable habitat features (e.g., burrows, rock piles, crevices, tree stumps/roots) were not observed within the plot but may be present elsewhere in the polygon.

Two candidate Reptile Hibernacula were recorded within the $RSA_{HRP-AQU}$ north and south of the AOI and LSA_{TER} (**Figure D-8**; **Table D-9**). Surveyors noted a "large rock pile and remnant of rock wall" and a mammal burrow that may be suitable for snake species. Eastern gartersnakes were incidentally observed at four locations and shed snakeskin (unidentified species) was found near Oppleck Lake within the $RSA_{HRP-AQU}$ north of the AOI and LSA_{TER}. Two of these eastern gartersnake observations occurred in late September; for the observation southeast of Schmidt Lake in a red maple swamp, surveyors noted the possibility of a hibernaculum nearby. The other observation, located within the southern portion of the $RSA_{HRP-AQU}$, was of an eastern gartersnake "sunning itself, late in season" in a corn field, which could also suggest a potential hibernaculum nearby. In addition, surveyors noted that the shed snakeskin was located at a potential burrow entrance in the bottom of a hollow tree. No other relevant reptile observations were available from existing desk-based datasets.

For candidate SWH to be confirmed as SWH, the presence of a hibernaculum used by a minimum of five individuals of a single snake species, or individuals of two or more snake species, is required (OMNRF 2015). Candidate SWH areas should be searched in the spring (April to May) or fall (September to October) for reptile congregations (i.e., basking areas) and to assess species presence, abundance, and habitat use.

4.1.9 Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)

Out of 925 ecosites mapped within the RSA_{AVI}, Zoetica's desk-based analyses found 28 meadow ecosites and one shrub ecosite that matched 6E ECS criteria (**Figure D-9**, **Table E-1**).

Of the 169 TEM plots within the RSA_{AVI} assessed in the field, none were identified as candidate SWH, two (1.2%) were assigned as "unknown", and the remaining 167 (98.8%) were not considered suitable Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) (**Figure D-9**). Both "unknown" plots are located along the Teeswater River within the AOI; one within a meadow polygon and the other in a shrub polygon. Neither polygon was identified as candidate SWH through desk-based ecosite analyses; however, field work identified eroding banks that could be suitable breeding habitat for bank swallows (Threatened). One bank swallow was observed travelling/feeding in a "heavily vegetated meadow" along the Teeswater River within the AOI (**Figure D-9**; **Table D-10**). The associated TEM plot was not considered candidate SWH; however, one of the "unknown" plots is located approximately 650 m upstream. No other bank/cliff-nesting swallow species were observed in the field in 2022.

From the GBIF dataset, one northern rough-winged swallow, two bank swallows, and eight cliff swallows have been observed within the AOI (**Figure D-9**; **Table D-11**). The location with eight cliff swallows is along a tributary of Alps Creek and close to the Teeswater River; both watercourses could potentially have suitable eroding banks for nesting. Unfortunately, this area was inaccessible and could not be surveyed in 2022. Another notable area, where one bank swallow, five cliff swallows, and at least two northern rough-winged swallows were observed, is located south of the LSA_{TER} near the intersection of Concession Road 4 and Sideroad 25 N. Based on satellite imagery, there is an aggregate pit near this location that the swallows could be using, but a licensed/permitted aggregate area would not be considered SWH (OMNRF 2015). Bank swallows have also been observed at three other locations within the RSA_{AVI} outside the AOI and LSA_{TER}.

For candidate SWH to be confirmed as SWH, the presence of one or more nesting sites with eight or more cliff swallow pairs and/or northern rough-winged swallow pairs during the breeding season is required (OMNRF 2015). Furthermore, important habitat identified for the Threatened bank swallow would be protected under the Ontario *ESA*. Targeted surveys should be conducted at candidate SWH areas to determine species presence, abundance, and habitat use.

4.1.10 Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)

Out of 2,155 ecosites mapped within the $RSA_{AVI-AQU}$, Zoetica's desk-based analyses found 657 polygons that matched 6E ECS criteria (**Figure D-10**, **Table E-1**). Ecosite matches were primarily hardwood swamps, followed by mixedwood swamps, as well as two fen ecosites.

Of the 473 TEM plots assessed in the field, 37 (7.8%) were identified as candidate SWH, 44 (9.3%) were assigned as "unknown", and the remaining 392 (82.9%) were not considered suitable Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs) (**Figure D-10**). For two plots marked as "not suitable", surveyors noted the potential for nesting elsewhere in the same ecosite and in adjacent swamp habitat. Five candidate SWH and 11 "unknown" plots are located within the AOI. Although no colony nests were observed in the field, great blue herons and/or green herons were observed throughout the AOI, LSA_{TER}, and $RSA_{AVI-AQU}$ (**Figure D-10**; **Table D-12**), including at one candidate SWH and two "unknown" plots within the AOI. Of note, surveyors recorded "multiple" great blue herons and green herons at the candidate SWH plot. At five locations where heron(s) were incidentally observed (one along the Teeswater River within

each of the AOI and LSA_{TER}, three in the GSWC within the $RSA_{AVI-AQU}$), surveyors also noted the potential for a nest or nesting colony nearby.

From the GBIF dataset, great blue herons were also observed at two locations along the Teeswater River or its tributary within the AOI. All other GBIF observations of great blue heron, green heron, and great egret (provincially rare) occurred within the $RSA_{AVI-AQU}$ outside the AOI and LSA_{TER} (**Figure D-10**; **Table D-13**). Notable observations of more than five individuals were located south of Clam Lake and northern portions of the GSWC. It is unclear if any of these observations include active nests (as GBIF records do not contain such information). Based on the NHIC Wildlife Concentration Areas Observation dataset, two great blue heron nesting sites/colonies have been documented within or overlapping the BIS study areas (**Figure D-10**). One colony of 22 nests was originally documented in 1967 east of the AOI near Teeswater. The colony was located within a woodland depression and nests were constructed in live silver maple, red maple, and elm trees. However, due to logging activity and a decline in fish populations in the area in the late 1980s, the herons deserted the colony nesting site and it has been considered "extinct" since 1991. In the northwestern portion of the GSWC (and $RSA_{AVI-AQU}$), a small heronry was found during the OBBA Atlas-2 (2001-2005) surveys. The colony was noted as having been active for at least four years; however, it is unclear when this information was provided, and if the colony is still active. The NHIC continues to designate both polygons as EO Candidates.

For candidate SWH to be confirmed as SWH, the presence of five or more active nests of the listed species is required (OMNRF 2015). Site visits should be conducted to the historic heronry and other candidate SWH areas during the nesting season (April to August) to confirm species presence, abundance, and nest activity status.

4.1.11 Colonially-Nesting Bird Breeding Habitat (Ground)

Zoetica's desk-based analyses identified candidate SWH ecosites only for Brewer's blackbird (also a provincially rare species), as there are no rocky islands or peninsulas associated with a lake or large river within the AOI, LSA_{TER}, and $RSA_{AVI-AQU}$ that would be suitable for colonially-nesting gulls and terns. Out of 925 ecosites mapped within the RSA_{AVI}, 95 marsh, 28 meadow, and one shrub ecosite matched 6E ECS criteria for Brewer's blackbird (**Figure D-11**, **Table E-1**).

Similarly, no candidate SWH for colonially-nesting gulls and terns was identified in the field. The following analysis of TEM plots is, therefore, only applicable to Brewer's blackbird. Of the 169 TEM plots assessed within the RSA_{AVI} in the field, four (2.4%) were identified as candidate SWH and the remaining 165 (97.6%) were not considered suitable Colonially-Nesting Bird Breeding Habitat (Ground). All four plots identified as candidate SWH were located within the AOI in open marsh habitats close to watercourses (**Figure D-11**), which surveyors noted may be suitable breeding habitat for Brewer's blackbird (but not gulls or terns). To date, no incidental observations of Brewer's blackbird or other relevant species for this SWH type have been recorded in the field or existing datasets during the breeding season.

From the GBIF dataset, there are numerous records of ring-billed gulls and herring gulls within the BIS study areas (data not mapped); all but one observation (a single ring-billed gull near the southern boundary of the AOI) are located within the $RSA_{AVI-AQU}$ outside the AOI and LSA_{TER}. Notable observations with more than 25 individual gulls are located within the central and northern portions of the GSWC. In addition, there are three records of Caspian tern (provincially rare) at Schmidt Lake and Silver Lake, and one record of a great black-backed gull (provincially rare) within the GSWC (see Section 4.3.2.1 in Chapter

7). It is unclear if any of these observations include active nests (as GBIF records do not contain such information). These observations will be mapped in future iterations of the SWH appendix if additional baseline data are found to support candidate Colonially-Nesting Bird Breeding Habitat (Ground) SWH for gulls and terns.

For candidate SWH to be confirmed as SWH, the presence of 25 or more active nests of herring gull or ring-billed gull, two or more active nests of Caspian tern, five or more pairs of Brewer's blackbird, or any active nesting colony of great black-backed gull, is needed (OMNRF 2015).[7] Candidate SWH areas should be surveyed during May/June when birds are actively nesting.

4.1.12 Deer Yarding Areas

Out of 1,260 ecosites mapped within the RSA_{UNG}, Zoetica's desk-based analyses found 577 polygons that matched 6E ECS criteria (**Figure D-12**, **Table E-1**). Most ecosite matches consisted of mixedwood forest, mixedwood swamp, and conifer forest; however, there were also numerous conifer swamp and plantation ecosites, as well as a two shrub ecosites.

Of the 213 TEM plots within the RSA_{UNG} assessed in the field, 175 (82.2%) were assigned as "unknown" and the remaining 38 (17.8%) were not considered suitable Deer Yarding Areas (**Figure D-12**). For many "unknown" plots and some "not suitable" plots, surveyors (correctly) noted that the MNRF is responsible for determining and mapping this SWH type. Other entries for "unknown" plots provided brief descriptions of the habitat, incidental observations of white-tailed deer sign, and evidence of being in a deer hunting area. Incidental deer observations were common throughout the AOI, LSA_{TER}, and RSA_{UNG} (see **Figure D-20** for deer observations in the context of Seeps and Springs SWH); however, these observations were not considered relevant to Deer Yarding Areas due to the summer and early fall (early July to mid-October) survey timing.

Based on the MNRF's Wildlife Values Area dataset, there are currently no White-tailed Deer Yard (Stratum I) areas identified within the AOI, LSA_{TER}, and RSA_{UNG} and, thus, Deer Yarding Areas are assumed to be absent. Future discussions with MNRF (e.g., as part of ongoing stakeholder and rights-holder engagement) may indicate that suitable habitats for Deer Yarding Areas (e.g., "unknown" plots) should be further investigated.

4.1.13 Deer Winter Congregation Areas

Out of 1,260 ecosites mapped within the RSA_{UNG}, Zoetica's desk-based analyses found 423 polygons that matched 6E ECS criteria (**Figure D-12**, **Table E-1**). Most ecosite matches consisted of hardwood and mixedwood swamps and forests, followed by conifer forests and swamps.

Of the 213 TEM plots within the RSA_{UNG} assessed in the field, 185 (86.9%) were assigned as "unknown" and the remaining 28 (13.1%) were not considered suitable Deer Winter Congregation Areas (**Figure D-12**). Similar to Deer Yarding Areas (Section 4.1.12), field surveyors correctly noted that it is MNRF's responsibility to determine and map this SWH type. Other entries for "unknown" plots provided brief descriptions of the habitat, incidental observations of white-tailed deer signs, and evidence of being in a deer hunting area. Incidental deer observations were common throughout the AOI, LSA_{TER}, and RSA_{UNG} (see **Figure D-20** for deer observations in the context of Seeps and Springs SWH); however, these observations were not considered relevant to Deer Winter Congregation Areas due to the summer and early fall (early July to mid-October) survey timing.

MNRF has identified five White-tailed Deer Wintering Areas (Stratum II) within the RSA_{UNG} (**Figure D-12**). The largest of these areas overlaps the GSWC, where the southern tip of this Deer Wintering Area extends into the northern portion of the LSA_{TER}. When all five polygons were mapped/verified in 2004, these Deer Wintering Areas were designated as "Presently Suitable" and had evidence of species use; however, no ranking of significance is provided in the dataset. To be conservative, Zoetica will consider the MNRF-mapped Deer Wintering Areas as confirmed SWH.

4.2 Rare Vegetation Communities

4.2.1 Cliffs and Talus Slopes

To date, no desk- or field-based observations have indicated the potential presence of candidate Cliff and Talus Slopes SWH.

4.2.2 Sand Barren

To date, no desk- or field-based observations have indicated the potential presence of candidate Sand Barren SWH. One 2022 field entry in an upland conifer ecosite within the LSA_{TER} (outside the AOI; not mapped) indicated that sand barren habitat was present, but it was heavily disturbed and specialized vegetation species were not present. Therefore, this area would not meet the criteria for SWH.

4.2.3 Alvar

Out of 2,155 ecosites mapped within the RSA_{VEG}, Zoetica's desk-based analyses found 58 conifer ecosites that matched 6E ECS criteria (**Figure D-14**, **Table E-1**). To date, no field-based observations have indicated the potential presence of candidate Alvar SWH within the TEM plots surveyed. However, field work was only conducted at seven of the candidate SWH ecosites identified through desk-based analyses, including one close to the southern boundary of the AOI. Future investigations for rare alvar habitat should prioritize the unassessed polygons.

4.2.4 Old Growth Forest

Out of 2,155 ecosites mapped within the RSA_{VEG}, Zoetica's desk-based analyses found 1,135 ecosites that matched 6E ECS criteria (**Figure D-15**, **Table E-1**). Ecosite matches were primarily hardwood swamps and forests, followed by mixedwood forests and swamps and, to a lesser extent, conifer forests and swamps.

Of the 473 TEM plots assessed in the field, one (0.2%) was identified as candidate SWH, seven (1.5%) were assigned as "unknown", and the remaining 465 (98.3%) were not considered suitable Old Growth Forest (**Figure D-15**). Candidate SWH and "unknown" plots were only located within the RSA_{VEG} outside the AOI and LSA_{TER}. The single plot identified as candidate SWH had multiple trees with >90 dbh and is located in a hardwood swamp in the northern portion of the GSWC. "Unknown" plots also had mature, large diameter trees; however, surveyors noted that stand age needs to be confirmed using historic aerial imagery.

To date, incidental observations of Old Growth Forest indicator/representative/associated bird species, as noted in the SWHMiST (MNRF 2014), have been recorded within the AOI and RSA_{VEG} (outside the LSA_{TER}). Evidence of pileated woodpecker foraging excavations was observed in a conifer swamp within the AOI during 2022 field studies (**Figure D-15**; **Table D-14**). In addition, winter wren, pileated woodpecker, and brown creeper were detected in various parts of the GSWC during the breeding season.

However, none of the survey plots where these species were observed were considered candidate SWH as the habitat at these plots did not meet the 6E ECS criteria for Old Growth Forest.

The GBIF dataset also includes numerous breeding season observations of brown creeper, winter wren, pileated woodpecker, and bald eagle within the RSA_{VEG} outside the AOI and LSA_{TER}, especially within the GSWC (**Figure D-15**; **Table D-15**). These bird observations may provide some support of the presence of Old Growth Forest; however, the defining criteria for this SWH type are characteristics of the forest itself and these will need to be confirmed through further investigations.

4.2.5 Savannah

To date, no desk- or field-based observations have indicated the potential presence of candidate Savannah SWH.

4.2.6 Tallgrass Prairie

To date, no desk- or field-based observations have indicated the potential presence of candidate Tallgrass Prairie SWH.

4.2.7 Other Rare Vegetation Communities

Based on the NHIC's Plant Community Occurrence and Observation datasets, there are no records of provincially tracked (i.e., rare) vegetation communities within the AOI, LSA_{TER}, or RSA_{VEG}. Field crews in 2022 noted the presence of potentially rare communities, including black ash swamp, bur oak forest and swamp, hemlock swamp, organic swamp, sugar maple, winterberry, and rare orchids and carnivorous wetland vegetation. Some of these observations may correspond to rare vegetation communities listed in Appendix M of the *Significant Wildlife Habitat Technical Guide* (OMNR 2000), such as White Cedar – Hemlock Coniferous Organic Swamp Type (listed as Southern Ontario ELC Code FOC4-2)[10], Moist – Fresh Black Oak – White Oak Tallgrass Woodland Type (TPW2-1), Moist – Fresh Pin Oak Tallgrass Woodland Type (TPW2-2), Moist – Fresh Sugar Maple – Black Maple Deciduous Forest Type (FOD6-2), and Winterberry Organic Thicket Swamp Type (SWT3-7). However, due to the challenges of converting GLSE assignments to the ELC-1998 system and vice versa, it is unclear which GLSE ecosites would be considered rare vegetation communities in the SON-South Bruce siting area. Further discussions with the authors of the GLSE classification system (Lee et al. 2021a) and NHIC are needed to reconcile the current ambiguities.

Note: Black ash was added as an Endangered species on the Species at Risk in Ontario (SARO) List (O. Reg. 230/08) in January 2022 and is now protected under the Ontario *ESA*. Except when black ash is mentioned as part of other provincially tracked, rare vegetation communities, this species and its habitat are discussed in more detail in the Vegetation chapter (Section 1.3.3.1, Chapter 2).

[10] The Southern Ontario ELC Codes listed in Appendix M of the *Significant Wildlife Habitat Technical Guide* are from the 1998 first approximation system. There may be a typo in Appendix M since FOC4-2 is defined as "Fresh – Moist White Cedar – Hemlock Coniferous Forest Type" in ELC-1998. A more suitable ELC Code would be SWC3-2, which is "White Cedar – Conifer Organic Coniferous Swamp Type".

4.3 Specialized Habitat for Wildlife

4.3.1 Waterfowl Nesting Area

Out of 2,155 ecosites mapped within the $RSA_{AVI-AQU}$, Zoetica's desk-based analyses found 355 ecosites that matched 6E ECS criteria (**Figure D-16**, **Table E-1**). Ecosite matches were primarily hardwood swamps and marshes but also included some shrub swamp ecosites.

Of the 473 TEM plots assessed in the field, 49 (10.4%) were identified as candidate SWH, 16 (3.4%) were assigned as "unknown", and the remaining 408 (86.3%) were not considered suitable Waterfowl Nesting Areas (although suitable habitat was observed outside one "not suitable" polygon) (**Figure D-16**). Thirteen candidate SWH and four "unknown" plots are located within the AOI. Surveyors noted the potential for ground-nesting and/or cavity-nesting waterfowl species in these areas.

Incidental observations of waterfowl were uncommon during the 2022 field studies. Wood ducks (or their nest boxes) and unidentified ducks were observed within the AOI and $RSA_{AVI-AQU}$; mallards were also observed on the Teeswater River near upland habitat within the AOI (**Figure D-16**; **Table D-16**). In addition, eDNA metabarcoding analyses identified hooded merganser, mallard, and wood duck in various aquatic habitats within the AOI and/or LSA_{AQU} during summer and/or fall (see Section 4.2.4 in Appendix E, Chapter 1). Although active nest boxes are not considered SWH, wood ducks could potentially be breeding in natural cavities elsewhere in the area. Of note, two adult and three juvenile wood ducks were recorded swimming/travelling/feeding within the $RSA_{AVI-AQU}$ north of Silver Lake. This observation is located in an agricultural field approximately 100 m east of two small ponds within a marsh ecosite, which may be suitable waterfowl nesting habitat.

Notable nesting season observations from the GBIF dataset include 15 Canada geese at a marsh ecosite northwest of the intersection of Concession Road 8 and Sideroad 25 North within the AOI (**Figure D-16**; **Table D-17**). This ecosite was not surveyed in 2022 as it did not meet the minimum area size and/or shape requirements for TEM plots. Two Canada geese and 20 common mergansers were observed at another marsh ecosite along the Teeswater River (or potentially within the river) at Concession Road 8. However, surveyors did not consider this ecosite to be candidate SWH as the habitat did not meet the 6E ECS criteria for Waterfowl Nesting Area; thus, the birds may have been using the marsh or watercourse as foraging habitat. A group of 20 Canada geese was also observed outside of mapped ecosites along Concession Road 8 within the LSA_{TER} east of the AOI. These geese may have been using the agricultural fields or simply flying over; no additional information was included in the GBIF record. There are numerous GBIF records of waterfowl within the $RSA_{AVI-AQU}$ outside the AOI and LSA_{TER} during the breeding season (**Figure D-16**; **Table D-17**). In addition to the aforementioned species, blue-winged teal (provincially rare), hooded merganser, American black duck, northern pintail, northern shoveler, gadwall, green-winged teal, American widgeon, bufflehead, common goldeneye, and red-breasted merganser have been detected.[11] However, it is unclear if any of these observations include active nests or confirmation of breeding (as GBIF records do not contain such information).

[11] Although Canada goose, common merganser, American widgeon, bufflehead, common goldeneye, and red-breasted merganser are not listed in the 6E ECS, these species are included in the SWHMiST for Waterfowl Nesting Area, which is indicated as being applicable to All of Ontario (MNRF 2014). However, further discussions with MNRF are needed to determine how many nesting pairs of Canada geese are needed to constitute SWH.

For candidate SWH to be confirmed as SWH, the presence of three or more nesting pairs of the listed species (excluding mallards), or the presence of 10 or more nesting pairs of the listed species (including mallards), is required (OMNRF 2015).[7] Candidate SWH areas should be surveyed during the spring breeding season (April to June) to determine waterfowl species presence, abundance, and habitat use.

4.3.2 Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat

Out of 2,155 ecosites mapped within the $RSA_{AVI-AQU}$, Zoetica's desk-based analyses found 307 ecosites that matched 6E ECS criteria (**Figure D-17**, **Table E-1**). Most ecosite matches consisted of hardwood swamps and forests, followed by mixedwood forests and swamps, and some conifer forests and swamps.

Of the 473 TEM plots assessed in the field, 23 (4.9%) were identified as candidate SWH, 10 (2.1%) were assigned as "unknown", and the remaining 440 (93.0%) were not considered suitable Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat (**Figure D-17**). Plots identified as candidate SWH had mature trees and were located near fish-bearing waterbodies and watercourses, such as the Teeswater River within the AOI and Schmidt Lake, Cunningham Lake, and Silver Lake within the $RSA_{AVI-AQU}$. However, surveyors also noted that two plots are likely not suitable for bald eagle due to the lack of super canopy trees. Many "unknown" plots were marked as such due to uncertainty about sufficient foraging habitat.

To date, there have been no desk- or field-based observations of bald eagle or osprey during the breeding season, nor their stick nests, within the AOI or LSA_{TER}. However, there are a number of GBIF observations of both species within the $RSA_{AVI-AQU}$ outside the AOI and LSA_{TER} (**Figure D-17**; **Table D-18**). Notable records of more than one individual include six bald eagles outside the northwest boundary of the LSA_{TER}, two bald eagles and two osprey at Silver Lake, two bald eagles and an osprey south of Clam Lake, four bald eagles near Highway 9 near the GSWC, two osprey at Schmidt Lake, and two bald eagles in Teeswater (likely along the Teeswater River). It is unclear if any of these observations include active nests (as GBIF records do not contain such information).

For candidate SWH to be confirmed as SWH, one or more active osprey or bald eagle nests must be present (OMNRF 2015). Candidate SWH areas should be surveyed during mid-March to mid-August to determine species presence and habitat use.

4.3.3 Woodland Raptor Nesting Habitat

Out of 925 ecosites mapped within the RSA_{AVI}, Zoetica's desk-based analyses found 54 ecosites that matched 6E ECS criteria (**Figure D-18**, **Table E-1**). Ecosite matches included (in order of descending frequency) mixedwood swamps, hardwood swamps, hardwood forests, mixedwood forests, conifer forests, and conifer swamps.

Of the 169 TEM plots within the RSA_{AVI} assessed in the field, 96 (56.8%) were identified as candidate SWH, 17 (10.1%) were assigned as "unknown", and the remaining 56 (33.1%) were not considered suitable Woodland Raptor Nesting Habitat (**Figure D-18**). Desk-based ecosite analyses had screened out all polygons in the AOI and LSA_{TER} not connected to the larger GSWC (which extends into the RSA_{AVI}) due to minimum size requirements. However, the presence of one or more active nests of the woodland raptor species listed in the 6E ECS is considered SWH (OMNRF 2015). Therefore, suitable habitats of non-optimal size should remain as candidate SWH and be further investigated for active raptor nests from mid-March to the end of May. Most "unknown" plots indicated a need for desk-based analysis of area size.

Only one incidental woodland raptor observation recorded during 2022 field studies was located within the BIS study areas for raptors – hawk feathers were found and an unidentified hawk was observed flying out of a tree in the southwest portion of the AOI (**Figure D-18**; **Table D-19**). This TEM plot, located within a hardwood forest polygon, was identified as candidate SWH. The GBIF dataset includes one record for Cooper's hawk within the AOI near Bruce Road 6 during the breeding season. Two other raptor species have been observed within the RSA_{AVI} outside the AOI and LSA_{TER}: great horned owl and merlin.[12] Most GBIF records consist of a single individual; however, in the area south of the LSA_{TER}, within hardwood and conifer forest ecosites, there are three observations of two broad-winged hawks and Cooper's hawks (**Figure D-18**; **Table D-20**), which could suggest breeding pairs. It is unclear if any of these observations include active nests (as GBIF records do not contain such information).

4.3.4 Turtle Nesting Areas

Out of 2,155 ecosites mapped within the $RSA_{HRP-AQU}$, Zoetica's desk-based analyses found 15 marsh polygons that matched 6E ECS criteria (**Figure D-19**, **Table E-1**).

Of the 473 TEM plots assessed in the field, six (1.3%) were identified as candidate SWH, 10 (2.1%) were assigned as "unknown", and the remaining 457 (96.6%) were not considered suitable Turtle Nesting Areas (**Figure D-19**). Three plots marked as "not suitable" and two "unknown" plots had additional surveyor notes indicating that nearby habitats may be candidate SWH based on habitat characteristics and/or observations of turtle nests. None of the candidate SWH plots are located within the AOI; two are in the LSA_{TER} and four are in the $RSA_{HRP-AQU}$. The candidate SWH plot on the west side of Silver Lake is corroborated by AHM surveys, which found sand/gravel shoreline on the west and north sides of the lake (see Figure C-4 in Appendix D, Chapter 1). The single polygon identified as candidate SWH within the AOI, via desk-based ecosite analyses, was not ground-truthed in 2022 as it did not meet the minimum area size and/or shape requirements for TEM plots. However, there are four "unknown" plots in a variety of habitats (meadow, mixedwood swamp, mixedwood forest, hardwood forest ecosites) along the Teeswater River or one of its tributaries within the AOI.

Field observations in 2022 include the remnants of suspected snapping turtle eggs in the riparian area along the Teeswater River next to a soy field within the AOI (**Figure D-19**; **Table D-21**). If the species is confirmed as snapping turtle, this area would constitute SWH. There were five additional observations of turtle nests and eggs (unknown species)[13], including observations at three locations along the Teeswater River within the AOI and one along Alps Creek within the $RSA_{HRP-AQU}$ south of the LSA_{TER}. Two of the turtle nests within the AOI and the nest outside the AOI had evidence of predation. In addition to field observations, there are three GBIF records of snapping turtle during the breeding season close to the northern and southern boundaries of the $RSA_{HRP-AQU}$ (**Figure D-19**; **Table D-22**). The NHIC's EO for snapping turtle was previously discussed for Turtle Wintering Areas (see Section 4.1.7).

For candidate SWH to be confirmed as SWH, the presence of five or more nesting midland painted turtles, or one or more nesting northern map turtle or snapping turtle, is required (OMNRF 2015). Candidate SWH

[12] Although great horned owl and merlin are not listed in the 6E ECS, these species are included in the SWHMiST for Woodland Raptor Nesting Habitat, which is indicated as being applicable to All of Ontario (MNRF 2014).

[13] Based on the coordinates, two turtle egg observations are likely duplicates recorded by different surveyors.

areas (including "unknown" and "nearby" plots) should be further investigated in the late spring to early summer to determine species presence, abundance, and habitat use.

4.3.5 Seeps and Springs

Out of 2,155 ecosites mapped within the LSA_{ECO}, Zoetica's desk-based analyses found 841 polygons that matched 6E ECS criteria (**Figure D-20**, **Table E-1**). Ecosite matches were primarily hardwood forests, followed by mixedwood forests and some conifer forests.

Of the 473 TEM plots assessed in the field, 29 (6.1%) were identified as candidate SWH, 29 (6.1%) were assigned as "unknown", and the remaining 415 (87.7%) were not considered suitable habitat for Seeps and Springs (**Figure D-20**). However, at one "not suitable" plot, surveyors noted evidence of seeps/springs while in transit to the plot. Furthermore, surveyors incidentally recorded two candidate Seeps and Springs south of the LSA_{TER} outside of survey plots. The 31 candidate SWH ("yes" plots and incidental observations) – including five plots within the AOI – were determined to have seeps/springs through direct observations of groundwater seepage and indicators, including iron precipitates, oily/metallic sheen, depressions, watercress, eastern swamp saxifrage, and eastern rough sedge (**Figure D-20**; **Table D-23**). At the candidate SWH plot in the western portion of the AOI, along a tributary of the Teeswater River, TEM/SWH data are corroborated by AHM surveys, which found two seeps in a marsh ecosite and a groundwater source nearby in the adjacent conifer swamp ecosite (see Figure E-1 in Appendix, D, Chapter 1). In addition, AHM surveys identified two springs and one seep in close proximity to one another within a single conifer swamp polygon along Alps Creek, north of a TEM plot outside the LSA_{TER} that was marked as "unknown" candidate SWH.

The presence of a site with two or more seeps/springs is considered SWH (OMNRF 2015); however, the 6E ECS also notes that Seeps and Springs SWH are typically located in a forested ecosite or ecoelement. It is unclear whether the marsh ecosite containing two seeps would be considered SWH; further discussions with MNRF are needed. Nevertheless, AHM surveys identified another area with multiple seeps and/or springs, which should be SWH. Furthermore, TEM/SWH surveyor notes indicated that some plots may meet this criterion for confirmed Seeps and Springs SWH; however, other notes for both candidate SWH and "unknown" plots are more ambiguous and will need to be confirmed with the field data collection contractor and/or through additional ground-truthing.

The 2022 baseline data are valuable as these summer surveys identified potential seeps/springs that provide year-round moist conditions, which are likely more important habitats than seeps/springs that are present in the spring but dry up prior to or early in the summer (OMNR 2000). Sites that support species of conservation concern would also be assigned greater significance. No observations of wildlife use were noted at the TEM plots containing candidate Seeps and Springs SWH within the AOI. White-tailed deer sign was observed throughout the BIS study areas, including at one candidate SWH plot within the RSA_{UNG} (**Figure D-20**; **Table D-23**). A group of 10 wild turkeys was observed within the AOI, amongst willows in an agricultural field next to the Teeswater River. Wild turkeys and ruffed grouse were also detected in the GSWC. However, none of these relevant bird observations occurred at candidate SWH or "unknown" plots.

From the GBIF dataset, no sensitive salamander species have been observed, but ruffed grouse and wild turkeys were recorded at two different hardwood forest ecosites, and another location outside of mapped ecosites (i.e., on agricultural land), within the LSA_{TER} (**Figure D-20**; **Table D-24**). However, neither ecosite

polygon was determined to be candidate Seeps and Springs SWH during 2022 field studies. Numerous observations of ruffed grouse (ranging from 1-4 individuals) and wild turkey (ranging from 1-60 individuals) were also recorded in a hardwood and conifer forest ecosite (not surveyed in 2022) within the RSA_{AVI} south of the LSA_{TER}. It remains to be determined whether this area may be important for these game birds due to seeps/springs or other habitat features.

4.3.6 Amphibian Breeding Habitat (Woodland)

Out of 2,155 ecosites mapped within the $RSA_{HRP-AQU}$, Zoetica's desk-based analyses found 1,664 polygons that matched 6E ECS criteria (**Figure D-21**, **Table E-1**). Ecosite matches were primarily hardwood swamps and forests, followed by mixedwood forests and swamps and, to a lesser extent, conifer forests and swamps.

Of the 473 TEM plots assessed in the field, 394 (83.3%) were identified as candidate SWH, 38 (8.0%) were assigned as "unknown", and the remaining 41 (8.7%) were not considered as suitable Amphibian Breeding Habitat (Woodland) (**Figure D-21**). Most of the "unknown" plots were marked as such due to uncertainty about the presence and longevity of vernal pools in the spring and summer. A variety of amphibians of relevance to this SWH type were detected throughout the AOI, LSA_{TER}, and $RSA_{HRP-AQU}$ during 2022 field studies. Wood frogs were most commonly observed; other species included spring peeper, American toad, gray treefrog, eastern newt, and unknown frog and amphibian species. eDNA metabarcoding analyses also identified four-toed salamander, eastern red-backed salamander, and eastern newt in various aquatic habitats within the AOI and/or LSA_{AQU} during summer and/or fall (see Section 4.2.3 in Appendix E, Chapter 1).[14]

Of note, surveyors recorded two separate incidental observations of "100" juvenile wood frogs in the eastern portion of the GSWC (**Figure D-21**; **Table D-25**). One observation describes the wood frogs within 10 m of a waterbody, located in a mixedwood forest habitat with vernal pools and ponds. The other observation, approximately 30 m away, describes the frogs in a beaver meadow within a deciduous forest. Both observations were recorded on the same day and the wood frogs were noted as travelling, resting, vocalizing, feeding, and startled. These observations also provide support for Amphibian Movement Corridors (Section 4.5.1).

Furthermore, tadpoles of unidentified frog/amphibian species were observed at two locations within the AOI and two within the $RSA_{HRP-AQU}$ outside the AOI and LSA_{TER} (**Figure D-21**; **Table D-25**). The tadpole observations within the AOI were located along the Teeswater River and its tributary, surrounded by marsh/mixedwood forest and conifer swamp ecosites, respectively. The number of individuals was not recorded for these incidental observations; nonetheless, these habitats should be further investigated to determine if they could be Amphibian Breeding Habitat SWH (Woodland or Wetlands; see Section 4.3.7). In addition to amphibian species detections, surveyors recorded three incidental observations of vernal pools, within the GSWC, as potential amphibian breeding habitat. These pools still had water at the time of survey in mid-late August, which would have allowed time for amphibians to complete metamorphosis. For two of these vernal pools, surveyors noted the presence of potential egg attachment sites (e.g., woody debris, vegetation).

[14] Although American toad, four-toed salamander, and eastern red-backed salamander are not listed in the 6E ECS, these species are included in the SWHMiST for Amphibian Breeding Habitat (Woodland), which is indicated as being applicable to Ecoregions 3E, 5E, 6E, and 7E (MNRF 2014).

From the GBIF dataset, there are a few observations of amphibians within the $RSA_{HRP-AQU}$ outside the AOI and LSA_{TER} during the breeding season (**Figure D-21**; **Table D-26**). These observations include eastern newt, four-toed salamander, gray treefrog, wood frog, and western chorus frog[15]. However, each location has only one species recorded, and the number of individuals and activity/habitat use was not provided.

For candidate SWH to be confirmed as SWH, the presence of a breeding population of one or more of the listed newt/salamander species, or two or more of the listed frog species with at least 20 individuals or calling in a full chorus, is required (OMNRF 2015). Candidate SWH areas, especially those with summer field observations of multiple amphibians (individuals and/or species), should be further investigated during the spring (March to June) to determine species presence, abundance, and habitat use.

4.3.7 Amphibian Breeding Habitat (Wetlands)

Out of 2,155 ecosites mapped within the $RSA_{HRP-AQU}$, Zoetica's desk-based analyses found 1,070 polygons that matched 6E ECS criteria (**Figure D-22**, **Table E-1**). Most ecosite matches consisted of hardwood swamps, followed by mixedwood swamps and marshes; however, there were also numerous conifer swamp, shrub swamp, and lake/river ecosites, as well as two fen ecosites.

Of the 473 TEM plots assessed in the field, 262 (55.4%) were identified as candidate SWH, 15 (3.2%) were assigned as "unknown", and the remaining 196 (41.4%) were not considered suitable Amphibian Breeding Habitat (Wetlands) (although suitable habitat was observed outside one "not suitable" plot within the same polygon) (**Figure D-22**). Similar to Amphibian Breeding Habitat (Woodlands) (see Section 4.3.6), surveyors marked plots as "unknown" when the presence and longevity of vernal pooling/flooding was uncertain. A variety of amphibians of relevance to this SWH type were detected throughout the AOI and $RSA_{HRP-AQU}$ (outside the LSA_{TER}) during 2022 field studies. Green frogs were most commonly observed; other species included American toad, gray treefrog, eastern newt, and unknown frog and amphibian species. eDNA metabarcoding analyses also identified four-toed salamander and eastern newt in various aquatic habitats within the AOI and/or LSA_{AQU} during summer and/or fall (see Section 4.2.3 in Appendix E, Chapter 1).

Of note, "numerous" green frogs were observed in hardwood swamp habitat in the northwestern portion of the GSWC west of Cunningham Lake (**Figure D-22**; **Table D-27**). The field crew noted that the plot was inundated with water at the time of survey in early August, when green frogs may still be breeding (Ontario Nature 2023). In addition, a "large amount of" frogs, including American bullfrogs and other species, were observed adjacent to Schmidt Lake in early July. Surveyors noted that the habitat was "not a wetland, marshy and muddy, mature forest nearby". This observation suggests that Schmidt Lake may provide important amphibian breeding habitat, with potential Amphibian Movement Corridors (Section 4.5.1) leading away from the lake. The notable locations with tadpoles (unidentified species) and vernal pools, as described in Section 4.3.6, are also relevant to Amphibian Breeding Habitat (Wetlands).

From the GBIF dataset, there are a few observations of amphibians within the $RSA_{HRP-AQU}$ outside the AOI and LSA_{TER} during the breeding season (**Figure D-22**; **Table D-28**). These observations include eastern newt, eastern red-backed salamander, four-toed salamander, American bullfrog, gray treefrog, green

[15] Western chorus frog is not listed under SARO; however, the Great Lakes / St. Lawrence – Canadian Shield population, which is relevant to the SON-South Bruce siting area, is listed as Threatened under Schedule 1 of *SARA* and by COSEWIC.

frog, northern leopard frog, wood frog, and western chorus frog. However, each location has only one species recorded, and the number of individuals and activity/habitat use was not provided.

The same criteria for confirming Amphibian Breeding Habitat (Woodlands) SWH apply to Wetlands (OMNRF 2015). Candidate SWH areas, especially those with field observations of multiple amphibians (individuals and/or species), should be further investigated during the spring (March to June) to determine species presence, abundance, and habitat use.

4.3.8 Woodland Area-Sensitive Bird Breeding Habitat

Out of 925 ecosites mapped within the RSA_{AVI}, Zoetica's desk-based analyses found 445 ecosites that matched 6E ECS criteria (**Figure D-23**, **Table E-1**). Ecosite matches were fairly evenly spread between hardwood and mixedwood forests and swamps, followed by conifer forests and swamps.

Of the 169 TEM plots within the RSA_{AVI} assessed in the field, 74 (43.8%) were identified as candidate SWH, 7.1 (6.6%) were assigned as "unknown", and the remaining 83 (49.1%) were not considered suitable Woodland Area-Sensitive Bird Breeding Habitat (**Figure D-23**). However, surveyors noted for four "not suitable" plots that there may be suitable interior forested habitat elsewhere in the polygon. Field surveyors identified 32 candidate SWH plots within the AOI. However, the presence of three or more nesting/breeding pairs of the species listed in the 6E ECS is considered SWH (OMNRF 2015). Therefore, suitable habitats of non-optimal size should remain as candidate SWH and be further investigated in the spring and early summer for active nesting. Most "unknown" plots indicated a need for desk-based analysis of interior habitat area size.

Incidental observations of woodland area-sensitive bird species were uncommon during the 2022 field studies. Yellow-bellied sapsucker and pileated woodpecker[16] were observed at three locations within the AOI (**Figure D-23**; **Table D-29**). All three woodpecker observations were made in mixedwood forest ecosites; two of these polygons were also marked as candidate SWH. Within the LSA_{TER} outside the AOI, blue-headed vireo and red-breasted nuthatch were observed at three locations within 400 m of each other along the Teeswater River. These TEM plots (hardwood, mixedwood, and conifer forest ecosites) were considered candidate or "unknown" SWH. Finally, within the RSA_{AVI} outside the LSA_{TER}, red-breasted nuthatch was recorded twice near Oppleck Lake, with surrounding plots in the hardwood and conifer ecosites considered candidate SWH. Yellow-bellied sapsucker was recorded once northeast of the LSA_{TER} in a hardwood swamp ecosite considered "unknown" candidate SWH (**Figure D-23**; **Table D-29**). eDNA metabarcoding analyses also identified red-breasted nuthatch within the LSA_{AQU} (the portion that overlaps the RSA_{AVI}) during the summer (see Section 4.2.4 in Appendix E, Chapter 1).

From the GBIF dataset, there were breeding season observations of ovenbird, yellow-bellied sapsucker, and red-breasted nuthatch within the AOI and LSA_{TER}. However, field surveyors in 2022 either did not visit the areas/polygons as the locations were inaccessible and/or outside natural/naturalized ecosites, or the polygons were determined not to be candidate SWH as they did not meet the 6E ECS habitat criteria for Woodland Area-Sensitive Bird Breeding Habitat. Other woodland area-sensitive breeding bird species have been observed within the RSA_{AVI} outside the AOI and LSA_{TER}, including Canada warbler (Special Concern), black-throated blue warbler, blackburnian warbler, northern parula, and veery (**Figure D-23**; **Table D-30**). Most of these GBIF records were of single individuals; however, the area (consisting of

[16] Although pileated woodpecker is not listed in the 6E ECS, this species is included in the SWHMiST for Woodland Area-Sensitive Bird Breeding Habitat, which is indicated as being applicable to Ecoregions 6E and 7E (MNRF 2014).

hardwood and conifer forest ecosites) south of the LSA_{TER} included groups of 1-6 individuals from 10 species and could be important bird breeding habitat. However, it is unclear if any of these observations include active nests or confirmation of breeding (as GBIF records do not contain such information).

4.4 Habitat for Species of Conservation Concern

4.4.1 Marsh Bird Breeding Habitat

Out of 2,155 ecosites mapped within the $RSA_{AVI-AQU}$, Zoetica's desk-based analyses found 1,097 polygons that matched 6E ECS criteria (**Figure D-24**, **Table E-1**). Most ecosite matches consisted of hardwood swamps, followed by mixedwood swamps and marshes; however, there were also numerous conifer swamp, meadow, and shrub swamp ecosites.

Of the 473 TEM plots assessed in the field, 26 (5.5%) were identified as candidate SWH, four (0.8%) were assigned as "unknown", and the remaining 443 (93.7%) were not considered suitable Marsh Bird Breeding Habitat (although suitable habitat was observed outside one "not suitable" polygon) (**Figure D-24**). Ten candidate SWH plots were identified in marsh, mixedwood swamp, and shrub swamp ecosites within the AOI. Surveyors noted whether the habitat was suitable for a variety of marsh/wetland breeding bird species or for selected species.

Three marsh bird species were observed during 2022 field studies (**Figure D-24**; **Table D-31**). Green herons were recorded in multiple locations within the AOI and $RSA_{AVI-AQU}$ (but not the LSA_{TER}). Green heron observations were also discussed for Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs) (Section 4.1.10). Within the $RSA_{AVI-AQU}$, a pair of sandhill cranes was observed in a marsh ecosite (candidate SWH plot) along Schmidt Creek within the GSWC.[17] To the west, near Cunningham Lake, Virginia rails were recorded vocalizing at two locations. Field surveyors noted that the species was presumably breeding within the marsh ecosite (also a candidate SWH plot). eDNA metabarcoding analyses also identified Virginia rail within the LSA_{AQU} during the summer (see Section 4.2.4 in Appendix E, Chapter 1). In addition, three sandhill cranes were incidentally observed flying overhead at a tributary of Alps Creek south of the AOI. The field crew noted the wetland (marsh ecosite) as a possible sandhill crane nesting area.

The NHIC has mapped an EO for least bittern (threatened) in the general vicinity of Clam Lake in the $RSA_{AVI-AQU}$. However, the last observation of this species was in 1980 and this record has been designated as a "Historical" EO by the NHIC. From the GBIF dataset, a variety of marsh breeding birds have been observed within the $RSA_{AVI-AQU}$ outside the AOI and LSA_{TER} during the breeding season (**Figure D-24**; **Table D-32**). These observations include black tern (Special Concern), red-necked grebe (provincially rare), common loon, green heron, pied-billed grebe, sandhill crane, sedge wren, sora, Virginia rail, lesser scaup, northern shoveler, ring-necked duck, and solitary sandpiper.[18] Notable locations with more than five species observed occurred south of Clam Lake (including the single observation of black tern) and at Schmidt Lake. It is unclear if any of these observations include active nests or confirmation of breeding (as GBIF records do not contain such information).

[17] The map figure (**Figure D-24**) presents two observations of sandhill cranes; however, they were recorded on the same date and are likely duplicates recorded by different surveyors.

[18] Although red-necked grebe, lesser scaup, northern shoveler, ring-necked duck, and solitary sandpiper are not listed in the 6E ECS, these species are included in the SWHMiST for Marsh Bird Breeding Habitat, which is indicated as being applicable to All of Ontario (MNRF 2014).

For candidate SWH to be confirmed as SWH, the presence of one or more nesting pairs of sandhill crane, black tern, or green heron, or breeding by any combination of five or more of the listed species, is required (OMNRF 2015).[7] Candidate SWH areas and "unknown" plots should be surveyed during May/June when birds are actively nesting.

4.4.2 Open Country Bird Breeding Habitat

Out of 2,155 ecosites mapped within the $RSA_{AVI-AQU}$, Zoetica's desk-based analyses found one polygon that matched 6E ECS criteria: a meadow ecosite southeast of Clam Lake (**Figure D-25**, **Table E-1**). As this polygon is located outside the RSA_{AVI}, the candidate SWH would only be suitable for upland sandpiper (provincially rare), a shorebird species, for the purposes of the BIS.

Of the 473 TEM plots assessed in the field, one (0.2%) was identified as candidate SWH, four (0.8%) were assigned as "unknown", and the remaining 468 (98.9%) were not considered suitable Open Country Bird Breeding Habitat (**Figure D-25**). However, one "not suitable" plot was indicated as being adjacent to appropriate upland habitat. The single candidate SWH plot is in a meadow adjacent to the Teeswater River within the AOI; the surveyor noted that it is likely suitable habitat for vesper sparrow.

There were only three observations of open country bird species during the 2022 field studies, all occurring in mid-late August: bobolink (Threatened) and eastern meadowlark (Threatened) were incidentally observed in agricultural fields (corn/pasture and alfalfa, respectively) and a heavily vegetated meadow within the AOI and/or LSA_{TER} (**Figure D-25**; **Table D-33**). eDNA metabarcoding analyses also revealed the presence of savannah sparrow within the AOI during the summer (see Section 4.2.4 in Appendix E, Chapter 1). During previous preliminary environmental studies for the Project in 2020, suitable habitat for eastern meadowlark and bobolink was found in agricultural fields adjacent to the NWMO's borehole sites BH-01 and BH-02, located within the AOI (Tulloch Environmental 2020, 2021).

From the GBIF dataset, a variety of open country species have been observed during the nesting season within the AOI, LSA_{TER}, RSA_{AVI}, and $RSA_{AVI-AQU}$ (which only applies to upland sandpiper) (**Figure D-25**; **Table D-34**). These observations include eastern meadowlark, bobolink, grasshopper sparrow (Special Concern), upland sandpiper, savannah sparrow, vesper sparrow, northern harrier, American kestrel, and horned lark.[19] Of these species, eastern meadowlark, bobolink, and upland sandpiper have been reported within the AOI. It is unclear if any of these observations include active nests or confirmation of breeding (as GBIF records do not contain such information). However, the NHIC has also mapped EOs for eastern meadowlark and bobolink within the RSA_{AVI}. As SAR, their habitats are protected under the Ontario *ESA* rather than classified as SWH. Eastern meadowlark and bobolink are discussed in more detail in Upland Breeding Bird Species of Conservation Concern (Section 2.3.2.1, Chapter 7).

For candidate SWH to be confirmed as SWH, the presence of two or more nesting/breeding pairs of the listed species is required (OMNRF 2015). Candidate SWH areas and "unknown" plots should be surveyed during the spring and early summer when birds are singing and defending their territories.

[19] Although American kestrel and horned lark are not listed in the 6E ECS, these species are included in the SWHMiST for Open Country Bird Breeding Habitat, which is indicated as being applicable to All of Ontario (MNRF 2014).

4.4.3 Shrub/Early Successional Bird Breeding Habitat

Out of 925 ecosites mapped within the RSA_{AVI}, Zoetica's desk-based analyses found one shrub ecosite that matched 6E ECS criteria (**Figure D-26**, **Table E-1**).

Of the 169 TEM plots within the RSA_{AVI} assessed in the field, one (0.6%) was identified as candidate SWH, eight (4.7%) were assigned as "unknown", and the remaining 160 (94.7%) were not considered suitable Shrub/Early Successional Bird Breeding Habitat (**Figure D-26**). The single candidate SWH plot and three "unknown" plots are located within the AOI. The candidate SWH is located in a hardwood forest ecosite where surveyors noted an abundance of willow shrubs. There were four observations of shrub/early successional bird species during the 2022 field studies, all occurring in mid-August: house wren and northern cardinal were heard at plots within 200 m of each other along the Teeswater River in the southeast portion of the LSA_{TER} (outside the AOI), and eastern towhees were heard at and near a plot within the RSA_{AVI} to the northeast of the LSA_{TER} (**Figure D-26**; **Table D-35**). The eastern towhee observations were in aspen and sugar maple hardwood treed habitats, which the surveyors noted as potentially suitable Shrub/Early Successional Bird Breeding Habitat. The mixedwood forest ecosite where the house wren was observed was marked as "unknown" candidate SWH; however, the hardwood forest ecosite with the northern cardinal was not considered candidate SWH as it did not meet the 6E ECS habitat criteria.

Surveyors also noted gray catbird at four plots; although this species is indicated in the *Significant Wildlife Habitat Technical Guide* (OMNR 2000) as utilizing thickets and second growth habitats, it is not listed in the 6E ECS nor the SWHMiST (MNRF 2014) as part of the defining criteria for Shrub/Early Successional Bird Breeding Habitat SWH. From the GBIF dataset, a variety of shrub/early successional breeding bird species have been recorded within the AOI, LSA_{TER}, and RSA_{AVI} (**Figure D-26**; **Table D-36**). These observations include brown thrasher and clay-colored sparrow (the two indicator species noted in 6E ECS), eastern whip-poor-will (Threatened), eastern towhee, field sparrow, black-billed cuckoo, willow flycatcher, palm warbler, blue-winged warbler, house wren, northern cardinal, and yellow-billed cuckoo.[20]

For candidate SWH to be confirmed as SWH, the presence of nesting or breeding of one of the indicator species and at least two of the "common species" listed in 6E ECS is required (OMNRF 2015).[7] Notable observations from the GBIF dataset that may meet this multi-species requirement occur at two locations: one is close to the northern boundary of the RSA_{AVI} outside of mapped ecosites but near hardwood swamp habitat where clay-colored sparrow, black-billed cuckoo, and field sparrow were observed; the other is south of the LSA_{TER} in/near a conifer forest ecosite where brown thrasher and six other species have been observed (**Figure D-26**). However, it is unclear if any of these observations include active nests or confirmation of breeding (as GBIF records do not contain such information). Candidate SWH areas and "unknown" plots should be surveyed during the spring and early summer when birds are singing and defending their territories.

4.4.4 Terrestrial Crayfish

Out of 2,128 ecosites mapped within the LSA_{AQU}, Zoetica's desk-based analyses found 992 polygons that matched 6E ECS criteria (**Figure D-27**, **Table E-1**). Ecosite matches were primarily hardwood swamps,

[20] Although palm warbler, blue-winged warbler, house wren, northern cardinal, and yellow-billed cuckoo are not listed in the 6E ECS, these species are included in the SWHMiST for Shrub/Early Successional Bird Breeding Habitat, which is indicated as being applicable to All of Ontario (MNRF 2014).

mixedwood swamps, and marshes; however, there were also numerous shrub swamp and meadow ecosites.

Of the 473 TEM plots within the LSA_{AQU} assessed in the field, 60 (12.7%) were identified as candidate SWH, 36 (7.6%) were assigned as "unknown", and the remaining 377 (79.7%) were not considered suitable Terrestrial Crayfish habitat (**Figure D-27**). Of the 60 candidate SWH plots identified in total, 14 were located within the AOI in a variety of habitats (marsh, hardwood swamp, mixedwood swamp, conifer swamp). Surveyors typically marked plots as "unknown" when moist soil conditions suggested suitable habitat, even if terrestrial crayfish chimneys or burrows were not observed within the plot (but may have been detected nearby). Furthermore, surveyors marked six plots as "not suitable" but observed chimneys while in transit outside the plot/polygon or on adjacent polygons.

Terrestrial crayfish chimneys or burrows were observed throughout the LSA_{AQU}, including at 10 locations across the AOI (**Figure D-27**; **Table D-37**).[21] Many observations correspond with candidate SWH plots; however, there are a few discrepancies due to detections of chimneys/burrows while field teams were in transit and not on the survey plot. Overall, two observations were identified to digger crayfish and three were attributed to the Great Plains mudbug (previously known as devil crayfish); however, most detections could not be identified to the species level. Terrestrial crayfish individuals were also observed at four locations in the GSWC, primarily on the eastern side where incidental observations and candidate SWH plots were concentrated. In addition, eDNA metabarcoding analyses identified digger crayfish at one location within the AOI and two within the GSWC (see Figure I-1 in Appendix E, Chapter 1).

Meadow marsh or swamp ecosites (or ecoelements) with the presence of one or more terrestrial crayfish individuals or their chimneys/burrows are confirmed SWH (OMNRF 2015). Therefore, the locations of all terrestrial crayfish observations from the 2022 field studies are considered SWH, though the area boundaries may need to be confirmed. Additional field work should also be conducted to confirm the presence of terrestrial crayfish at "unknown" plots.

4.4.5 Special Concern and Rare Wildlife Species

A total of 39 Special Concern and Rare Wildlife Species – including 12 vegetation species, two reptiles, 22 birds, and three invertebrates – have been observed within the BIS study areas (**Table 4-2**). Of these species, nine have been detected within the AOI, 13 within the LSA_{TER} or LSA_{AQU} outside the AOI, and 16 within their BV-specific RSAs outside the AOI and LSAs. These Special Concern and Rare species observations are discussed below, generally in order of decreasing data quality with respect to identification of candidate SWH. Mapped data are discussed in the Species of Conservation Concern section of the applicable BV chapter of the 2023 BIS Baseline Report.

- **2022 Tier 1 BIS baseline studies**: There were incidental field observations of eight Special Concern (green dragon, eastern ribbonsnake, snapping turtle, monarch, barn swallow, eastern wood-pewee, wood thrush, and bald eagle) and two provincially rare species (eastern green-violet and terrestrial crayfish) within their applicable BIS study areas in 2022. Wood thrush was detected twice within the AOI: once as an incidental field observation, the other through eDNA metabarcoding analyses (see Section 4.1.4 in Appendix E, Chapter 1). Eastern ribbonsnake and bald eagle each had only one observation, both within the GSWC. None of these uncommon detections suggested that important

[21] Some terrestrial crayfish chimneys/burrows observed during TEM/SWH surveys were documented in more detail on separate incidental observations data forms. Duplicate observations have not been removed from **Figure D-27**.

habitat for the species was present. However, notable observations with details about wildlife activity/behaviour, local vegetation populations, or other important habitat features – which may warrant review by NHIC as candidate EOs and SWH – include the following:

- Terrestrial crayfish – please refer to Terrestrial Crayfish (Section 4.4.4) for a discussion of pertinent 2022 field observations.
- Snapping turtle – please refer to Turtle Wintering Areas (Section 4.1.7) and Turtle Nesting Areas (Section 4.3.4) for a discussion of pertinent 2022 field observations.
- Eastern green-violet was observed at two locations in sugar maple forests within the AOI; surveyors indicated that thousands of individuals (some fruiting) were present at both sites. At one location close to the Teeswater River in the northern portion of the AOI, the surveyor noted that "This might represent one of the largest [occurrences] in Ontario". These observations should be reported to NHIC and will likely constitute SWH.
- Barn swallows were observed at nine locations throughout the AOI (a few in close proximity) between July 18 and September 30. At a property within the southern AOI, surveyors observed 20 birds (a mix of adults and juveniles) feeding overhead and noted that barn swallows were present and nesting in the old barn. In addition, 25 adult barn swallows were observed feeding and flying around another barn within the AOI; it is possible that birds are/were nesting in this building. Confirmed breeding habitats and nest sites should constitute SWH.
- Eastern wood-pewees were observed (primarily through audio cues) throughout the AOI, LSA_{TER}, and RSA_{AVI} between July 7 and August 31. Birds were commonly found in hardwood and mixedwood forests and swamps, often adjacent to agricultural fields. Within the AOI and LSA_{TER}, pairs of male eastern wood-pewees were recorded calling at three locations in deciduous forest/swamp habitats, one bird was "heard consistently calling" in a sugar maple forest, and another was described as "singing" in a treed swamp. Within the RSA_{AVI} outside the LSA_{TER}, observations of two or more birds occurred at four locations, including counter-calling of three individuals in a maple forest north of Concession Road 10. Although no eastern wood-pewee nests or other indicators of confirmed or probable breeding were noted by surveyors, birds calling during the nesting season may indicate important breeding habitat in the area, and additional targeted breeding bird surveys should be conducted to identify candidate and confirmed SWH.
- Green dragon was observed at two locations (one amongst riparian shrubs, one within cedar stands) along Alps Creek within the LSA_{AQU} south of the AOI. Both observations were of a single fruiting individual. It is unlikely that a single individual would be considered an EO by the NHIC (and thus SWH); however, further field investigations of the area may be warranted.
- Monarch butterflies were observed throughout the AOI between July 13 and September 29. In the field, groups of 1-7 individuals of various ages (egg, larva including third and fourth instar, adult) were observed. Most individuals were recorded as feeding; these locations were primarily in agricultural (soybean and alfalfa) fields and meadow marshes, with milkweed and joe pye weed specifically noted. Other monarchs were recorded as travelling and resting, and there was one observation of a breeding pair. The NHIC currently only tracks significant

migratory staging areas for monarchs (i.e., "enduring migration aggregations" with "enough individuals" as noted in existing NHIC records). Therefore, these monarch field observations in 2022 are likely insufficient to be classified as an EO or candidate SWH. However, given that field surveyors recorded some observations of feeding and resting adult butterflies in the fall, further field investigations of potentially suitable habitats within the AOI may be warranted.

- **NHIC dataset**: There are EOs for rigid sedge, beaked spikerush, greater round-leaved orchid, and snapping turtle within the AOI and BV-specific LSAs and RSAs. Beaked spikerush was last observed in 1976 and rigid sedge and greater round-leaved orchid were last observed in 1987; these EOs have been designated as "Historical" by the NHIC. The EO for snapping turtle is "Verified extant (viability not assessed)", as previously discussed in Turtle Wintering Areas (Section 4.1.7). Detailed field studies are needed to delineate the ELC ecosites that protect the species' habitat form and function; these ecosites would become confirmed SWH.

- **Greenock Swamp ANSI report**: The Greenock Swamp Area of Natural and Scientific Interest (ANSI) Life Science Inventory report identified five provincially rare aquatic, wetland, or riparian vegetation species within the Greenock Swamp ANSI (i.e., within the LSA_{AQU} outside the AOI): Hill's pondweed, rigid sedge, beaked spikerush, greater round-leaved orchid, and green arrow arum (Johnson 1994). Appendix F of this ANSI report presents a "Rare Vascular Plant Atlas" that describes one or more populations of each species, which may include hundreds or thousands of fruiting individuals. The NHIC has not mined and mapped these inventory findings as EOs due to lack of time and resources, and their general prioritization of Endangered and Threatened species. Nevertheless, the rare vegetation descriptions in the Greenock Swamp ANSI report provide evidence of strong candidate SWH.

- **Previous 2020 preliminary environmental studies for the Project**: A reconnaissance for natural heritage features was conducted in July 2020 for borehole BH-01 (Tulloch Environmental 2020) and in October 2020 for borehole BH-02 (Tulloch Environmental 2021) within the AOI. At BH-01, nesting barn swallows were observed within farmstead out-buildings on site. At BH-02, no active or recently active barn swallow nests were found, but suitable habitat exists within/around the buildings on site. Along with the 2022 Tier 1 BIS incidental field observations of barn swallows (described above), these findings provide support for confirmed SWH.

- **GBIF dataset**: There are existing observations of seven Special Concern or provincially rare vegetation species, two reptiles, 22 birds (10 upland breeding birds, one shorebird, 10 waterbirds, one raptor), and one invertebrate. Except for Bush's pocket moss, which has been observed within the LSA_{TER} outside the AOI, all other GBIF observations of rare vegetation occurred in the GSWC within the LSA_{AQU}. All GBIF records of Special Concern and rare vegetation species are of preserved specimens collected in 1977 or 1987. Either a single individual was collected, or the number was not specified, and there are no additional notes about the potential occurrence of a local viable population. Similarly, GBIF records for more mobile and wider-ranging species (e.g., birds, reptiles) rarely provide additional information about species habitat use. As such, the potential importance of the habitats within which the species were observed, with respect to identifying candidate or confirmed SWH, is difficult to ascertain. These Special Concern and Rare Wildlife Species will not be further described in this SWH appendix; however, details regarding their presence and distribution

from current and historical records are provided within the corresponding BV chapters of the 2023 BIS Baseline Report.

Further field studies are needed to verify the presence and distribution of Special Concern and provincially rare species throughout applicable BIS study areas, to confirm breeding (or probable breeding) of wildlife species, and to assess the area needed to protect the habitat form and function for the species in order to define the SWH (OMNRF 2015).

Table 4-2. Ontario Special Concern and Rare Wildlife Species with desk-based and/or field-based observations within the BIS study areas.

Biodiversity Value[1]	**Common Name**	**SARO Status or Provincial Rarity**[2]	**BV-Specific Study Area(s) with Detections**	**Data Source(s)**[3]
Vegetation (aquatic; N/A)	Floating Crystalwort	S3	LSA_{AQU}	GBIF
Vegetation (aquatic; OBL)	Beaked Spikerush	S3	LSA_{AQU}	NHIC, ANSI, GBIF
Vegetation (aquatic; OBL)	Green Arrow Arum	S3	LSA_{AQU}	ANSI
Vegetation (aquatic; OBL)	Hill's Pondweed	Special Concern	LSA_{AQU}	GBIF, ANSI
Vegetation (terrestrial; FACU)	Eastern Green-violet	S2	AOI	Field
Vegetation (terrestrial; N/A)	Bush's Pocket Moss	S3	LSA_{TER}	GBIF
Vegetation (wetland/riparian; FAC)	Greater Round-leaved Orchid	S2	LSA_{AQU}	NHIC, ANSI
Vegetation (wetland/riparian; FAC)	Slender Mountain-mint	S3	LSA_{AQU}	GBIF
Vegetation (wetland/riparian; FACW)	Green Dragon	Special Concern	LSA_{AQU}	Field
Vegetation (wetland/riparian; FACW)	Rigid Sedge	S3?	LSA_{AQU}	NHIC, ANSI
Vegetation (wetland/riparian; FACW)	Tubercled Orchid	S3	LSA_{AQU}	GBIF
Vegetation (wetland/riparian; N/A)	Large-leaved Leafy Moss	S3	LSA_{AQU}	GBIF
Reptiles	Eastern Ribbonsnake	Special Concern	$RSA_{HRP\text{-}AQU}$	GBIF, Field
Reptiles	Snapping Turtle	Special Concern	AOI, LSA_{TER}, $RSA_{HRP\text{-}AQU}$	NHIC, GBIF, Field
Terrestrial Invertebrates	Monarch	Special Concern	AOI	Field
Upland Breeding Birds	Barn Swallow	Special Concern	AOI, LSA_{TER}, RSA_{AVI}	GBIF, Field
Upland Breeding Birds	Canada Warbler	Special Concern	RSA_{AVI}	GBIF
Upland Breeding Birds	Common Nighthawk	Special Concern	RSA_{AVI}	GBIF

Biodiversity Value[1]	Common Name	SARO Status or Provincial Rarity[2]	BV-Specific Study Area(s) with Detections	Data Source(s)[3]
Upland Breeding Birds	Eastern Wood-pewee	Special Concern	AOI, LSA_{TER}, RSA_{AVI}	GBIF, Field
Upland Breeding Birds	Evening Grosbeak	Special Concern	RSA_{AVI}	GBIF
Upland Breeding Birds	Fox Sparrow	S5B,S3N	RSA_{AVI}	GBIF
Upland Breeding Birds	Grasshopper Sparrow	Special Concern	RSA_{AVI}	GBIF
Upland Breeding Birds	Rusty Blackbird	Special Concern	RSA_{AVI}	GBIF
Upland Breeding Birds	White-crowned Sparrow	S5B,S3N	RSA_{AVI}	GBIF
Upland Breeding Birds	Wood Thrush	Special Concern	AOI, LSA_{TER}, RSA_{AVI}	GBIF, Field, eDNA
Shorebirds	Upland Sandpiper	S2B	AOI, $RSA_{AVI-AQU}$	GBIF
Waterbirds	Black Tern	Special Concern	$RSA_{AVI-AQU}$	GBIF
Waterbirds	Blue-winged Teal	S3B,S4M	$RSA_{AVI-AQU}$	GBIF
Waterbirds	Canvasback	S1B,S3N,S4M	$RSA_{AVI-AQU}$	GBIF
Waterbirds	Caspian Tern	S3B,S5M	$RSA_{AVI-AQU}$	GBIF
Waterbirds	Great Black-backed Gull	S1B,S4N	$RSA_{AVI-AQU}$	GBIF
Waterbirds	Great Egret	S2B,S3M	$RSA_{AVI-AQU}$	GBIF
Waterbirds	Greater White-fronted Goose	S3M	LSA_{TER}, $RSA_{AVI-AQU}$	GBIF
Waterbirds	Horned Grebe	Special Concern	$RSA_{AVI-AQU}$	GBIF
Waterbirds	Red-necked Grebe	S3	$RSA_{AVI-AQU}$	GBIF
Waterbirds	Tundra Swan	S2B,S4N,S3M	LSA_{TER}, $RSA_{AVI-AQU}$	GBIF
Raptors	Bald Eagle	Special Concern	AOI, LSA_{TER}, $RSA_{AVI-AQU}$	GBIF, Field
Primary and Secondary Producers	Terrestrial Crayfish[4]	S3	AOI, LSA_{AQU}	Field, eDNA
Primary and Secondary Producers	River Bluet	S3	LSA_{TER}	GBIF

Notes:

1. For the purposes of the 2023 BIS Baseline Report, vegetation species are categorized by their habitat to determine the appropriate study area. Aquatic (OBL) and wetland/riparian (FACW, FAC) species are studied to the LSA_{AQU}, while terrestrial (FACU, UPL) species are studied to the LSA_{TER}. Wetland indicator statuses are available for vascular vegetation only: OBL = Obligate, FACW = Facultative Wetland, FAC = Facultative, FACU = Facultative Upland, UPL = Upland.

Biodiversity Value[1]	Common Name	SARO Status or Provincial Rarity[2]	BV-Specific Study Area(s) with Detections	Data Source(s)[3]

2. Conservation status ranks: SC = Special Concern; S1 = Critically Imperiled, S2 = Imperiled, S3 = Vulnerable, S4 = Apparently Secure, S5 = Secure. B (Breeding), N (Non-breeding), and M (migrant) are breeding status modifiers.
3. "eDNA" as a data source refers to the Tier 1 eDNA metabarcoding studies (see Appendix E, Chapter 1), which is the use of eDNA in combination with metabarcoding for multi-species identification.
4. Terrestrial crayfish observations within the AOI include digger crayfish (*Creaserinus fodiens*) and unidentified species. Both species listed in the 6E ECS – digger crayfish and devil crayfish (since renamed as Great Plains mudbug, *Lacunicambarus nebrascensis*) – are provincially rare (S3).

4.5 Animal Movement Corridors

4.5.1 Amphibian Movement Corridors

Amphibian Movement Corridors may be found in all ecosites associated with water but must be determined when Amphibian Breeding Habitat (Wetlands) is confirmed as SWH (OMNRF 2015). Out of 2,155 ecosites mapped within the $RSA_{HRP-AQU}$, Zoetica's desk-based analyses found 1,664 polygons that matched 6E ECS criteria (**Figure D-28**, **Table E-1**). Ecosite matches for this SWH type were the same as for Amphibian Breeding Habitat (Woodland) (see Section 4.3.6).

Of the 473 TEM plots assessed in the field, 217 (45.9%) were identified as candidate SWH, 113 (23.9%) were assigned as "unknown", and the remaining 143 (30.2%) were not considered suitable Amphibian Movement Corridors (**Figure D-28**). Some plots were marked "not suitable" as corridor habitat because they were likely to be amphibian breeding habitat instead. Field notes for the majority of "unknown" plots indicated (correctly) that amphibian surveys are needed, and breeding habitat needs to be confirmed as SWH first. However, supplementary information for the plots marked as candidate SWH will also be useful for designing or prioritizing future amphibian studies, as field surveyors noted the extent and quality of connectivity between vernal pools.

A variety of amphibians were detected throughout the AOI, LSA_{TER}, and $RSA_{HRP-AQU}$ during 2022 field studies (**Figure D-28**; **Table D-38**). In addition to species and notable observations already described for Amphibian Breeding Habitat SWH (Woodland and Wetlands; Sections 4.3.6 and 4.3.7), surveyors reported American bullfrog, eastern red-backed salamander, northern leopard frog, pickerel frog, unidentified *Lithobates* frogs (e.g., northern leopard frog, pickerel frog, or green frog), and an unidentified salamander. Many observations were noted by surveyors as supporting candidate Amphibian Movement Corridors based on the habitat (i.e., away from potential breeding ponds) and/or "travelling" frogs and toads. "Lots of leopard frogs" were observed at a stream in the northwestern portion of the AOI in early October 2022, the same location where unidentified frogs and tadpoles were observed earlier in July. However, the northern leopard frog observation is relatively late in the season and may suggest an overwintering site rather than a movement corridor. From the GBIF dataset, there is one notable record of 49 green frogs within the $RSA_{HRP-AQU}$ outside the AOI and LSA_{TER} (**Figure D-28**; **Table D-39**). However, as these frogs were observed in Formosa Creek, and green frogs may breed as late as August (Ontario Nature 2023) this area may be a potential amphibian breeding habitat instead.

4.5.2 Deer Movement Corridors

Deer Movement Corridors may be found in all forested ecosites but must be determined when deer wintering habitat is confirmed as SWH (OMNRF 2015). Out of 1,260 ecosites mapped within the RSA_{UNG}, Zoetica's desk-based analyses found 928 polygons that matched 6E ECS criteria (**Figure D-29**, **Table E-1**).

Most ecosite matches consisted of hardwood forests and swamps, followed by mixedwood forests and swamps and, to a lesser extent, conifer forests and swamps.

Of the 213 TEM plots within the RSA_{UNG} assessed in the field, 197 (92.5%) were assigned as "unknown" and the remaining 16 (7.5%) were not considered suitable Deer Movement Corridors (**Figure D-29**). Similar to Deer Yarding Areas (Section 4.1.12) and Deer Winter Congregation Areas (Section 4.1.13), surveyors noted that MNRF is responsible for determining and mapping this SWH type. Nonetheless, for many plots marked as candidate SWH or "unknown", surveyors also provided brief but useful descriptions of the habitat, incidental observations of white-tailed deer sign, and evidence of being in a deer hunting area. Incidental deer observations were common throughout the AOI, LSA_{TER}, and RSA_{UNG} (see **Figure D-20** for Seeps and Springs SWH); however, these observations were not considered relevant to Deer Movement Corridors due to the summer and early fall (early July to mid-October) survey timing.

Based on the MNRF's Wildlife Values Area dataset, there are currently no White-tailed Deer Migration Routes identified within the AOI, LSA_{TER}, and RSA_{UNG} and, thus, Deer Movement Corridors are assumed to be absent. Future discussions with MNRF (e.g., as part of ongoing stakeholder and rights-holder engagement) may indicate that suitable habitats for Deer Movement Corridors (e.g., "yes" and "unknown" plots) should be further investigated.

5.0 DISCUSSION

This 2023 SWH baseline report focused on updating candidate SWH mapping with 2022 Tier 1 BIS field data, while retaining the desk-based species observations and habitat data previously reported in 2022. Out of the 39 SWH types from the 6E ECS (OMNRF 2015) that were deemed relevant to the SON-South Bruce siting area (see Section 1.0), Zoetica's analyses revealed confirmed or candidate SWH within the AOI, LSA_{TER} or LSA_{AQU}, and/or BV-specific RSAs for 27 SWH types, including:

- 11 seasonal concentration areas
- 2 rare vegetation communities
- 8 specialized habitats for wildlife
- 5 habitats for species of conservation concern
- 1 animal movement corridor

Based on information available to date, candidate SWH was not found or unlikely to be present for six SWH types, including Bat Hibernacula, Deer Yarding Areas, Cliff and Talus Slopes, Sand Barren, Savannah, and Tallgrass Prairie. There may be Other Rare Vegetation Communities present; however, further discussions with NHIC and MNRF are needed.

5.1 Confirmed Significant Wildlife Habitat

To date, four types of confirmed SWH have been identified: Deer Winter Congregation Areas, Seeps and Springs, Terrestrial Crayfish, and habitat for barn swallow (Special Concern).

The MNRF-mapped Deer Wintering Area (equivalent to Deer Winter Congregation Area SWH) that overlaps the GSWC occurs within the RSA_{UNG} and extends into the LSA_{TER} outside the AOI (**Figure D-13**). According to the 6E ECS, all woodlots exceeding the >100 ha minimum size criteria are significant unless determined not be significant by MNRF (OMNRF 2015). Therefore, engagement with MNRF staff is needed to clarify if their mapped polygon, especially in areas potentially impacted by the Project (i.e., LSA_{TER}), is considered significant overwintering habitat for white-tailed deer. Until further information is available from MNRF, the current mapped polygon will be considered confirmed SWH for the purposes of the BIS.

During 2022 TEM field studies, surveyors identified 31 candidate Seeps and Springs throughout the BIS study areas, including at five plots within the AOI (**Figure D-20**). Additional seeps and springs were identified within the AOI and LSA_{AQU} during AHM surveys (see Figure E-1 in Appendix D, Chapter 1). These AHM findings included two areas (one in the AOI, the other in the LSA_{TER}) with two or more seeps and/or springs; at least one of these areas meets the criteria for confirmed SWH (OMNRF 2015). Furthermore, although the number of individual seeps or springs were not systematically recorded in the field during TEM/SWH surveys, some observations indicated the presence of "some" or "many" seeps or springs in swampy depressions. These and other candidate SWH areas should be further investigated on the ground to confirm the number of seeps/springs present.

Terrestrial crayfish chimneys or burrows were observed throughout the AOI and LSA_{AQU} during 2022 field studies (**Figure D-27**). According to the 6E ECS, the area of the ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH (OMNRF 2015). Therefore, using a conservative approach, all ecosite polygons where terrestrial crayfish chimneys/burrows or individuals were observed should be considered SWH. In addition, surveyors marked "yes" or "unknown" candidate SWH where no chimneys or burrows were found on the plot (but may have been detected nearby), but

the habitat was deemed suitable for terrestrial crayfish (e.g., appropriate ecosite, moist soils, edges). These plots and polygons should be further investigated for the presence of terrestrial crayfish. Given the prevalence of incidental observations during 2022 field studies, it is likely that terrestrial crayfish are present in other parts of the AOI. Detailed field investigations for terrestrial crayfish (and other SWH types) will be needed when additional information about the Project footprint and construction activities is known.

Barn swallows were recently downlisted from Threatened to Special Concern in Ontario in January 2023; thus, their habitat protection changed from the Ontario *ESA* to the *Planning Act* and PPS (as SWH). Barn swallows were reported nesting in farm buildings within the AOI during both 2022 field studies and previous 2020 preliminary environmental studies (Tulloch Environmental 2020, 2021). Zoetica assumes that confirmed barn swallow nest sites would be designated as EOs by the NHIC; if so, SWH would be confirmed after mapping the exact location of the nest(s). Under the Ontario *ESA*, the General Habitat Description for Barn Swallow defined the area of habitat protected as the nest site (Category 1), the area within 5 m of the nest (Category 2), and the area between 5 m and 200 m of the nest (Category 3) (MECP 2013). Further discussions with NHIC and/or MNRF would be helpful to clarify if these habitat categories were carried forward to delineate SWH for barn swallows, since ELC mapping is likely not appropriate for this species.

5.2 Candidate Significant Wildlife Habitat

Mapped candidate SWH will be used to inform Tier 2 study design and prioritized for field verification. If the SON-South Bruce siting area is selected for the Project, detailed baseline field studies will be conducted to confirm SWH. Based on information available to date, there is strong evidence to support candidate SWH (i.e., more likely to become confirmed SWH), including within the AOI, for Bat Maternity Colonies and habitat for two Special Concern or Rare Wildlife Species: snapping turtle and eastern green-violet. Furthermore, SWH types related to amphibians are likely present within the BIS study areas for herpetofauna.

The Toronto Zoo NBCP's bat studies focused trap-and-release and radio-telemetry methods on Restricted Species M1 due to the importance of improving our collective understanding of a SAR and to inform conservation efforts to support the species' recovery strategy (Humphrey and Fotherby 2019). However, NBCP researchers also mist-netted seven "heavily pregnant" big brown bats during the exploratory trap-and-release program (Sparrow-Scinocca et al. 2022). Tagging and tracking some big brown bats, in addition to Restricted Species M1, may help identify additional Bat Maternity Colonies within the AOI, LSA_{TER}, and/or RSA_{BAT}. During 2022 Tier 1 BIS field studies, survey crews identified numerous cavity trees (potential bat roosting habitat) throughout the BIS study areas, including several locations with medium and high snag densities within the AOI (**Figure D-6**, **Table D-6**). Exit surveys and acoustic monitoring will focus on areas with high and medium snag densities within the AOI and LSA_{TER} to further investigate candidate Bat Maternity Colonies SWH (OMNR 2011a).

Important habitat for snapping turtle (Special Concern), and potentially Turtle Nesting Area and/or Turtle Wintering Area SWH, may occur throughout the BIS study areas and the SON-South Bruce siting area. The NHIC has delineated a very large EO for snapping turtle that overlaps the AOI, LSA_{TER}, and $RSA_{HRP\text{-}AQU}$. This EO is based on 169 observations throughout the counties of Bruce, Grey, Huron, Perth, and Wellington. Although the last observation was made in 2004, the NHIC still considers this EO as "Verified Extant" due to one or more observations being made in the last 20 years. Ground-truthing of the snapping turtle EO,

including areas identified as candidate SWH ecosites for Turtle Wintering Area (**Figure D-7**) and Turtle Nesting Area (**Figure D-19**), will help identify important habitats for snapping turtle.

TEM surveyors recorded thousands of eastern green-violet (provincially rare) individuals at two locations within the AOI during 2022 field studies (see Figure B-3c in Chapter 2). These large populations (one estimated as covering 15 m x 60 m and noted by the surveyor as possibly one of the largest in Ontario) were found on the slopes of sugar maple forests close to the Teeswater River or its tributary. Additional scattered individuals were observed outside of the main patches, including on a trail. One surveyor noted the observation as a range expansion of the species, since eastern green-violet is rare and local in rich moist floodplain woods in southwestern Ontario (Argus et al. 1987) and had not been previously recorded in the area. These observations should be reported to NHIC for review; if deemed an EO (or two EOs), SWH could be confirmed after detailed habitat mapping.

There are likely Amphibian Breeding Habitat (Woodland and/or Wetlands) and Amphibian Movement Corridors SWH within the $RSA_{HRP-AQU}$. Large groups of wood frogs (including juveniles), green frogs, American bullfrogs, and unidentified frogs were observed in the northern half of the GSWC during 2022 field studies (**Figure D-21**, **Figure D-22**, **Figure D-28**). Areas around Schmidt Lake, Cunningham Lake, a small pond west of Bruce Road 20 and north of Concession Road 2, and other parts of the GSWC appear to provide important habitats for local amphibian populations. Amphibians were also observed throughout the AOI but not in great numbers. Nonetheless, many TEM plots within the AOI were marked as candidate SWH for all three amphibian-related SWH types, and tadpoles and juveniles were also observed at a few locations. However, as field data collection occurred in the summer and fall of 2022 and focused primarily on other surveys, it was difficult to interpret incidental observations and to distinguish potential amphibian breeding habitats, summer habitats, movement corridors, and possible overwintering habitats. Dedicated amphibian surveys are planned as part of Tier 2 BIS baseline studies.

5.2.1 Candidate SWH within the AOI

Based on the BIS baseline studies completed to date, candidate SWH within the AOI may differ from the BV-specific LSAs and/or RSAs in several respects:

1. Desk-based ecosite screening identified Woodland Raptor Nesting Habitat only outside the AOI due to habitat patches within the AOI not meeting the minimum interior forest area requirement specified in the 6E ECS. However, many plots within the AOI were identified as candidate SWH by field crews during TEM studies (**Figure D-18**), which may be due to a different perception of contiguous habitat or forest size on the ground, along with observations of relevant woodland raptor species in or around these survey plots during the breeding season.

2. Desk-based ecosite screening identified Turtle Nesting Areas only outside the AOI. Turtles require sand or gravel areas for nesting; these habitats were not identified within the AOI and were also rarely found outside the AOI through remotely sensed ecosite classification (**Figure D-19**). However, field crews identified seven shoreline locations within the AOI with evidence of inactive turtle nests and/or potentially suitable habitat for turtle nesting (i.e., “unknown” candidate SWH plots) – these areas should be further investigated for SWH.

3. Additional habitat criteria to identify candidate SWH were met in the AOI (i.e., “yes” plots), but not in the LSA_{TER} or RSA_{AVI}/$RSA_{AVI-AQU}$, for Colonially-Nesting Bird Breeding Habitat (Ground) (**Figure D-11**). Field crews identified four open fields or meadow marshes with scattered shrubs, in close

proximity to watercourses, that could potentially support Brewer's blackbirds. This species was not observed in mid-late August when the TEM field surveys were completed for these plots. However, Brewer's blackbirds typically breed between mid-May to mid-July in southern Ontario (OBBA and Birds Canada 2023); thus, targeted surveys during this period should be completed as part of Tier 2 BIS baseline studies.

4. Additional habitat criteria to identify candidate SWH were met in the AOI and LSA_{TER} (i.e., "yes" and "nearby" plots), but not in the RSA_{AVI}, for Open Country Bird Breeding Habitat (**Figure D-25**). Desk-based ecosite screening did not identify candidate SWH for this habitat type in any applicable BIS study area (**Table 4-1**); however, as discussed in Section 3.1, agricultural fields were not included when developing the ecosite classification dataset. Both Open Country Bird Breeding Habitat and Shrub/Early Successional Bird Breeding Habitat (for which there were also no ecosite matches) may consist of modified habitats that are not Class 1 or 2 agricultural lands and are not being actively used for farming (OMNRF 2015). Additional ground-truthing and engagement with landowners are needed to identify abandoned fields and pasturelands, within and outside the AOI, that may offer suitable nesting habitat for the relevant bird species, including SAR.

5. Additional habitat criteria to identify candidate SWH may have been met in the AOI (i.e., "unknown" plots), but not in the LSA_{TER} or RSA_{AVI}, for Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) (**Figure D-9**). Specifically, TEM field crews found eroding banks at two locations along the Teeswater River within the AOI that could be suitable for bank swallows. Targeted surveys during this species' breeding season from mid-May to mid-July (OBBA and Birds Canada 2023) should be completed in the future.

6. Within the BIS study areas for terrestrial crayfish, incidental observations only occurred within the AOI (and not the LSA_{TER}) during 2022 field studies. However, these findings are likely confounded by accessibility issues in the LSA_{TER} (see Figure B-1 in Appendix B, Chapter 1 for terrestrial survey locations and Figures A-1, A-2, and A-3 in Appendix D, Chapter 1 for aquatic survey locations). Furthermore, terrestrial crayfish chimneys/burrows and a few individuals were recorded throughout the LSA_{AQU} (outside the AOI and LSA_{TER}) by field crews. Thus, the SON-South Bruce siting area, in general, appears to provide important habitat for terrestrial crayfish.

7. Within the past 30 years, two shorebird species – pectoral sandpiper and stilt sandpiper – have only been detected within the AOI and not the LSA_{TER} or $RSA_{AVI\text{-}AQU}$ (**Figure D-3**). The GBIF records for these and other shorebirds, at a marsh ecosite amongst agricultural lands, are potentially relevant to Shorebird Migratory Stopover Area SWH (Section 4.1.3). However, given the rarity of these species' observations (May 23, 2018, and May 3, 2020), it is unlikely that the marsh constitutes significant habitat for pectoral sandpiper, stilt sandpiper, or local shorebird populations.

5.3 Limitations and Next Steps

Existing species observations may supplement ecosite and habitat data to provide further evidence of the presence of candidate SWH. However, the existing spatial datasets include data from other studies/programs with different objectives, incidental observations with inherent reporting biases, limited information on sites within the BIS study areas, and species observations with little to no context. For example, GBIF records may include the species name, location, date, and count, but there is no

information about habitat, activity/behaviour, demographics, type of sign, or other comments that would further inform the identification of candidate SWH. In addition, where a species has only been detected using desk-based data, caution should be taken as those data could be as old as 1970, and the conditions supporting the species' presence in the area may have changed.

With respect to field data, field identification of candidate SWH in 2022 was conducted opportunistically in conjunction with TEM verification (see Appendix B, Chapter 1). TEM surveys were completed in the summer and some SWH types can only be identified and evaluated during spring, fall, and/or winter. A brief summary of the surveys, including seasonal considerations, required to confirm each SWH type was presented in **Table 4-1**. Systematic, detailed, seasonally-appropriate, BV-specific field investigations to confirm SWH, following guidance from the 6E ECS and *Significant Wildlife Habitat Technical Guide*, are planned as part of Tier 2 BIS baseline studies. These Tier 2 studies would only be conducted if the SON-South Bruce siting area is selected for the Project. The NWMO currently anticipates that Project site selection will occur at the end of 2024.

Should the SON-South Bruce siting area be selected for the Project, future Tier 2 SWH studies will prioritize surveying areas with pertinent species observations and/or habitat information from both desk- and field-based data (e.g., plots/polygons identified as candidate SWH, species-rich 'hotspots'), with a focus on areas within the extent of indirect project impacts (i.e., AOI and LSA_{TER}).[22] Survey site selection will also prioritize areas that were inaccessible or not selected for survey in 2022 due to minimum size and/or shape requirements for the TEM program. Future Tier 2 SWH studies will not be restricted to TEM plots or natural/naturalized habitats, as agricultural lands may be considered suitable upland habitats for some SWH types (e.g., Open Country and Shrub/Early Successional Bird Breeding Habitats, Waterfowl Stopover and Staging Areas (Aquatic), Raptor Wintering Area). However, access limitations will continue to be a factor in determining which areas can be surveyed. The NWMO continues to engage with local landowners to gain permission to access their properties. Zoetica is providing input to the NWMO regarding priority locations within which they should seek access based on the baseline information collected to date. Zoetica and the NWMO will continue to discuss opportunities to maximize survey efficiency and coverage, such as the feasibility of conducting certain surveys from a distance (e.g., from public roads).

[22] As described in Zoetica's BPPA Report (Zoetica 2021a), the NWMO defined the AOI as the area within which the Project footprint will be located, and Zoetica designed the LSA_{TER} as a 1 km buffer around the AOI to capture potential indirect impacts of the Project on the terrestrial environment. The focal areas for Tier 2 studies, including confirmation of SWH, may change depending on the Project Description (which is not yet available) and further information about potential project effects.

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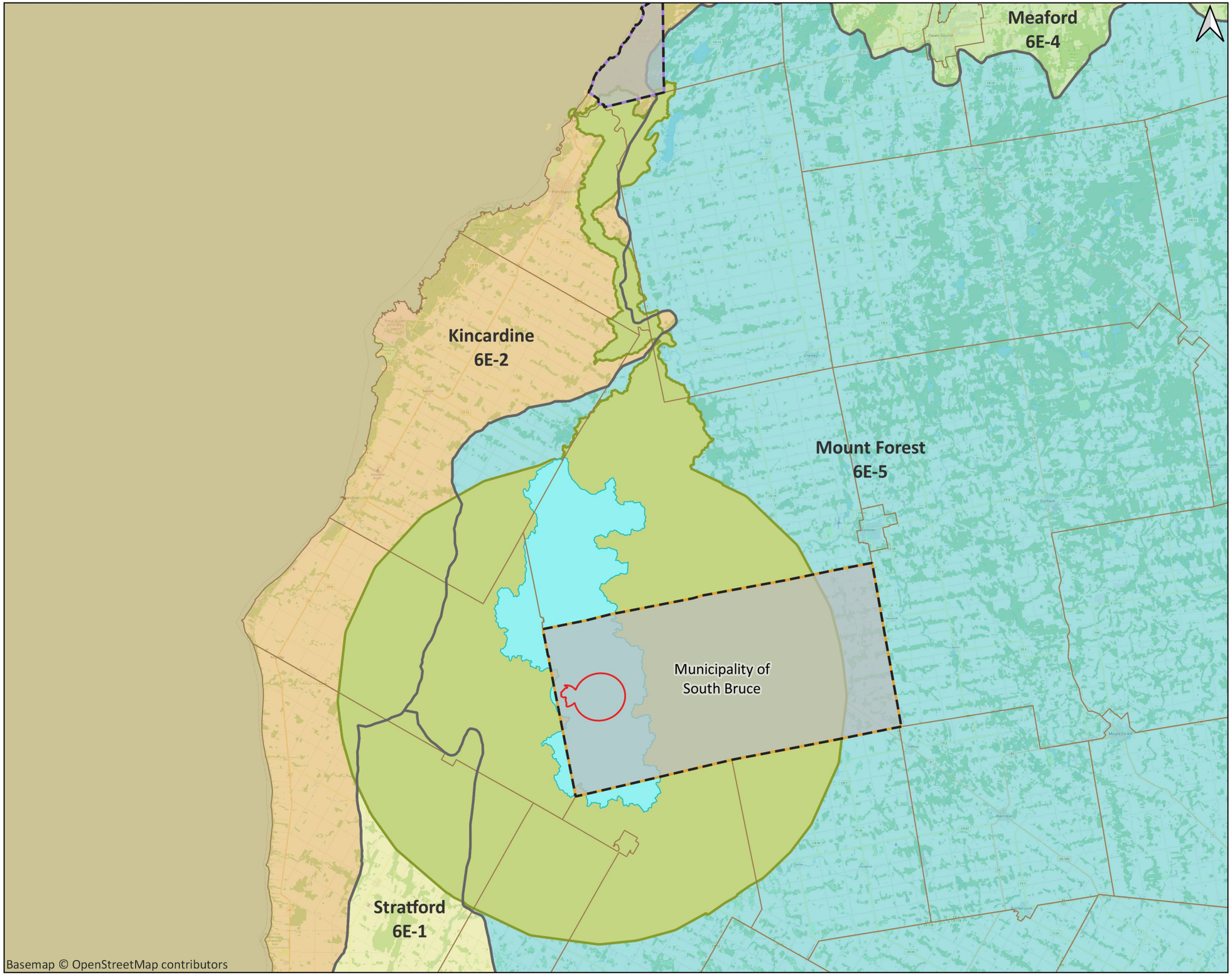
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APPENDIX A – PROJECT AREA MAPS



NWMO Biodiversity Impact Studies

Ecoregions and Ecodistricts in the SON-South Bruce Siting Area

Figure A-1

Main Map

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{ECO})
- Municipal Boundary
- South Bruce Boundary
- Saugeen No. 29

Ecodistricts

- 6E-1
- 6E-4
- 6E-2
- 6E-5

Inset Map

- Ecodistrict Boundary
- Regional Study Area (RSA_{ECO})

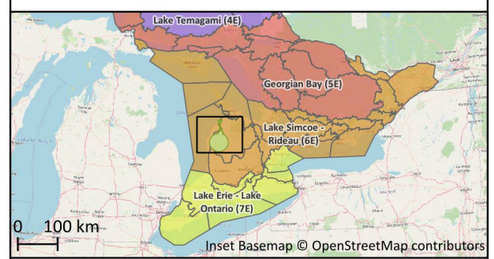
Ecoregions

- 4E
- 5E
- 6E
- 7E

1:350,000

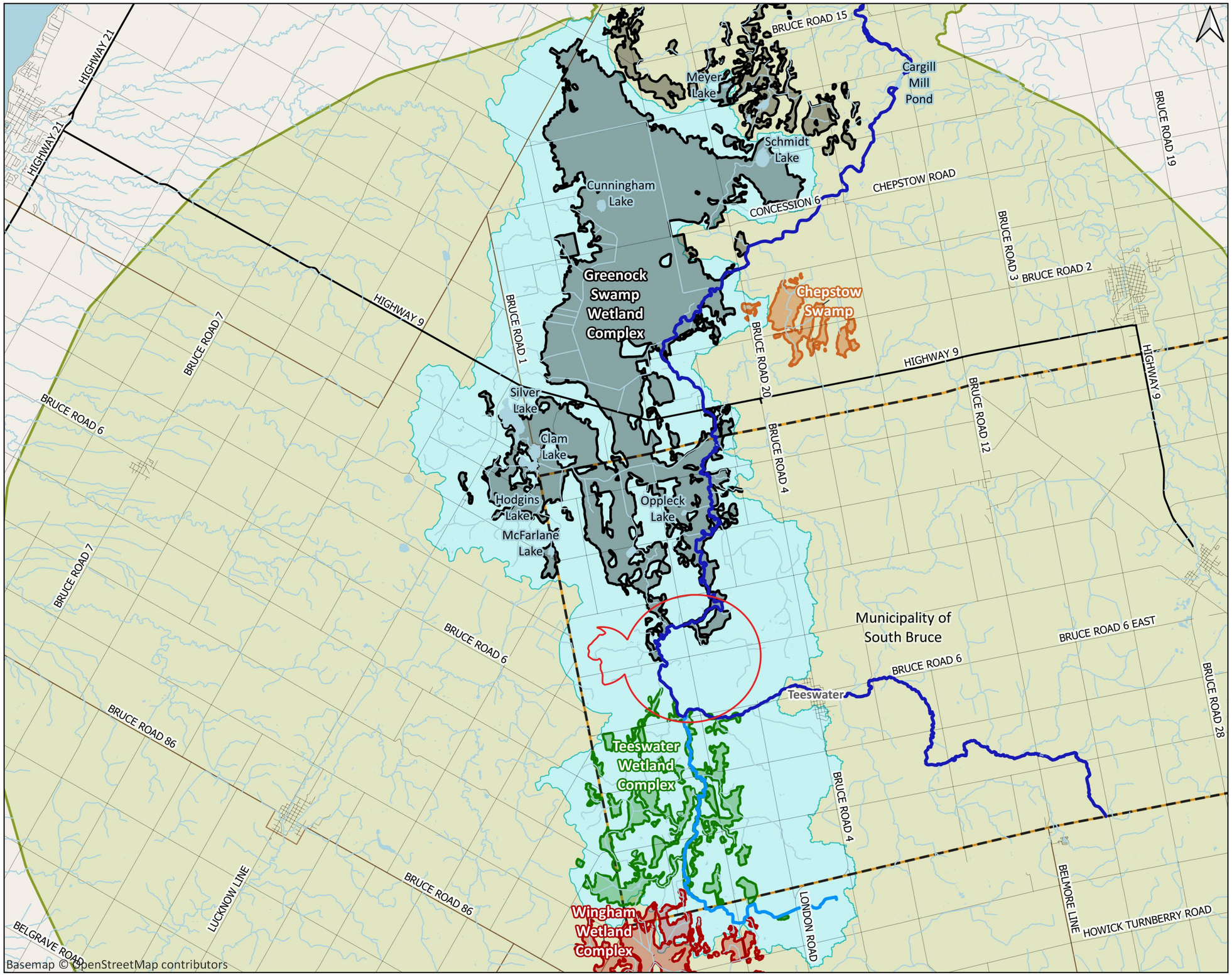
0 5 10 km

ZOETICA



Data received from:
Ontario GeoHub — EcoDistricts (NDMNRF); EcoRegions (NDMNRF); Indian Reserve (NDMNRF); Municipal Boundary - Lower Tier (MMAH)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
September 26, 2023	Map ID: NWMO_BIS_D187	



NWMO Biodiversity Impact Studies

LSA_{ECO} and Local Features

Figure A-2

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{ECO})
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary
- Teeswater River
- Alps Creek
- Other Watercourse
- Lake

Provincially Significant Wetlands

- Greenock Swamp Wetland Complex
- Teeswater Wetland Complex
- Wingham Wetland Complex
- Chepstow Swamp

1:130,000

0 2 4 km

ZOETICA



Data received from:
Ontario GeoHub — EcoDistricts (NDMNRF); EcoRegions (NDMNRF); Indian Reserve (NDMNRF); Municipal Boundary - Lower Tier (MMAH)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
February 02, 2024	Map ID: NWMO_BIS_D188	

APPENDIX B – SPECIES LIST

Table B-1. Common and scientific names for species mentioned in this report. Species names follow the NHIC's Ontario species lists, current to March 1, 2023.

Biodiversity Value	Common Name	Scientific Name
VEGETATION		
Vegetation	Alfalfa	*Medicago sativa*
Vegetation	Beaked Spikerush	*Eleocharis rostellata*
Vegetation	Black Ash	*Fraxinus nigra*
Vegetation	Bur Oak	*Quercus macrocarpa*
Vegetation	Bush's Pocket Moss	*Fissidens bushii*
Vegetation	Common Winterberry	*Ilex verticillata*
Vegetation	Eastern Green-violet	*Hybanthus concolor*
Vegetation	Eastern Rough Sedge	*Carex scabrata*
Vegetation	Eastern Swamp Saxifrage	*Micranthes pensylvanica*
Vegetation	Elm	*Ulmus* spp.
Vegetation	Floating Crystalwort	*Riccia fluitans*
Vegetation	Greater Round-leaved Orchid	*Platanthera macrophylla*
Vegetation	Green Arrow Arum	*Peltandra virginica*
Vegetation	Green Dragon	*Arisaema dracontium*
Vegetation	Hill's Pondweed	*Potamogeton hillii*
Vegetation	Joe Pye Weed	*Eutrochium* spp.
Vegetation	Large-leaved Leafy Moss	*Rhizomnium magnifolium*
Vegetation	Milkweed	*Asclepias* spp.
Vegetation	Red Maple	*Acer rubrum*
Vegetation	Rigid Sedge	*Carex tetanica*
Vegetation	Silver Maple	*Acer saccharinum*
Vegetation	Slender Mountain-mint	*Pycnanthemum tenuifolium*
Vegetation	Soybean	*Glycine max*
Vegetation	Sugar Maple	*Acer saccharum*
Vegetation	Tubercled Orchid	*Platanthera flava*
Vegetation	Watercress	*Nasturtium* or *Rorippa* spp.
MAMMALS		
Ungulates	White-tailed Deer	*Odocoileus virginianus*
Carnivores	American Black Bear	*Ursus americanus*
Small Terrestrial Mammals	Northern Raccoon	*Procyon lotor*
Bats	Big Brown Bat	*Eptesicus fuscus*
Bats	Eastern Small-footed Myotis	*Myotis leibii*
Bats	Little Brown Myotis	*Myotis lucifugus*
Bats	Silver-haired Bat	*Lasionycteris noctivagans*
Bats	Tricolored Bat	*Perimyotis subflavus*
HERPETOFAUNA		
Amphibians	American Bullfrog	*Lithobates catesbeianus*
Amphibians	American Toad	*Anaxyrus americanus*
Amphibians	Eastern Newt	*Notophthalmus viridescens*
Amphibians	Eastern Red-backed Salamander	*Plethodon cinereus*
Amphibians	Four-toed Salamander	*Hemidactylium scutatum*
Amphibians	Gray Treefrog	*Dryophytes versicolor*
Amphibians	Green Frog	*Lithobates clamitans*
Amphibians	Northern Leopard Frog	*Lithobates pipiens*
Amphibians	Pickerel Frog	*Lithobates palustris*
Amphibians	Spring Peeper	*Pseudacris crucifer*
Amphibians	Western Chorus Frog – Great Lakes – St. Lawrence – Canadian Shield population	*Pseudacris maculata pop. 1*
Amphibians	Wood Frog	*Lithobates sylvaticus*

Biodiversity Value	Common Name	Scientific Name
Reptiles	Common Five-lined Skink (Great Lakes/St. Lawrence population)	*Plestiodon fasciatus pop. 2*
Reptiles	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*
Reptiles	Eastern Milksnake	*Lampropeltis triangulum*
Reptiles	Eastern Ribbonsnake	*Thamnophis saurita*
Reptiles	Midland Painted Turtle	*Chrysemys picta marginata*
Reptiles	Snapping Turtle	*Chelydra serpentina*
TERRESTRIAL & SEMI-AQUATIC INVERTEBRATES		
Terrestrial Invertebrates	Monarch	*Danaus plexippus*
Terrestrial Invertebrates	Terrestrial Crayfish	Digger Crayfish, *Creaserinus fodiens*
		Great Plains Mudbug, *Lacunicambarus nebrascensis*
Primary and Secondary Producers	River Bluet	*Enallagma anna*
BIRDS		
Upland Breeding Birds	Bank Swallow	*Riparia riparia*
Upland Breeding Birds	Barn Swallow	*Hirundo rustica*
Upland Breeding Birds	Black-billed Cuckoo	*Coccyzus erythropthalmus*
Upland Breeding Birds	Blackburnian Warbler	*Setophaga fusca*
Upland Breeding Birds	Black-throated Blue Warbler	*Setophaga caerulescens*
Upland Breeding Birds	Blue-headed Vireo	*Vireo solitarius*
Upland Breeding Birds	Blue-winged Warbler	*Vermivora cyanoptera*
Upland Breeding Birds	Bobolink	*Dolichonyx oryzivorus*
Upland Breeding Birds	Brewer's Blackbird	*Euphagus cyanocephalus*
Upland Breeding Birds	Brown Creeper	*Certhia americana*
Upland Breeding Birds	Brown Thrasher	*Toxostoma rufum*
Upland Breeding Birds	Canada Warbler	*Cardellina canadensis*
Upland Breeding Birds	Clay-colored Sparrow	*Spizella pallida*
Upland Breeding Birds	Cliff Swallow	*Petrochelidon pyrrhonota*
Upland Breeding Birds	Common Nighthawk	*Chordeiles minor*
Upland Breeding Birds	Eastern Meadowlark	*Sturnella magna*
Upland Breeding Birds	Eastern Towhee	*Pipilo erythrophthalmus*
Upland Breeding Birds	Eastern Whip-poor-will	*Antrostomus vociferus*
Upland Breeding Birds	Eastern Wood-pewee	*Contopus virens*
Upland Breeding Birds	Evening Grosbeak	*Coccothraustes vespertinus*
Upland Breeding Birds	Field Sparrow	*Spizella pusilla*
Upland Breeding Birds	Fox Sparrow	*Passerella iliaca*
Upland Breeding Birds	Grasshopper Sparrow	*Ammodramus savannarum*
Upland Breeding Birds	Gray Catbird	*Dumetella carolinensis*
Upland Breeding Birds	Horned Lark	*Eremophila alpestris*
Upland Breeding Birds	House Wren	*Troglodytes aedon*
Upland Breeding Birds	Northern Cardinal	*Cardinalis cardinalis*
Upland Breeding Birds	Northern Parula	*Setophaga americana*
Upland Breeding Birds	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Upland Breeding Birds	Ovenbird	*Seiurus aurocapilla*
Upland Breeding Birds	Palm Warbler	*Setophaga palmarum*
Upland Breeding Birds	Pileated Woodpecker	*Dryocopus pileatus*
Upland Breeding Birds	Red-breasted Nuthatch	*Sitta canadensis*
Upland Breeding Birds	Ruffed Grouse	*Bonasa umbellus*
Upland Breeding Birds	Rusty Blackbird	*Euphagus carolinus*
Upland Breeding Birds	Savannah Sparrow	*Passerculus sandwichensis*
Upland Breeding Birds	Sedge Wren	*Cistothorus stellaris*
Upland Breeding Birds	Sharp-tailed Grouse	*Tympanuchus phasianellus*
Upland Breeding Birds	Veery	*Catharus fuscescens*
Upland Breeding Birds	Vesper Sparrow	*Pooecetes gramineus*
Upland Breeding Birds	White-crowned Sparrow	*Zonotrichia leucophrys*

Biodiversity Value	Common Name	Scientific Name
Upland Breeding Birds	Wild Turkey	*Meleagris gallopavo*
Upland Breeding Birds	Willow Flycatcher	*Empidonax traillii*
Upland Breeding Birds	Winter Wren	*Troglodytes hiemalis*
Upland Breeding Birds	Wood Thrush	*Hylocichla mustelina*
Upland Breeding Birds	Yellow-bellied Sapsucker	*Sphyrapicus varius*
Upland Breeding Birds	Yellow-billed Cuckoo	*Coccyzus americanus*
Shorebirds	Dunlin	*Calidris alpina*
Shorebirds	Greater Yellowlegs	*Tringa melanoleuca*
Shorebirds	Least Sandpiper	*Calidris minutilla*
Shorebirds	Lesser Yellowlegs	*Tringa flavipes*
Shorebirds	Pectoral Sandpiper	*Calidris melanotos*
Shorebirds	Semipalmated Plover	*Charadrius semipalmatus*
Shorebirds	Semipalmated Sandpiper	*Calidris pusilla*
Shorebirds	Solitary Sandpiper	*Tringa solitaria*
Shorebirds	Spotted Sandpiper	*Actitis macularius*
Shorebirds	Stilt Sandpiper	*Calidris himantopus*
Shorebirds	Upland Sandpiper	*Bartramia longicauda*
Waterbirds	American Black Duck	*Anas rubripes*
Waterbirds	American Wigeon	*Mareca americana*
Waterbirds	Black Tern	*Chlidonias niger*
Waterbirds	Blue-winged Teal	*Spatula discors*
Waterbirds	Bufflehead	*Bucephala albeola*
Waterbirds	Cackling Goose	*Branta hutchinsii*
Waterbirds	Canada Goose	*Branta canadensis*
Waterbirds	Canvasback	*Aythya valisineria*
Waterbirds	Caspian Tern	*Hydroprogne caspia*
Waterbirds	Common Goldeneye	*Bucephala clangula*
Waterbirds	Common Loon	*Gavia immer*
Waterbirds	Common Merganser	*Mergus merganser*
Waterbirds	Gadwall	*Mareca strepera*
Waterbirds	Great Black-backed Gull	*Larus marinus*
Waterbirds	Great Blue Heron	*Ardea herodias*
Waterbirds	Great Egret	*Ardea alba*
Waterbirds	Greater White-fronted Goose	*B-3nswer albifrons*
Waterbirds	Green Heron	*Butorides virescens*
Waterbirds	Green-winged Teal	*Anas crecca*
Waterbirds	Herring Gull	*Larus argentatus*
Waterbirds	Hooded Merganser	*Lophodytes cucullatus*
Waterbirds	Horned Grebe	*Podiceps auritus*
Waterbirds	Lesser Scaup	*Aythya affinis*
Waterbirds	Long-tailed Duck	*Clangula hyemalis*
Waterbirds	Mallard	*Anas platyrhynchos*
Waterbirds	Northern Pintail	*Anas acuta*
Waterbirds	Northern Shoveler	*Spatula clypeata*
Waterbirds	Pied-billed Grebe	*Podilymbus podiceps*
Waterbirds	Red-breasted Merganser	*Mergus serrator*
Waterbirds	Red-necked Grebe	*Podiceps grisegena*
Waterbirds	Ring-billed Gull	*Larus delawarensis*
Waterbirds	Ring-necked Duck	*Aythya collaris*
Waterbirds	Sandhill Crane	*Antigone canadensis*
Waterbirds	Snow Goose	*Anser caerulescens*
Waterbirds	Sora	*Porzana carolina*
Waterbirds	Tundra Swan	*Cygnus columbianus*
Waterbirds	Virginia Rail	*Rallus limicola*
Waterbirds	White-winged Scoter	*Melanitta deglandi*

Biodiversity Value	Common Name	Scientific Name
Waterbirds	Wood Duck	*Aix sponsa*
Raptors	American Kestrel	*Falco sparverius*
Raptors	Bald Eagle	*Haliaeetus leucocephalus*
Raptors	Broad-winged Hawk	*Buteo platypterus*
Raptors	Cooper's Hawk	*Accipiter cooperii*
Raptors	Eastern Screech-Owl	*Megascops asio*
Raptors	Great Horned Owl	*Bubo virginianus*
Raptors	Merlin	*Falco columbarius*
Raptors	Northern Harrier	*Circus hudsonius*
Raptors	Osprey	*Pandion haliaetus*
Raptors	Red-tailed Hawk	*Buteo jamaicensis*
Raptors	Rough-legged Hawk	*Buteo lagopus*
Raptors	Snowy Owl	*Bubo scandiacus*

APPENDIX C – SUPPORTING INFORMATION FOR SWH ANALYSES AND MAPPING

Table C-1. Existing spatial datasets and reports investigated and analyzed for the 2023 SWH baseline report. Relevant habitat features and species observations are included on the candidate SWH maps presented in Appendix D of this report, except for data already published in other NWMO-related reports. Updated datasets will be periodically requested/acquired as the BIS baseline program progresses.

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains relevant[1] data?
Zoetica / Sumac Geomatics *BIS Tier 1 studies*	Ecosite Classification Dataset	Shapefile	03/2022	Y
Toronto Zoo's Native Bat Conservation Program (NBCP) *Partnership with NWMO*	2020 Bat Activities Report (Thorne et al. 2021)	Unpublished Report	06/2021	Y
	2021 Bat Activities Report (Sparrow-Scinocca et al. 2022)	Unpublished Report	09/2022	Y
	2022 Bat Activities Report (Thorne 2023)	Unpublished Report	10/2023	Y
Tulloch Environmental *Preliminary environmental studies for the Project*	July 2020 Site Reconnaissance (Tulloch Environmental 2020)	Unpublished Report	10/2020	Y
	October 2020 Natural Heritage Features (Tulloch Environmental 2021)	Unpublished Report	04/2021	Y
Ontario Natural Heritage Information Centre (NHIC)	Plant Community Occurrence	Shapefile	12/2020	N
	Plant Community Observation	Shapefile	12/2020	N
	Species Occurrences	Shapefile	12/2020	Y
	Wildlife Concentration Area Observation	Shapefile	12/2020	Y
Ontario Ministry of Natural Resources and Forestry (MNRF)	Wildlife Activity Site	Shapefile	12/2020	N
	Wildlife Activity Area	Shapefile	12/2020	Y
	Southern Ontario Land Resource Information System (SOLRIS) 3.0	TIFF (Raster)	08/2022	N
	Abandoned Mines Information System (AMIS)	Geodatabase	03/2020	N
	Karst	PDF Map	08/2022	N
	Surficial Geology	Shapefile	08/2022	N
	Physiography	Shapefile	08/2022	N
Global Biodiversity Information Facility (GBIF)	Species Occurrences	CSV	10/2021	Y

Notes:

1. Zoetica determined dataset relevance based on geographic and temporal relevance, as well as relevance to SWH. For example, data that were not within the relevant BIS study areas, data that were too old to be considered relevant, or data that did not include records of species of relevance to SWH were labelled "N" for not containing relevant data.

Table C-2. Conversion of Great Lakes Shoreline Ecosystem (GLSE) ecosite codes (Lee et al. 2021a) to the Ecological Land Classification (ELC) for Southern Ontario: First Approximation, 1998 codes (Lee et al. 1998) for SWH analyses. Data are currently limited to the local study area for ecosystem function and services (LSA_{ECO}). Rows highlighted in grey indicate ELC-1998 codes manually assigned by Zoetica based on ecosite and vegetation descriptions. All other rows are derived from the ecosite tables provided in (Lee et al. 2021b).

GLSE Code	GLSE Name	ELC-1998 Code	ELC-1998 Name
AGW-2	Conifer Plantation	CUP3	Coniferous Plantations
AGW-3	Mixed Plantation	CUP2	Mixed Plantations
AOO-1	Anthropogenic Open Aquatic	OAO	Open Aquatic
FEW-T1	Treed Fen	FET1	Treed Fen Ecosite
MAE-m1	Mineral Emergent Marsh	MAS2	Mineral Shallow Marsh Ecosite
MAE-o1	Organic Emergent Marsh	MAS3	Organic Shallow Marsh Ecosite
MAM-m1	Mineral Meadow Marsh	MAM2	Mineral Meadow Marsh Ecosite
		MAM5	Mineral Fen Meadow Marsh Ecosite
		MAM6	Tallgrass Meadow Marsh Ecosite
MAM-o1	Organic Meadow Marsh	MAM3	Graminoid Organic Meadow Marsh Ecosite
MEO-k1	Dry to Fresh Coarse Calcareous Open Meadow	CUM1	Mineral Cultural Meadow Ecosite
MEO-k2	Dry to Fresh Fine Calcareous Open Meadow	CUM1	Mineral Cultural Meadow Ecosite
MEO-k3	Moist Coarse Calcareous Open Meadow	CUM1	Mineral Cultural Meadow Ecosite
MEO-k4	Moist Fine Calcareous Open Meadow	CUM1	Mineral Cultural Meadow Ecosite
MEW-Sk1	Dry to Fresh Coarse Calcareous Shrub Meadow	CUM1	Mineral Cultural Meadow Ecosite
MEW-Sk2	Dry to Fresh Fine Calcareous Shrub Meadow	CUM1	Mineral Cultural Meadow Ecosite
MEW-Sk3	Moist Coarse Calcareous Shrub Meadow	CUM1	Mineral Cultural Meadow Ecosite
MEW-Sk4	Moist Fine Calcareous Shrub Meadow	CUM1	Mineral Cultural Meadow Ecosite
MEW-Tk1	Dry to Fresh Coarse Calcareous Treed Meadow	CUM1	Mineral Cultural Meadow Ecosite
MEW-Tk3	Moist Coarse Calcareous Treed Meadow	CUM1	Mineral Cultural Meadow Ecosite
MEW-Tk4	Moist Fine Calcareous Treed Meadow	CUM1	Mineral Cultural Meadow Ecosite
OAL-m1	Mineral Open Water Lacustrine	OA	Open Water
OAL-o1	Organic Open Water Lacustrine	OA	Open Water
OAR-m1	Mineral Open Water Riverine	OA	Open Water
SSL-m1	Mineral Low Shrub Swamp	SWT2	Mineral Thicket Swamp Ecosite
SSL-o1	Organic Low Shrub Swamp	SWT3	Organic Thicket Swamp Ecosite
SST-m1	Mineral Deciduous Thicket Swamp	SWT2	Mineral Thicket Swamp Ecosite
SST-o1	Organic Deciduous Thicket Swamp	SWT3	Organic Thicket Swamp Ecosite
SWT-Cm1	White Cedar Mineral Conifer Swamp	SWC1	White Cedar Mineral Coniferous Swamp Ecosite
SWT-Cm2	White Cedar +/ White Spruce Mineral Conifer Swamp	SWC1-2	White Cedar – Conifer Mineral Coniferous Swamp Type
SWT-Cm3	Mineral Conifer Swamp	SWC2	White Pine – Hemlock Mineral Coniferous Swamp Ecosite
SWT-Co1	White Cedar Organic Conifer Swamp	SWC3	White Cedar Organic Coniferous Swamp Ecosite
SWT-Co4	Larch Organic Conifer Swamp	SWC4-2	Tamarack Organic Coniferous Swamp Type
SWT-Co5	White Cedar +/ Larch Organic Conifer Swamp	SWC3	White Cedar Organic Coniferous Swamp Ecosite
SWT-Co6	Larch +/ Spruce Organic Conifer Swamp	SWC4	Tamarack – Black Spruce Organic Coniferous Swamp Ecosite

GLSE Code	GLSE Name	ELC-1998 Code	ELC-1998 Name
SWT-Co8	Organic Conifer Swamp	SWC3	White Cedar Organic Coniferous Swamp Ecosite
		SWC4	Tamarack – Black Spruce Organic Coniferous Swamp Ecosite
SWT-Hm1	Coarse Mineral Hardwood Swamp	SWD4	Mineral Deciduous Swamp Ecosite
SWT-Hm12	Silver Maple +/ Freeman's Maple Fine Mineral Hardwood Swamp	SWD3	Maple Mineral Deciduous Swamp Ecosite
SWT-Hm13	Red Maple Fine Mineral Hardwood Swamp	SWD3	Maple Mineral Deciduous Swamp Ecosite
SWT-Hm2	Poplar +/ Birch Coarse Mineral Hardwood Swamp	SWD4	Mineral Deciduous Swamp Ecosite
SWT-Hm5	Silver Maple +/ Freeman's Maple Coarse Mineral Hardwood Swamp	SWD3	Maple Mineral Deciduous Swamp Ecosite
SWT-Hm8	Fine Mineral Hardwood Swamp	SWD4	Mineral Deciduous Swamp Ecosite
SWT-Hm9	Poplar +/ Birch Fine Mineral Hardwood Swamp	SWD4	Mineral Deciduous Swamp Ecosite
SWT-Ho2	Maple Organic Hardwood Swamp	SWD6	Maple Organic Deciduous Swamp Ecosite
SWT-Ho3	Organic Hardwood Swamp	SWD7	Organic Deciduous Swamp Ecosite
SWT-Mm1	White Cedar Mineral Mixedwood Swamp	SWM1	White Cedar Mineral Mixed Swamp Ecosite
SWT-Mm3	Maple Mineral Mixedwood Swamp	SWM2	Maple Mineral Mixed Swamp Ecosite
SWT-Mm4	Birch +/ Poplar Mineral Mixedwood Swamp	SWM3	Birch – Poplar Mineral Mixed Swamp Ecosite
SWT-Mm6	Mineral Mixedwood Swamp	SWM1	White Cedar Mineral Mixed Swamp Ecosite
		SWM2	Maple Mineral Mixed Swamp Ecosite
		SWM3	Birch – Poplar Mineral Mixed Swamp Ecosite
SWT-Mo1	White Cedar Organic Mixedwood Swamp	SWM4	White Cedar Organic Mixed Swamp Ecosite
SWT-Mo3	Maple Organic Mixedwood Swamp	SWM5	Maple Organic Mixed Swamp Ecosite
SWT-Mo5	Birch +/ Poplar Organic Mixedwood Swamp	SWM6	Birch – Poplar Organic Mixed Swamp Ecosite
SWT-Mo6	Organic Mixedwood Swamp	SWM4	White Cedar Organic Mixed Swamp Ecosite
		SWM5	Maple Organic Mixed Swamp Ecosite
		SWM6	Birch – Poplar Organic Mixed Swamp Ecosite
TRT-CNd1	Dry to Fresh Coarse Mineral Conifer Treed	FOC1	Dry - Fresh Pine Coniferous Forest Ecosite
		FOC2	Dry - Fresh Cedar Coniferous Forest Ecosite
TRT-CNd2	Dry to Fresh Pine Coarse Mineral Conifer Treed	FOC1	Dry - Fresh Pine Coniferous Forest Ecosite
TRT-CNd3	Dry to Fresh White Pine +/ Red Pine Coarse Mineral Conifer Treed	FOC1	Dry - Fresh Pine Coniferous Forest Ecosite
TRT-CNd4	Dry to Fresh White Cedar Coarse Mineral Conifer Treed	FOC2	Dry - Fresh Cedar Coniferous Forest Ecosite
TRT-CNd7	Dry to Fresh Pine Fine Mineral Conifer Treed	FOC1	Dry - Fresh Pine Coniferous Forest Ecosite
TRT-CNd8	Dry to Fresh White Cedar Fine Mineral Conifer Treed	FOC2	Dry - Fresh Cedar Coniferous Forest Ecosite
TRT-CNf1	Moist Coarse Mineral Conifer Treed	FOC3	Fresh - Moist Hemlock Coniferous Forest Ecosite
		FOC4	Fresh – Moist White Cedar Coniferous Forest Ecosite
TRT-CNf2	Moist Hemlock Coarse Mineral Conifer Treed	FOC3	Fresh - Moist Hemlock Coniferous Forest Ecosite
TRT-CNf3	Moist White Cedar Coarse Mineral Conifer Treed	FOC4	Fresh – Moist White Cedar Coniferous Forest Ecosite
TRT-CNf4	Moist Fine Mineral Conifer Treed	FOC3	Fresh - Moist Hemlock Coniferous Forest Ecosite
		FOC4	Fresh – Moist White Cedar Coniferous Forest Ecosite

GLSE Code	GLSE Name	ELC-1998 Code	ELC-1998 Name
TRT-CNf6	Moist White Cedar Fine Mineral Conifer Treed	FOC4	Fresh – Moist White Cedar Coniferous Forest Ecosite
TRT-CZ1	Naturalized Pine Conifer Treed Plantation	CUP3	Coniferous Plantations
TRT-CZ2	Naturalized Spruce Conifer Treed Plantation	CUP3	Coniferous Plantations
TRT-CZ3	Naturalized Conifer Treed Plantation	CUP3	Coniferous Plantations
TRT-CZ7	Naturalized Larch Conifer Treed Plantation	CUP3	Coniferous Plantations
TRT-HNd1	Dry to Fresh Coarse Mineral Hardwood Treed	FOD4	Dry – Fresh Deciduous Forest Ecosite
TRT-HNd10	Dry to Fresh Sugar Maple Fine Mineral Hardwood Treed	FOD5	Dry – Fresh Sugar Maple Deciduous Forest Ecosite
TRT-HNd11	Dry to Fresh Aspen +/ White Birch Fine Mineral Hardwood Treed	FOD3	Dry – Fresh Poplar – White Birch Deciduous Forest Ecosite
TRT-HNd3	Dry to Fresh Sugar Maple Coarse Mineral Hardwood Treed	FOD5	Dry – Fresh Sugar Maple Deciduous Forest Ecosite
TRT-HNd4	Dry to Fresh Aspen +/ White Birch Coarse Mineral Hardwood Treed	FOD3	Dry – Fresh Poplar – White Birch Deciduous Forest Ecosite
TRT-HNd8	Dry to Fresh Fine Mineral Hardwood Treed	FOD4	Dry – Fresh Deciduous Forest Ecosite
TRT-HNd9	Dry to Fresh Red Maple Fine Mineral Hardwood Treed	FOD5-9	Dry – Fresh Sugar Maple – Red Maple Deciduous Forest Type
TRT-HNf1	Moist Coarse Mineral Hardwood Treed	FOD6	Fresh – Moist Sugar Maple Deciduous Forest Ecosite
		FOD7	Fresh – Moist Lowland Deciduous Forest Ecosite
		FOD8	Fresh – Moist Poplar – Sassafras Successional Deciduous Forest Ecosite
		FOD9	Fresh – Moist Oak – Maple – Hickory Deciduous Forest Ecosite
TRT-HNf11	Moist Fine Mineral Hardwood Treed	FOD6	Fresh – Moist Sugar Maple Deciduous Forest Ecosite
		FOD7	Fresh – Moist Lowland Deciduous Forest Ecosite
		FOD8	Fresh – Moist Poplar – Sassafras Successional Deciduous Forest Ecosite
		FOD9	Fresh – Moist Oak – Maple – Hickory Deciduous Forest Ecosite
TRT-HNf15	Moist Aspen +/ Birch Fine Mineral Hardwood Treed	FOD8	Fresh – Moist Poplar – Sassafras Successional Deciduous Forest Ecosite
TRT-HNf17	Moist Red Maple Fine Mineral Hardwood Treed	FOD9-2	Fresh – Moist Oak – Maple Deciduous Forest Type
TRT-HNf5	Moist Aspen +/ Birch Coarse Mineral Hardwood Treed	FOD8	Fresh – Moist Poplar – Sassafras Successional Deciduous Forest Ecosite
TRT-HNf7	Moist Red Maple Coarse Mineral Hardwood Treed	FOD9-2	Fresh – Moist Oak – Maple Deciduous Forest Type
TRT-HZ1	Naturalized Hardwood Treed Plantation	CUP1	Deciduous Plantations
TRT-HZ4	Naturalized Hardwood Treed Hedgerow	CUP1	Deciduous Plantations
TRT-MNd1	Dry to Fresh Coarse Mineral Mixedwood Treed	FOM2	Dry – Fresh White Pine – Maple - Oak Mixed Forest Ecosite
		FOM3	Dry – Fresh Hardwood – Hemlock Mixed Forest Ecosite
		FOM4	Dry – Fresh White Cedar Mixed Forest Ecosite
		FOM5	Dry – Fresh White Birch – Poplar – Conifer Mixed Forest Ecosite
TRT-MNd11	Dry to Fresh Fine Mineral Mixedwood Treed	FOM2	Dry – Fresh White Pine – Maple - Oak Mixed Forest Ecosite
		FOM3	Dry – Fresh Hardwood – Hemlock Mixed Forest Ecosite

GLSE Code	GLSE Name	ELC-1998 Code	ELC-1998 Name
		FOM4	Dry – Fresh White Cedar Mixed Forest Ecosite
		FOM5	Dry – Fresh White Birch – Poplar – Conifer Mixed Forest Ecosite
TRT-MNd14	Dry to Fresh White Pine +/ Red Pine Fine Mineral Mixedwood Treed	FOM2	Dry – Fresh White Pine – Maple - Oak Mixed Forest Ecosite
TRT-MNd15	Dry to Fresh White Cedar Fine Mineral Mixedwood Treed	FOM4	Dry – Fresh White Cedar Mixed Forest Ecosite
TRT-MNd16	Dry to Fresh Aspen +/ White Birch Fine Mineral Mixedwood Treed	FOM5	Dry – Fresh White Birch – Poplar – Conifer Mixed Forest Ecosite
TRT-MNd2	Dry to Fresh Hemlock Coarse Mineral Mixedwood Treed	FOM3	Dry – Fresh Hardwood – Hemlock Mixed Forest Ecosite
TRT-MNd3	Dry to Fresh White Pine +/ Red Pine Coarse Mineral Mixedwood Treed	FOM2	Dry – Fresh White Pine – Maple - Oak Mixed Forest Ecosite
TRT-MNd4	Dry to Fresh Pine Coarse Mineral Mixedwood Treed	FOM2	Dry – Fresh White Pine – Maple - Oak Mixed Forest Ecosite
TRT-MNd5	Dry to Fresh White Cedar Coarse Mineral Mixedwood Treed	FOM4	Dry – Fresh White Cedar Mixed Forest Ecosite
TRT-MNd6	Dry to Fresh Aspen +/ White Birch Coarse Mineral Mixedwood Treed	FOM5	Dry – Fresh White Birch – Poplar – Conifer Mixed Forest Ecosite
TRT-MNd7	Dry to Fresh Maple Coarse Mineral Mixedwood Treed	FOM3-2	Dry – Fresh Sugar Maple – Hemlock Mixed Forest Type
TRT-MNf1	Moist Coarse Mineral Mixedwood Treed	FOM6	Fresh – Moist Hemlock - Hardwood Mixed Forest Ecosite
		FOM7	Fresh – Moist White Cedar – Hardwood Mixed Forest Ecosite
		FOM8	Fresh – Moist Poplar – White Birch Mixed Forest Ecosite
TRT-MNf10	Moist White Cedar Fine Mineral Mixedwood Treed	FOM7	Fresh – Moist White Cedar – Hardwood Mixed Forest Ecosite
TRT-MNf11	Moist Aspen +/ Birch Fine Mineral Mixedwood Treed	FOM8	Fresh – Moist Poplar – White Birch Mixed Forest Ecosite
TRT-MNf13	Moist Maple Fine Mineral Mixedwood Treed	FOM6-1	Fresh – Moist Sugar Maple – Hemlock Mixed Forest Type
		FOM7-1	Fresh – Moist White Cedar – Sugar Maple Mixed Forest Type
TRT-MNf2	Moist Hemlock Coarse Mineral Mixedwood Treed	FOM6	Fresh – Moist Hemlock - Hardwood Mixed Forest Ecosite
TRT-MNf3	Moist White Cedar Coarse Mineral Mixedwood Treed	FOM7	Fresh – Moist White Cedar – Hardwood Mixed Forest Ecosite
TRT-MNf4	Moist Aspen +/ Birch Coarse Mineral Mixedwood Treed	FOM8	Fresh – Moist Poplar – White Birch Mixed Forest Ecosite
TRT-MNf8	Moist Fine Mineral Mixedwood Treed	FOM6	Fresh – Moist Hemlock - Hardwood Mixed Forest Ecosite
		FOM7	Fresh – Moist White Cedar – Hardwood Mixed Forest Ecosite
		FOM8	Fresh – Moist Poplar – White Birch Mixed Forest Ecosite
TRT-MZ21	Naturalized Spruce Mixedwood Treed Hedgerow	CUP2	Mixed Plantations
TRT-MZ6	Naturalized Spruce Mixedwood Treed Plantation	CUP2	Mixed Plantations
TRT-MZ7	Naturalized Pine Mixedwood Treed Plantation	CUP2	Mixed Plantations
SWT-Mo2	Hemlock +/ Yellow Birch +/ Maple Organic Mixedwood Swamp	SWM5	Maple Organic Mixed Swamp Ecosite
		SWM6-1	Birch – Conifer Organic Mixed Swamp Type

GLSE Code	GLSE Name	ELC-1998 Code	ELC-1998 Name
TRT-HNf8	Moist Sugar Maple Coarse Mineral Hardwood Treed	FOD6	Fresh – Moist Sugar Maple Deciduous Forest Ecosite
SWT-Hm6	Red Maple Coarse Mineral Hardwood Swamp	SWD3	Maple Mineral Deciduous Swamp Ecosite
TRT-MNf12	Moist Ash Fine Mineral Mixedwood Treed	FOM6-2	Fresh – Moist Hemlock – Hardwood Mixed Forest Type
		FOM7-2	Fresh – Moist White Cedar – Hardwood Mixed Forest Type
TRT-MNd17	Dry to Fresh Maple Fine Mineral Mixedwood Treed	FOM2-2	Dry – Fresh White Pine – Sugar Maple Mixed Forest Type
		FOM3-2	Dry – Fresh Sugar Maple – Hemlock Mixed Forest Type
TRT-CNd6	Dry to Fresh Fine Mineral Conifer Treed	FOC1	Dry - Fresh Pine Coniferous Forest Ecosite
		FOC2	Dry - Fresh Cedar Coniferous Forest Ecosite
SWT-Mm2	Hemlock +/ Yellow Birch +/ Maple Mineral Mixedwood Swamp	SWM3	Birch – Poplar Mineral Mixed Swamp Ecosite
MEW-Sn1	Dry to Fresh Coarse Non-Calcareous Shrub Meadow	CUM1	Mineral Cultural Meadow Ecosite
SWT-Hm10	Ash +/ White Elm Fine Mineral Hardwood Swamp	SWD2	Ash Mineral Deciduous Swamp Ecosite
SWT-Ho1	Ash Organic Hardwood Swamp	SWD5	Ash Organic Deciduous Swamp Ecosite
SWT-Hm7	Oak + Maple Coarse Mineral Hardwood Swamp	SWD1	Oak Mineral Deciduous Swamp Ecosite
TRT-MZ13	Naturalized Pine Mixedwood Treed Regeneration	CUP2	Mixed Plantations
TRT-MNf9	Moist Hemlock Fine Mineral Mixedwood Treed	FOM6	Fresh – Moist Hemlock - Hardwood Mixed Forest Ecosite
MEO-n2	Dry to Fresh Fine Non-Calcareous Open Meadow	CUM1	Mineral Cultural Meadow Ecosite
SWT-Hm11	Oak Fine Mineral Hardwood Swamp	SWD1	Oak Mineral Deciduous Swamp Ecosite
TRT-HNf39	Moist Ash Coarse Mineral Hardwood Treed	FOD7-2	Fresh – Moist Green Ash - Hardwood Lowland Deciduous Forest Type
TRT-MNd8	Dry to Fresh Sugar Maple Coarse Mineral Mixedwood Treed	FOM2-2	Dry – Fresh White Pine – Sugar Maple Mixed Forest Type
		FOM3-2	Dry – Fresh Sugar Maple – Hemlock Mixed Forest Type
TRT-HNf18	Moist Sugar Maple Fine Mineral Hardwood Treed	FOD6	Fresh – Moist Sugar Maple Deciduous Forest Ecosite
TRT-CZ12	Naturalized Pine Conifer Treed Regeneration	CUP3	Coniferous Plantations
SLT-Hn2	Moist Non-Calcareous Deciduous Thicket	CUT1	Mineral Cultural Thicket Ecosite
TRT-MNd18	Dry to Fresh Sugar Maple Fine Mineral Mixedwood Treed	FOM2-2	Dry – Fresh White Pine – Sugar Maple Mixed Forest Type
		FOM3-2	Dry – Fresh Sugar Maple – Hemlock Mixed Forest Type
TRT-HNd7	Dry to Fresh Oak +/ Maple Coarse Mineral Hardwood Treed	FOD1	Dry – Fresh Oak Deciduous Forest Ecosite
		FOD2	Dry – Fresh Oak – Maple – Hickory Deciduous Forest Ecosite
TRT-HNf40	Moist Ash Fine Mineral Hardwood Treed	FOD6-1	Fresh – Moist Sugar Maple – Lowland Ash Deciduous Forest Type
		FOD7-2	Fresh – Moist Green Ash - Hardwood Lowland Deciduous Forest Type
TRT-HNf25	Moist Oak Fine Mineral Hardwood Treed	FOD9-1	Fresh – Moist Oak – Sugar Maple Deciduous Forest Type
		FOD9-2	Fresh – Moist Oak – Maple Deciduous Forest Type

GLSE Code	GLSE Name	ELC-1998 Code	ELC-1998 Name
		FOD9-3	Fresh – Moist Bur Oak Deciduous Forest Type
MEW-Sn2	Dry to Fresh Fine Non-Calcareous Shrub Meadow	CUM1	Mineral Cultural Meadow Ecosite
SWT-Hm15	Oak + Maple Fine Mineral Hardwood Swamp	SWD1	Oak Mineral Deciduous Swamp Ecosite
TRT-HZ6	Naturalized Black Walnut Hardwood Treed Plantation	CUP1	Deciduous Plantations
SWT-Mm5	Ash Mineral Mixedwood Swamp	SWM1-1	White Cedar – Hardwood Mineral Mixed Swamp Type
MAS-o2	Organic Mixed Shallow Water Marsh	MAS3	Organic Shallow Marsh Ecosite
		SAM1	Mixed Shallow Aquatic Ecosite
MEO-n3	Moist Coarse Non-Calcareous Open Meadow	CUM1	Mineral Cultural Meadow Ecosite
SWT-Hm3	Ash +/ White Elm Coarse Mineral Hardwood Swamp	SWD2	Ash Mineral Deciduous Swamp Ecosite
TRT-MNf7	Moist Sugar Maple Coarse Mineral Mixedwood Treed	FOM6-1	Fresh – Moist Sugar Maple – Hemlock Mixed Forest Type
		FOM7-1	Fresh – Moist White Cedar – Sugar Maple Mixed Forest Type
TRT-HZ3	Naturalized Hardwood Treed Regeneration	CUP1	Deciduous Plantations
TRT-HNf26	Moist Red Oak +/ White Oak Fine Mineral Hardwood Treed	FOD9-1	Fresh – Moist Oak – Sugar Maple Deciduous Forest Type
		FOD9-2	Fresh – Moist Oak – Maple Deciduous Forest Type
SLT-Hn1	Dry to Fresh Non-Calcareous Deciduous Thicket	CUT1	Mineral Cultural Thicket Ecosite

Table C-3. Seasonal timing window(s) for mapping existing species observations (e.g., NHIC, GBIF datasets) and 2022 incidental field observations for each SWH type in Ecoregion 6E (OMNRF 2015).[1,2,3]

SWH Type	Timing Window for Mapping	Notes and References[4]
Cliffs and Talus Slopes	All year	-
Sand Barren	All year	-
Alvar	All year	-
Old Growth Forest	Apr 1 – Aug 31 (indicator birds)	ECCC Nesting Zone C2 (ECCC 2018)
Savannah	All year	-
Tallgrass Prairie	All year	-
Other Rare Vegetation Communities	All year	-
Waterfowl Stopover and Staging Areas (Terrestrial)	Mar 1 – May 15	OBBA-3 Safe Dates (BSC et al. 2021); 6E ECS (OMNRF 2015)
Waterfowl Stopover and Staging Areas (Aquatic)	Mar 1 – May 15 Jul 15 – Oct 31	6E ECS (OMNRF 2015); Ontario bird monitoring guidelines (OMNR 2011b); OBBA-3 Safe Dates (BSC et al. 2021)
Shorebird Migratory Stopover Area	May 1 – Jun 15 Jul 1 - Oct 31	6E ECS (OMNRF 2015)
Raptor Wintering Area	Dec 1 – Feb 29	Migration information from Ontario Field Ornithologists (Pittaway 1999) and field naturalists (Burrell 2012)
Bat Hibernacula	Aug 1 – Apr 30	6E ECS (OMNRF 2015); Ontario bat habitat management guidelines (Gerson 1984) – *includes peak swarming (August) as these locations are near hibernacula*
Bat Maternity Colonies	Apr 1 – Jul 31	Life cycle timing of Ontario and eastern North American bats (MNR 2013, Silvis et al. 2016)
Turtle Wintering Areas	Sep 1 – Apr 30	6E ECS (OMNRF 2015) – *includes fall and spring basking (September and April) as these locations are near hibernacula*
Reptile Hibernaculum	Sep 1 – Apr 30	6E ECS (OMNRF 2015) – *includes fall and spring basking (September and April) as these locations are near hibernacula*
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)	Apr 1 – Aug 31	ECCC Nesting Zone C2 (ECCC 2018)
Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)	Apr 1 – Aug 31	ECCC Nesting Zone C2 (ECCC 2018)
Colonially -Nesting Bird Breeding Habitat (Ground)	Apr 1 – Aug 31	ECCC Nesting Zone C2 (ECCC 2018)
Deer Yarding Areas	Jan 15 – Feb 28	Ontario deer habitat management guidelines (Voigt et al. 1997)
Deer Winter Congregation Areas	Dec 1 – Mar 31	Ontario deer habitat management guidelines (Voigt et al. 1997)
Waterfowl Nesting Area	Apr 1 – Aug 31	ECCC Nesting Zone C2 (ECCC 2018)
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Mar 15 – Aug 31	6E ECS (OMNRF 2015); ECCC Nesting Zone C2 (ECCC 2018)
Woodland Raptor Nesting Habitat	Mar 15 – Aug 31	ECCC Nesting Zone C2 (ECCC 2018); 6E ECS (OMNRF 2015)
Turtle Nesting Areas	May 1 – Jul 15 Sep 1 – Sep 30 (hatchlings)	Ontario BMPs for at-risk reptiles and amphibians (OMNRF 2016); Ontario Reptile and Amphibian Field Guide (Ontario Nature 2022)
Seeps and Springs	All year	-
Amphibian Breeding Habitat (Woodland)	Mar 1 – Jun 30 Jul 1 – Jul 31 (tadpoles)	6E ECS (OMNRF 2015); Ontario BMPs for at-risk reptiles and amphibians (OMNRF 2016); Ontario Reptile and Amphibian Field Guide (Ontario Nature 2022); annual chronology information (City of Toronto 2015)

SWH Type	Timing Window for Mapping	Notes and References[4]
Amphibian Breeding Habitat (Wetlands)	Mar 1 – Jun 30 Jul 1 – Jul 31 (tadpoles)	6E ECS (OMNRF 2015); Ontario BMPs for at-risk reptiles and amphibians (OMNRF 2016); Ontario Reptile and Amphibian Field Guide (Ontario Nature 2022); annual chronology information (City of Toronto 2015)
Woodland Area-Sensitive Bird Breeding Habitat	Apr 1 – Aug 31	ECCC Nesting Zone C2 (ECCC 2018)
Marsh Breeding Bird Habitat	Apr 1 – Aug 31	ECCC Nesting Zone C2 (ECCC 2018)
Open Country Bird Breeding Habitat	Apr 1 – Aug 31	ECCC Nesting Zone C2 (ECCC 2018)
Shrub/Early Successional Bird Breeding Habitat	Apr 1 – Aug 31	ECCC Nesting Zone C2 (ECCC 2018)
Terrestrial Crayfish	Apr 1 – Aug 31	6E ECS (OMNRF 2015)
Special Concern and Rare Wildlife Species	All year	-
Amphibian Movement Corridors[5]	Jul 1 – Apr 30	MMP Participant's Handbook for Surveying Amphibians (BSC 2009)
Deer Movement Corridors	Nov 1 – Dec 31 Mar 15 – Apr 30	6E ECS (OMNRF 2015); Ontario deer habitat management guidelines (Voigt et al. 1997)

Notes:

1. Seasonal windows are generalized for the BV and phenological differences between species within the group may not be captured. To be conservative, there are some overlapping 'shoulder' periods between breeding, spring and fall migration, and winter seasons.
2. Due to the limited information available from existing desk-based records, it may not be possible to distinguish local breeding populations from late spring and early fall migrants. Similarly, it may not be possible to distinguish late fall migrants and early spring migrants from local overwintering populations. Nevertheless, existing species observations from the NHIC and GBIF are presented in Section 4.0 and Appendix D to give a general idea of seasonal wildlife presence and distribution within the BIS study areas.
3. Timing windows for mapping were also applied to 2022 field observations that lacked additional context of potential relevance to SWH. See Section 3.2 for more information.
4. Abbreviations: OBBA-3 = Ontario Breeding Bird Atlas-3; 6E ECS = Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E; ECCC = Environment and Climate Change Canada; BMPs = Best Management Practices
5. A broad timing window of July 1 to April 30 (i.e., a conservative inverse of amphibian breeding season) was applied for mapping species observations for Amphibian Movement Corridors. However, this window may capture observations of overwintering amphibians, which would not be relevant to the SWH type. Relevant desk- and field-based observations to date have not extended past October 16.

APPENDIX D – CANDIDATE SWH MAPS AND SUPPLEMENTAL DATA TABLES

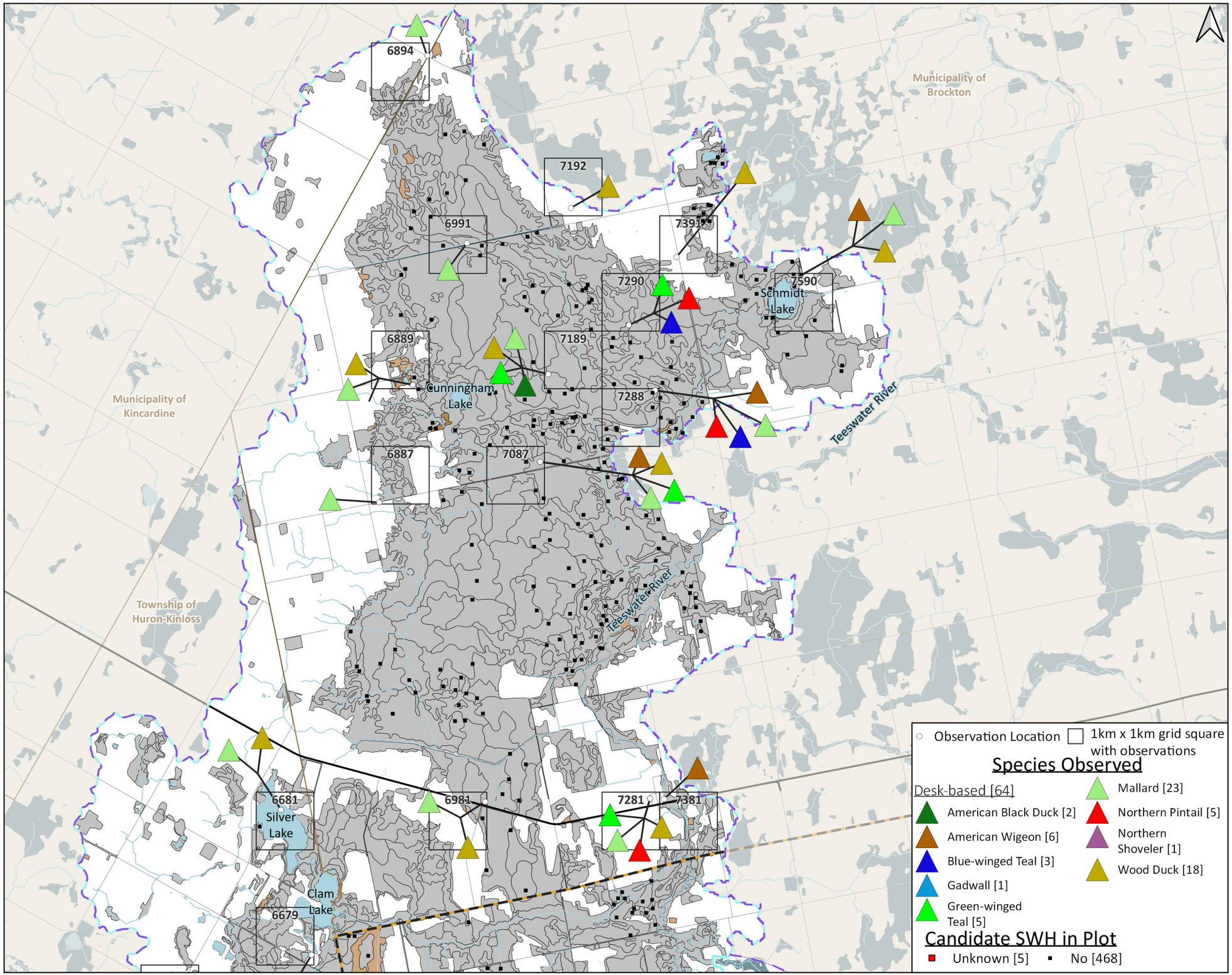
The following maps present candidate SWH as identified through ecosite analysis, habitat criteria, and relevant species observations according to the SWH Criteria Schedules for Ecoregion 6E (OMNRF 2015). Supplemental tables for field- and desk-based species observations, where available, are provided after each map. Explanatory notes and common abbreviations for the supplemental tables are provided below:

- The first column of each table denotes the NHIC 1 km grid square ID. Refer to the corresponding figure for the labelled grid locations where observations occur. The grid system and numbering are standardized across maps.
- Study areas (AOI and BV-specific LSAs and RSAs): 1 = detected, 0 = not detected. For the purposes of these tables, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. More than one RSA may be shown in each table if the SWH type is relevant to multiple BVs or due to variation in the species' ecology; "/" indicates that the RSA is not applicable to the species.
- Coordinates are not provided for species of conservation concern (SAR and provincially rare species) due to the sensitive nature of these data, as per the NHIC's Sensitive Data Location Standards (NHIC n.d.). For species of conservation concern, the indicated study area(s) is based on overlap with the 1 km grid square, not the actual point or polygon location.
- Count: "U" = unspecified for desk-based data. For the 2022 field data, Zoetica assumed a count of one individual unless otherwise indicated, a count of one individual when a singular observation (e.g., "frog") was recorded in the field notes, and more than one individual if plural observations (e.g., "frogs") were recorded. Zoetica simplified qualitative information into "many", "multiple", and "several". The "many" category includes field incidental observation entries of "many", "large amount", "large number", "lots", and "numerous" individuals, whereas "multiple" and "several" included only entries with "multiple" and "several" individuals, respectively.
- Observation Type (2022 field data): ad = adult, juv = juvenile, pb = presumed breeding. Zoetica assumed 'unspecified' observation type and adult organisms unless otherwise indicated. However, "ad" was included when more than one age class of a species was detected within a single observation.
- Source Type (2022 field data): "TEM SWH" refers to field observations made during the Tier 1 candidate SWH identification surveys completed alongside TEM. "Potential SWH Incidental" refers to field observations recorded on the BIS *Incidental Wildlife and Plant Observations* data form (Zoetica 2022) that were marked by surveyors as a potential indicator of SWH. "Other Incidental" refers to field observations made during other Tier 1 baseline programs (TEM, AHM, eDNA).

NWMO Biodiversity Impact Studies

Candidate SWH for Waterfowl Stopover and Staging Area (Terrestrial) - North $RSA_{AVI-AQU}$

Figure D-1a



- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2093]

Ecosites that Match SWH Criteria

- Shrub [3]
- Meadow [59]

- Observation Location
- 1km x 1km grid square with observations

Species Observed

Desk-based [64]

- American Black Duck [2]
- American Wigeon [6]
- Blue-winged Teal [3]
- Gadwall [1]
- Green-winged Teal [5]
- Mallard [23]
- Northern Pintail [5]
- Northern Shoveler [1]
- Wood Duck [18]

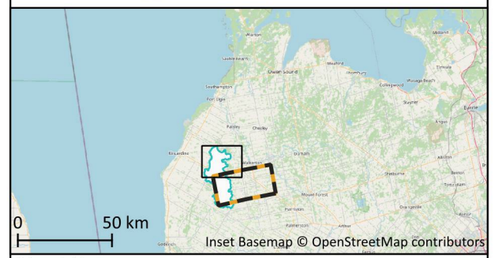
Candidate SWH in Plot

- Unknown [5]
- No [468]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Waterfowl Stopover and Staging Area (Terrestrial) - South $RSA_{AVI-AQU}$

Figure D-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2093]

Ecosites that Match SWH Criteria

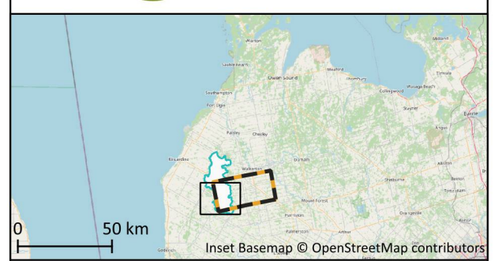
- Shrub [3]
- Meadow [59]

See Figure D-1a for Full Legend

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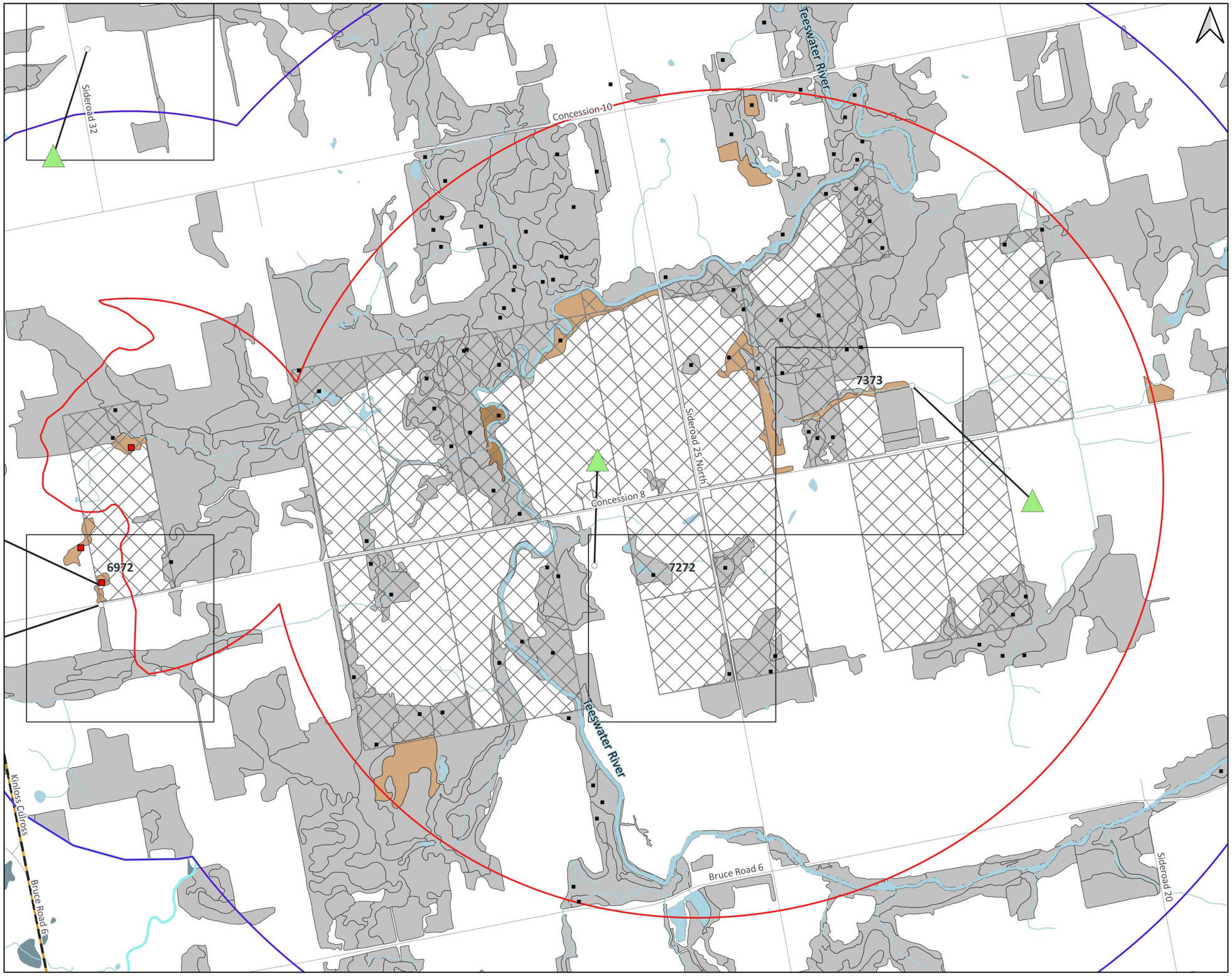
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Waterfowl Stopover and Staging Area (Terrestrial) - AOI

Figure D-1c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2093]

Ecosites that Match SWH Criteria

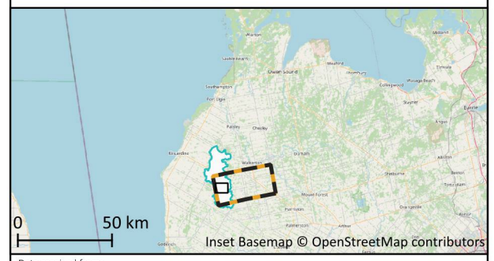
- Shrub [3]
- Meadow [59]

See Figure D-1a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-1. Supplemental data for desk-based observations relevant to Waterfowl Stopover and Staging Areas (Terrestrial).

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6478	Green-winged Teal	2	464790, 4878460	0	0	1
6478	Green-winged Teal	2	464790, 4878460	0	0	1
6478	Mallard	1	464102, 4878713	0	0	1
6478	Mallard	1	464102, 4878713	0	0	1
6478	Mallard	1	464102, 4878713	0	0	1
6478	Northern Pintail	1	464102, 4878713	0	0	1
6478	Northern Pintail	1	464102, 4878713	0	0	1
6478	Northern Pintail	1	464102, 4878713	0	0	1
6675	Northern Shoveler	2	466310, 4875396	0	0	1
6679	Blue-winged Teal	1	-	0	0	1
6679	Blue-winged Teal	1	-	0	0	1
6679	Mallard	2	466958, 4879176	0	0	1
6679	Mallard	1	466958, 4879176	0	0	1
6679	Mallard	4	466958, 4879176	0	0	1
6679	Mallard	2	466958, 4879176	0	0	1
6679	Mallard	1	466958, 4879176	0	0	1
6679	Wood Duck	6	466958, 4879176	0	0	1
6679	Wood Duck	2	466958, 4879176	0	0	1
6681	Mallard	3	466430, 4881693	0	0	1
6681	Wood Duck	2	466430, 4881693	0	0	1
6770	Wood Duck	U	467055, 4870390	0	0	1
6869	Wood Duck	1	468492, 4869229	0	0	1
6869	Wood Duck	1	468492, 4869229	0	0	1
6887	Mallard	4	468134, 4887028	0	0	1
6889	Gadwall	U	468719, 4889066	0	0	1
6889	Mallard	U	468719, 4889066	0	0	1
6889	Wood Duck	U	468719, 4889066	0	0	1
6894	Mallard	2	468965, 4894778	0	0	1
6972	American Wigeon	4	469399, 4872727	0	1	1
6972	American Wigeon	8	469397, 4872625	0	1	1
6972	Mallard	30	469397, 4872625	0	1	1
6972	Mallard	10	469399, 4872727	0	1	1
6975	Mallard	40	469325, 4875593	0	0	1
6981	Mallard	2	469971, 4881834	0	0	1
6981	Wood Duck	1	469971, 4881834	0	0	1
6991	Mallard	1	469657, 4891528	0	0	1
7087	American Wigeon	U	470927, 4887732	0	0	1
7087	Green-winged Teal	U	470927, 4887732	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7087	Mallard	U	470927, 4887732	0	0	1
7087	Mallard	6	470927, 4887732	0	0	1
7087	Mallard	6	470927, 4887732	0	0	1
7087	Wood Duck	6	470927, 4887732	0	0	1
7087	Wood Duck	U	470927, 4887732	0	0	1
7189	American Black Duck	2	471067, 4889252	0	0	1
7189	Green-winged Teal	2	471067, 4889252	0	0	1
7189	Mallard	8	471067, 4889252	0	0	1
7189	Mallard	10	471067, 4889252	0	0	1
7189	Mallard	12	471067, 4889252	0	0	1
7189	Mallard	1	471067, 4889252	0	0	1
7189	Mallard	4	471067, 4889252	0	0	1
7189	Mallard	2	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	3	471067, 4889252	0	0	1
7189	Wood Duck	1	471067, 4889252	0	0	1
7189	Wood Duck	4	471067, 4889252	0	0	1
7189	Wood Duck	3	471067, 4889252	0	0	1
7192	Wood Duck	2	471459, 4892136	0	0	1
7192	Wood Duck	2	471459, 4892136	0	0	1
7192	Wood Duck	4	471459, 4892136	0	0	1
7272	Mallard	4	472032, 4872835	1	1	1
7281	Green-winged Teal	20	472834, 4881889	0	0	1
7281	Green-winged Teal	20	472834, 4881889	0	0	1
7281	Green-winged Teal	20	472834, 4881889	0	0	1
7281	Mallard	6	472834, 4881889	0	0	1
7281	Mallard	25	472834, 4881889	0	0	1
7281	Mallard	25	472834, 4881889	0	0	1
7281	Mallard	3	472834, 4881889	0	0	1
7281	Mallard	3	472834, 4881889	0	0	1
7281	Mallard	6	472834, 4881889	0	0	1
7281	Mallard	3	472834, 4881889	0	0	1
7281	Mallard	6	472834, 4881889	0	0	1
7281	Northern Pintail	6	472834, 4881889	0	0	1
7281	Northern Pintail	6	472834, 4881889	0	0	1
7281	Northern Pintail	6	472834, 4881889	0	0	1
7281	Wood Duck	4	472834, 4881889	0	0	1
7281	Wood Duck	1	472834, 4881889	0	0	1
7281	Wood Duck	1	472834, 4881889	0	0	1

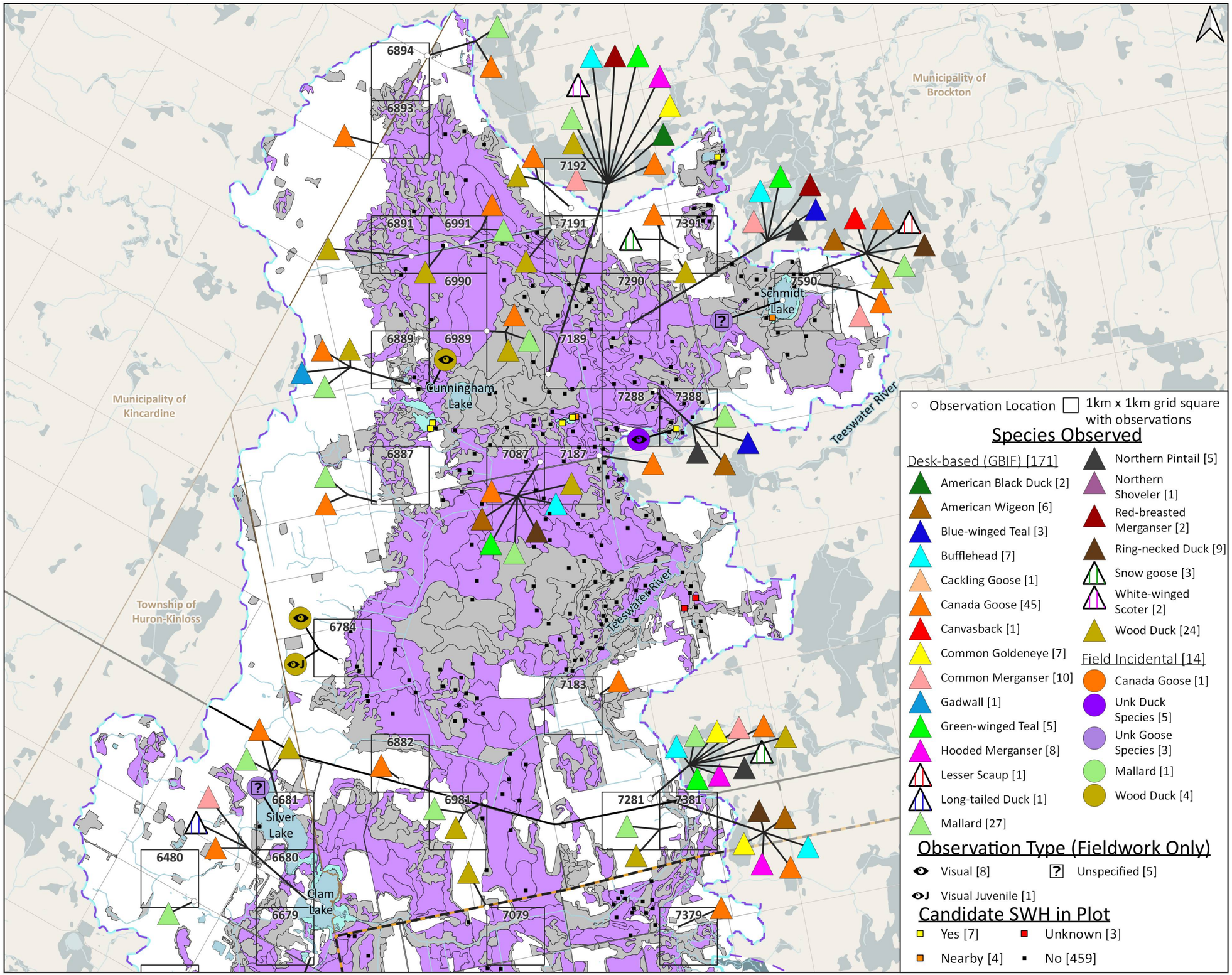
Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7281	Wood Duck	1	472834, 4881889	0	0	1
7281	Wood Duck	4	472834, 4881889	0	0	1
7281	Wood Duck	4	472834, 4881889	0	0	1
7288	American Wigeon	2	472919, 4888970	0	0	1
7288	Blue-winged Teal	10	-	0	0	1
7288	Mallard	6	472919, 4888970	0	0	1
7288	Mallard	6	472919, 4888970	0	0	1
7288	Northern Pintail	12	472919, 4888970	0	0	1
7288	Northern Pintail	35	472919, 4888970	0	0	1
7290	Blue-winged Teal	15	-	0	0	1
7290	Green-winged Teal	15	472462, 4890105	0	0	1
7290	Northern Pintail	15	472462, 4890105	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	6	473155, 4869453	0	0	1
7369	Mallard	2	473155, 4869453	0	0	1
7369	Mallard	2	473155, 4869453	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	2	473155, 4869453	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	3	473265, 4869455	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Northern Pintail	3	473265, 4869455	0	0	1
7369	Wood Duck	1	473265, 4869455	0	0	1
7369	Wood Duck	3	473155, 4869453	0	0	1
7369	Wood Duck	1	473155, 4869453	0	0	1
7369	Wood Duck	2	473265, 4869455	0	0	1
7373	Mallard	2	473726, 4873795	1	1	1
7373	Mallard	2	473726, 4873795	1	1	1
7381	American Wigeon	1	473077, 4881882	0	0	1
7391	Wood Duck	3	473293, 4891285	0	0	1
7590	American Wigeon	6	475329, 4890898	0	0	1
7590	Mallard	2	475329, 4890898	0	0	1
7590	Wood Duck	2	475329, 4890898	0	0	1
7672	American Black Duck	5	476233, 4872198	0	0	1
7672	American Black Duck	5	476233, 4872198	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7672	American Black Duck	5	476233, 4872198	0	0	1
7672	Mallard	1	476944, 4872068	0	0	1
7672	Wood Duck	2	476233, 4872198	0	0	1
7672	Wood Duck	2	476233, 4872198	0	0	1
7672	Wood Duck	2	476233, 4872198	0	0	1
7675	Wood Duck	1	476262, 4875979	0	0	1
7764	Wood Duck	2	477685, 4864041	0	0	1
7764	Wood Duck	2	477780, 4864202	0	0	1
7766	Mallard	1	477656, 4866035	0	0	1
7771	Mallard	5	477425, 4871882	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Waterfowl Stopover and Staging Area (Aquatic) - North $RSA_{AVI-AQU}$

Figure D-2a



- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1634]

Ecosites that Match SWH Criteria

- Hardwood Swamp [506]
- Marsh [15]

Observation Location

1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [171]

- American Black Duck [2]
- American Wigeon [6]
- Blue-winged Teal [3]
- Bufflehead [7]
- Cackling Goose [1]
- Canada Goose [45]
- Canvasback [1]
- Common Goldeneye [7]
- Common Merganser [10]
- Gadwall [1]
- Green-winged Teal [5]
- Hooded Merganser [8]
- Lesser Scaup [1]
- Long-tailed Duck [1]
- Mallard [27]
- Northern Pintail [5]
- Northern Shoveler [1]
- Red-breasted Merganser [2]
- Ring-necked Duck [9]
- Snow goose [3]
- White-winged Scoter [2]
- Wood Duck [24]

Field Incidental [14]

- Canada Goose [1]
- Unk Duck Species [5]
- Unk Goose Species [3]
- Mallard [1]
- Wood Duck [4]

Observation Type (Fieldwork Only)

- Visual [8]
- Unspecified [5]
- Visual Juvenile [1]

Candidate SWH in Plot

- Yes [7]
- Unknown [3]
- Nearby [4]
- No [459]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Waterfowl Stopover and Staging Area (Aquatic) - South $RSA_{AVI-AQU}$

Figure D-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1634]

Ecosites that Match SWH Criteria

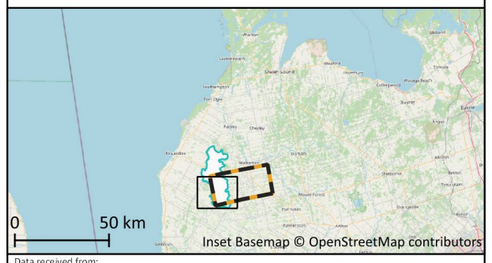
- Hardwood Swamp [506]
- Marsh [15]

See Figure D-2a for Full Legend

1:65,000

0 1 2 km

ZOETICA



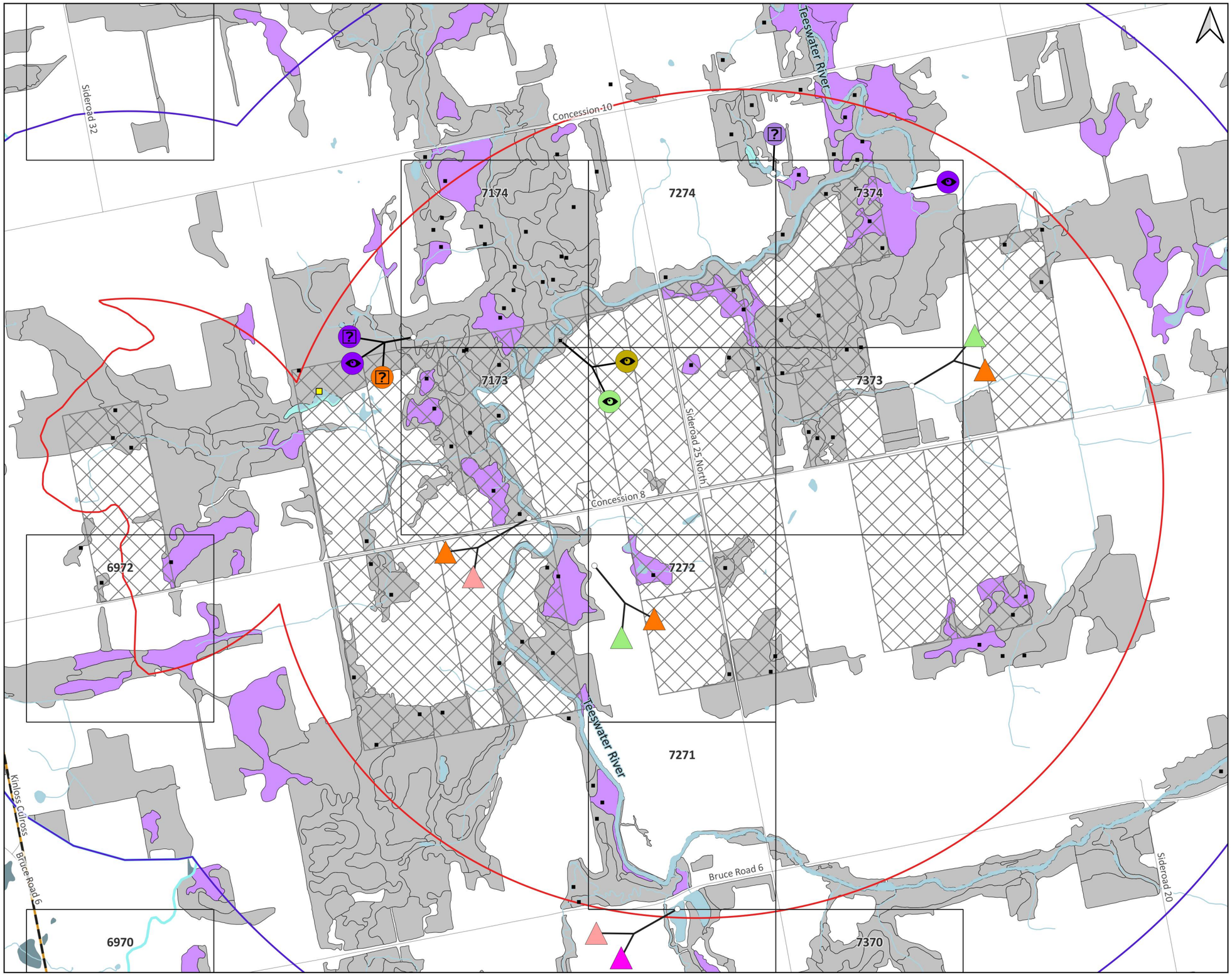
Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Waterfowl Stopover and Staging Area (Aquatic) - AOI

Figure D-2c



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1634]

Ecosites that Match SWH Criteria

- Hardwood Swamp [506]
- Marsh [15]

See Figure D-2a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-2. Supplemental data for 2022 field-based incidental observations relevant to Waterfowl Stopover and Staging Areas (Aquatic).

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6681	Goose species	Unspecified	>1	Other Incidental	466437, 4881431	0	0	1
6784	Wood Duck	Visual	2	Potential SWH Incidental	467461, 4884273	0	0	1
6784	Wood Duck	Visual (juv)	3	Potential SWH Incidental	467461, 4884273	0	0	1
6989	Wood Duck	Visual	1	TEM SWH	469031, 4889002	0	0	1
7168	Duck species	Visual	>1	Other Incidental	471205, 4868082	0	0	1
7168	Duck species	Visual	>1	Other Incidental	471205, 4868082	0	0	1
7168	Duck species	Visual	>1	Other Incidental	471205, 4868082	0	0	1
7174	Canada Goose	Unspecified	1	Other Incidental	471066, 4874055	1	1	1
7174	Canada Goose	Unspecified	1	Other Incidental	471066, 4874055	1	1	1
7174	Duck species	Unspecified	>1	Other Incidental	471066, 4874055	1	1	1
7174	Duck species	Visual	>1	Other Incidental	471066, 4874055	1	1	1
7174	Mallard	Visual	>1	TEM SWH	471850, 4874037	1	1	1
7174	Wood Duck	Visual	>1	TEM SWH	471850, 4874037	1	1	1
7274	Goose species	Unspecified	>1	Other Incidental	472986, 4874930	1	1	1
7374	Duck species	Visual	>1	Other Incidental	473708, 4874843	1	1	1
7374	Duck species	Visual	>1	Other Incidental	473708, 4874843	1	1	1
7388	Duck species	Visual	>1	Other Incidental	473316, 4888307	0	0	1
7590	Goose species	Unspecified	>1	Other Incidental	475131, 4890532	0	0	1
7590	Goose species	Unspecified	>1	Other Incidental	475131, 4890532	0	0	1
7590	Goose species	Unspecified	>1	Other Incidental	475131, 4890532	0	0	1

Table D-3. Supplemental data for desk-based observations relevant to Waterfowl Stopover and Staging Areas (Aquatic).

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6478	Bufflehead	3	464790, 4878460	0	0	1
6478	Bufflehead	2	464790, 4878460	0	0	1
6478	Bufflehead	3	464790, 4878460	0	0	1
6478	Bufflehead	3	464790, 4878460	0	0	1
6478	Bufflehead	2	464790, 4878460	0	0	1
6478	Canada Goose	50	464074, 4878806	0	0	1
6478	Canada Goose	22	464102, 4878713	0	0	1
6478	Canada Goose	22	464102, 4878713	0	0	1
6478	Canada Goose	22	464102, 4878713	0	0	1
6478	Green-winged Teal	2	464790, 4878460	0	0	1
6478	Green-winged Teal	2	464790, 4878460	0	0	1
6478	Mallard	1	464102, 4878713	0	0	1
6478	Mallard	1	464102, 4878713	0	0	1
6478	Mallard	1	464102, 4878713	0	0	1
6478	Northern Pintail	1	464102, 4878713	0	0	1
6478	Northern Pintail	1	464102, 4878713	0	0	1
6478	Northern Pintail	1	464102, 4878713	0	0	1
6478	Ring-necked Duck	3	464790, 4878460	0	0	1
6478	Ring-necked Duck	6	464790, 4878460	0	0	1
6478	Ring-necked Duck	3	464790, 4878460	0	0	1
6478	Ring-necked Duck	3	464790, 4878460	0	0	1
6478	Ring-necked Duck	1	464074, 4878806	0	0	1
6478	Ring-necked Duck	6	464790, 4878460	0	0	1
6480	Mallard	6	464922, 4880107	0	0	1
6672	Canada Goose	2	466868, 4872476	0	0	1
6675	Hooded Merganser	5	466142, 4875247	0	0	1
6675	Northern Shoveler	2	466310, 4875396	0	0	1
6679	Blue-winged Teal	1	-	0	0	1
6679	Blue-winged Teal	1	-	0	0	1
6679	Bufflehead	4	466958, 4879176	0	0	1
6679	Bufflehead	1	466958, 4879176	0	0	1
6679	Canada Goose	4	466958, 4879176	0	0	1
6679	Canada Goose	35	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	10	466958, 4879176	0	0	1
6679	Canada Goose	11	466958, 4879176	0	0	1
6679	Canada Goose	63	466958, 4879176	0	0	1
6679	Canada Goose	24	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Canada Goose	178	466958, 4879176	0	0	1
6679	Canada Goose	16	466958, 4879176	0	0	1
6679	Canada Goose	14	466958, 4879176	0	0	1
6679	Canada Goose	25	466958, 4879176	0	0	1
6679	Canada Goose	76	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	38	466958, 4879176	0	0	1
6679	Canada Goose	20	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	17	466958, 4879176	0	0	1
6679	Canada Goose	41	466958, 4879176	0	0	1
6679	Canada Goose	70	466958, 4879176	0	0	1
6679	Canada Goose	228	466958, 4879176	0	0	1
6679	Canada Goose	28	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	4	466958, 4879176	0	0	1
6679	Canada Goose	60	466958, 4879176	0	0	1
6679	Canada Goose	15	466958, 4879176	0	0	1
6679	Canada Goose	39	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	44	466958, 4879176	0	0	1
6679	Canada Goose	65	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	8	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	3	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	35	466958, 4879176	0	0	1
6679	Canada Goose	60	466958, 4879176	0	0	1
6679	Canada Goose	15	466958, 4879176	0	0	1
6679	Canada Goose	3	466958, 4879176	0	0	1
6679	Canada Goose	8	466958, 4879176	0	0	1
6679	Canada Goose	20	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	5	466958, 4879176	0	0	1
6679	Canada Goose	23	466958, 4879176	0	0	1
6679	Canada Goose	37	466958, 4879176	0	0	1
6679	Canada Goose	24	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Canada Goose	29	466958, 4879176	0	0	1
6679	Canada Goose	37	466958, 4879176	0	0	1
6679	Canada Goose	50	466958, 4879176	0	0	1
6679	Canada Goose	20	466958, 4879176	0	0	1
6679	Canada Goose	5	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	4	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	32	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	200	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	32	466958, 4879176	0	0	1
6679	Canada Goose	540	466958, 4879176	0	0	1
6679	Canada Goose	23	466958, 4879176	0	0	1
6679	Canada Goose	60	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	3	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	26	466958, 4879176	0	0	1
6679	Canada Goose	13	466958, 4879176	0	0	1
6679	Canada Goose	6	466958, 4879176	0	0	1
6679	Canada Goose	461	466958, 4879176	0	0	1
6679	Canada Goose	11	466958, 4879176	0	0	1
6679	Canada Goose	10	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	20	466958, 4879176	0	0	1
6679	Canada Goose	65	466958, 4879176	0	0	1
6679	Canada Goose	60	466958, 4879176	0	0	1
6679	Canada Goose	27	466958, 4879176	0	0	1
6679	Canada Goose	94	466958, 4879176	0	0	1
6679	Canada Goose	29	466958, 4879176	0	0	1
6679	Canada Goose	369	466958, 4879176	0	0	1
6679	Canada Goose	20	466958, 4879176	0	0	1
6679	Canada Goose	30	466958, 4879176	0	0	1
6679	Canada Goose	40	466958, 4879176	0	0	1
6679	Canada Goose	29	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	26	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	32	466958, 4879176	0	0	1
6679	Canada Goose	40	466958, 4879176	0	0	1
6679	Canada Goose	47	466958, 4879176	0	0	1
6679	Canada Goose	6	466958, 4879176	0	0	1
6679	Canada Goose	22	466958, 4879176	0	0	1
6679	Canada Goose	51	466958, 4879176	0	0	1
6679	Canada Goose	11	466958, 4879176	0	0	1
6679	Canada Goose	6	466958, 4879176	0	0	1
6679	Canada Goose	15	466958, 4879176	0	0	1
6679	Canada Goose	162	466958, 4879176	0	0	1
6679	Canada Goose	14	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	131	466958, 4879176	0	0	1
6679	Canada Goose	167	466958, 4879176	0	0	1
6679	Canada Goose	9	466958, 4879176	0	0	1
6679	Canada Goose	10	466958, 4879176	0	0	1
6679	Canada Goose	11	466958, 4879176	0	0	1
6679	Canada Goose	5	466958, 4879176	0	0	1
6679	Canada Goose	35	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	50	466958, 4879176	0	0	1
6679	Canada Goose	19	466958, 4879176	0	0	1
6679	Canada Goose	58	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	3	466958, 4879176	0	0	1
6679	Canada Goose	40	466958, 4879176	0	0	1
6679	Canada Goose	15	466958, 4879176	0	0	1
6679	Canada Goose	21	466958, 4879176	0	0	1
6679	Canada Goose	23	466958, 4879176	0	0	1
6679	Canada Goose	137	466958, 4879176	0	0	1
6679	Canada Goose	30	466958, 4879176	0	0	1
6679	Canada Goose	4	466958, 4879176	0	0	1
6679	Common Goldeneye	6	466958, 4879176	0	0	1
6679	Mallard	6	466958, 4879176	0	0	1
6679	Mallard	1	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Mallard	6	466958, 4879176	0	0	1
6679	Mallard	2	466958, 4879176	0	0	1
6679	Mallard	6	466958, 4879176	0	0	1
6679	Mallard	1	466958, 4879176	0	0	1
6679	Mallard	4	466958, 4879176	0	0	1
6679	Mallard	2	466958, 4879176	0	0	1
6679	Mallard	1	466958, 4879176	0	0	1
6679	Ring-necked Duck	3	466958, 4879176	0	0	1
6679	Ring-necked Duck	2	466958, 4879176	0	0	1
6679	Ring-necked Duck	2	466958, 4879176	0	0	1
6679	Snow goose	3	466958, 4879176	0	0	1
6679	White-winged Scoter	2	466958, 4879176	0	0	1
6679	Wood Duck	2	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	2	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	6	466958, 4879176	0	0	1
6679	Wood Duck	20	466958, 4879176	0	0	1
6679	Wood Duck	1	466958, 4879176	0	0	1
6679	Wood Duck	2	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	2	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6680	Canada Goose	6	466912, 4880100	0	0	1
6680	Common Merganser	4	466912, 4880100	0	0	1
6680	Long-tailed Duck	2	466912, 4880100	0	0	1
6681	Canada Goose	31	466430, 4881693	0	0	1
6681	Canada Goose	36	466430, 4881693	0	0	1
6681	Mallard	3	466430, 4881693	0	0	1
6681	Mallard	1	466430, 4881693	0	0	1
6681	Wood Duck	2	466430, 4881693	0	0	1
6770	Wood Duck	U	467055, 4870390	0	0	1
6869	Wood Duck	1	468492, 4869229	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6869	Wood Duck	1	468492, 4869229	0	0	1
6882	Canada Goose	3	468519, 4882206	0	0	1
6887	Canada Goose	15	468134, 4887028	0	0	1
6887	Mallard	4	468134, 4887028	0	0	1
6889	Canada Goose	U	468719, 4889066	0	0	1
6889	Gadwall	U	468719, 4889066	0	0	1
6889	Mallard	U	468719, 4889066	0	0	1
6889	Wood Duck	U	468719, 4889066	0	0	1
6891	Wood Duck	15	468691, 4891301	0	0	1
6893	Canada Goose	U	468168, 4893235	0	0	1
6893	Canada Goose	20	468168, 4893235	0	0	1
6894	Canada Goose	14	468965, 4894778	0	0	1
6894	Canada Goose	2	468965, 4894778	0	0	1
6894	Mallard	2	468965, 4894778	0	0	1
6970	Canada Goose	U	470000, 4870000	0	0	1
6970	Mallard	U	470000, 4870000	0	0	1
6972	American Wigeon	4	469399, 4872727	0	1	1
6972	American Wigeon	8	469397, 4872625	0	1	1
6972	Canada Goose	10	469399, 4872727	0	1	1
6972	Canada Goose	7	469397, 4872625	0	1	1
6972	Mallard	30	469397, 4872625	0	1	1
6972	Mallard	10	469399, 4872727	0	1	1
6972	Ring-necked Duck	4	469397, 4872625	0	1	1
6975	Canada Goose	60	469325, 4875593	0	0	1
6975	Mallard	40	469325, 4875593	0	0	1
6981	Mallard	2	469971, 4881834	0	0	1
6981	Wood Duck	1	469971, 4881834	0	0	1
6990	Canada Goose	U	470000, 4890000	0	0	1
6990	Mallard	U	470000, 4890000	0	0	1
6990	Wood Duck	U	470000, 4890000	0	0	1
6991	Canada Goose	1	469657, 4891528	0	0	1
6991	Mallard	1	469657, 4891528	0	0	1
6991	Wood Duck	9	469287, 4891492	0	0	1
7079	Wood Duck	U	470000, 4880000	0	0	1
7087	American Wigeon	U	470927, 4887732	0	0	1
7087	Bufflehead	6	470927, 4887732	0	0	1
7087	Canada Goose	U	470927, 4887732	0	0	1
7087	Canada Goose	100	470927, 4887732	0	0	1
7087	Green-winged Teal	U	470927, 4887732	0	0	1
7087	Mallard	U	470927, 4887732	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7087	Mallard	6	470927, 4887732	0	0	1
7087	Mallard	6	470927, 4887732	0	0	1
7087	Ring-necked Duck	4	470927, 4887732	0	0	1
7087	Wood Duck	6	470927, 4887732	0	0	1
7087	Wood Duck	U	470927, 4887732	0	0	1
7173	Canada Goose	2	471682, 4873088	1	1	1
7173	Common Merganser	20	471682, 4873088	1	1	1
7183	Canada Goose	10	471916, 4883662	0	0	1
7187	Canada Goose	6	471949, 4887839	0	0	1
7189	American Black Duck	2	471067, 4889252	0	0	1
7189	Bufflehead	16	471067, 4889252	0	0	1
7189	Bufflehead	2	471067, 4889252	0	0	1
7189	Canada Goose	8	471067, 4889252	0	0	1
7189	Canada Goose	2	471067, 4889252	0	0	1
7189	Canada Goose	6	471067, 4889252	0	0	1
7189	Canada Goose	2	471067, 4889252	0	0	1
7189	Canada Goose	2	471067, 4889252	0	0	1
7189	Canada Goose	4	471067, 4889252	0	0	1
7189	Canada Goose	7	471067, 4889252	0	0	1
7189	Canada Goose	3	471067, 4889252	0	0	1
7189	Canada Goose	16	471067, 4889252	0	0	1
7189	Canada Goose	4	471067, 4889252	0	0	1
7189	Canada Goose	4	471067, 4889252	0	0	1
7189	Common Goldeneye	3	471067, 4889252	0	0	1
7189	Common Goldeneye	4	471067, 4889252	0	0	1
7189	Common Merganser	6	471067, 4889252	0	0	1
7189	Green-winged Teal	2	471067, 4889252	0	0	1
7189	Hooded Merganser	4	471067, 4889252	0	0	1
7189	Hooded Merganser	3	471067, 4889252	0	0	1
7189	Mallard	8	471067, 4889252	0	0	1
7189	Mallard	10	471067, 4889252	0	0	1
7189	Mallard	12	471067, 4889252	0	0	1
7189	Mallard	7	471067, 4889252	0	0	1
7189	Mallard	1	471067, 4889252	0	0	1
7189	Mallard	1	471067, 4889252	0	0	1
7189	Mallard	4	471067, 4889252	0	0	1
7189	Mallard	2	471067, 4889252	0	0	1
7189	Red-breasted Merganser	15	471067, 4889252	0	0	1
7189	White-winged Scoter	2	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	12	471067, 4889252	0	0	1
7189	Wood Duck	12	471067, 4889252	0	0	1
7189	Wood Duck	16	471067, 4889252	0	0	1
7189	Wood Duck	3	471067, 4889252	0	0	1
7189	Wood Duck	1	471067, 4889252	0	0	1
7189	Wood Duck	4	471067, 4889252	0	0	1
7189	Wood Duck	16	471067, 4889252	0	0	1
7189	Wood Duck	4	471067, 4889252	0	0	1
7189	Wood Duck	4	471067, 4889252	0	0	1
7189	Wood Duck	20	471067, 4889252	0	0	1
7189	Wood Duck	6	471067, 4889252	0	0	1
7189	Wood Duck	16	471067, 4889252	0	0	1
7189	Wood Duck	12	471067, 4889252	0	0	1
7189	Wood Duck	1	471067, 4889252	0	0	1
7189	Wood Duck	7	471067, 4889252	0	0	1
7189	Wood Duck	3	471067, 4889252	0	0	1
7191	Wood Duck	5	471160, 4891804	0	0	1
7192	Canada Goose	2	471459, 4892136	0	0	1
7192	Canada Goose	2	471459, 4892136	0	0	1
7192	Canada Goose	5	471459, 4892136	0	0	1
7192	Canada Goose	3	471459, 4892136	0	0	1
7192	Wood Duck	2	471459, 4892136	0	0	1
7192	Wood Duck	2	471459, 4892136	0	0	1
7192	Wood Duck	4	471459, 4892136	0	0	1
7271	Common Merganser	2	472475, 4871002	1	1	1
7271	Hooded Merganser	1	472475, 4871002	1	1	1
7272	Canada Goose	2	472032, 4872835	1	1	1
7272	Mallard	4	472032, 4872835	1	1	1
7281	Bufflehead	4	472834, 4881889	0	0	1
7281	Bufflehead	4	472834, 4881889	0	0	1
7281	Bufflehead	4	472834, 4881889	0	0	1
7281	Canada Goose	700	472834, 4881889	0	0	1
7281	Canada Goose	500	472834, 4881889	0	0	1
7281	Canada Goose	10	472834, 4881889	0	0	1
7281	Canada Goose	700	472834, 4881889	0	0	1
7281	Canada Goose	10	472834, 4881889	0	0	1
7281	Canada Goose	500	472834, 4881889	0	0	1
7281	Canada Goose	10	472834, 4881889	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7281	Canada Goose	500	472834, 4881889	0	0	1
7281	Common Goldeneye	4	472834, 4881889	0	0	1
7281	Common Goldeneye	2	472834, 4881889	0	0	1
7281	Common Goldeneye	2	472834, 4881889	0	0	1
7281	Common Goldeneye	4	472834, 4881889	0	0	1
7281	Common Goldeneye	4	472834, 4881889	0	0	1
7281	Common Goldeneye	2	472834, 4881889	0	0	1
7281	Common Merganser	2	472834, 4881889	0	0	1
7281	Common Merganser	2	472834, 4881889	0	0	1
7281	Common Merganser	2	472834, 4881889	0	0	1
7281	Green-winged Teal	20	472834, 4881889	0	0	1
7281	Green-winged Teal	20	472834, 4881889	0	0	1
7281	Green-winged Teal	20	472834, 4881889	0	0	1
7281	Hooded Merganser	2	472834, 4881889	0	0	1
7281	Hooded Merganser	2	472834, 4881889	0	0	1
7281	Hooded Merganser	2	472834, 4881889	0	0	1
7281	Hooded Merganser	3	472834, 4881889	0	0	1
7281	Hooded Merganser	3	472834, 4881889	0	0	1
7281	Hooded Merganser	3	472834, 4881889	0	0	1
7281	Mallard	6	472834, 4881889	0	0	1
7281	Mallard	25	472834, 4881889	0	0	1
7281	Mallard	25	472834, 4881889	0	0	1
7281	Mallard	3	472834, 4881889	0	0	1
7281	Mallard	3	472834, 4881889	0	0	1
7281	Mallard	6	472834, 4881889	0	0	1
7281	Mallard	3	472834, 4881889	0	0	1
7281	Mallard	6	472834, 4881889	0	0	1
7281	Northern Pintail	6	472834, 4881889	0	0	1
7281	Northern Pintail	6	472834, 4881889	0	0	1
7281	Northern Pintail	6	472834, 4881889	0	0	1
7281	Snow goose	1	472834, 4881889	0	0	1
7281	Snow goose	1	472834, 4881889	0	0	1
7281	Wood Duck	4	472834, 4881889	0	0	1
7281	Wood Duck	1	472834, 4881889	0	0	1
7281	Wood Duck	1	472834, 4881889	0	0	1
7281	Wood Duck	1	472834, 4881889	0	0	1
7281	Wood Duck	4	472834, 4881889	0	0	1
7281	Wood Duck	4	472834, 4881889	0	0	1
7288	American Wigeon	2	472919, 4888970	0	0	1
7288	Blue-winged Teal	10	-	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7288	Mallard	6	472919, 4888970	0	0	1
7288	Mallard	6	472919, 4888970	0	0	1
7288	Northern Pintail	12	472919, 4888970	0	0	1
7288	Northern Pintail	35	472919, 4888970	0	0	1
7290	Blue-winged Teal	15	-	0	0	1
7290	Bufflehead	15	472462, 4890105	0	0	1
7290	Common Merganser	15	472462, 4890105	0	0	1
7290	Green-winged Teal	15	472462, 4890105	0	0	1
7290	Northern Pintail	15	472462, 4890105	0	0	1
7290	Red-breasted Merganser	500	472462, 4890105	0	0	1
7290	Red-breasted Merganser	35	472462, 4890105	0	0	1
7290	Red-breasted Merganser	75	472462, 4890105	0	0	1
7369	Canada Goose	4	473265, 4869455	0	0	1
7369	Canada Goose	4	473155, 4869453	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	40	473265, 4869455	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	18	473265, 4869455	0	0	1
7369	Canada Goose	18	473265, 4869455	0	0	1
7369	Canada Goose	35	473265, 4869455	0	0	1
7369	Canada Goose	U	473155, 4869453	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	4	473155, 4869453	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	9	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	4	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	30	473155, 4869453	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Common Goldeneye	2	473265, 4869455	0	0	1
7369	Common Goldeneye	1	473265, 4869455	0	0	1
7369	Common Goldeneye	2	473265, 4869455	0	0	1
7369	Common Goldeneye	4	473265, 4869455	0	0	1
7369	Common Merganser	2	473265, 4869455	0	0	1
7369	Hooded Merganser	3	473265, 4869455	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	6	473155, 4869453	0	0	1
7369	Mallard	2	473155, 4869453	0	0	1
7369	Mallard	2	473155, 4869453	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	2	473155, 4869453	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	3	473265, 4869455	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Northern Pintail	3	473265, 4869455	0	0	1
7369	Wood Duck	1	473265, 4869455	0	0	1
7369	Wood Duck	3	473155, 4869453	0	0	1
7369	Wood Duck	1	473155, 4869453	0	0	1
7369	Wood Duck	2	473265, 4869455	0	0	1
7370	Canada Goose	20	473144, 4870137	0	1	1
7370	Canada Goose	5	473310, 4870415	0	1	1
7373	Canada Goose	2	473726, 4873795	1	1	1
7373	Canada Goose	8	473726, 4873795	1	1	1
7373	Mallard	2	473726, 4873795	1	1	1
7373	Mallard	2	473726, 4873795	1	1	1
7379	Canada Goose	2	473276, 4879645	0	0	1
7381	American Wigeon	1	473077, 4881882	0	0	1
7381	Bufflehead	7	473077, 4881882	0	0	1
7381	Canada Goose	4	473077, 4881882	0	0	1
7381	Common Goldeneye	5	473077, 4881882	0	0	1
7381	Hooded Merganser	2	473077, 4881882	0	0	1
7381	Mallard	8	473338, 4881427	0	0	1
7381	Ring-necked Duck	10	473077, 4881882	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7381	Wood Duck	1	473338, 4881427	0	0	1
7391	Canada Goose	500	473369, 4891408	0	0	1
7391	Snow goose	3	473369, 4891408	0	0	1
7391	Wood Duck	3	473293, 4891285	0	0	1
7464	Canada Goose	2	474588, 4864832	0	0	1
7565	Canada Goose	12	475158, 4865182	0	0	1
7590	American Wigeon	6	475329, 4890898	0	0	1
7590	Canada Goose	7	475329, 4890898	0	0	1
7590	Canada Goose	2	475329, 4890898	0	0	1
7590	Canada Goose	1	475329, 4890898	0	0	1
7590	Canada Goose	2	475329, 4890898	0	0	1
7590	Canada Goose	50	475329, 4890898	0	0	1
7590	Canada Goose	22	475329, 4890898	0	0	1
7590	Canada Goose	7	475492, 4890863	0	0	1
7590	Canada Goose	75	475329, 4890898	0	0	1
7590	Canvasback	3	-	0	0	1
7590	Common Merganser	1	475492, 4890863	0	0	1
7590	Lesser Scaup	40	475329, 4890898	0	0	1
7590	Mallard	2	475329, 4890898	0	0	1
7590	Ring-necked Duck	1	475329, 4890898	0	0	1
7590	Wood Duck	2	475329, 4890898	0	0	1
7663	Canada Goose	2	476500, 4863533	0	0	1
7672	American Black Duck	5	476233, 4872198	0	0	1
7672	American Black Duck	5	476233, 4872198	0	0	1
7672	American Black Duck	5	476233, 4872198	0	0	1
7672	Cackling Goose	5	476944, 4872068	0	0	1
7672	Canada Goose	50	476233, 4872198	0	0	1
7672	Canada Goose	50	476233, 4872198	0	0	1
7672	Canada Goose	35	476944, 4872068	0	0	1
7672	Canada Goose	50	476233, 4872198	0	0	1
7672	Common Goldeneye	2	476233, 4872198	0	0	1
7672	Common Goldeneye	2	476233, 4872198	0	0	1
7672	Common Goldeneye	2	476233, 4872198	0	0	1
7672	Common Goldeneye	1	476944, 4872068	0	0	1
7672	Common Merganser	6	476233, 4872198	0	0	1
7672	Common Merganser	2	476944, 4872068	0	0	1
7672	Common Merganser	6	476233, 4872198	0	0	1
7672	Common Merganser	6	476233, 4872198	0	0	1
7672	Hooded Merganser	10	476233, 4872198	0	0	1
7672	Hooded Merganser	10	476233, 4872198	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7672	Hooded Merganser	5	476944, 4872068	0	0	1
7672	Hooded Merganser	10	476233, 4872198	0	0	1
7672	Mallard	1	476944, 4872068	0	0	1
7672	Ring-necked Duck	4	476233, 4872198	0	0	1
7672	Ring-necked Duck	4	476233, 4872198	0	0	1
7672	Ring-necked Duck	4	476233, 4872198	0	0	1
7672	Ring-necked Duck	7	476944, 4872068	0	0	1
7672	Wood Duck	2	476233, 4872198	0	0	1
7672	Wood Duck	2	476233, 4872198	0	0	1
7672	Wood Duck	2	476233, 4872198	0	0	1
7675	Wood Duck	1	476262, 4875979	0	0	1
7764	Canada Goose	1	477639, 4864107	0	0	1
7764	Canada Goose	2	477685, 4864041	0	0	1
7764	Wood Duck	2	477685, 4864041	0	0	1
7764	Wood Duck	2	477780, 4864202	0	0	1
7766	Canada Goose	15	477656, 4866035	0	0	1
7766	Mallard	1	477656, 4866035	0	0	1
7771	Canada Goose	16	477109, 4871190	0	0	1
7771	Canada Goose	4	477425, 4871882	0	0	1
7771	Mallard	5	477425, 4871882	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Shorebird Migratory Stopover Area - North $RSA_{AVI-AQU}$

Figure D-3a

Municipality of Brockton

Municipality of Kincardine

Township of Huron-Kinloss

Schmidt Lake

Cunningham Lake

Silver Lake

Clam Lake

Teeswater River

6688 6889 7087 7187 7189 7590 6681 6679 7182 7382 7179 7379

- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2010]

Ecosites that Match SWH Criteria

- Marsh [145]

○ Observation Location ☐ 1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [37]

- Dunlin [4]
- Greater Yellowlegs [5]
- Least Sandpiper [4]
- Lesser Yellowlegs [9]
- Pectoral Sandpiper [1]
- Semipalmated Plover [1]
- Semipalmated Sandpiper [2]
- Solitary Sandpiper [3]
- Spotted Sandpiper [8]
- Stilt Sandpiper [1]

Candidate SWH in Plot

- No [473]

1:65,000

0 1 2 km

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0 50 km

Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Shorebird Migratory Stopover Area - South $RSA_{AVI-AQU}$

Figure D-3b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2010]

Ecosites that Match SWH Criteria

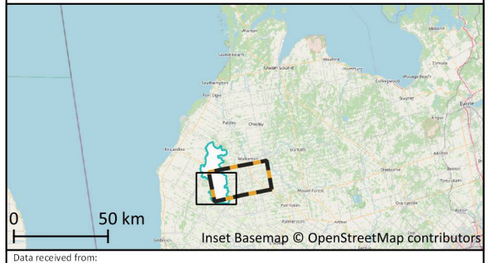
- Marsh [145]

See Figure D-3a for Full Legend

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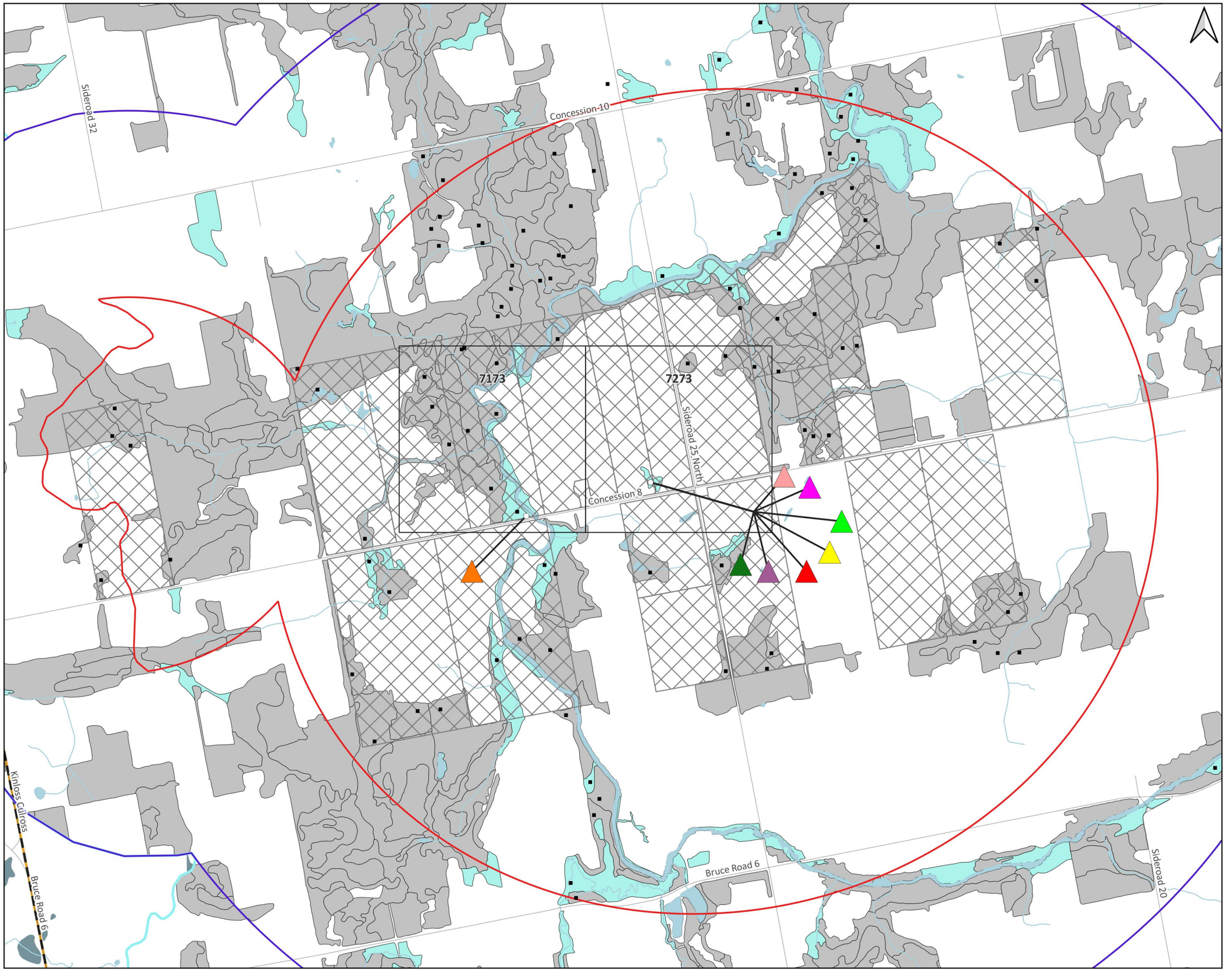
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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Shorebird Migratory Stopover Area - AOI

Figure D-3c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2010]

Ecosites that Match SWH Criteria

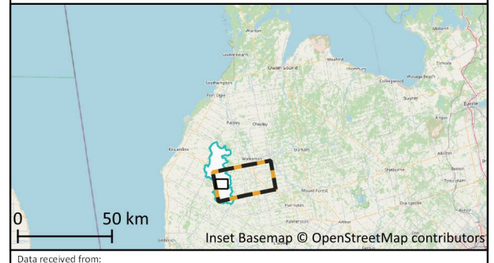
- Marsh [145]

See Figure D-3a for Full Legend

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0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-4. Supplemental data for desk-based observations relevant to Shorebird Migratory Stopover Area.

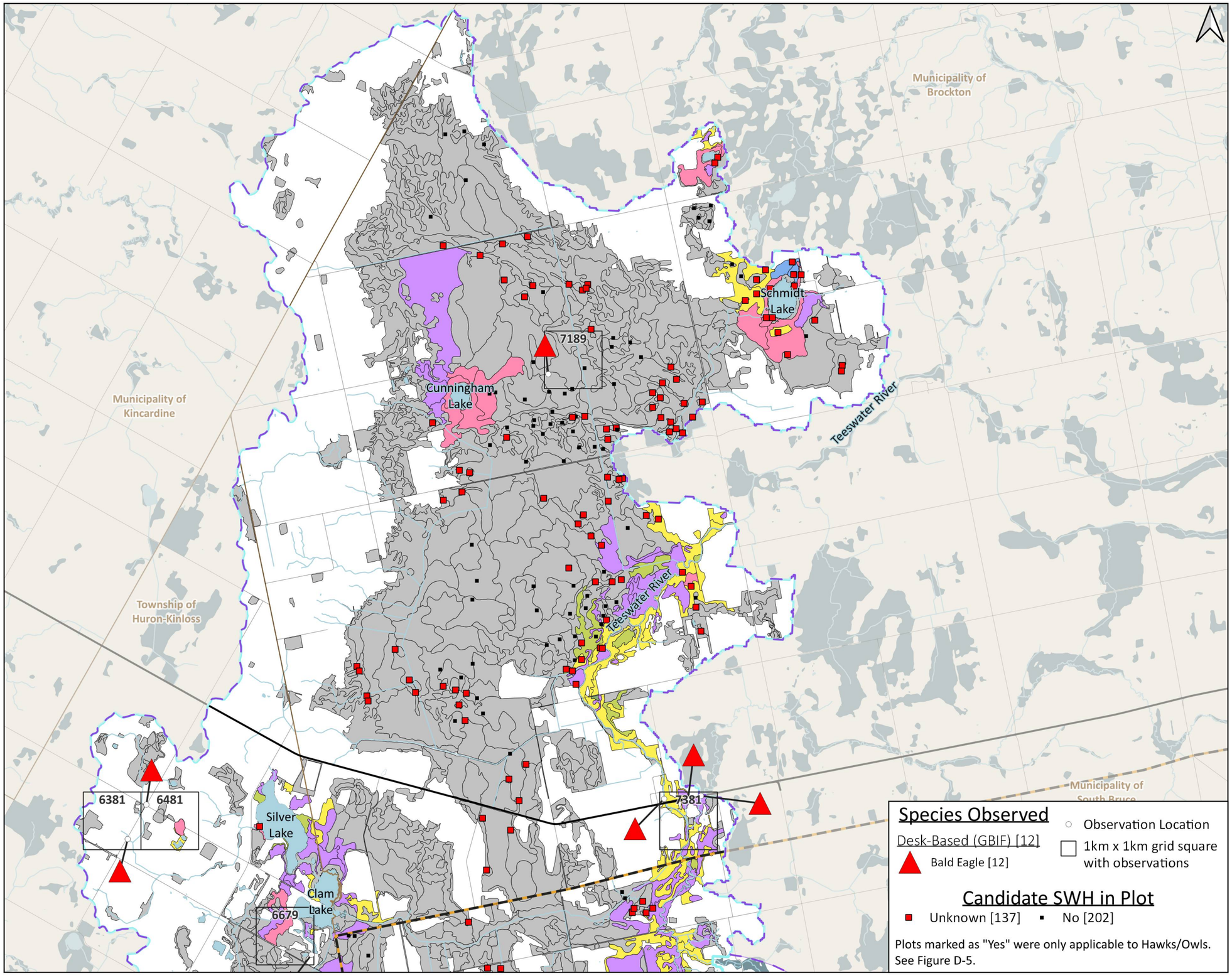
Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6478	Dunlin	1	464102, 4878713	0	0	1
6478	Dunlin	1	464102, 4878713	0	0	1
6478	Dunlin	1	464102, 4878713	0	0	1
6478	Greater Yellowlegs	1	464790, 4878460	0	0	1
6478	Greater Yellowlegs	1	464790, 4878460	0	0	1
6478	Greater Yellowlegs	1	464790, 4878460	0	0	1
6478	Lesser Yellowlegs	5	-	0	0	1
6478	Lesser Yellowlegs	3	-	0	0	1
6478	Lesser Yellowlegs	5	-	0	0	1
6478	Lesser Yellowlegs	5	-	0	0	1
6478	Lesser Yellowlegs	3	-	0	0	1
6478	Lesser Yellowlegs	3	-	0	0	1
6478	Spotted Sandpiper	U	464570, 4878434	0	0	1
6478	Spotted Sandpiper	U	464570, 4878434	0	0	1
6679	Solitary Sandpiper	1	466958, 4879176	0	0	1
6681	Spotted Sandpiper	2	466430, 4881693	0	0	1
6681	Spotted Sandpiper	2	466430, 4881693	0	0	1
6688	Semipalmated Sandpiper	1	466810, 4888851	0	0	1
6889	Dunlin	U	468719, 4889066	0	0	1
6889	Greater Yellowlegs	U	468719, 4889066	0	0	1
6889	Least Sandpiper	U	468719, 4889066	0	0	1
6889	Lesser Yellowlegs	U	-	0	0	1
7087	Dunlin	U	470927, 4887732	0	0	1
7087	Greater Yellowlegs	U	470927, 4887732	0	0	1
7087	Least Sandpiper	U	470927, 4887732	0	0	1
7087	Lesser Yellowlegs	U	-	0	0	1
7087	Spotted Sandpiper	U	470927, 4887732	0	0	1
7173	Spotted Sandpiper	3	471682, 4873088	1	1	1
7179	Lesser Yellowlegs	U	-	0	0	1
7182	Solitary Sandpiper	1	471995, 4882283	0	0	1
7182	Spotted Sandpiper	1	471995, 4882283	0	0	1
7187	Spotted Sandpiper	1	471266, 4887693	0	0	1
7189	Greater Yellowlegs	2	471067, 4889252	0	0	1
7189	Greater Yellowlegs	1	471067, 4889252	0	0	1
7189	Least Sandpiper	8	471067, 4889252	0	0	1
7189	Lesser Yellowlegs	1	-	0	0	1
7189	Lesser Yellowlegs	2	-	0	0	1
7189	Spotted Sandpiper	2	471067, 4889252	0	0	1
7189	Spotted Sandpiper	1	471067, 4889252	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7273	Dunlin	20	472349, 4873269	1	1	1
7273	Least Sandpiper	5	472349, 4873269	1	1	1
7273	Lesser Yellowlegs	3	-	1	1	1
7273	Lesser Yellowlegs	3	-	1	1	1
7273	Lesser Yellowlegs	3	-	1	1	1
7273	Pectoral Sandpiper	2	472349, 4873269	1	1	1
7273	Pectoral Sandpiper	2	472349, 4873269	1	1	1
7273	Semipalmated Plover	4	472349, 4873269	1	1	1
7273	Semipalmated Sandpiper	1	472349, 4873269	1	1	1
7273	Stilt Sandpiper	1	472349, 4873269	1	1	1
7369	Spotted Sandpiper	1	473265, 4869455	0	0	1
7379	Greater Yellowlegs	1	473276, 4879645	0	0	1
7379	Lesser Yellowlegs	4	-	0	0	1
7382	Lesser Yellowlegs	5	-	0	0	1
7590	Solitary Sandpiper	1	475329, 4890898	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Raptor Wintering Area for Bald Eagles - North $RSA_{AVI-AQU}$

Figure D-4a



- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1848]

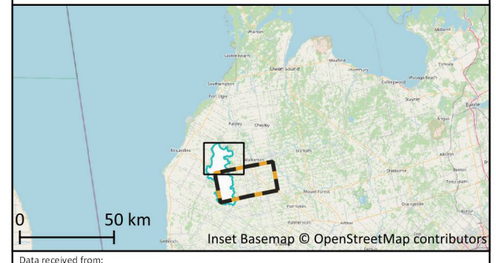
Ecosites that Match SWH Criteria

- Conifer [16]
- Mixedwood [48]
- Hardwood [77]
- Conifer Swamp [10]
- Mixedwood Swamp [46]
- Hardwood Swamp [110]

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0 1 2 km

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Species Observed

Desk-Based (GBIF) [12]

- Bald Eagle [12]
- Observation Location
- 1km x 1km grid square with observations

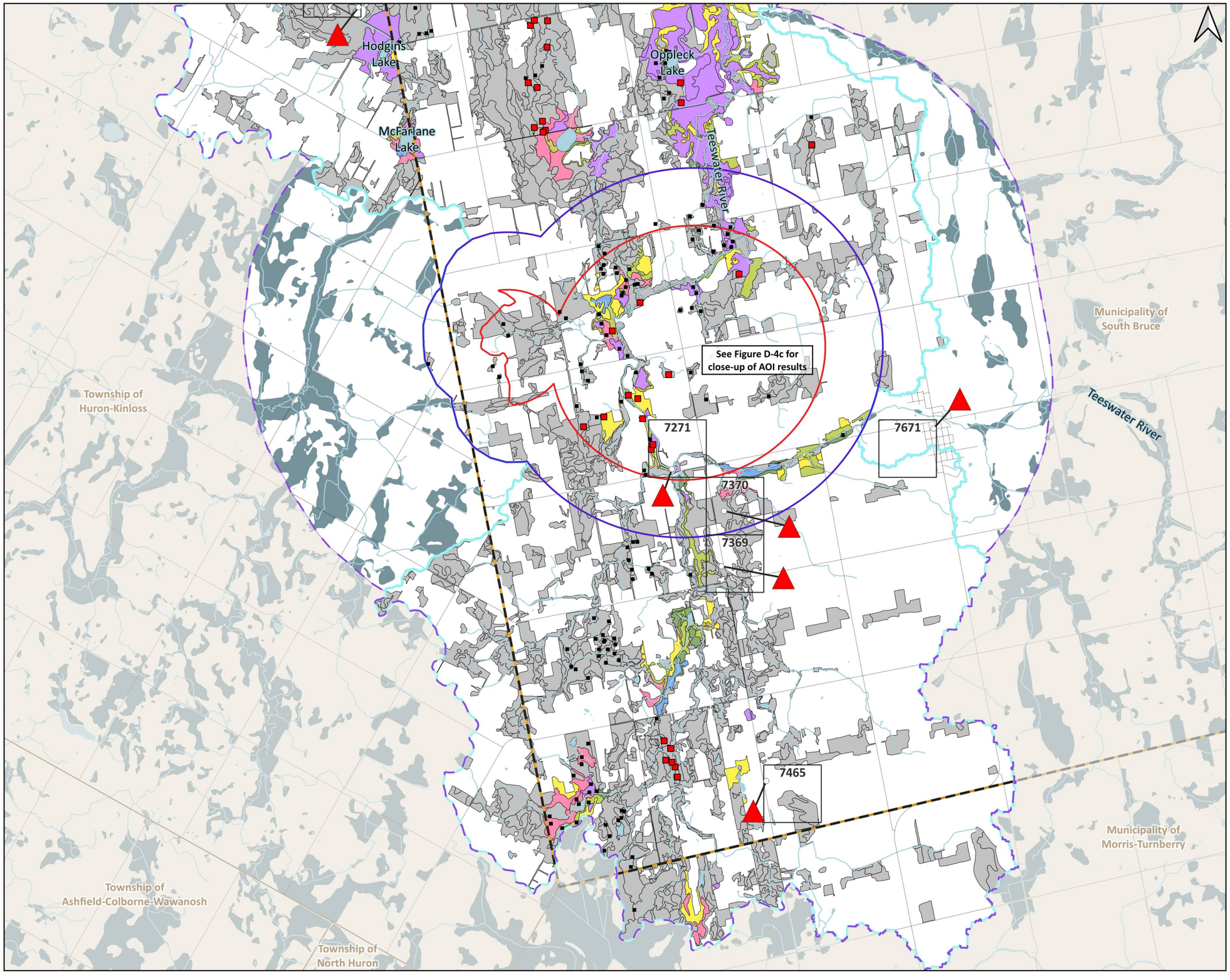
Candidate SWH in Plot

- Unknown [137]
- No [202]

Plots marked as "Yes" were only applicable to Hawks/Owls. See Figure D-5.

Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Raptor Wintering Area for Bald Eagles - South $RSA_{AVI-AQU}$

Figure D-4b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1848]

Ecosites that Match SWH Criteria

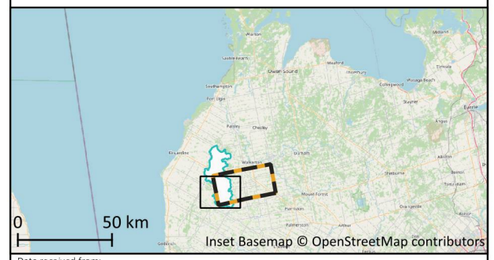
- Conifer [16]
- Mixedwood [48]
- Hardwood [77]
- Conifer Swamp [10]
- Mixedwood Swamp [46]
- Hardwood Swamp [110]

See Figure D-4a for Full Legend

1:65,000

0 1 2 km

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Raptor Wintering Area for Bald Eagles - AOI

Figure D-4c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1848]

Ecosites that Match SWH Criteria

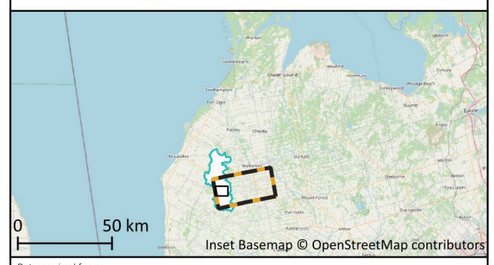
- Conifer [16]
- Mixedwood [48]
- Hardwood [77]
- Conifer Swamp [10]
- Mixedwood Swamp [46]
- Hardwood Swamp [110]

See Figure D-4a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



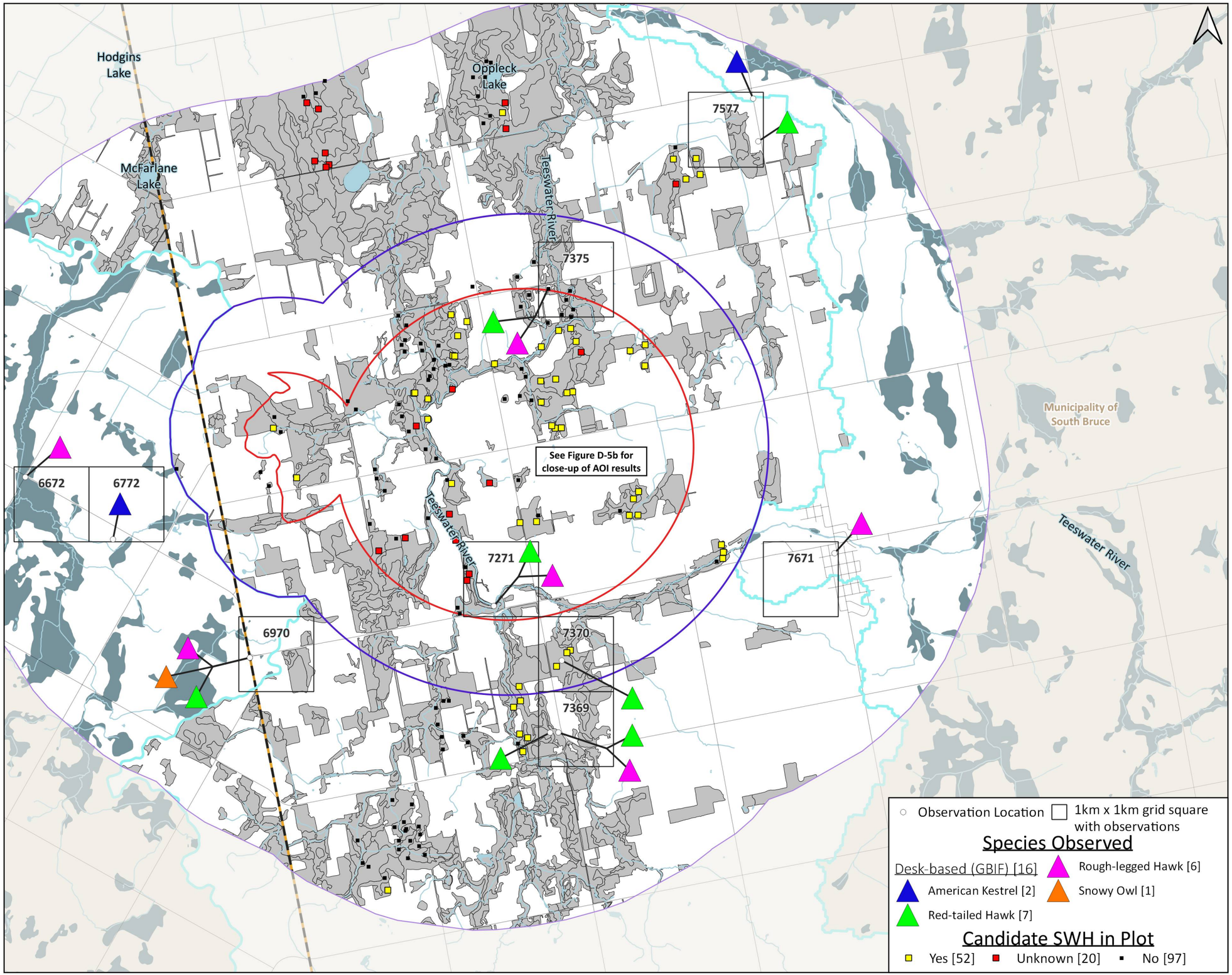
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Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Raptor Wintering Area for Hawks/Owls - RSA_{AVI}

Figure D-5a



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AVI})
- Watercourse
- Lake
- Wetland Outside LSA
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [925]

Observation Location

1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [16]

- American Kestrel [2]
- Red-tailed Hawk [7]
- Rough-legged Hawk [6]
- Snowy Owl [1]

Candidate SWH in Plot

- Yes [52]
- Unknown [20]
- No [97]

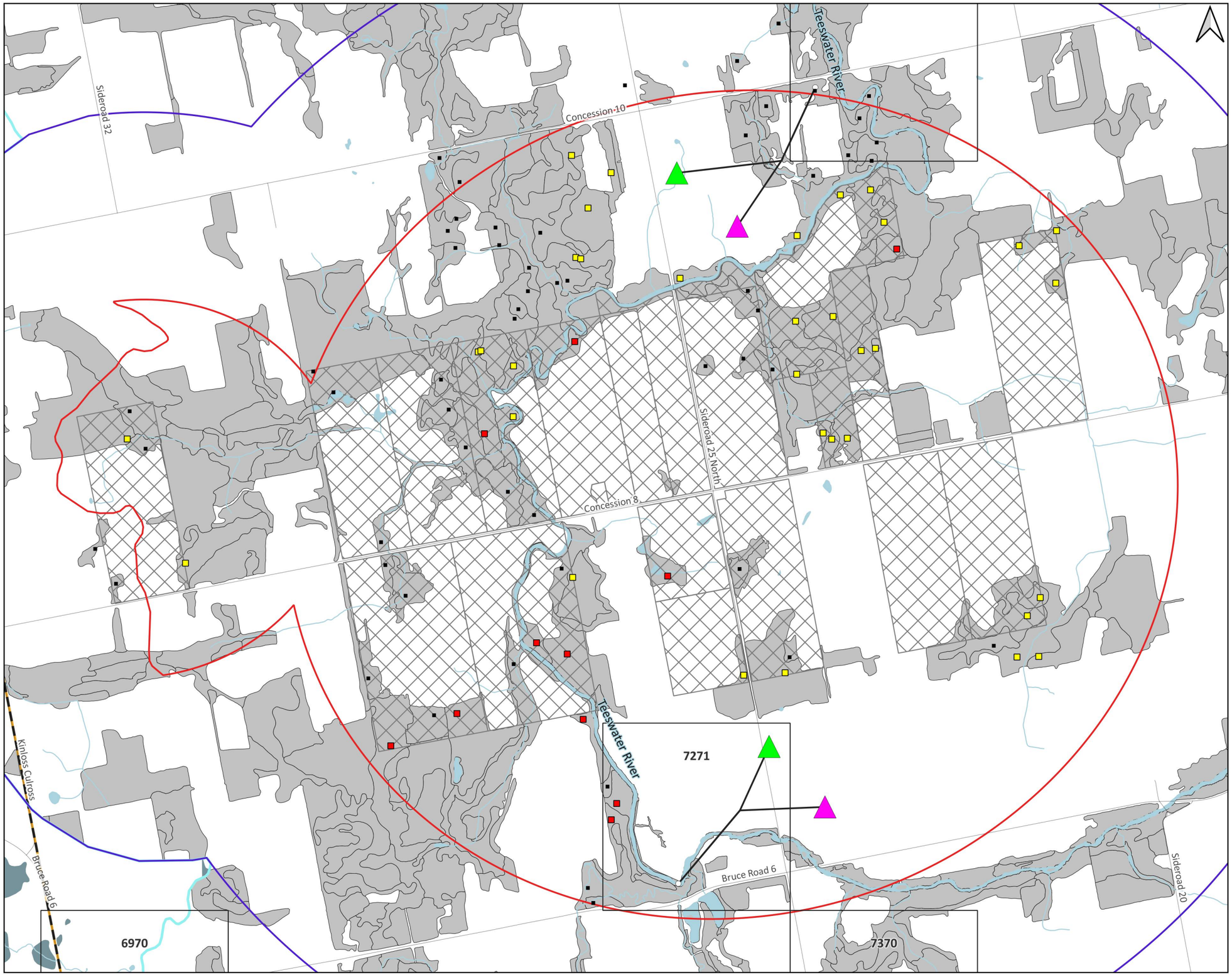
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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Raptor Wintering Area for Hawks/Owls - AOI

Figure D-5b

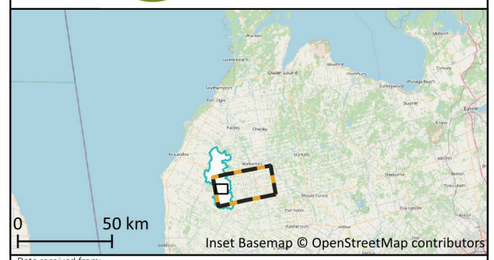
- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [925]

See Figure D-5a for Full Legend

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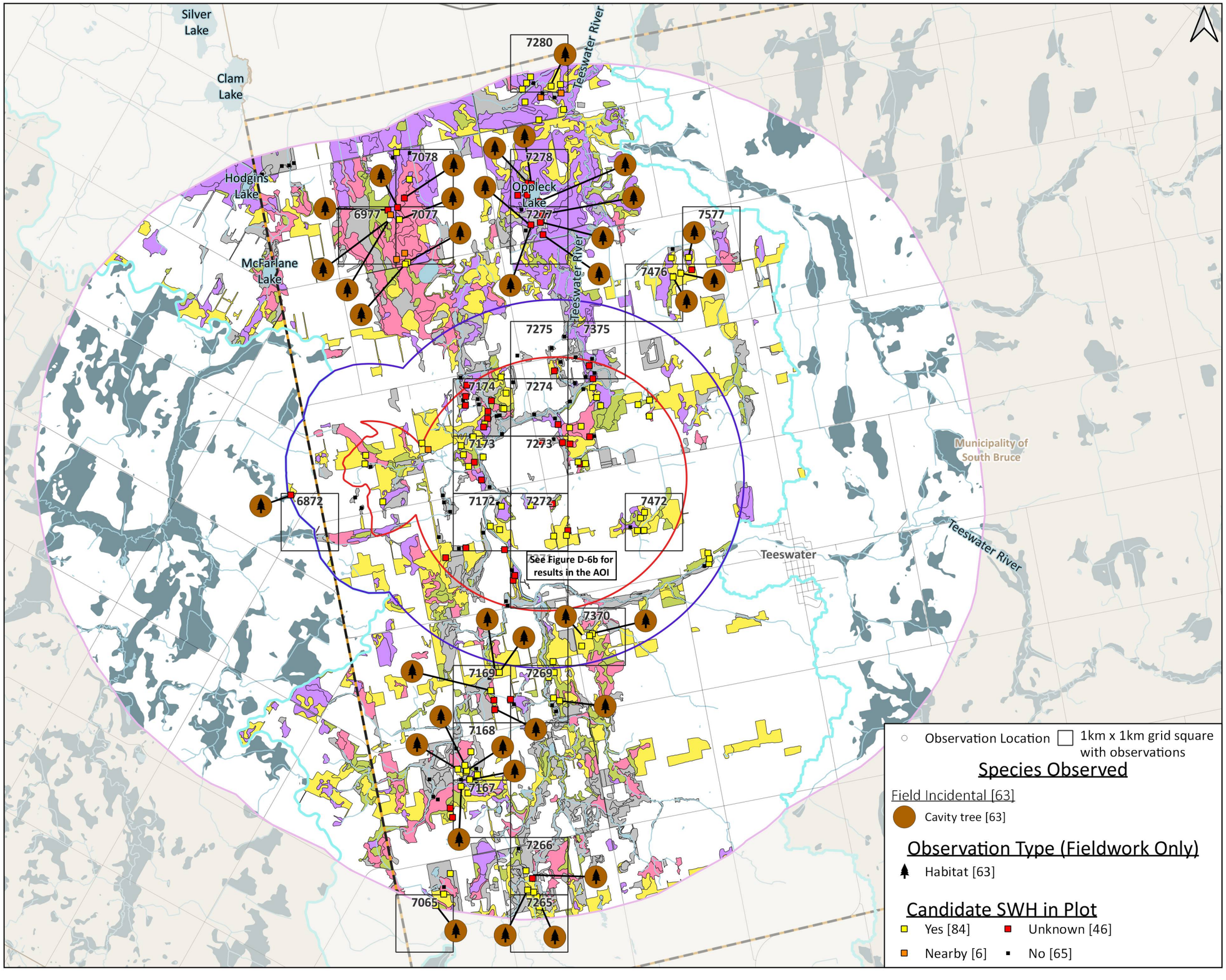
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Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

Table D-5. Supplemental data for desk-based observations relevant to Raptor Wintering Area.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
6381	Bald Eagle	1	-	0	0	/	1
6481	Bald Eagle	1	-	0	0	/	1
6481	Bald Eagle	1	-	0	0	/	1
6672	Rough-legged Hawk	1	466150, 4872863	0	0	1	/
6672	Rough-legged Hawk	1	466150, 4872863	0	0	1	/
6679	Bald Eagle	1	-	0	0	/	1
6679	Bald Eagle	1	-	0	0	/	1
6772	American Kestrel	1	467321, 4872033	0	0	1	/
6970	Red-tailed Hawk	3	469147, 4870454	0	0	1	/
6970	Rough-legged Hawk	3	469147, 4870454	0	0	1	/
6970	Snowy Owl	2	469147, 4870454	0	0	1	/
7189	Bald Eagle	3	-	0	0	/	1
7271	Bald Eagle	4	-	1	1	/	1
7271	Red-tailed Hawk	1	472403, 4871143	1	1	1	/
7271	Rough-legged Hawk	1	472403, 4871143	1	1	1	/
7369	Bald Eagle	1	-	0	0	/	1
7369	Bald Eagle	2	-	0	0	/	1
7369	Bald Eagle	1	-	0	0	/	1
7369	Bald Eagle	1	-	0	0	/	1
7369	Bald Eagle	1	-	0	0	/	1
7369	Bald Eagle	1	-	0	0	/	1
7369	Bald Eagle	1	-	0	0	/	1
7369	Bald Eagle	1	-	0	0	/	1
7369	Bald Eagle	1	-	0	0	/	1
7369	Bald Eagle	1	-	0	0	/	1
7369	Bald Eagle	1	-	0	0	/	1
7369	Red-tailed Hawk	2	473265, 4869455	0	0	1	/
7369	Red-tailed Hawk	1	473155, 4869453	0	0	1	/
7369	Red-tailed Hawk	2	473265, 4869455	0	0	1	/
7369	Red-tailed Hawk	1	473265, 4869455	0	0	1	/
7369	Red-tailed Hawk	1	473265, 4869455	0	0	1	/
7369	Rough-legged Hawk	1	473265, 4869455	0	0	1	/
7369	Rough-legged Hawk	1	473265, 4869455	0	0	1	/
7369	Rough-legged Hawk	1	473265, 4869455	0	0	1	/
7369	Rough-legged Hawk	1	473265, 4869455	0	0	1	/
7369	Rough-legged Hawk	1	473265, 4869455	0	0	1	/
7370	Bald Eagle	2	-	0	1	/	1
7370	Bald Eagle	1	-	0	1	/	1
7370	Bald Eagle	1	-	0	1	/	1
7370	Red-tailed Hawk	1	473310, 4870415	0	1	1	/
7370	Red-tailed Hawk	2	473310, 4870415	0	1	1	/

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
7375	Red-tailed Hawk	1	473134, 4875394	0	1	1	/
7375	Rough-legged Hawk	1	473134, 4875394	0	1	1	/
7381	Bald Eagle	1	-	0	0	/	1
7381	Bald Eagle	2	-	0	0	/	1
7381	Bald Eagle	2	-	0	0	/	1
7465	Bald Eagle	3	-	0	0	/	1
7577	American Kestrel	3	475864, 4877915	0	0	1	/
7577	Red-tailed Hawk	1	475932, 4877344	0	0	1	/
7671	Bald Eagle	1	-	0	0	/	1
7671	Rough-legged Hawk	1	476950, 4871847	0	0	1	/



Observation Location
1km x 1km grid square with observations

Species Observed

Field Incidental [63]

Cavity tree [63]

Observation Type (Fieldwork Only)

Habitat [63]

Candidate SWH in Plot

Yes [84]
Unknown [46]
Nearby [6]
No [65]

NWMO Biodiversity Impact Studies

Candidate SWH for Bat Maternity Colony - RSA_{BAT}

Figure D-6a

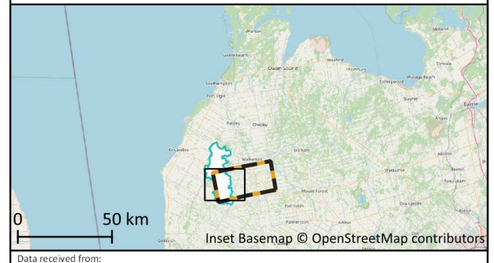
- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{BAT})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [429]

Ecosites that Match SWH Criteria

- Mixedwood [174]
- Hardwood [218]
- Mixedwood Swamp [147]
- Hardwood Swamp [201]

1:65,000
0 1 2 km

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Bat Maternity Colony - AOI

Figure D-6b



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [429]

Ecosites that Match SWH Criteria

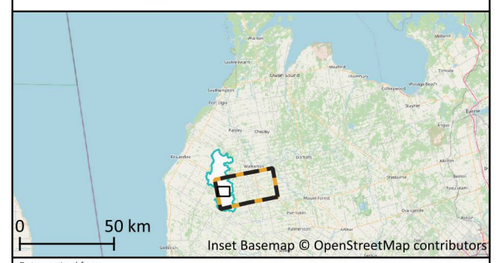
- Mixedwood [174]
- Hardwood [218]
- Mixedwood Swamp [147]
- Hardwood Swamp [201]

See Figure D-6a for Full Legend

1:20,000

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

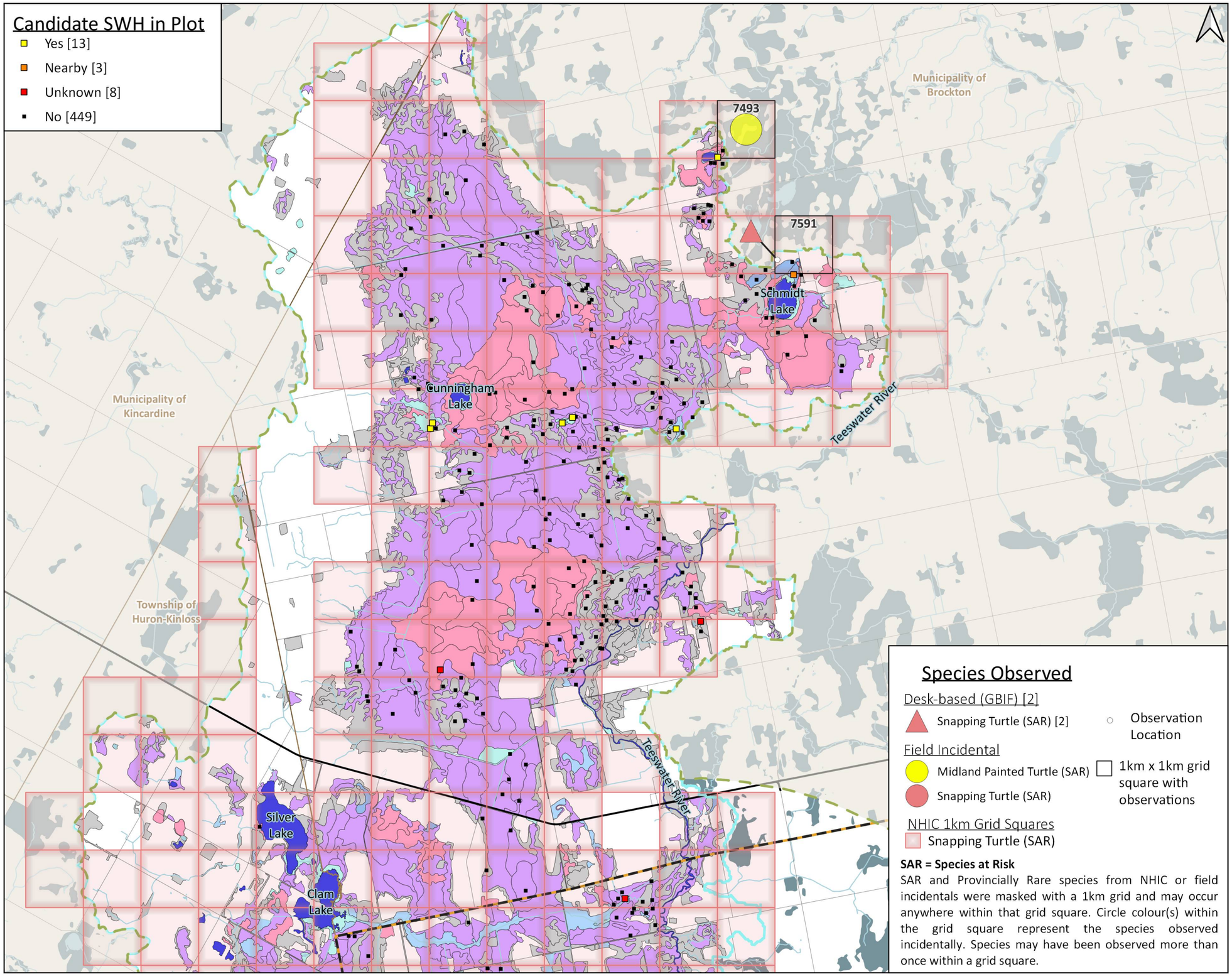
Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-6. Supplemental data for 2022 field-based incidental observations relevant to Bat Maternity Colonies.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	RSA_{BAT}
6872	Cavity tree	Habitat	1	Potential SWH Incidental	468185, 4872971	0	1	1
6977	Cavity tree	Habitat	med density	Potential SWH Incidental	469890, 4877775	0	0	1
6977	Cavity tree	Habitat	low density	Potential SWH Incidental	469863, 4877945	0	0	1
6977	Cavity tree	Habitat	low density	Potential SWH Incidental	469889, 4877776	0	0	1
7065	Cavity tree	Habitat	low density	Potential SWH Incidental	470699, 4865817	0	0	1
7071	Cavity tree	Habitat	1	Other Incidental	470873, 4871883	1	1	1
7077	Cavity tree	Habitat	low density	Potential SWH Incidental	470169, 4877006	0	0	1
7077	Cavity tree	Habitat	med density	Potential SWH Incidental	470038, 4877983	0	0	1
7077	Cavity tree	Habitat	low density	Potential SWH Incidental	470061, 4877776	0	0	1
7077	Cavity tree	Habitat	low density	Potential SWH Incidental	470204, 4877033	0	0	1
7078	Cavity tree	Habitat	low density	Potential SWH Incidental	470141, 4878150	0	0	1
7167	Cavity tree	Habitat	low density	Potential SWH Incidental	471142, 4867890	0	0	1
7168	Cavity tree	Habitat	med density	Potential SWH Incidental	471205, 4868257	0	0	1
7168	Cavity tree	Habitat	med density	Potential SWH Incidental	471296, 4868008	0	0	1
7168	Cavity tree	Habitat	low density	Potential SWH Incidental	471233, 4868164	0	0	1
7168	Cavity tree	Habitat	low density	Potential SWH Incidental	471079, 4868191	0	0	1
7169	Cavity tree	Habitat	1	Potential SWH Incidental	471725, 4869242	0	0	1
7169	Cavity tree	Habitat	1	Potential SWH Incidental	471731, 4869886	0	0	1
7169	Cavity tree	Habitat	1	Potential SWH Incidental	471650, 4869565	0	0	1
7169	Cavity tree	Habitat	low density	Potential SWH Incidental	471801, 4869875	0	0	1
7172	Cavity tree	Habitat	low density	Potential SWH Incidental	471811, 4872371	1	1	1
7172	Cavity tree	Habitat	1	Potential SWH Incidental	471839, 4872779	1	1	1
7172	Cavity tree	Habitat	1	Potential SWH Incidental	471803, 4872372	1	1	1
7172	Cavity tree	Habitat	1	Potential SWH Incidental	471896, 4872024	1	1	1
7173	Cavity tree	Habitat	1	Potential SWH Incidental	471495, 4873244	1	1	1
7174	Cavity tree	Habitat	low density	Potential SWH Incidental	471240, 4874712	1	1	1
7174	Cavity tree	Habitat	low density	Potential SWH Incidental	471524, 4874154	1	1	1
7174	Cavity tree	Habitat	low density	Potential SWH Incidental	471200, 4874532	1	1	1
7174	Cavity tree	Habitat	1	Potential SWH Incidental	471631, 4874414	1	1	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	RSA_{BAT}
7174	Cavity tree	Habitat	1	Potential SWH Incidental	471666, 4874618	1	1	1
7174	Cavity tree	Habitat	1	Potential SWH Incidental	471548, 4874206	1	1	1
7265	Cavity tree	Habitat	med density	Potential SWH Incidental	472461, 4865960	0	0	1
7266	Cavity tree	Habitat	low density	Potential SWH Incidental	472345, 4866347	0	0	1
7266	Cavity tree	Habitat	low density	Potential SWH Incidental	472302, 4866096	0	0	1
7269	Cavity tree	Habitat	low density	Potential SWH Incidental	472849, 4869384	0	0	1
7271	Cavity tree	Habitat	1	Potential SWH Incidental	472059, 4871494	1	1	1
7271	Cavity tree	Habitat	high density	Potential SWH Incidental	472075, 4871573	1	1	1
7272	Cavity tree	Habitat	low density	Potential SWH Incidental	472977, 4872362	1	1	1
7272	Cavity tree	Habitat	low density	Potential SWH Incidental	472970, 4872270	1	1	1
7272	Cavity tree	Habitat	med density	Potential SWH Incidental	472751, 4872262	1	1	1
7272	Cavity tree	Habitat	1	Potential SWH Incidental	472347, 4872783	1	1	1
7273	Cavity tree	Habitat	1	Potential SWH Incidental	472556, 4873905	1	1	1
7274	Cavity tree	Habitat	med density	Potential SWH Incidental	472838, 4874211	1	1	1
7275	Cavity tree	Habitat	low density	Potential SWH Incidental	472766, 4875144	1	1	1
7277	Cavity tree	Habitat	1	Other Incidental	472559, 4877868	0	0	1
7277	Cavity tree	Habitat	1	Potential SWH Incidental	472568, 4877507	0	0	1
7277	Cavity tree	Habitat	1	Potential SWH Incidental	472335, 4877686	0	0	1
7277	Cavity tree	Habitat	1	Potential SWH Incidental	472366, 4877683	0	0	1
7277	Cavity tree	Habitat	1	Potential SWH Incidental	472532, 4877731	0	0	1
7278	Cavity tree	Habitat	low density	Potential SWH Incidental	472361, 4878401	0	0	1
7278	Cavity tree	Habitat	low density	Potential SWH Incidental	472307, 4878410	0	0	1
7278	Cavity tree	Habitat	low density	Potential SWH Incidental	472482, 4878089	0	0	1
7280	Cavity tree	Habitat	1	Potential SWH Incidental	472701, 4880122	0	0	1
7370	Cavity tree	Habitat	1	Potential SWH Incidental	473330, 4870537	0	1	1
7370	Cavity tree	Habitat	1	Potential SWH Incidental	473277, 4870494	0	1	1
7375	Cavity tree	Habitat	1	Other Incidental	473434, 4875001	1	1	1
7375	Cavity tree	Habitat	med density	Potential SWH Incidental	473372, 4875232	1	1	1
7472	Cavity tree	Habitat	med density	Potential SWH Incidental	474339, 4872665	1	1	1
7472	Cavity tree	Habitat	1	Potential SWH Incidental	474272, 4872548	1	1	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	RSA_{BAT}
7472	Cavity tree	Habitat	low density	Potential SWH Incidental	474175, 4872334	1	1	1
7476	Cavity tree	Habitat	med density	Potential SWH Incidental	474827, 4876781	0	0	1
7476	Cavity tree	Habitat	low density	Potential SWH Incidental	474971, 4876841	0	0	1
7577	Cavity tree	Habitat	med density	Potential SWH Incidental	475098, 4877104	0	0	1



NWMO Biodiversity Impact Studies

Candidate SWH for Turtle Wintering Area - North $RSA_{AQU-HRP}$

Figure D-7a

- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Lake
- Wetland Outside LSA_{ECO}
- Watercourse
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1087]

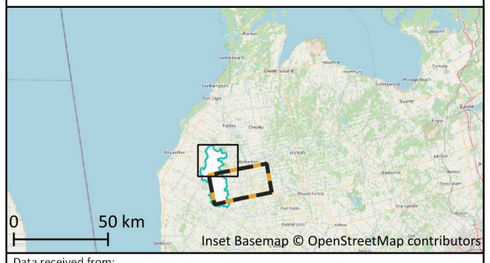
Ecosites that Match SWH Criteria

- Lake or River [30]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]
- Shrub Swamp [55]
- Marsh [160]

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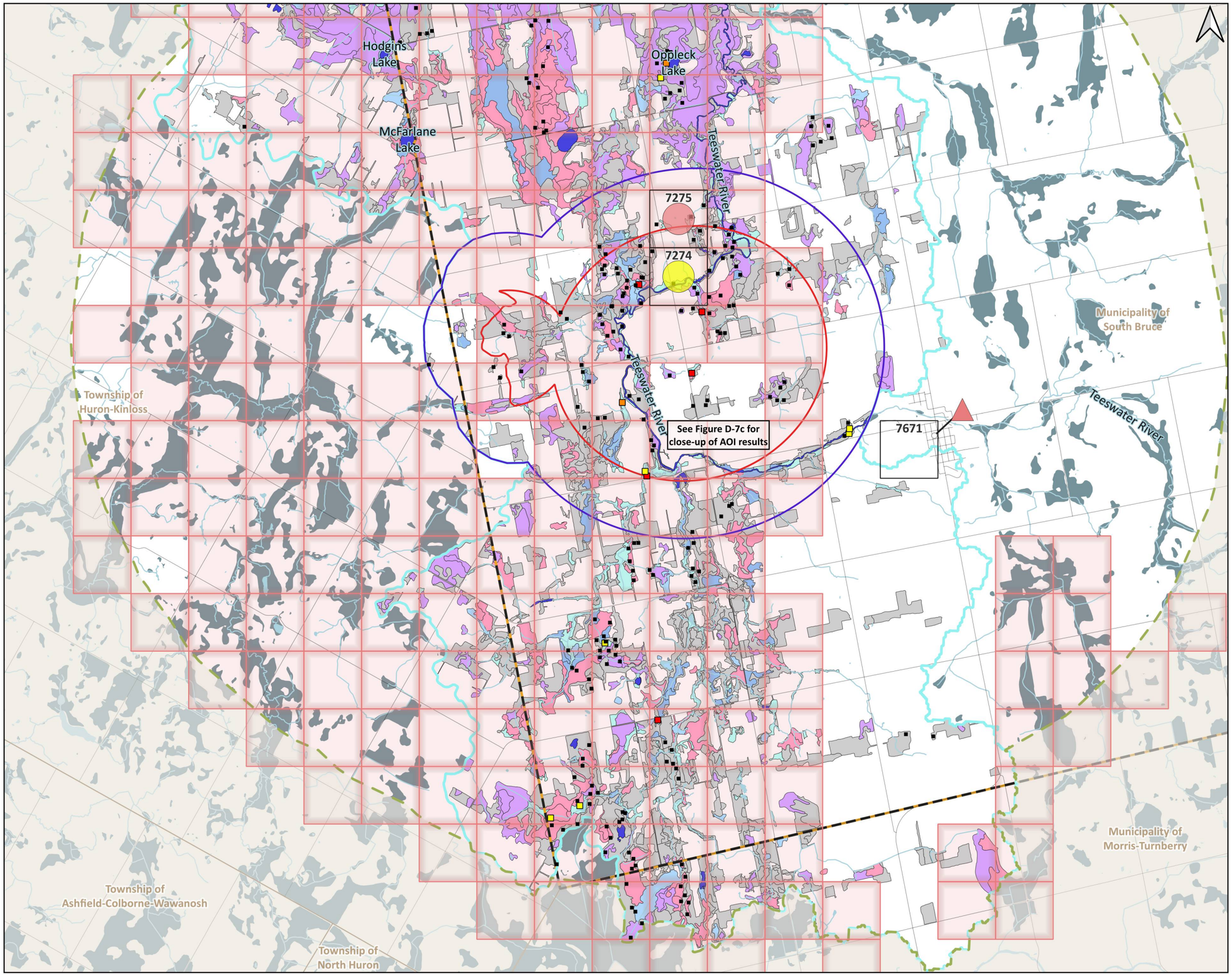
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Turtle Wintering Area - South $RSA_{AQU-HRP}$

Figure D-7b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Lake
- Wetland Outside LSA_{ECO}
- Watercourse
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1087]

Ecosites that Match SWH Criteria

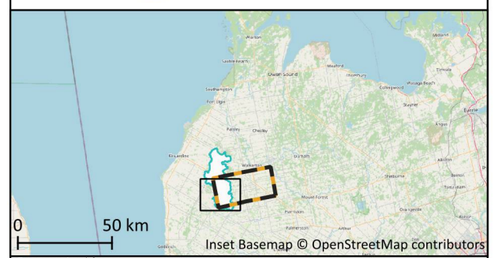
- Lake or River [30]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]
- Shrub Swamp [55]
- Marsh [160]

See Figure D-7a for Full Legend

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Turtle Wintering Area - AOI

Figure D-7c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Lake
- Wetland Outside LSA_{ECO}
- Watercourse
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1087]

Ecosites that Match SWH Criteria

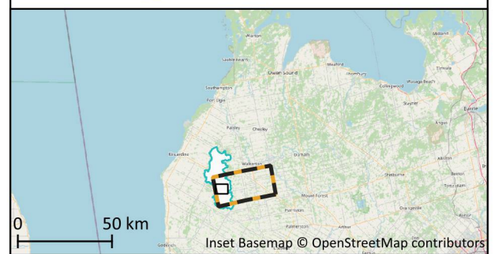
- Lake or River [30]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]
- Shrub Swamp [55]
- Marsh [160]

See Figure D-7a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-7. Supplemental data for 2022 field-based incidental observations relevant to Turtle Wintering Areas.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7274	Midland Painted Turtle	Visual	1	Other Incidental	-	1	1	1
7275	Snapping Turtle	Visual	1	Other Incidental	-	1	1	1
7275	Snapping Turtle	Unspecified	1	Other Incidental	-	1	1	1
7493	Midland Painted Turtle	Visual (juv)	1	Potential SWH Incidental	-	0	0	1
7493	Midland Painted Turtle	Visual	1	TEM SWH	-	0	0	1

Table D-8. Supplemental data for desk-based observations relevant to Turtle Wintering Areas.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7591	Snapping Turtle	U	-	0	0	1
7671	Snapping Turtle	U	-	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Reptile Hibernaculum - North $RSA_{HRP-AQU}$

Figure D-8a

Municipality of Brockton

Municipality of Kincardine

Township of Huron-Kinloss

7493

7392

7590

Schmidt Lake

Cunningham Lake

Silver Lake

Clam Lake

6979

Teeswater River

- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1371]

Ecosites that Match SWH Criteria

- Conifer [24]
- Mixedwood [272]
- Hardwood [488]

Species Observed

Field Incidental [7]

- Unknown Snake Species [3]
- Eastern Gartersnake [4]

- Observation Location
- 1km x 1km grid square with observations

Observation Type (Fieldwork Only)

- Potential hibernaculum [2]
- Visual [3]
- Visual Juvenile [1]
- Sign (Reptile) [1]

Candidate SWH in Plot

Yes [85] Unknown [45] No [343]

1:65,000

0 1 2 km

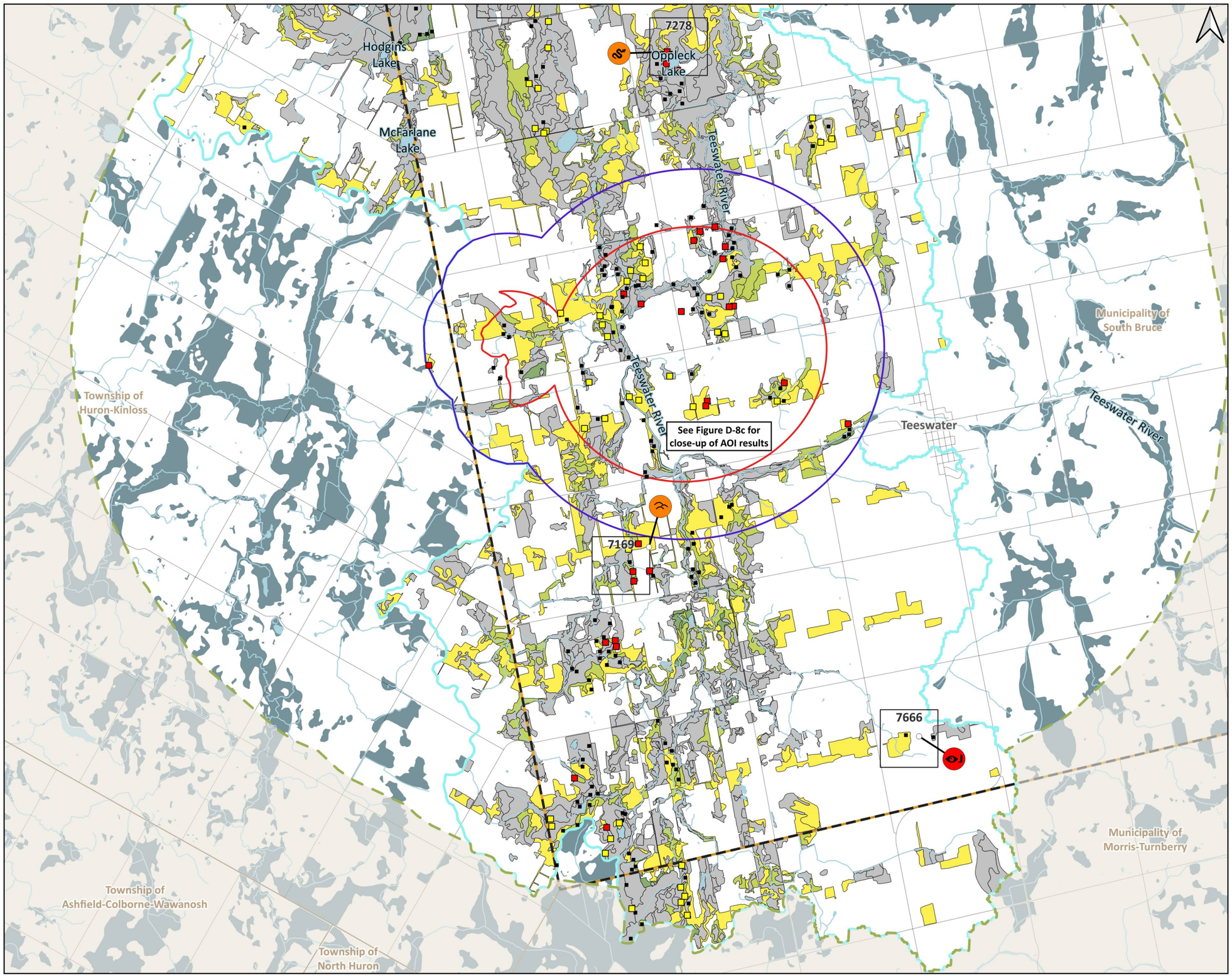
ZOETICA

0 50 km

Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Reptile Hibernaculum - South $RSA_{HRP-AQU}$

Figure D-8b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1371]

Ecosites that Match SWH Criteria

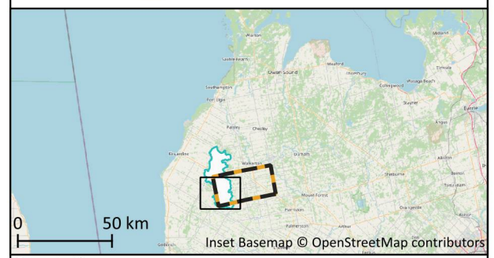
- Conifer [24]
- Mixedwood [272]
- Hardwood [488]

See Figure D-8a for Full Legend

1:65,000

0 1 2 km

ZOETICA



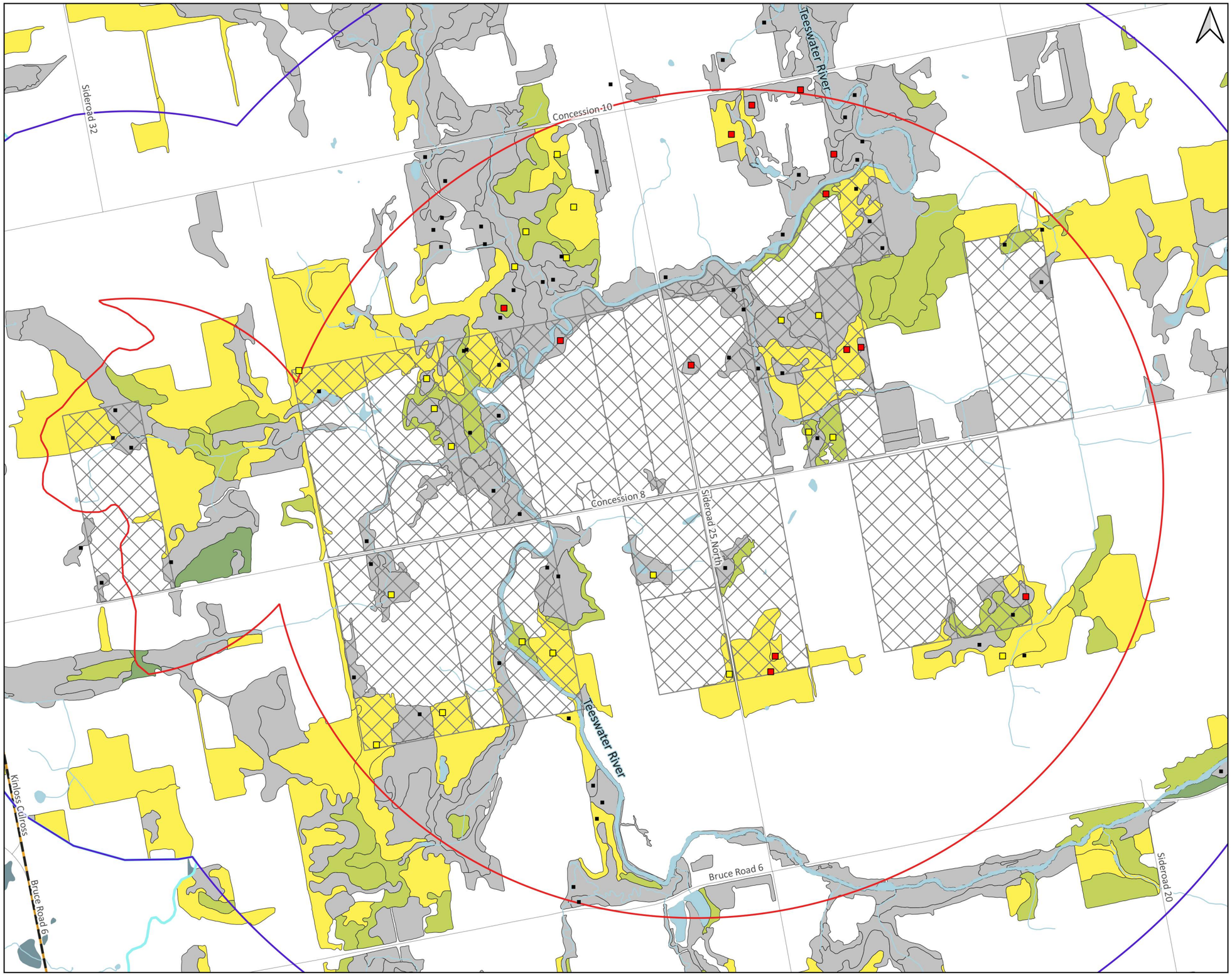
Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Reptile Hibernaculum - AOI

Figure D-8c



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1371]

Ecosites that Match SWH Criteria

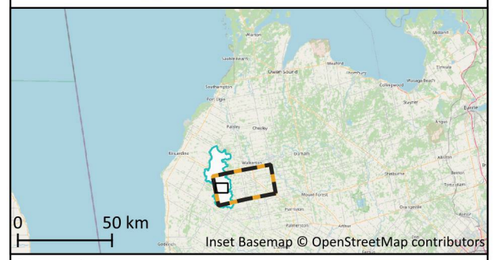
- Conifer [24]
- Mixedwood [272]
- Hardwood [488]

See Figure D-8a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
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January 23, 2024	Map ID: NWMO_BIS_D178	

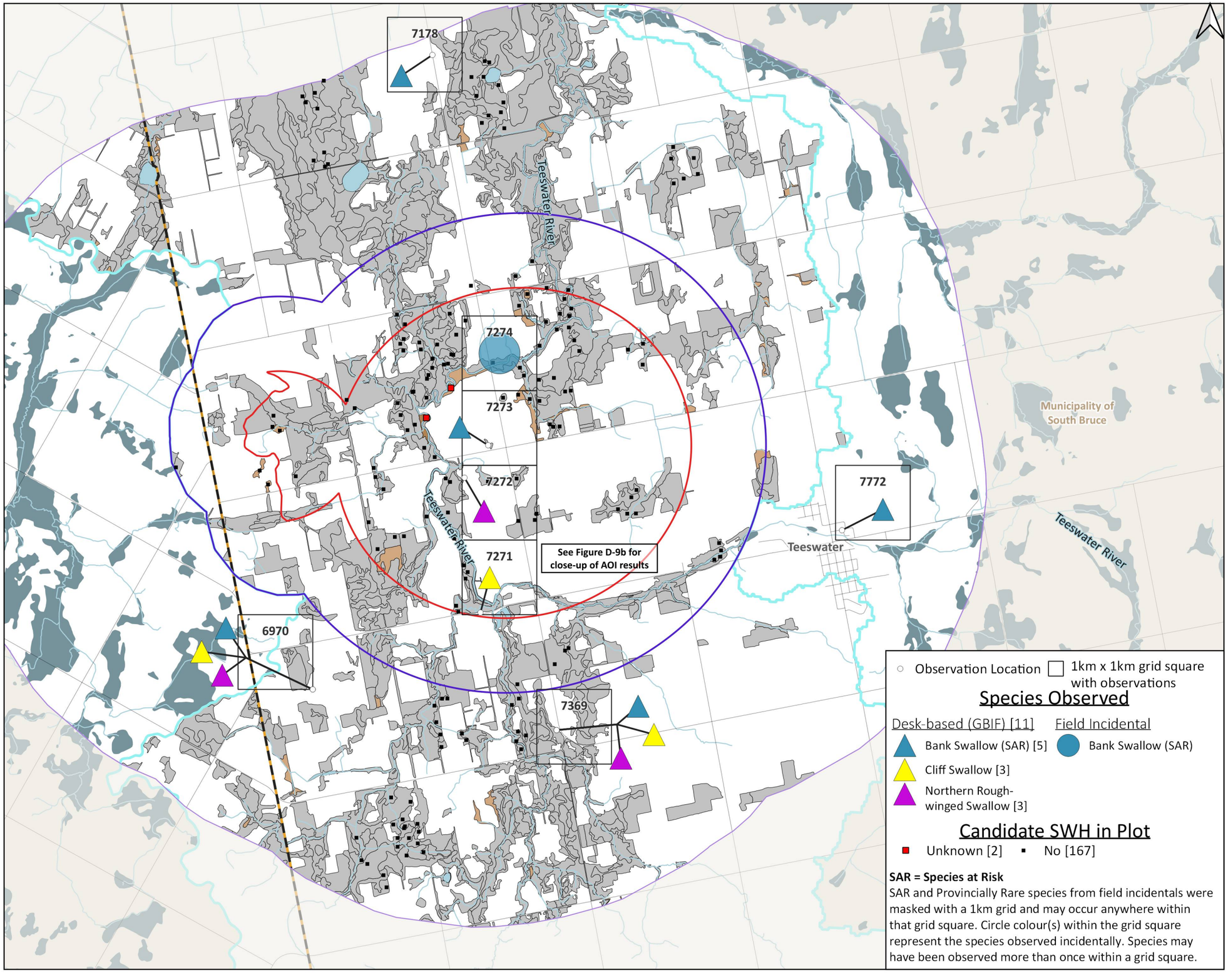
Table D-9. Supplemental data for 2022 field-based incidental observations relevant to Reptile Hibernaculum.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	RSA_{HRP}	$RSA_{HRP-AQU}$
6979	Snake species	Potential hibernaculum	1	TEM SWH	469682, 4879742	0	0	1	1
7169	Snake species	Potential hibernaculum	1	Potential SWH Incidental	471987, 4869820	0	0	1	1
7278	Snake species	Sign	1	Other Incidental	472343, 4878410	0	0	1	1
7392	Eastern Gartersnake	Visual	1	TEM SWH	473888, 4892921	0	0	/	1
7493	Eastern Gartersnake	Visual	1	TEM SWH	474094, 4893132	0	0	/	1
7590	Eastern Gartersnake	Visual	1	Other Incidental	475538, 4890055	0	0	/	1
7666	Eastern Gartersnake	Visual (juv)	1	Other Incidental	476673, 4866538	0	0	/	1

NWMO Biodiversity Impact Studies

Candidate SWH for Colonially - Nesting Bird Breeding Habitat (Bank & Cliff) - RSA_{AVI}

Figure D-9a



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AVI})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [896]

Ecosites that Match SWH Criteria

- Shrub [1]
- Meadow [28]

1:50,000

0 1 2 km

ZOETICA

- Observation Location
- 1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [11]

- Bank Swallow (SAR) [5]
- Cliff Swallow [3]
- Northern Rough-winged Swallow [3]

Field Incidental

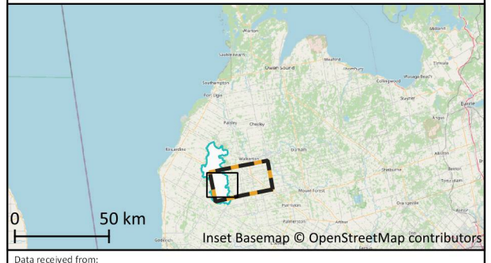
- Bank Swallow (SAR)

Candidate SWH in Plot

- Unknown [2]
- No [167]

SAR = Species at Risk

SAR and Provincially Rare species from field incidentals were masked with a 1km grid and may occur anywhere within that grid square. Circle colour(s) within the grid square represent the species observed incidentally. Species may have been observed more than once within a grid square.



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Colonially - Nesting Bird Breeding Habitat (Bank & Cliff) - AOI

Figure D-9b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [896]

Ecosites that Match SWH Criteria

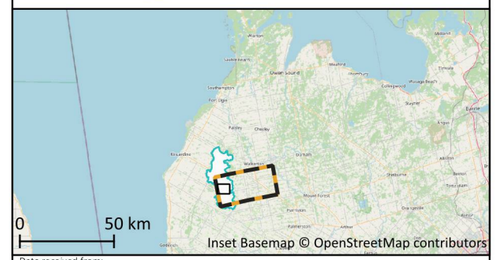
- Shrub [1]
- Meadow [28]

See Figure D-9a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-10. Supplemental data for 2022 field-based incidental observations relevant to Colonially-Nesting Bird Breeding Habitat (Bank and Cliff).

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
7274	Bank Swallow	Visual	1	Other Incidental	-	1	1	1

Table D-11. Supplemental data for desk-based observations relevant to Colonially-Nesting Bird Breeding Habitat (Bank and Cliff).

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
6970	Bank Swallow	U	-	0	0	1
6970	Cliff Swallow	U	470000, 4870000	0	0	1
6970	Northern Rough-winged Swallow	U	470000, 4870000	0	0	1
7178	Bank Swallow	3	-	0	0	1
7271	Cliff Swallow	8	472246, 4871029	1	1	1
7272	Northern Rough-winged Swallow	1	472032, 4872835	1	1	1
7273	Bank Swallow	2	-	1	1	1
7369	Bank Swallow	1	-	0	0	1
7369	Cliff Swallow	5	473265, 4869455	0	0	1
7369	Northern Rough-winged Swallow	2	473265, 4869455	0	0	1
7369	Northern Rough-winged Swallow	1	473265, 4869455	0	0	1
7369	Northern Rough-winged Swallow	2	473265, 4869455	0	0	1
7369	Northern Rough-winged Swallow	1	473265, 4869455	0	0	1
7369	Northern Rough-winged Swallow	2	473265, 4869455	0	0	1
7369	Northern Rough-winged Swallow	2	473265, 4869455	0	0	1
7772	Bank Swallow	4	-	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) - North $RSA_{AVI-AQU}$

Figure D-10a

- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1498]

Ecosites that Match SWH Criteria

- Mixedwood Swamp [149]
- Hardwood Swamp [506]
- Fen [2]

- Observation Location
- 1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [41]	Field Incidental [27]
Great Blue Heron [28]	Great Blue Heron [17]
Great Egret [1]	Unknown Heron [1]
Green Heron [12]	Green Heron [9]

Observation Type (Fieldwork Only)

- Visual [19]
- Vocal [2]
- Unspecified [4]
- Vocal, Visual [2]

NHIC 1km Grids

- Great Blue Heron Nesting Site/Colony

SAR and Provincially Rare species from NHIC were masked with a 1km grid and may occur anywhere within that grid square. Species may have been observed more than once within a grid square.

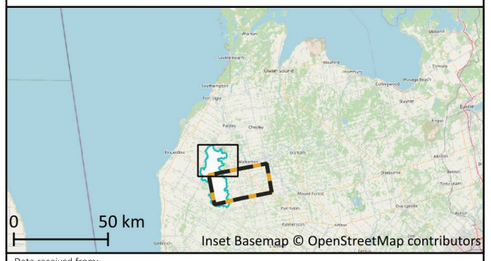
Candidate SWH in Plot

- Yes [37]
- Unknown [44]
- Nearby [2]
- No [390]

1:65,000

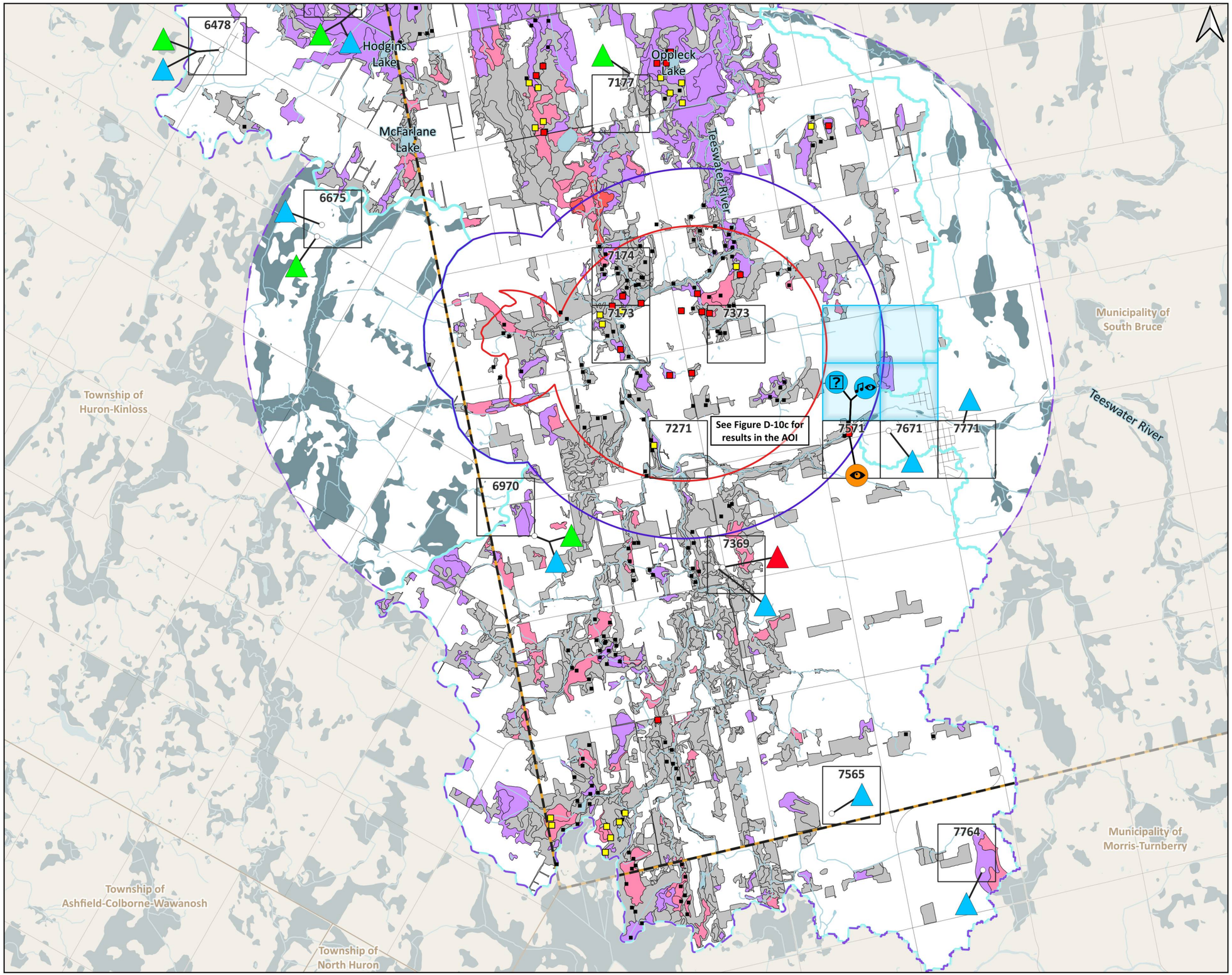
0 1 2 km

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Ontario GeoHub — Municipal Boundary Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) - South $RSA_{AVI-AQU}$

Figure D-10b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1498]

Ecosites that Match SWH Criteria

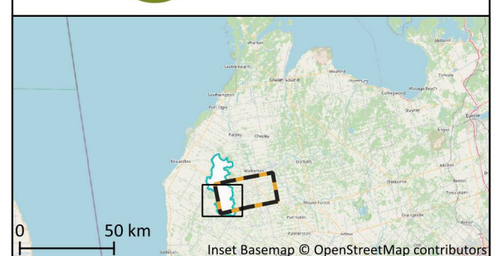
- Mixedwood Swamp [149]
- Hardwood Swamp [506]
- Fen [2]

See Figure D-10a for Full Legend

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) - AOI

Figure D-10c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1498]

Ecosites that Match SWH Criteria

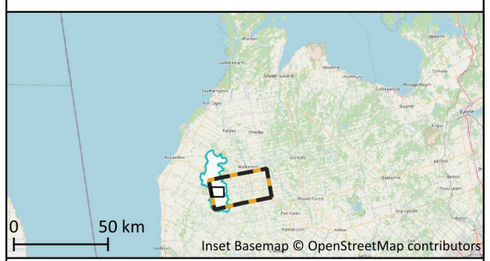
- Mixedwood Swamp [149]
- Hardwood Swamp [506]
- Fen [2]

See Figure D-10a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-12. Supplemental data for 2022 field-based incidental observations relevant to Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs).

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6784	Great Blue Heron	Vocal, Visual	1	Potential SWH Incidental	467461, 4884273	0	0	1
6888	Great Blue Heron	Vocal	1	TEM SWH	468817, 4888993	0	0	1
6889	Great Blue Heron	Visual	1	TEM SWH	468743, 4889195	0	0	1
6889	Great Blue Heron	Vocal	1	TEM SWH	468991, 4889051	0	0	1
6988	Great Blue Heron	Visual	1	TEM SWH	469059, 4888409	0	0	1
7173	Great Blue Heron	Visual	"multiple"	TEM SWH	471523, 4873907	1	1	1
7173	Great Blue Heron	Visual	1	TEM SWH	471349, 4873988	1	1	1
7173	Great Blue Heron	Unspecified	1	Other Incidental	471652, 4873925	1	1	1
7173	Great Blue Heron	Unspecified	1	Other Incidental	471601, 4873872	1	1	1
7173	Green Heron	Visual	"multiple"	TEM SWH	471523, 4873907	1	1	1
7173	Green Heron	Visual	1	TEM SWH	471349, 4873988	1	1	1
7174	Great Blue Heron	Visual	1	TEM SWH	471850, 4874037	1	1	1
7174	Green Heron	Visual	1	TEM SWH	471850, 4874037	1	1	1
7188	Green Heron	Unspecified	3	TEM SWH	471308, 4888407	0	0	1
7188	Green Heron	Visual	3	TEM SWH	471487, 4888503	0	0	1
7280	Great Blue Heron	Visual	1	TEM SWH	472398, 4880157	0	0	1
7280	Green Heron	Visual	1	Other Incidental	472838, 4880453	0	0	1
7373	Green Heron	Visual	1	Other Incidental	473326, 4873709	1	1	1
7388	Great Blue Heron	Visual	1	Potential SWH Incidental	473282, 4888303	0	0	1
7388	Great Blue Heron	Visual	1	TEM SWH	473285, 4888305	0	0	1
7388	Great Blue Heron	Visual	1	Other Incidental	473316, 4888307	0	0	1
7388	Great Blue Heron	Visual	1	Other Incidental	473287, 4888192	0	0	1
7388	Green Heron	Visual	1	Other Incidental	473316, 4888307	0	0	1
7388	Green Heron	Visual	1	Other Incidental	473287, 4888192	0	0	1
7571	Great Blue Heron	Vocal, Visual	1	TEM SWH	475467, 4871861	0	1	1
7571	Great Blue Heron	Unspecified	1	TEM SWH	475467, 4871861	0	1	1
7571	Heron species	Visual	1	TEM SWH	475458, 4871777	0	1	1

Table D-13. Supplemental data for desk-based observations relevant to Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs).

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6478	Great Blue Heron	U	464570, 4878434	0	0	1
6478	Great Blue Heron	U	464570, 4878434	0	0	1
6478	Green Heron	U	464570, 4878434	0	0	1
6478	Green Heron	U	464570, 4878434	0	0	1
6675	Great Blue Heron	2	466310, 4875396	0	0	1
6675	Green Heron	1	466227, 4875196	0	0	1
6675	Green Heron	1	466227, 4875196	0	0	1
6675	Green Heron	1	466227, 4875196	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	3	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	2	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	2	466958, 4879176	0	0	1
6679	Great Blue Heron	2	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	3	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	3	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	2	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Great Blue Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	6	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	10	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	7	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	7	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	8	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1

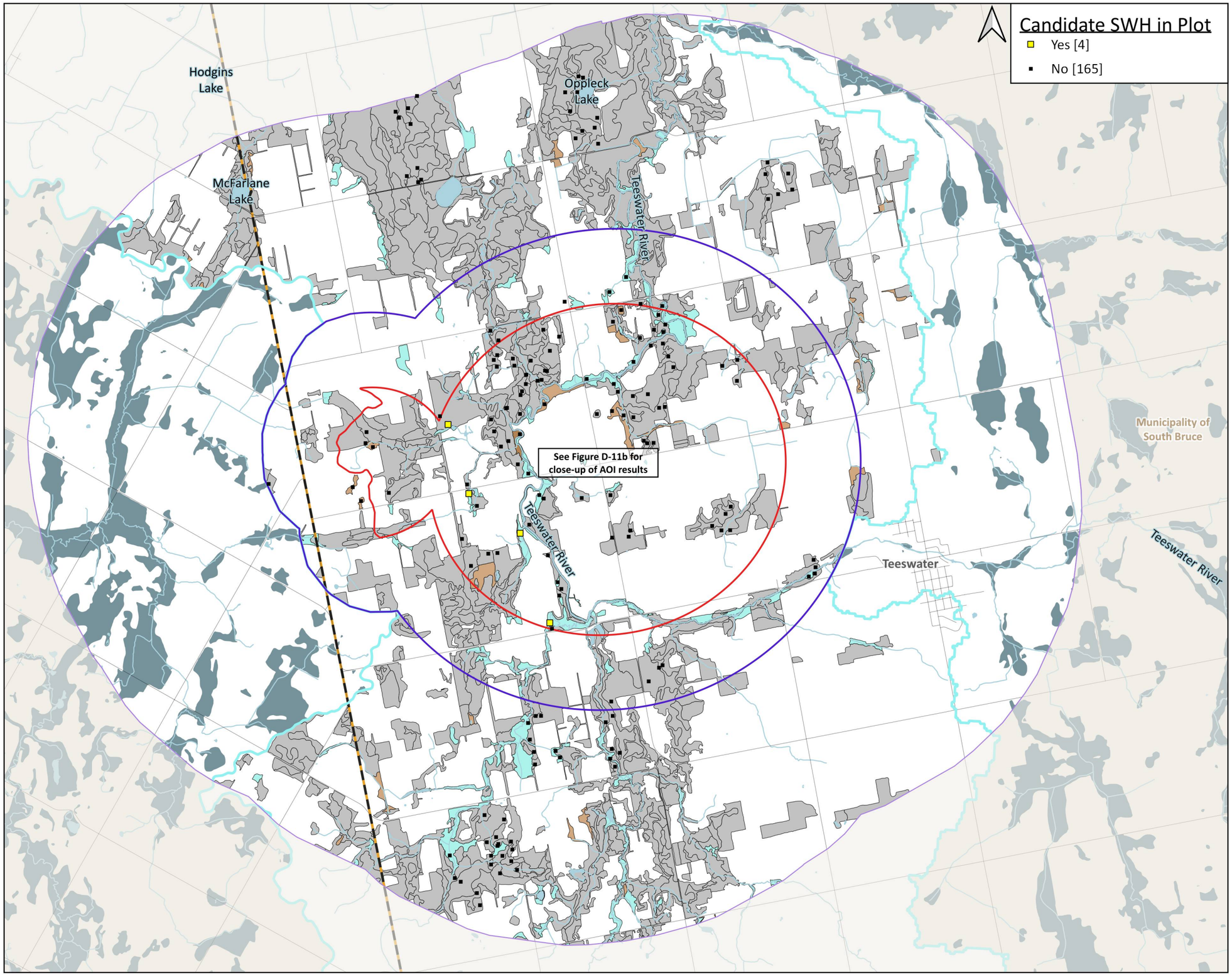
Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	18	466958, 4879176	0	0	1
6679	Green Heron	6	466958, 4879176	0	0	1
6679	Green Heron	6	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	7	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	5	466958, 4879176	0	0	1
6679	Green Heron	8	466958, 4879176	0	0	1
6679	Green Heron	4	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	3	466958, 4879176	0	0	1
6679	Green Heron	1	466958, 4879176	0	0	1
6679	Green Heron	2	466958, 4879176	0	0	1
6681	Great Blue Heron	1	466430, 4881693	0	0	1
6681	Great Blue Heron	1	466430, 4881693	0	0	1
6681	Green Heron	1	466430, 4881693	0	0	1
6681	Green Heron	1	466430, 4881693	0	0	1
6681	Green Heron	3	466430, 4881693	0	0	1
6889	Great Blue Heron	U	468719, 4889066	0	0	1
6889	Great Blue Heron	10	468719, 4889066	0	0	1
6889	Green Heron	2	468719, 4889066	0	0	1
6891	Great Blue Heron	1	468691, 4891301	0	0	1
6891	Great Blue Heron	1	468490, 4891288	0	0	1
6891	Great Blue Heron	1	468329, 4891236	0	0	1
6891	Green Heron	1	468329, 4891236	0	0	1
6891	Green Heron	1	468329, 4891236	0	0	1
6970	Great Blue Heron	U	470000, 4870000	0	0	1
6970	Great Blue Heron	U	470000, 4870000	0	0	1
6970	Green Heron	U	470000, 4870000	0	0	1
6990	Great Blue Heron	U	470000, 4890000	0	0	1
6990	Green Heron	U	470000, 4890000	0	0	1
6991	Great Blue Heron	1	469706, 4891506	0	0	1
7087	Great Blue Heron	U	470927, 4887732	0	0	1
7087	Great Blue Heron	U	470927, 4887732	0	0	1
7087	Great Blue Heron	4	470927, 4887732	0	0	1
7087	Green Heron	U	470927, 4887732	0	0	1
7173	Great Blue Heron	1	471682, 4873088	1	1	1
7177	Green Heron	1	471693, 4877991	0	0	1
7187	Great Blue Heron	1	471266, 4887693	0	0	1
7187	Great Blue Heron	U	471971, 4887831	0	0	1
7187	Great Blue Heron	1	471769, 4887884	0	0	1
7188	Great Blue Heron	1	471091, 4888080	0	0	1
7188	Great Blue Heron	1	471091, 4888080	0	0	1
7188	Great Blue Heron	1	471091, 4888080	0	0	1
7189	Great Blue Heron	5	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	2	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	2	471067, 4889252	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	2	471067, 4889252	0	0	1
7189	Great Blue Heron	2	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	2	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	2	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	3	471067, 4889252	0	0	1
7189	Great Blue Heron	2	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	2	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	2	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	2	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Great Blue Heron	1	471067, 4889252	0	0	1
7189	Green Heron	1	471067, 4889252	0	0	1
7189	Green Heron	1	471067, 4889252	0	0	1
7191	Great Blue Heron	1	471160, 4891804	0	0	1
7192	Great Blue Heron	2	471459, 4892136	0	0	1
7192	Great Blue Heron	1	471459, 4892136	0	0	1
7192	Great Blue Heron	2	471459, 4892136	0	0	1
7271	Great Blue Heron	1	472246, 4871029	1	1	1
7290	Great Blue Heron	10	472462, 4890105	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7369	Great Blue Heron	1	473155, 4869453	0	0	1
7369	Great Egret	1	-	0	0	1
7565	Great Blue Heron	1	475158, 4865182	0	0	1
7590	Great Blue Heron	1	475329, 4890898	0	0	1
7590	Great Blue Heron	1	475329, 4890898	0	0	1
7590	Green Heron	1	475329, 4890898	0	0	1
7671	Great Blue Heron	1	476145, 4871824	0	0	1
7764	Great Blue Heron	1	477780, 4864202	0	0	1
7771	Great Blue Heron	1	477425, 4871882	0	0	1



NWMO Biodiversity Impact Studies

Candidate SWH for Colonially - Nesting Bird Breeding Habitat (Ground) for Brewer's Blackbird - RSA_{AVI}

Figure D-11a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AVI})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [801]

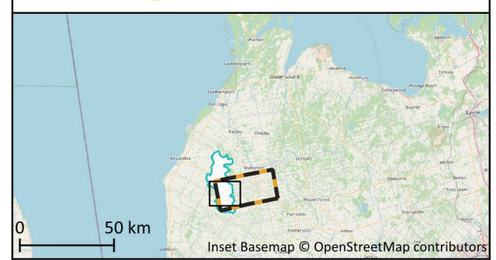
Ecosites that Match SWH Criteria

- Marsh [95]
- Shrub [1]
- Meadow [28]

1:50,000

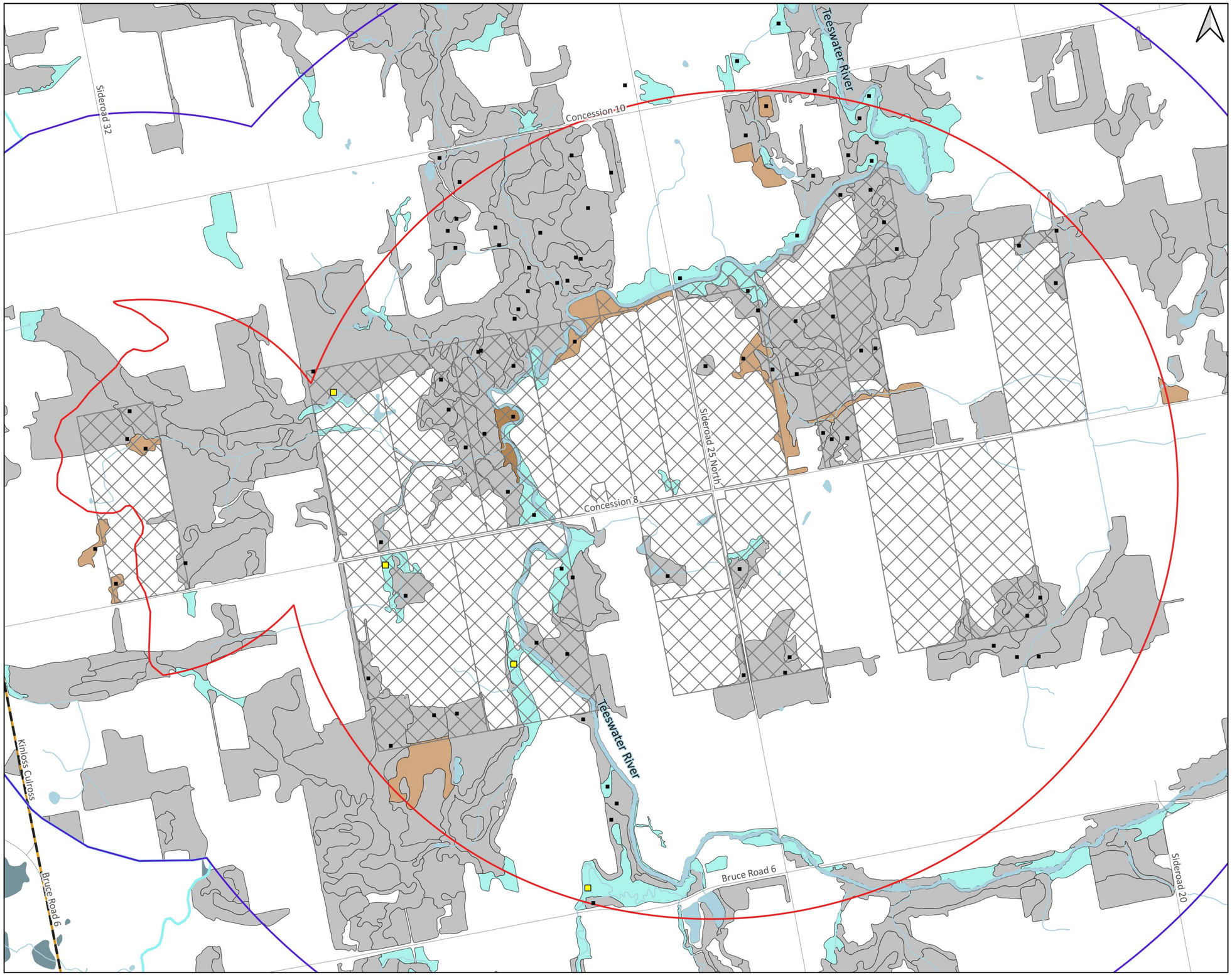
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Colonially - Nesting Bird Breeding Habitat (Ground) - AOI

Figure D-11b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [801]

Ecosites that Match SWH Criteria

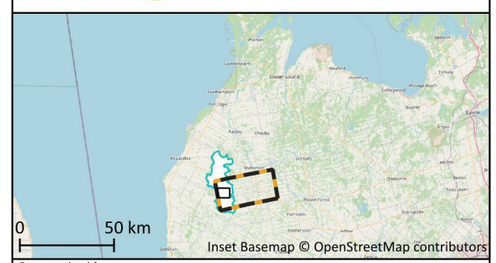
- Marsh [95]
- Shrub [1]
- Meadow [28]

See Figure D-11a for Full Legend

1:20,000

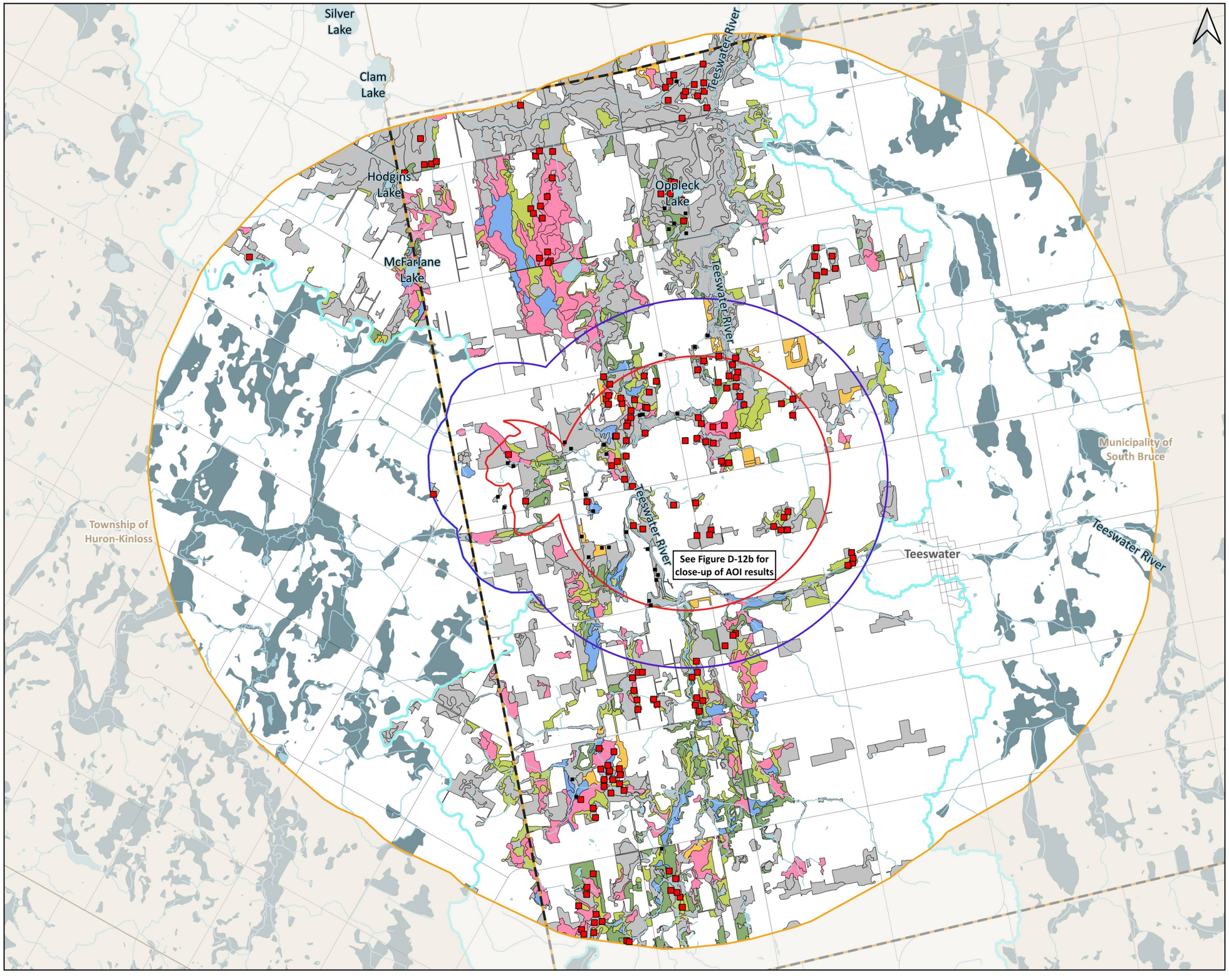
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Deer Yarding Areas - RSA_{UNG}

Figure D-12a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{UNG})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [683]

Ecosites that Match SWH Criteria

- Conifer [137]
- Mixedwood [195]
- Plantation [29]
- Conifer Swamp [57]
- Mixedwood Swamp [157]
- Shrub [2]

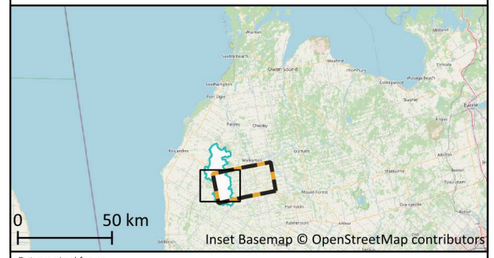
Candidate SWH in Plot [213]

- Unknown [175]
- No [38]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Deer Yarding Areas - AOI

Figure D-12b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [683]

Ecosites that Match SWH Criteria

- Conifer [137]
- Mixedwood [195]
- Plantation [29]
- Conifer Swamp [57]
- Mixedwood Swamp [157]
- Shrub [2]

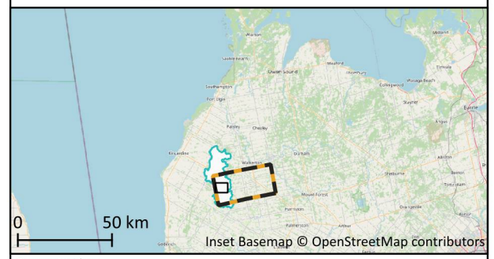
Candidate SWH in Plot [213]

- Unknown [175]
- No [38]

1:20,000

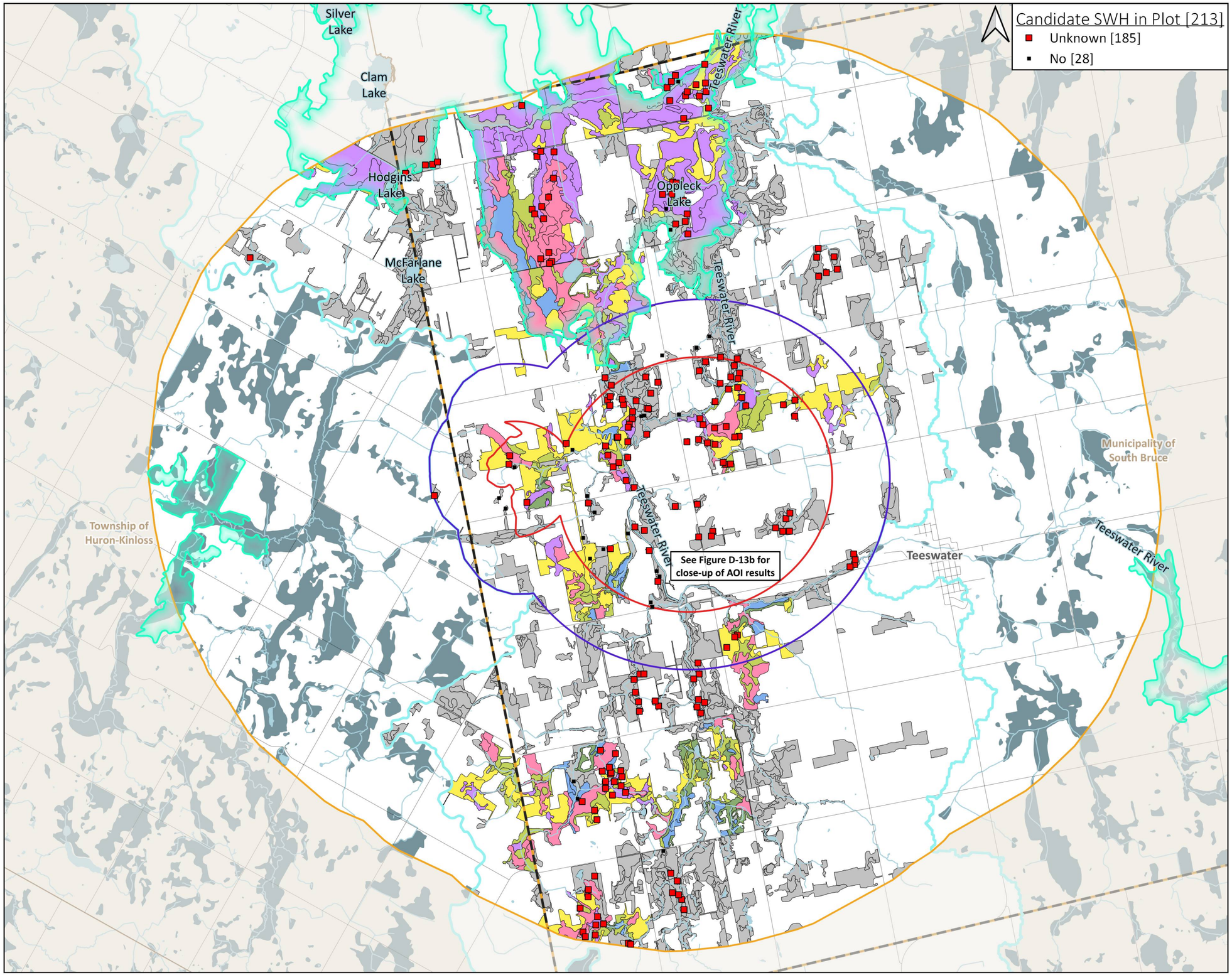
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary . Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Deer Winter Congregation Areas - RSA_{UNG}

Figure D-13a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{UNG})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Deer Wintering Area Stratum 2 (identified by MNRF)
- Ecosites that Do Not Match the SWH Criteria [837]

Ecosites that Match SWH Criteria

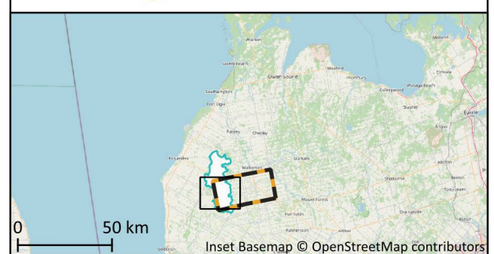
- Conifer [33]
- Mixedwood [84]
- Hardwood [91]
- Conifer Swamp [29]
- Mixedwood Swamp [82]
- Hardwood Swamp [104]

Deer Winter Congregation Areas SWH were refined to only include polygons that meet the area requirement (>100ha).

1:65,000

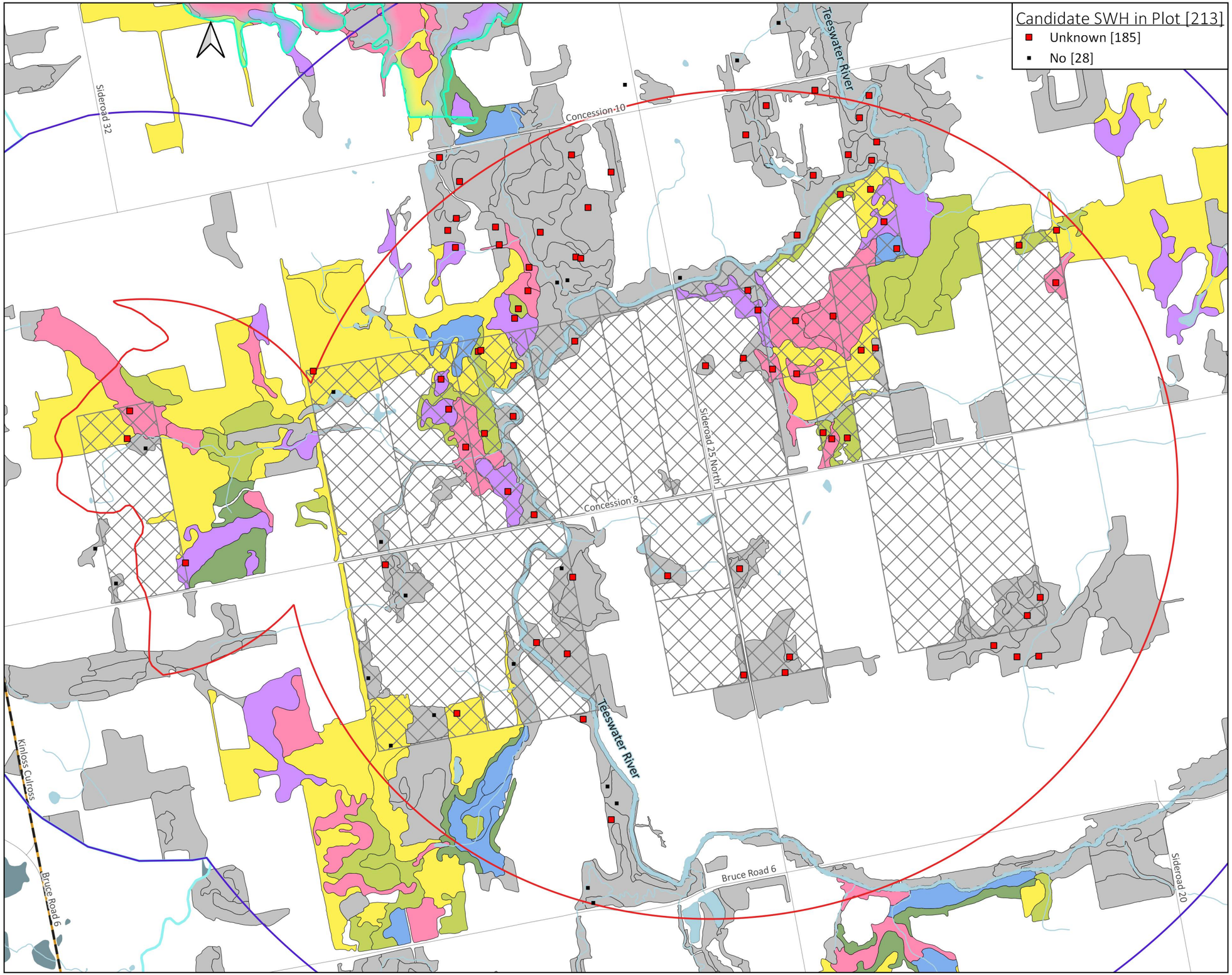
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Deer Winter Congregation Areas - AOI

Figure D-13b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Deer Wintering Area Stratum 2 (identified by MNRF)
- Ecosites that Do Not Match the SWH Criteria [837]

Ecosites that Match SWH Criteria

- Conifer [33]
- Mixedwood [84]
- Hardwood [91]
- Conifer Swamp [29]
- Mixedwood Swamp [82]
- Hardwood Swamp [104]

Deer Winter Congregation Areas SWH were refined to only include polygons that meet the area requirement (>100ha).

1:20,000

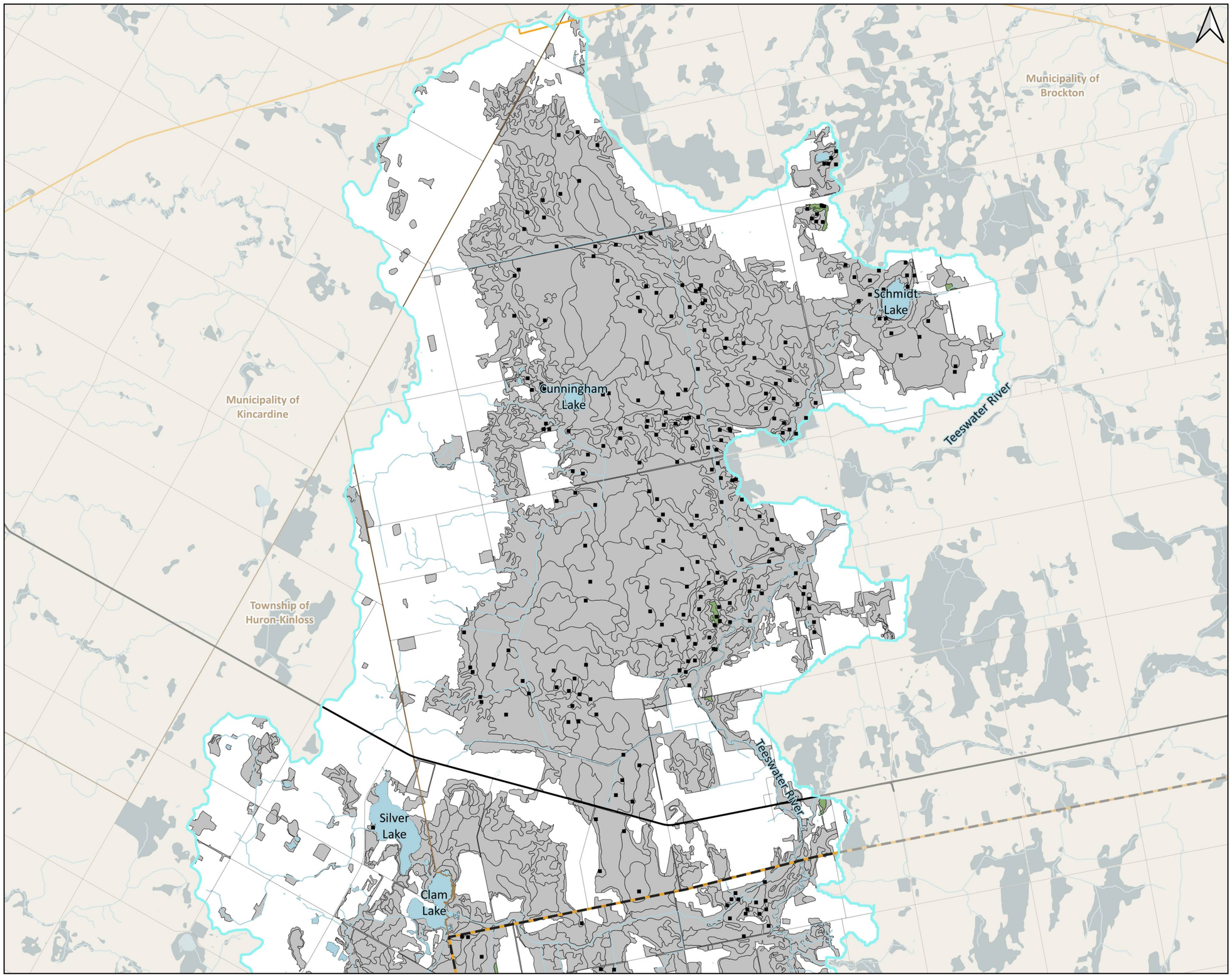
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Alvar - North

LSA_{ECO}

Figure D-14a

- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{VEG})
- Wetland Outside LSA_{ECO}
- Lake
- Watercourse
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2097]

Ecosites that Match the SWH Criteria

- Conifer [58]

Candidate SWH in Plot [473]

- No [473]

1:65,000

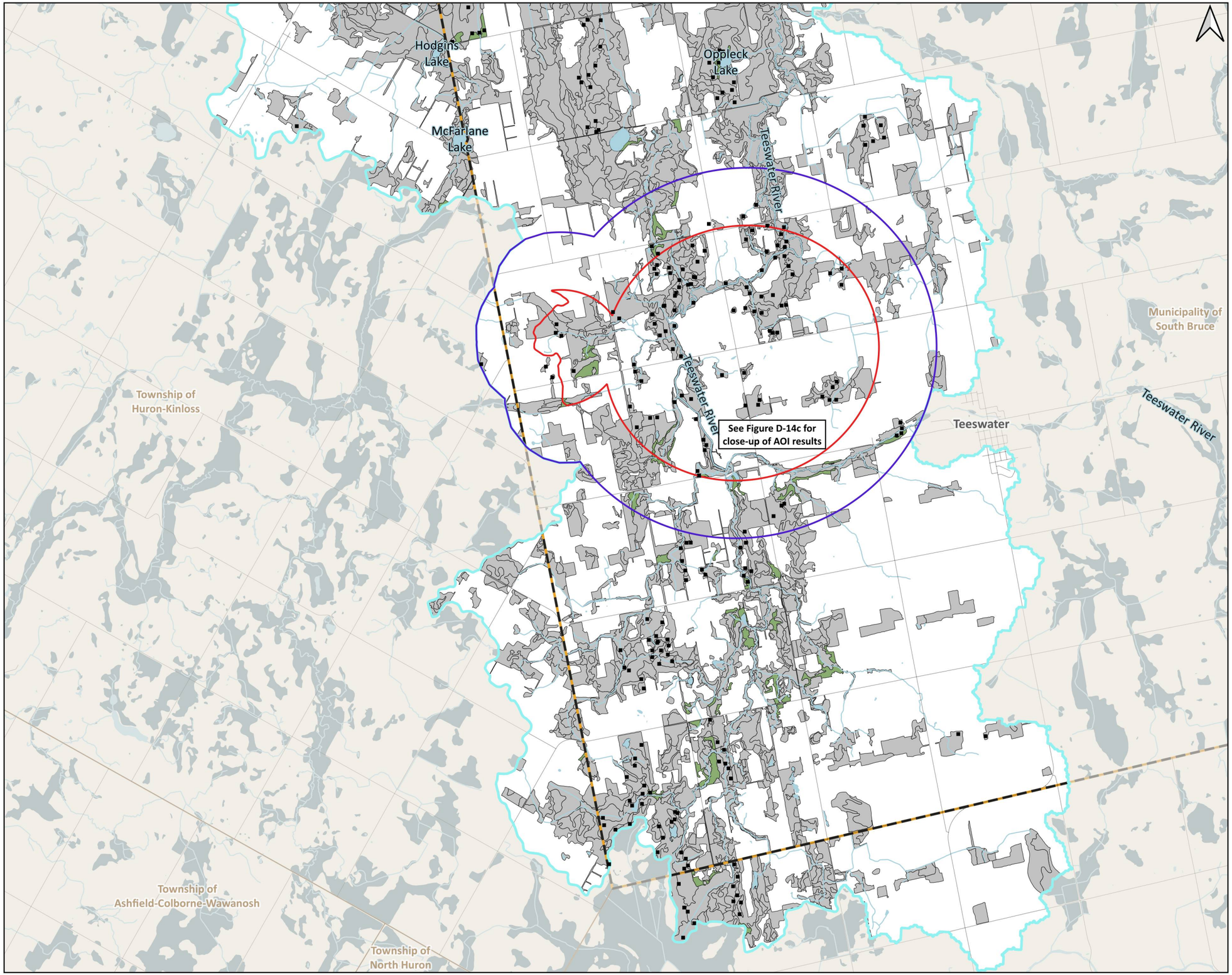
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Alvar - South LSA_{ECO}

Figure D-14b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Wetland Outside LSA_{ECO}
- Lake
- Watercourse
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2097]

Ecosites that Match the SWH Criteria

- Conifer [58]

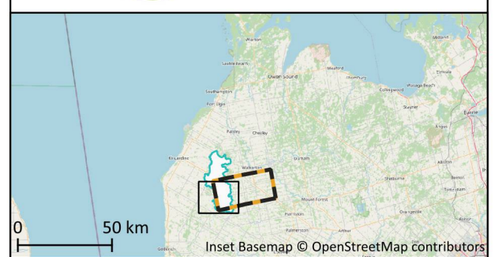
Candidate SWH in Plot [473]

- No [473]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Alvar - AOI

Figure D-14c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Wetland Outside LSA_{ECO}
- Lake
- Watercourse
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2097]

Ecosites that Match the SWH Criteria

- Conifer [58]

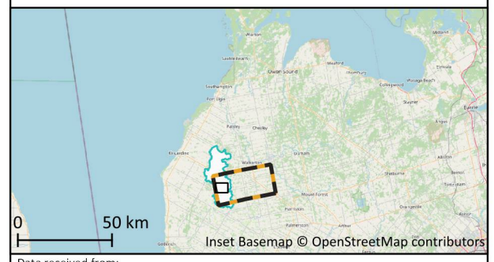
Candidate SWH in Plot [473]

- No [473]

1:20,000

0 0.5 1 km

ZOETICA



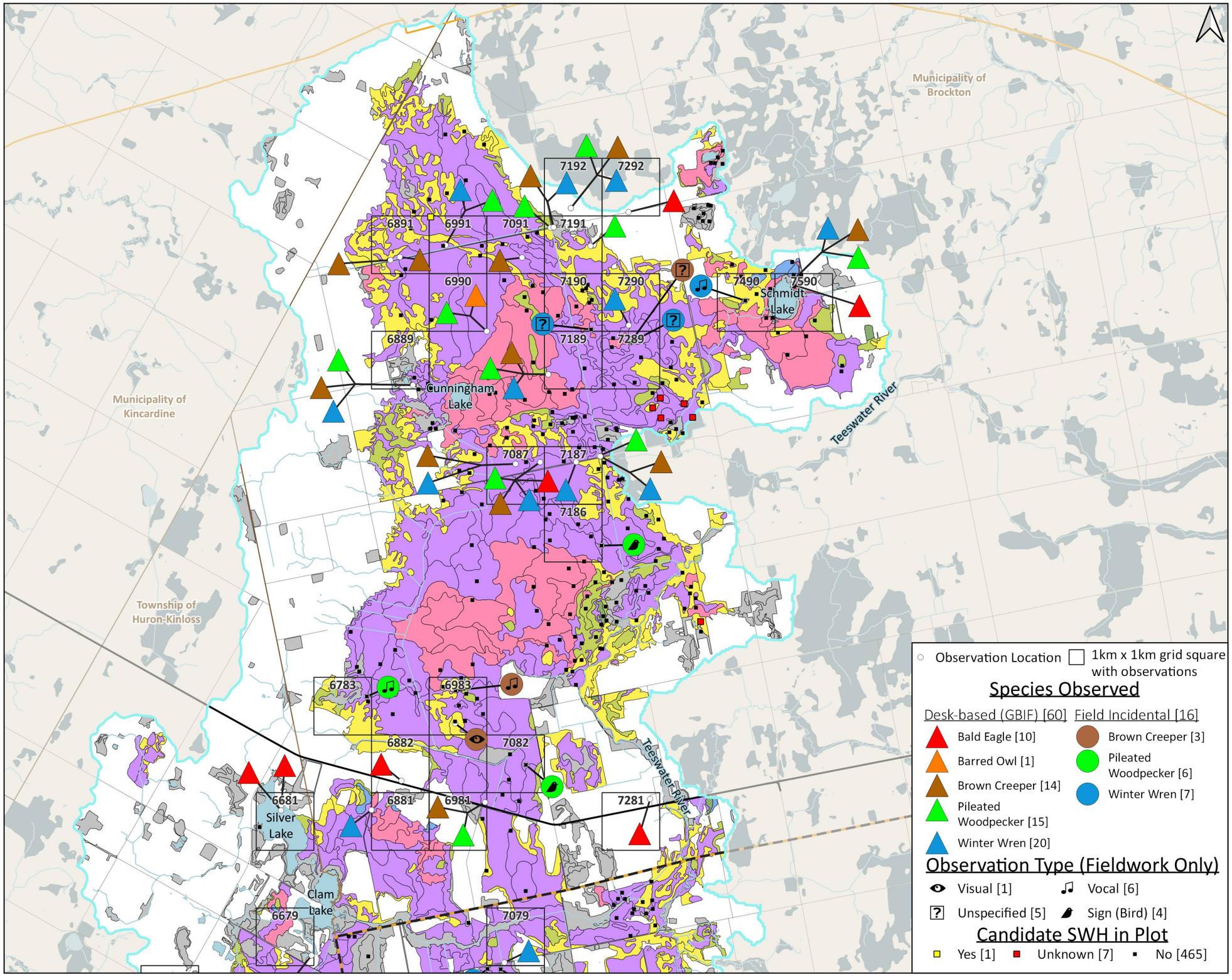
Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Old Growth Forest - North LSA_{ECO}

Figure D-15a



Local Study Area (LSA_{ECO})
Regional Study Area (RSA_{VEG})
Watercourse
Lake
Wetland Outside LSA_{ECO}
South Bruce Boundary
Municipal Boundary
Highway
Local Road
Ecosites that Do Not Match the SWH Criteria [1020]

Ecosites that Match the SWH Criteria

- Conifer [56]
- Mixedwood [189]
- Hardwood [293]
- Conifer Swamp [52]
- Mixedwood Swamp [183]
- Hardwood Swamp [362]

Observation Location
1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [60]

- Bald Eagle [10]
- Barred Owl [1]
- Brown Creeper [14]
- Pileated Woodpecker [15]
- Winter Wren [20]

Field Incidental [16]

- Brown Creeper [3]
- Pileated Woodpecker [6]
- Winter Wren [7]

Observation Type (Fieldwork Only)

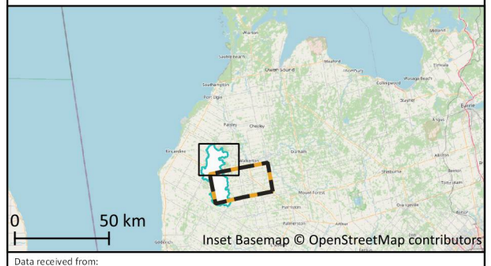
Visual [1] Vocal [6]
Unspecified [5] Sign (Bird) [4]

Candidate SWH in Plot

Yes [1] Unknown [7] No [465]

1:65,000
0 1 2 km

ZOETICA



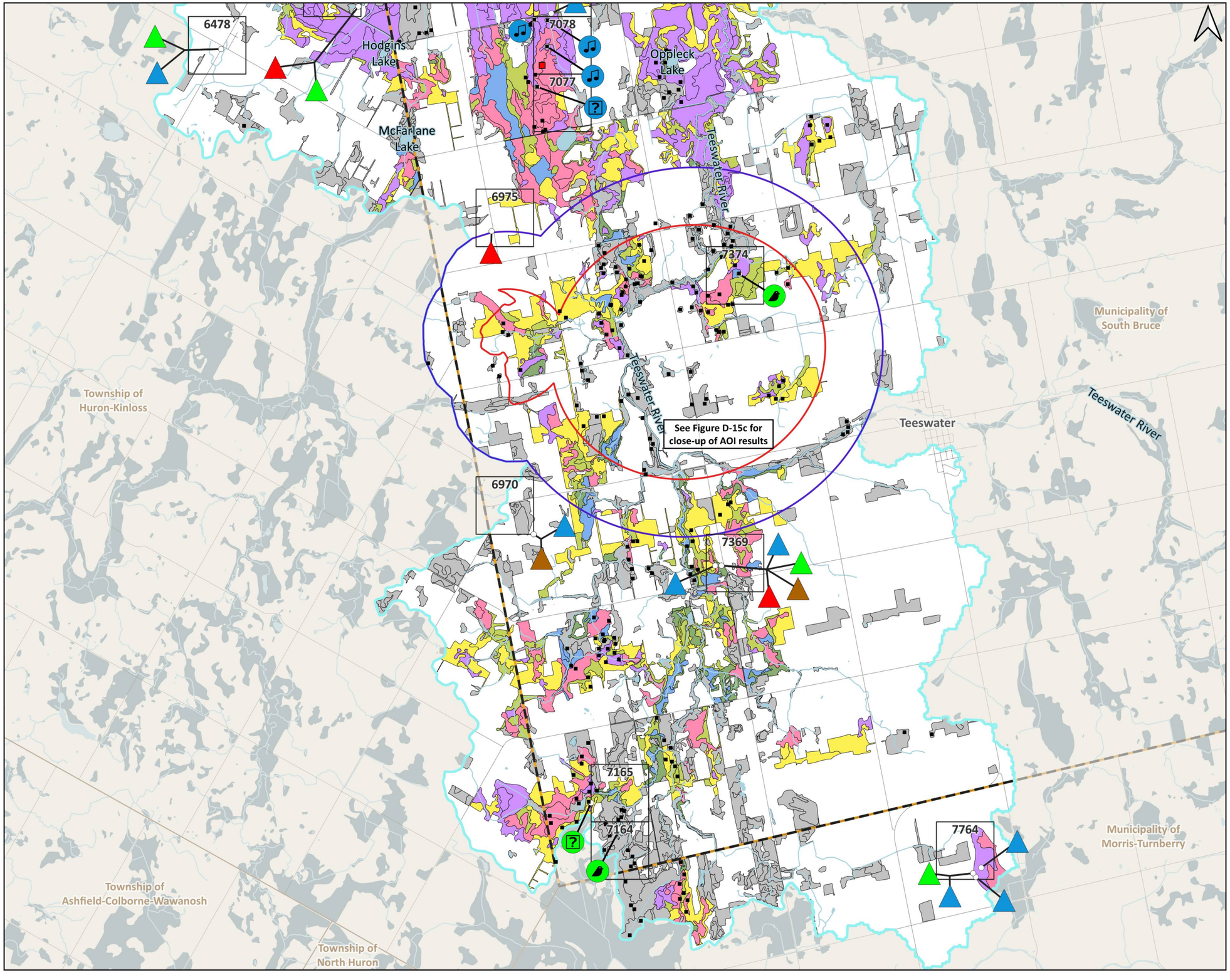
Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Old Growth Forest - South LSA_{ECO}

Figure D-15b



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1020]

Ecosites that Match SWH Criteria

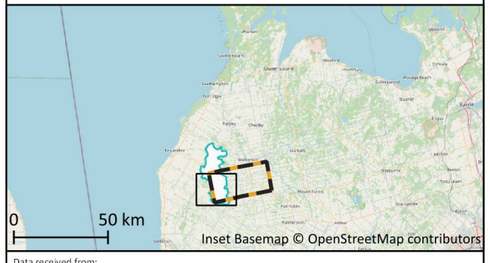
- Conifer [56]
- Mixedwood [189]
- Hardwood [293]
- Conifer Swamp [52]
- Mixedwood Swamp [183]
- Hardwood Swamp [362]

See Figure D-15a for Full Legend

1:65,000

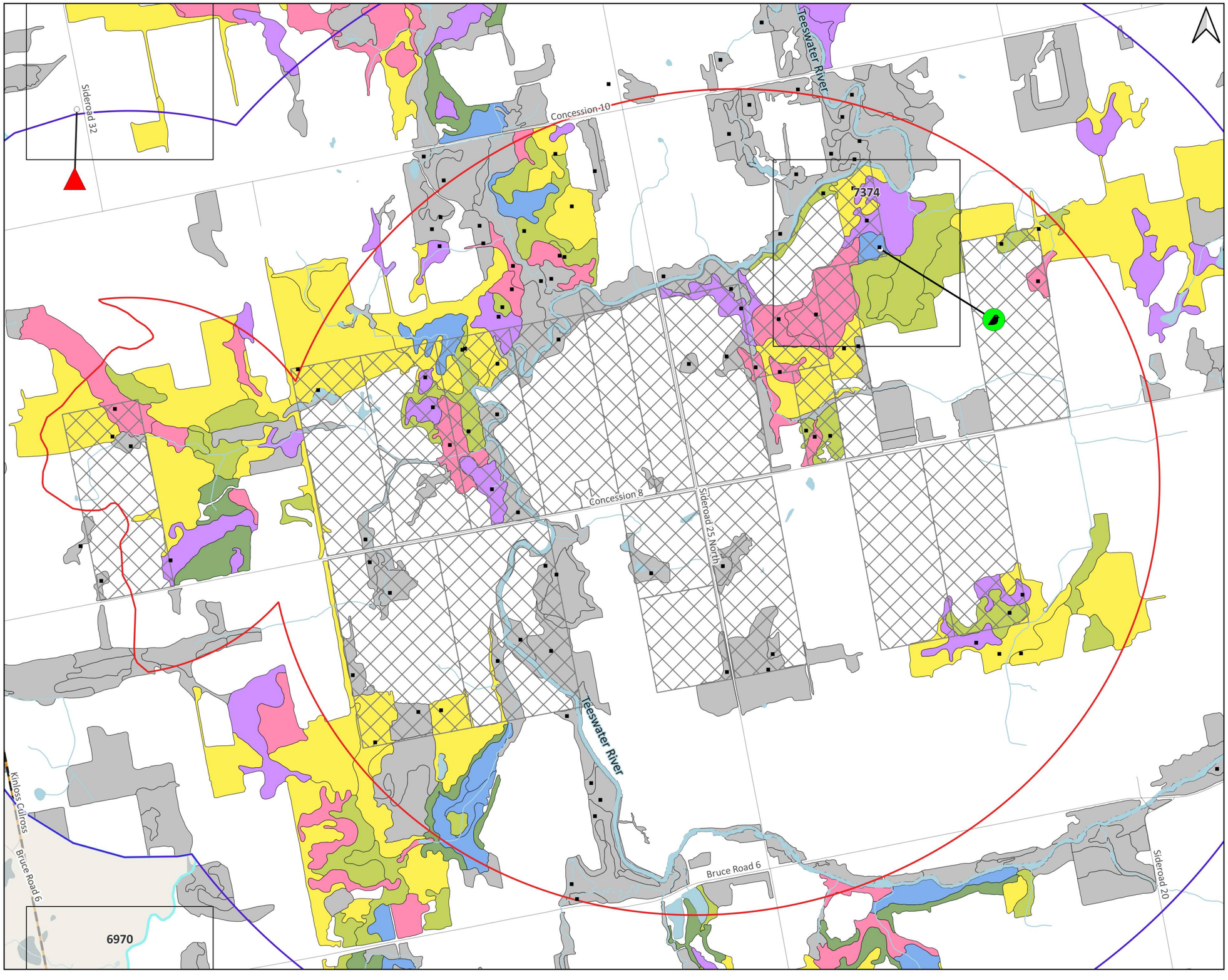
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Old Growth Figures - AOI

Figure D-15c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1020]

Ecosites that Match SWH Criteria

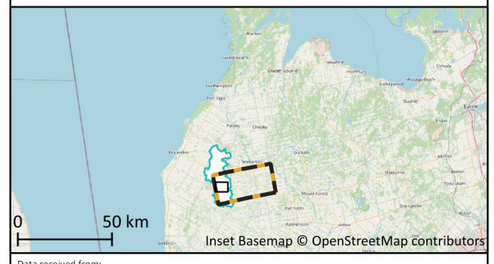
- Conifer [56]
- Mixedwood [189]
- Hardwood [293]
- Conifer Swamp [52]
- Mixedwood Swamp [183]
- Hardwood Swamp [362]

See Figure D-15a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-14. Supplemental data for 2022 field-based incidental observations relevant to Old Growth Forest.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
6783	Pileated Woodpecker	Vocal	1	TEM SWH	467919, 4883668	0	0	1
6983	Brown Creeper	Vocal	1	TEM SWH	469457, 4883771	0	0	1
6983	Brown Creeper	Visual	1	Other Incidental	469449, 4883201	0	0	1
7077	Winter Wren	Unspecified	1	TEM SWH	470062, 4877777	0	0	1
7078	Winter Wren	Vocal	1	TEM SWH	470242, 4878937	0	0	1
7078	Winter Wren	Vocal	1	TEM SWH	470012, 4878945	0	0	1
7078	Winter Wren	Vocal	1	TEM SWH	470234, 4878480	0	0	1
7082	Pileated Woodpecker	Sign	1	TEM SWH	470679, 4882481	0	0	1
7164	Pileated Woodpecker	Sign	>1	Other Incidental	471497, 4864878	0	0	1
7165	Pileated Woodpecker	Unspecified	1	Other Incidental	471001, 4865330	0	0	1
7186	Pileated Woodpecker	Sign	high density	TEM SWH	471990, 4886283	0	0	1
7190	Winter Wren	Unspecified	1	TEM SWH	471809, 4890031	0	0	1
7289	Brown Creeper	Unspecified	1	Other Incidental	472489, 4889803	0	0	1
7289	Winter Wren	Unspecified	1	Other Incidental	472489, 4889803	0	0	1
7289	Winter Wren	Unspecified	1	TEM SWH	472489, 4889803	0	0	1
7374	Pileated Woodpecker	Sign	med density	Other Incidental	473574, 4874521	1	1	1
7490	Winter Wren	Vocal	1	TEM SWH	474485, 4890531	0	0	1

Table D-15. Supplemental data for desk-based observations relevant to Old Growth Forest.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
6478	Pileated Woodpecker	U	464570, 4878434	0	0	1
6478	Winter Wren	U	464570, 4878434	0	0	1
6478	Winter Wren	U	464570, 4878434	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	2	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Pileated Woodpecker	1	466958, 4879176	0	0	1
6679	Pileated Woodpecker	2	466958, 4879176	0	0	1
6679	Pileated Woodpecker	3	466958, 4879176	0	0	1
6679	Pileated Woodpecker	3	466958, 4879176	0	0	1
6681	Bald Eagle	2	-	0	0	1
6681	Bald Eagle	1	-	0	0	1
6681	Bald Eagle	2	-	0	0	1
6881	Winter Wren	1	468000, 4881700	0	0	1
6882	Bald Eagle	4	-	0	0	1
6889	Brown Creeper	1	468719, 4889066	0	0	1
6889	Pileated Woodpecker	U	468719, 4889066	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
6889	Winter Wren	U	468719, 4889066	0	0	1
6891	Brown Creeper	1	468490, 4891288	0	0	1
6891	Brown Creeper	1	468329, 4891236	0	0	1
6970	Brown Creeper	U	470000, 4870000	0	0	1
6970	Brown Creeper	U	470000, 4870000	0	0	1
6970	Winter Wren	U	470000, 4870000	0	0	1
6975	Bald Eagle	6	-	0	0	1
6975	Bald Eagle	6	-	0	0	1
6975	Bald Eagle	6	-	0	0	1
6981	Brown Creeper	1	469971, 4881834	0	0	1
6981	Pileated Woodpecker	1	469971, 4881834	0	0	1
6990	Barred Owl	U	470000, 4890000	0	0	1
6990	Pileated Woodpecker	U	470000, 4890000	0	0	1
6991	Pileated Woodpecker	1	469287, 4891492	0	0	1
6991	Winter Wren	1	469287, 4891492	0	0	1
7079	Winter Wren	1	470307, 4879055	0	0	1
7087	Bald Eagle	U	-	0	0	1
7087	Brown Creeper	1	470500, 4887700	0	0	1
7087	Brown Creeper	1	470927, 4887732	0	0	1
7087	Brown Creeper	U	470927, 4887732	0	0	1
7087	Pileated Woodpecker	U	470927, 4887732	0	0	1
7087	Winter Wren	1	470927, 4887732	0	0	1
7087	Winter Wren	1	470500, 4887700	0	0	1
7087	Winter Wren	U	470927, 4887732	0	0	1
7091	Brown Creeper	2	470611, 4891279	0	0	1
7187	Brown Creeper	U	471971, 4887831	0	0	1
7187	Pileated Woodpecker	2	471949, 4887839	0	0	1
7187	Winter Wren	U	471971, 4887831	0	0	1
7187	Winter Wren	1	471551, 4887734	0	0	1
7189	Brown Creeper	2	471067, 4889252	0	0	1
7189	Brown Creeper	3	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	2	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	4	471067, 4889252	0	0	1
7189	Brown Creeper	4	471067, 4889252	0	0	1
7189	Brown Creeper	6	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	5	471067, 4889252	0	0	1
7189	Brown Creeper	2	471067, 4889252	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
7189	Brown Creeper	5	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	2	471067, 4889252	0	0	1
7189	Brown Creeper	5	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	1	471067, 4889252	0	0	1
7189	Brown Creeper	4	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	2	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Pileated Woodpecker	1	471067, 4889252	0	0	1
7189	Winter Wren	1	471067, 4889252	0	0	1
7189	Winter Wren	1	471067, 4889252	0	0	1
7189	Winter Wren	3	471067, 4889252	0	0	1
7189	Winter Wren	U	471067, 4889252	0	0	1
7189	Winter Wren	4	471067, 4889252	0	0	1
7189	Winter Wren	4	471067, 4889252	0	0	1
7189	Winter Wren	1	471067, 4889252	0	0	1
7189	Winter Wren	2	471067, 4889252	0	0	1
7189	Winter Wren	2	471067, 4889252	0	0	1
7189	Winter Wren	4	471067, 4889252	0	0	1
7189	Winter Wren	3	471067, 4889252	0	0	1
7189	Winter Wren	5	471067, 4889252	0	0	1
7189	Winter Wren	1	471067, 4889252	0	0	1
7189	Winter Wren	3	471067, 4889252	0	0	1
7189	Winter Wren	4	471067, 4889252	0	0	1
7189	Winter Wren	1	471067, 4889252	0	0	1
7189	Winter Wren	1	471067, 4889252	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
7189	Winter Wren	2	471067, 4889252	0	0	1
7191	Brown Creeper	1	471160, 4891804	0	0	1
7191	Pileated Woodpecker	1	471106, 4891798	0	0	1
7191	Pileated Woodpecker	1	471800, 4891480	0	0	1
7191	Pileated Woodpecker	1	471106, 4891798	0	0	1
7191	Winter Wren	2	471160, 4891804	0	0	1
7192	Brown Creeper	1	471459, 4892136	0	0	1
7192	Brown Creeper	1	471459, 4892136	0	0	1
7192	Pileated Woodpecker	1	471459, 4892136	0	0	1
7192	Pileated Woodpecker	2	471459, 4892136	0	0	1
7192	Pileated Woodpecker	1	471459, 4892136	0	0	1
7192	Winter Wren	2	471459, 4892136	0	0	1
7281	Bald Eagle	1	-	0	0	1
7281	Bald Eagle	1	-	0	0	1
7281	Bald Eagle	1	-	0	0	1
7290	Winter Wren	15	472462, 4890105	0	0	1
7292	Bald Eagle	1	-	0	0	1
7369	Bald Eagle	1	-	0	0	1
7369	Brown Creeper	1	473265, 4869455	0	0	1
7369	Brown Creeper	2	473265, 4869455	0	0	1
7369	Brown Creeper	1	473265, 4869455	0	0	1
7369	Brown Creeper	2	473265, 4869455	0	0	1
7369	Brown Creeper	3	473265, 4869455	0	0	1
7369	Brown Creeper	2	473265, 4869455	0	0	1
7369	Brown Creeper	2	473265, 4869455	0	0	1
7369	Brown Creeper	3	473265, 4869455	0	0	1
7369	Brown Creeper	2	473265, 4869455	0	0	1
7369	Brown Creeper	1	473265, 4869455	0	0	1
7369	Brown Creeper	3	473265, 4869455	0	0	1
7369	Brown Creeper	2	473265, 4869455	0	0	1
7369	Brown Creeper	1	473265, 4869455	0	0	1
7369	Brown Creeper	3	473265, 4869455	0	0	1
7369	Brown Creeper	2	473265, 4869455	0	0	1
7369	Brown Creeper	2	473265, 4869455	0	0	1
7369	Pileated Woodpecker	1	473265, 4869455	0	0	1
7369	Pileated Woodpecker	1	473265, 4869455	0	0	1
7369	Pileated Woodpecker	1	473265, 4869455	0	0	1
7369	Pileated Woodpecker	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	2	473265, 4869455	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
7369	Winter Wren	2	473265, 4869455	0	0	1
7369	Winter Wren	5	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	2	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473155, 4869453	0	0	1
7369	Winter Wren	1	473155, 4869453	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7590	Bald Eagle	1	-	0	0	1
7590	Brown Creeper	2	475329, 4890898	0	0	1
7590	Pileated Woodpecker	1	475329, 4890898	0	0	1
7590	Pileated Woodpecker	1	475329, 4890898	0	0	1
7590	Winter Wren	1	475329, 4890898	0	0	1
7590	Winter Wren	U	475329, 4890898	0	0	1
7590	Winter Wren	3	475329, 4890898	0	0	1
7590	Winter Wren	3	475329, 4890898	0	0	1
7764	Pileated Woodpecker	1	477639, 4864107	0	0	1
7764	Winter Wren	1	477780, 4864202	0	0	1
7764	Winter Wren	1	477639, 4864107	0	0	1
7764	Winter Wren	2	477685, 4864041	0	0	1
7764	Winter Wren	1	477780, 4864202	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Waterfowl Nesting Area - North $RSA_{AVI-AQU}$

Figure D-16a

- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- 120m Buffer from Ecosites that Match SWH Criteria
- Ecosites within 120m Buffer
- Ecosites that Do Not Match the SWH Criteria [1800]

Ecosites that Match SWH Criteria

- Hardwood Swamp [183]
- Shrub Swamp [12]
- Marsh [160]

- Observation Location
- 1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [132]

- American Wigeon [3]
- Blue-winged Teal [3]
- Bufflehead [6]
- Canada Goose [38]
- Common Goldeneye [4]
- Common Merganser [7]
- Gadwall [1]
- Green-winged Teal [5]
- Hooded Merganser [4]
- Mallard [29]
- Northern Pintail [3]
- Northern Shoveler [1]
- Red-breasted Merganser [2]
- Wood Duck [26]

Field Incidental [10]

- Wood Duck [6]
- Mallard [1]
- Unk Duck Species [3]

Observation Type (Fieldwork Only)

- Visual [6]
- Unspecified [2]
- Visual Juvenile [1]
- Nest Box [1]

Candidate SWH in Plot

- Yes [49]
- Unknown [16]
- Nearby [1]
- No [407]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Waterfowl Nesting Area - South $RSA_{AVI-AQU}$

Figure D-16b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- 120m Buffer from Ecosites that Match SWH Criteria
- Ecosites within 120m Buffer
- Ecosites that Do Not Match the SWH Criteria [1800]

Ecosites that Match SWH Criteria

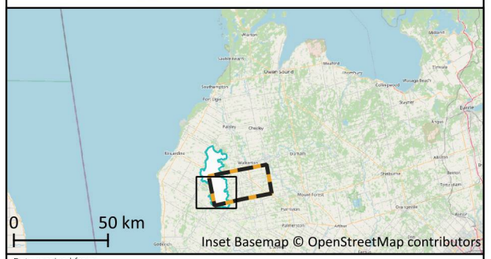
- Hardwood Swamp [183]
- Shrub Swamp [12]
- Marsh [160]

See Figure D-16a for Full Legend

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Waterfowl Nesting Area - AOI

Figure D-16c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- 120m Buffer from Ecosites that Match SWH Criteria
- Ecosites within 120m Buffer
- Ecosites that Do Not Match the SWH Criteria [1800]

Ecosites that Match SWH Criteria

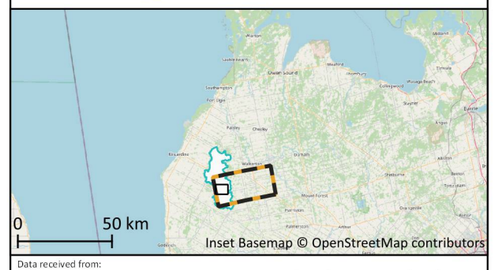
- Hardwood Swamp [183]
- Shrub Swamp [12]
- Marsh [160]

See Figure D-16a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-16. Supplemental data for 2022 field-based incidental observations relevant to Waterfowl Nesting Area.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6784	Wood Duck	Visual	2	Potential SWH Incidental	467461, 4884273	0	0	1
6784	Wood Duck	Visual (juv)	3	Potential SWH Incidental	467461, 4884273	0	0	1
6989	Wood Duck	Visual	1	TEM SWH	469031, 4889002	0	0	1
7168	Duck species	Visual	>1	Other Incidental	471205, 4868082	0	0	1
7168	Duck species	Visual	>1	Other Incidental	471205, 4868082	0	0	1
7168	Duck species	Visual	>1	Other Incidental	471205, 4868082	0	0	1
7168	Wood Duck	Nest Box	2	TEM SWH	471222, 4868142	0	0	1
7174	Duck species	Unspecified	>1	Other Incidental	471806, 4874102	1	1s	1
7174	Mallard	Visual	>1	TEM SWH	471850, 4874037	1	1	1
7174	Wood Duck	Visual	>1	TEM SWH	471850, 4874037	1	1	1
7174	Wood Duck	Unspecified	>1	Other Incidental	471806, 4874102	1	1	1
7388	Duck species	Visual	>1	Other Incidental	473316, 4888307	0	0	1

Table D-17. Supplemental data for desk-based observations relevant to Waterfowl Nesting Area.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6478	Bufflehead	3	464790, 4878460	0	0	1
6478	Bufflehead	2	464790, 4878460	0	0	1
6478	Bufflehead	3	464790, 4878460	0	0	1
6478	Bufflehead	3	464790, 4878460	0	0	1
6478	Bufflehead	2	464790, 4878460	0	0	1
6478	Canada Goose	22	464102, 4878713	0	0	1
6478	Canada Goose	22	464102, 4878713	0	0	1
6478	Canada Goose	22	464102, 4878713	0	0	1
6478	Green-winged Teal	2	464790, 4878460	0	0	1
6478	Green-winged Teal	2	464790, 4878460	0	0	1
6478	Mallard	U	464570, 4878434	0	0	1
6478	Mallard	1	464102, 4878713	0	0	1
6478	Mallard	1	464102, 4878713	0	0	1
6478	Mallard	1	464102, 4878713	0	0	1
6478	Northern Pintail	1	464102, 4878713	0	0	1
6478	Northern Pintail	1	464102, 4878713	0	0	1
6478	Northern Pintail	1	464102, 4878713	0	0	1
6478	Wood Duck	U	464570, 4878434	0	0	1
6480	Mallard	6	464922, 4880107	0	0	1
6672	Canada Goose	2	466868, 4872476	0	0	1
6675	Northern Shoveler	2	466310, 4875396	0	0	1
6679	Blue-winged Teal	1	-	0	0	1
6679	Blue-winged Teal	1	-	0	0	1
6679	Bufflehead	4	466958, 4879176	0	0	1
6679	Bufflehead	1	466958, 4879176	0	0	1
6679	Canada Goose	4	466958, 4879176	0	0	1
6679	Canada Goose	56	466958, 4879176	0	0	1
6679	Canada Goose	21	466958, 4879176	0	0	1
6679	Canada Goose	63	466958, 4879176	0	0	1
6679	Canada Goose	13	466958, 4879176	0	0	1
6679	Canada Goose	14	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	17	466958, 4879176	0	0	1
6679	Canada Goose	70	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	4	466958, 4879176	0	0	1
6679	Canada Goose	15	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	20	466958, 4879176	0	0	1
6679	Canada Goose	80	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Canada Goose	9	466958, 4879176	0	0	1
6679	Canada Goose	5	466958, 4879176	0	0	1
6679	Canada Goose	3	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	54	466958, 4879176	0	0	1
6679	Canada Goose	50	466958, 4879176	0	0	1
6679	Canada Goose	15	466958, 4879176	0	0	1
6679	Canada Goose	3	466958, 4879176	0	0	1
6679	Canada Goose	8	466958, 4879176	0	0	1
6679	Canada Goose	20	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	30	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	5	466958, 4879176	0	0	1
6679	Canada Goose	20	466958, 4879176	0	0	1
6679	Canada Goose	24	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	21	466958, 4879176	0	0	1
6679	Canada Goose	10	466958, 4879176	0	0	1
6679	Canada Goose	50	466958, 4879176	0	0	1
6679	Canada Goose	20	466958, 4879176	0	0	1
6679	Canada Goose	5	466958, 4879176	0	0	1
6679	Canada Goose	9	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	54	466958, 4879176	0	0	1
6679	Canada Goose	9	466958, 4879176	0	0	1
6679	Canada Goose	50	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	25	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	10	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	33	466958, 4879176	0	0	1
6679	Canada Goose	80	466958, 4879176	0	0	1
6679	Canada Goose	30	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	4	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	26	466958, 4879176	0	0	1
6679	Canada Goose	13	466958, 4879176	0	0	1
6679	Canada Goose	20	466958, 4879176	0	0	1
6679	Canada Goose	11	466958, 4879176	0	0	1
6679	Canada Goose	80	466958, 4879176	0	0	1
6679	Canada Goose	10	466958, 4879176	0	0	1
6679	Canada Goose	65	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	19	466958, 4879176	0	0	1
6679	Canada Goose	30	466958, 4879176	0	0	1
6679	Canada Goose	27	466958, 4879176	0	0	1
6679	Canada Goose	18	466958, 4879176	0	0	1
6679	Canada Goose	46	466958, 4879176	0	0	1
6679	Canada Goose	40	466958, 4879176	0	0	1
6679	Canada Goose	10	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	6	466958, 4879176	0	0	1
6679	Canada Goose	22	466958, 4879176	0	0	1
6679	Canada Goose	11	466958, 4879176	0	0	1
6679	Canada Goose	6	466958, 4879176	0	0	1
6679	Canada Goose	15	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	162	466958, 4879176	0	0	1
6679	Canada Goose	14	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	30	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	31	466958, 4879176	0	0	1
6679	Canada Goose	9	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	80	466958, 4879176	0	0	1
6679	Canada Goose	21	466958, 4879176	0	0	1
6679	Canada Goose	11	466958, 4879176	0	0	1
6679	Canada Goose	23	466958, 4879176	0	0	1
6679	Canada Goose	5	466958, 4879176	0	0	1
6679	Canada Goose	35	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	1	466958, 4879176	0	0	1
6679	Canada Goose	50	466958, 4879176	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Canada Goose	19	466958, 4879176	0	0	1
6679	Canada Goose	9	466958, 4879176	0	0	1
6679	Canada Goose	23	466958, 4879176	0	0	1
6679	Canada Goose	12	466958, 4879176	0	0	1
6679	Canada Goose	3	466958, 4879176	0	0	1
6679	Canada Goose	6	466958, 4879176	0	0	1
6679	Canada Goose	40	466958, 4879176	0	0	1
6679	Canada Goose	15	466958, 4879176	0	0	1
6679	Canada Goose	21	466958, 4879176	0	0	1
6679	Canada Goose	80	466958, 4879176	0	0	1
6679	Canada Goose	2	466958, 4879176	0	0	1
6679	Canada Goose	56	466958, 4879176	0	0	1
6679	Canada Goose	30	466958, 4879176	0	0	1
6679	Canada Goose	34	466958, 4879176	0	0	1
6679	Canada Goose	4	466958, 4879176	0	0	1
6679	Common Goldeneye	6	466958, 4879176	0	0	1
6679	Mallard	1	466958, 4879176	0	0	1
6679	Mallard	6	466958, 4879176	0	0	1
6679	Mallard	6	466958, 4879176	0	0	1
6679	Mallard	2	466958, 4879176	0	0	1
6679	Mallard	6	466958, 4879176	0	0	1
6679	Mallard	1	466958, 4879176	0	0	1
6679	Mallard	4	466958, 4879176	0	0	1
6679	Mallard	2	466958, 4879176	0	0	1
6679	Mallard	1	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	6	466958, 4879176	0	0	1
6679	Wood Duck	2	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6679	Wood Duck	3	466958, 4879176	0	0	1
6680	Canada Goose	6	466912, 4880100	0	0	1
6680	Common Merganser	4	466912, 4880100	0	0	1
6681	Canada Goose	18	466430, 4881693	0	0	1
6681	Canada Goose	31	466430, 4881693	0	0	1
6681	Canada Goose	36	466430, 4881693	0	0	1
6681	Mallard	3	466430, 4881693	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6681	Mallard	1	466430, 4881693	0	0	1
6681	Wood Duck	2	466430, 4881693	0	0	1
6688	Mallard	3	466810, 4888851	0	0	1
6770	Wood Duck	U	467055, 4870390	0	0	1
6792	Mallard	1	467744, 4892549	0	0	1
6869	Wood Duck	1	468492, 4869229	0	0	1
6869	Wood Duck	1	468492, 4869229	0	0	1
6882	Canada Goose	3	468519, 4882206	0	0	1
6887	Canada Goose	15	468134, 4887028	0	0	1
6887	Mallard	4	468134, 4887028	0	0	1
6889	Canada Goose	15	468719, 4889066	0	0	1
6889	Canada Goose	U	468719, 4889066	0	0	1
6889	Gadwall	U	468719, 4889066	0	0	1
6889	Mallard	4	468719, 4889066	0	0	1
6889	Mallard	U	468719, 4889066	0	0	1
6889	Wood Duck	5	468719, 4889066	0	0	1
6889	Wood Duck	U	468719, 4889066	0	0	1
6891	Canada Goose	3	468329, 4891236	0	0	1
6891	Mallard	2	468329, 4891236	0	0	1
6891	Wood Duck	15	468691, 4891301	0	0	1
6893	Canada Goose	U	468168, 4893235	0	0	1
6894	Canada Goose	2	468965, 4894778	0	0	1
6970	Canada Goose	U	470000, 4870000	0	0	1
6970	Mallard	U	470000, 4870000	0	0	1
6981	Mallard	2	469971, 4881834	0	0	1
6981	Wood Duck	1	469971, 4881834	0	0	1
6987	Canada Goose	3	469031, 4887219	0	0	1
6990	Canada Goose	U	470000, 4890000	0	0	1
6990	Mallard	U	470000, 4890000	0	0	1
6990	Wood Duck	U	470000, 4890000	0	0	1
6991	Canada Goose	1	469657, 4891528	0	0	1
6991	Mallard	1	469657, 4891528	0	0	1
6991	Wood Duck	9	469287, 4891492	0	0	1
7079	Wood Duck	U	470000, 4880000	0	0	1
7087	American Wigeon	U	470927, 4887732	0	0	1
7087	Bufflehead	6	470927, 4887732	0	0	1
7087	Canada Goose	U	470927, 4887732	0	0	1
7087	Canada Goose	U	470927, 4887732	0	0	1
7087	Canada Goose	100	470927, 4887732	0	0	1
7087	Green-winged Teal	U	470927, 4887732	0	0	1
7087	Mallard	U	470927, 4887732	0	0	1
7087	Mallard	6	470927, 4887732	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7087	Mallard	6	470927, 4887732	0	0	1
7087	Wood Duck	6	470927, 4887732	0	0	1
7087	Wood Duck	U	470927, 4887732	0	0	1
7087	Wood Duck	U	470927, 4887732	0	0	1
7173	Canada Goose	2	471682, 4873088	1	1	1
7173	Common Merganser	20	471682, 4873088	1	1	1
7182	Mallard	3	471995, 4882283	0	0	1
7182	Wood Duck	2	471995, 4882283	0	0	1
7187	Canada Goose	U	471971, 4887831	0	0	1
7187	Canada Goose	6	471949, 4887839	0	0	1
7187	Canada Goose	15	471769, 4887884	0	0	1
7187	Mallard	3	471769, 4887884	0	0	1
7187	Wood Duck	U	471971, 4887831	0	0	1
7188	Canada Goose	12	471091, 4888080	0	0	1
7188	Canada Goose	12	471091, 4888080	0	0	1
7188	Canada Goose	5	471091, 4888080	0	0	1
7189	Bufflehead	16	471067, 4889252	0	0	1
7189	Bufflehead	2	471067, 4889252	0	0	1
7189	Canada Goose	8	471067, 4889252	0	0	1
7189	Canada Goose	4	471067, 4889252	0	0	1
7189	Canada Goose	2	471067, 4889252	0	0	1
7189	Canada Goose	2	471067, 4889252	0	0	1
7189	Canada Goose	6	471067, 4889252	0	0	1
7189	Canada Goose	2	471067, 4889252	0	0	1
7189	Canada Goose	2	471067, 4889252	0	0	1
7189	Canada Goose	6	471067, 4889252	0	0	1
7189	Canada Goose	4	471067, 4889252	0	0	1
7189	Canada Goose	15	471067, 4889252	0	0	1
7189	Canada Goose	2	471067, 4889252	0	0	1
7189	Canada Goose	U	471067, 4889252	0	0	1
7189	Canada Goose	U	471067, 4889252	0	0	1
7189	Canada Goose	3	471067, 4889252	0	0	1
7189	Canada Goose	16	471067, 4889252	0	0	1
7189	Canada Goose	4	471067, 4889252	0	0	1
7189	Canada Goose	4	471067, 4889252	0	0	1
7189	Common Goldeneye	3	471067, 4889252	0	0	1
7189	Common Goldeneye	4	471067, 4889252	0	0	1
7189	Common Merganser	6	471067, 4889252	0	0	1
7189	Green-winged Teal	2	471067, 4889252	0	0	1
7189	Hooded Merganser	4	471067, 4889252	0	0	1
7189	Mallard	2	471067, 4889252	0	0	1
7189	Mallard	1	471067, 4889252	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7189	Mallard	8	471067, 4889252	0	0	1
7189	Mallard	10	471067, 4889252	0	0	1
7189	Mallard	2	471067, 4889252	0	0	1
7189	Mallard	7	471067, 4889252	0	0	1
7189	Mallard	1	471067, 4889252	0	0	1
7189	Mallard	2	471067, 4889252	0	0	1
7189	Mallard	2	471067, 4889252	0	0	1
7189	Mallard	1	471067, 4889252	0	0	1
7189	Mallard	U	471067, 4889252	0	0	1
7189	Mallard	1	471067, 4889252	0	0	1
7189	Mallard	4	471067, 4889252	0	0	1
7189	Mallard	2	471067, 4889252	0	0	1
7189	Red-breasted Merganser	15	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	20	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	12	471067, 4889252	0	0	1
7189	Wood Duck	12	471067, 4889252	0	0	1
7189	Wood Duck	28	471067, 4889252	0	0	1
7189	Wood Duck	1	471067, 4889252	0	0	1
7189	Wood Duck	16	471067, 4889252	0	0	1
7189	Wood Duck	1	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	20	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	4	471067, 4889252	0	0	1
7189	Wood Duck	16	471067, 4889252	0	0	1
7189	Wood Duck	4	471067, 4889252	0	0	1
7189	Wood Duck	1	471067, 4889252	0	0	1
7189	Wood Duck	4	471067, 4889252	0	0	1
7189	Wood Duck	7	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	20	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	6	471067, 4889252	0	0	1
7189	Wood Duck	16	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	1	471067, 4889252	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7189	Wood Duck	1	471067, 4889252	0	0	1
7189	Wood Duck	12	471067, 4889252	0	0	1
7189	Wood Duck	1	471067, 4889252	0	0	1
7189	Wood Duck	7	471067, 4889252	0	0	1
7189	Wood Duck	2	471067, 4889252	0	0	1
7189	Wood Duck	3	471067, 4889252	0	0	1
7191	Wood Duck	5	471160, 4891804	0	0	1
7191	Wood Duck	2	471106, 4891798	0	0	1
7191	Wood Duck	2	471106, 4891798	0	0	1
7192	Canada Goose	2	471459, 4892136	0	0	1
7192	Canada Goose	4	471459, 4892136	0	0	1
7192	Mallard	1	471459, 4892136	0	0	1
7192	Wood Duck	2	471459, 4892136	0	0	1
7192	Wood Duck	2	471459, 4892136	0	0	1
7192	Wood Duck	4	471459, 4892136	0	0	1
7271	Common Merganser	2	472475, 4871002	1	1	1
7271	Hooded Merganser	1	472475, 4871002	1	1	1
7272	Canada Goose	2	472032, 4872835	1	1	1
7272	Mallard	4	472032, 4872835	1	1	1
7273	Canada Goose	15	472349, 4873269	1	1	1
7281	Bufflehead	4	472834, 4881889	0	0	1
7281	Bufflehead	4	472834, 4881889	0	0	1
7281	Bufflehead	4	472834, 4881889	0	0	1
7281	Canada Goose	10	472834, 4881889	0	0	1
7281	Canada Goose	10	472834, 4881889	0	0	1
7281	Canada Goose	10	472834, 4881889	0	0	1
7281	Common Goldeneye	4	472834, 4881889	0	0	1
7281	Common Goldeneye	4	472834, 4881889	0	0	1
7281	Common Goldeneye	4	472834, 4881889	0	0	1
7281	Common Merganser	2	472834, 4881889	0	0	1
7281	Common Merganser	2	472834, 4881889	0	0	1
7281	Common Merganser	2	472834, 4881889	0	0	1
7281	Green-winged Teal	20	472834, 4881889	0	0	1
7281	Green-winged Teal	20	472834, 4881889	0	0	1
7281	Green-winged Teal	20	472834, 4881889	0	0	1
7281	Hooded Merganser	2	472834, 4881889	0	0	1
7281	Hooded Merganser	2	472834, 4881889	0	0	1
7281	Hooded Merganser	2	472834, 4881889	0	0	1
7281	Mallard	6	472834, 4881889	0	0	1
7281	Mallard	6	472834, 4881889	0	0	1
7281	Mallard	6	472834, 4881889	0	0	1
7281	Wood Duck	1	472834, 4881889	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7281	Wood Duck	1	472834, 4881889	0	0	1
7281	Wood Duck	1	472834, 4881889	0	0	1
7288	American Wigeon	2	472919, 4888970	0	0	1
7288	Blue-winged Teal	10	-	0	0	1
7288	Mallard	6	472919, 4888970	0	0	1
7288	Mallard	6	472919, 4888970	0	0	1
7288	Northern Pintail	12	472919, 4888970	0	0	1
7288	Northern Pintail	35	472919, 4888970	0	0	1
7290	Blue-winged Teal	15	-	0	0	1
7290	Bufflehead	15	472462, 4890105	0	0	1
7290	Common Merganser	15	472462, 4890105	0	0	1
7290	Green-winged Teal	15	472462, 4890105	0	0	1
7290	Northern Pintail	15	472462, 4890105	0	0	1
7290	Red-breasted Merganser	500	472462, 4890105	0	0	1
7290	Red-breasted Merganser	35	472462, 4890105	0	0	1
7290	Red-breasted Merganser	75	472462, 4890105	0	0	1
7369	Canada Goose	4	473265, 4869455	0	0	1
7369	Canada Goose	4	473155, 4869453	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	U	473155, 4869453	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	4	473155, 4869453	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	4	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	2	473265, 4869455	0	0	1
7369	Canada Goose	30	473155, 4869453	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Canada Goose	1	473265, 4869455	0	0	1
7369	Common Goldeneye	2	473265, 4869455	0	0	1
7369	Common Merganser	2	473265, 4869455	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	6	473155, 4869453	0	0	1
7369	Mallard	2	473155, 4869453	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7369	Mallard	2	473155, 4869453	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Mallard	2	473155, 4869453	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	3	473265, 4869455	0	0	1
7369	Mallard	1	473265, 4869455	0	0	1
7369	Mallard	4	473265, 4869455	0	0	1
7369	Mallard	2	473265, 4869455	0	0	1
7369	Wood Duck	1	473265, 4869455	0	0	1
7369	Wood Duck	3	473155, 4869453	0	0	1
7369	Wood Duck	3	473265, 4869455	0	0	1
7369	Wood Duck	1	473155, 4869453	0	0	1
7369	Wood Duck	2	473265, 4869455	0	0	1
7377	Canada Goose	1	473308, 4877689	0	0	1
7379	Canada Goose	2	473276, 4879645	0	0	1
7381	Canada Goose	4	473077, 4881882	0	0	1
7381	Hooded Merganser	2	473077, 4881882	0	0	1
7391	Wood Duck	3	473293, 4891285	0	0	1
7467	Mallard	10	474747, 4867361	0	0	1
7476	Mallard	7	474050, 4876630	0	0	1
7565	Canada Goose	12	475158, 4865182	0	0	1
7573	Canada Goose	20	475580, 4873801	0	1	1
7590	American Wigeon	6	475329, 4890898	0	0	1
7590	Canada Goose	3	475316, 4890806	0	0	1
7590	Canada Goose	4	475329, 4890898	0	0	1
7590	Canada Goose	7	475329, 4890898	0	0	1
7590	Canada Goose	35	475329, 4890898	0	0	1
7590	Canada Goose	35	475329, 4890898	0	0	1
7590	Canada Goose	2	475329, 4890898	0	0	1
7590	Canada Goose	U	475329, 4890898	0	0	1
7590	Canada Goose	1	475329, 4890898	0	0	1
7590	Mallard	2	475329, 4890898	0	0	1
7590	Mallard	1	475329, 4890898	0	0	1
7590	Mallard	1	475329, 4890898	0	0	1
7590	Wood Duck	2	475329, 4890898	0	0	1
7671	Mallard	3	476145, 4871824	0	0	1
7675	Wood Duck	1	476262, 4875979	0	0	1
7764	Canada Goose	1	477639, 4864107	0	0	1
7764	Canada Goose	2	477685, 4864041	0	0	1
7764	Wood Duck	2	477685, 4864041	0	0	1
7764	Wood Duck	2	477780, 4864202	0	0	1
7771	Canada Goose	4	477425, 4871882	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7771	Mallard	5	477425, 4871882	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Bald Eagle and Osprey Nesting, Foraging and Perching Habitat - North $RSA_{AVI-AQU}$

Figure D-17a

6894
7292
7590
7189
7087
6882
6681
6679
7281

Municipality of Brockton
Municipality of Kincardine
Township of Huron-Kinloss
Municipality of South Bruce
Schmidt Lake
Cunningham Lake
Silver Lake
Clam Lake
Teeswater River

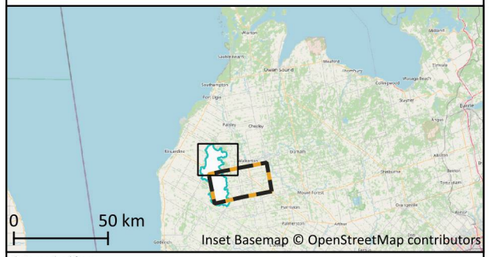
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1848]

Ecosites that Match SWH Criteria

- Conifer [16]
- Mixedwood [48]
- Hardwood [77]
- Conifer Swamp [10]
- Mixedwood Swamp [46]
- Hardwood Swamp [110]

1:65,000
0 1 2 km

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Species Observed

Desk-based (GBIF) [18]

- Bald Eagle [12]
- Osprey [6]
- Observation Location
- 1km x 1km grid square with observations

Candidate SWH in Plot

Yes [23] Unknown [10] No [440]

Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Bald Eagle and Osprey Nesting, Foraging and Perching Habitat - South $RSA_{AVI-AQU}$

Figure D-17b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1848]

Ecosites that Match SWH Criteria

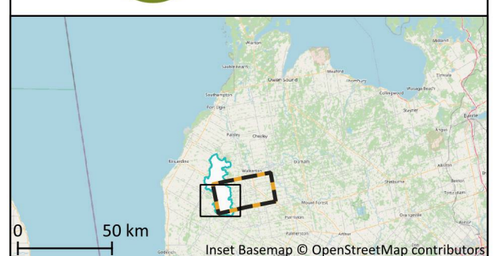
- Conifer [16]
- Mixedwood [48]
- Hardwood [77]
- Conifer Swamp [10]
- Mixedwood Swamp [46]
- Hardwood Swamp [110]

See Figure D-17a for Full Legend

1:65,000

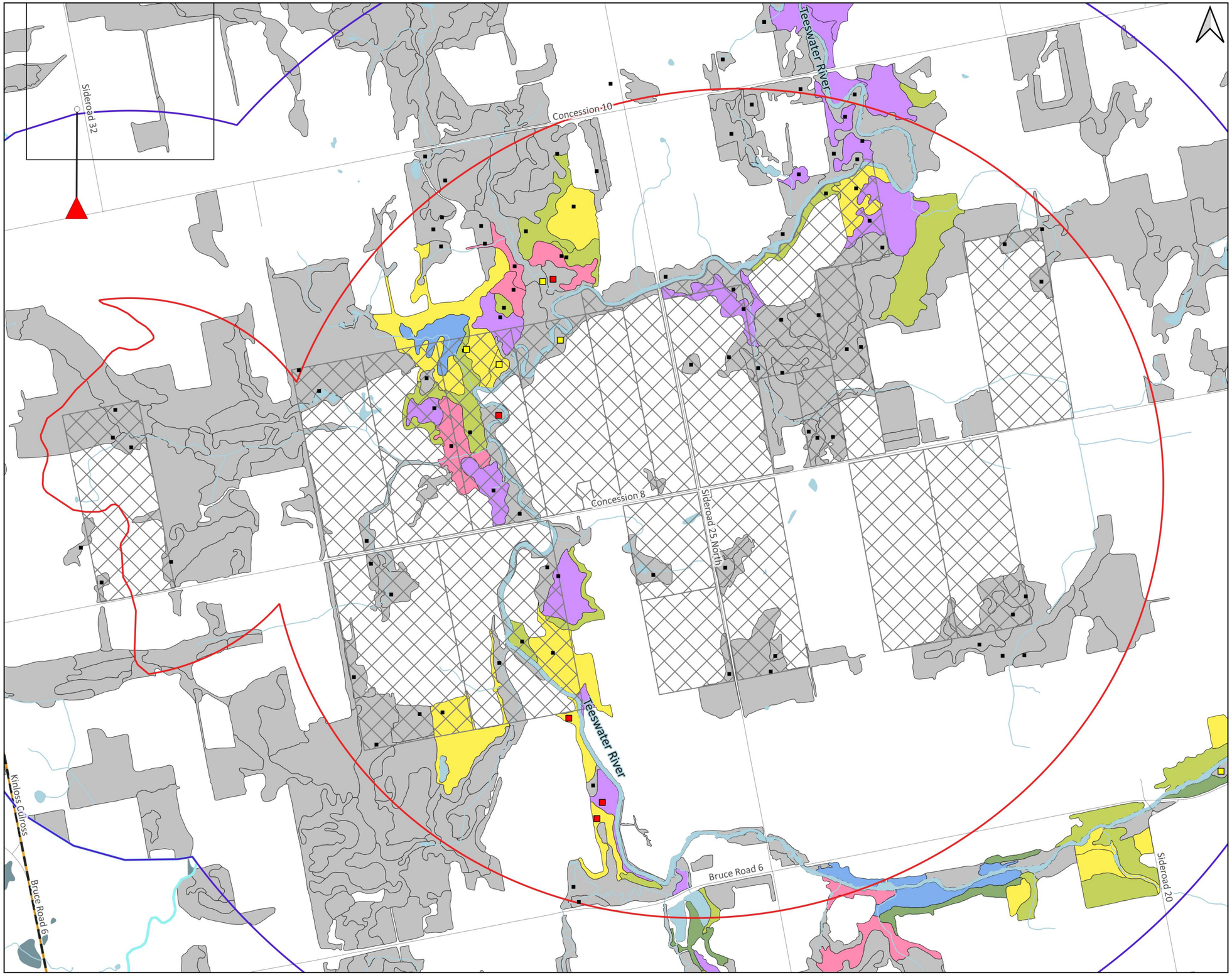
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ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Bald Eagle and Osprey Nesting, Foraging and Perching Habitat - AOI

Figure D-17c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1848]

Ecosites that Match SWH Criteria

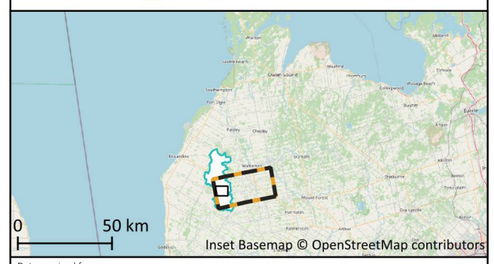
- Conifer [16]
- Mixedwood [48]
- Hardwood [77]
- Conifer Swamp [10]
- Mixedwood Swamp [46]
- Hardwood Swamp [110]

See Figure D-17a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-18. Supplemental data for desk-based observations relevant to Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat.

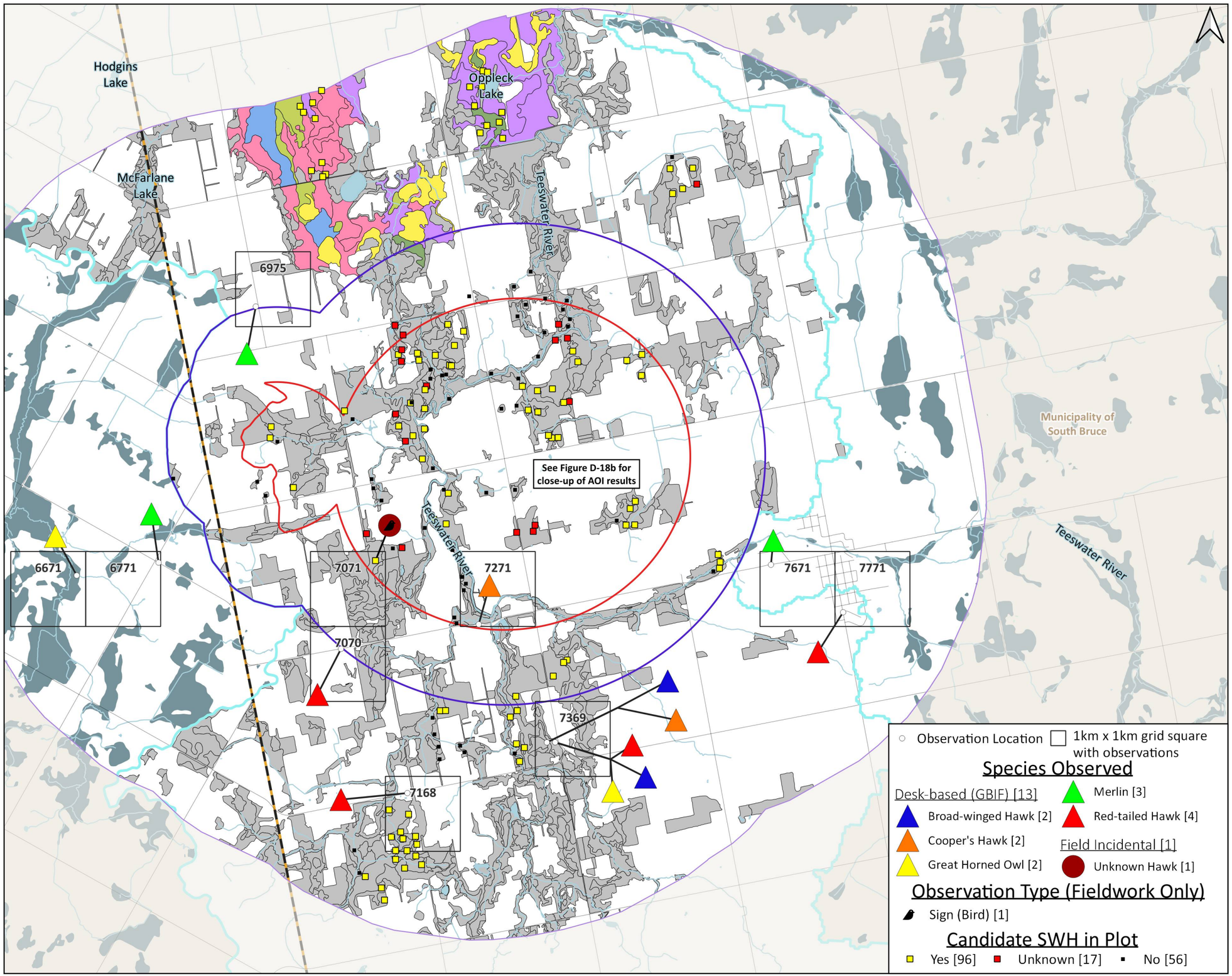
Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	2	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Bald Eagle	1	-	0	0	1
6679	Osprey	1	466958, 4879176	0	0	1
6681	Bald Eagle	2	-	0	0	1
6681	Bald Eagle	1	-	0	0	1
6681	Bald Eagle	2	-	0	0	1
6681	Osprey	2	466430, 4881693	0	0	1
6882	Bald Eagle	4	-	0	0	1
6894	Bald Eagle	1	-	0	0	1
6975	Bald Eagle	6	-	0	0	1
6975	Bald Eagle	6	-	0	0	1
6975	Bald Eagle	6	-	0	0	1
7087	Bald Eagle	U	-	0	0	1
7189	Osprey	1	471067, 4889252	0	0	1
7189	Osprey	1	471067, 4889252	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
7281	Bald Eagle	1	-	0	0	1
7281	Bald Eagle	1	-	0	0	1
7281	Bald Eagle	1	-	0	0	1
7281	Bald Eagle	1	-	0	0	1
7281	Bald Eagle	1	-	0	0	1
7281	Bald Eagle	1	-	0	0	1
7292	Bald Eagle	1	-	0	0	1
7369	Bald Eagle	1	-	0	0	1
7369	Osprey	1	473265, 4869455	0	0	1
7369	Osprey	1	473265, 4869455	0	0	1
7590	Bald Eagle	1	-	0	0	1
7590	Osprey	1	475329, 4890898	0	0	1
7590	Osprey	1	475329, 4890898	0	0	1
7590	Osprey	2	475316, 4890806	0	0	1
7590	Osprey	U	475329, 4890898	0	0	1
7590	Osprey	2	475329, 4890898	0	0	1
7672	Bald Eagle	2	-	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Woodland Raptor Nesting Habitat - RSA_{AVI}

Figure D-18a



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AVI})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [871]

Ecosites that Match SWH Criteria

- Conifer [3]
- Mixedwood [6]
- Hardwood [11]
- Conifer Swamp [2]
- Mixedwood Swamp [19]
- Hardwood Swamp [13]

Woodland Raptor Nesting Habitat SWH were refined to only include polygons that meet the area requirement (>30ha and >10ha interior habitat with 200m buffer).

1:50,000

0 1 2 km

ZOETICA

- Observation Location
- 1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [13]

- Broad-winged Hawk [2]
- Cooper's Hawk [2]
- Great Horned Owl [2]
- Merlin [3]
- Red-tailed Hawk [4]

Field Incidental [1]

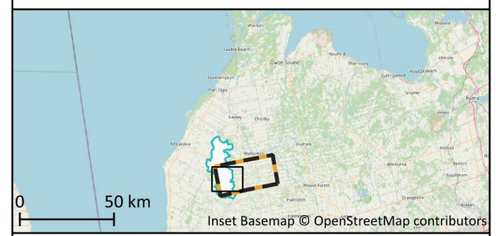
- Unknown Hawk [1]

Observation Type (Fieldwork Only)

- Sign (Bird) [1]

Candidate SWH in Plot

- Yes [96]
- Unknown [17]
- No [56]



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Woodland Raptor Nesting Habitat - AOI

Figure D-18b

Area of Interest (AOI)
Local Study Area (LSA_{TER})
Local Study Area (LSA_{ECO})
NWMO Purchased or Optioned Land
Watercourse
Lake
Wetland Outside LSA_{ECO}
South Bruce Boundary
Municipal Boundary
Highway
Local Road
Ecosites that Do Not Match the SWH Criteria [871]

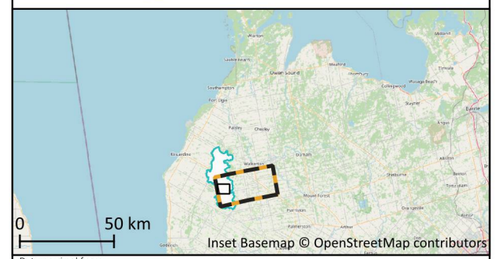
Ecosites that Match SWH Criteria

Conifer [3]
Mixedwood [6]
Hardwood [11]
Conifer Swamp [2]
Mixedwood Swamp [19]
Hardwood Swamp [13]

See Figure D-18a for Full Legend

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

Table D-19. Supplemental data for 2022 field-based incidental observations relevant to Woodland Raptor Nesting Habitat.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
7071	Hawk species	Sign	1	TEM SWH	470868, 4871879	1	1	1

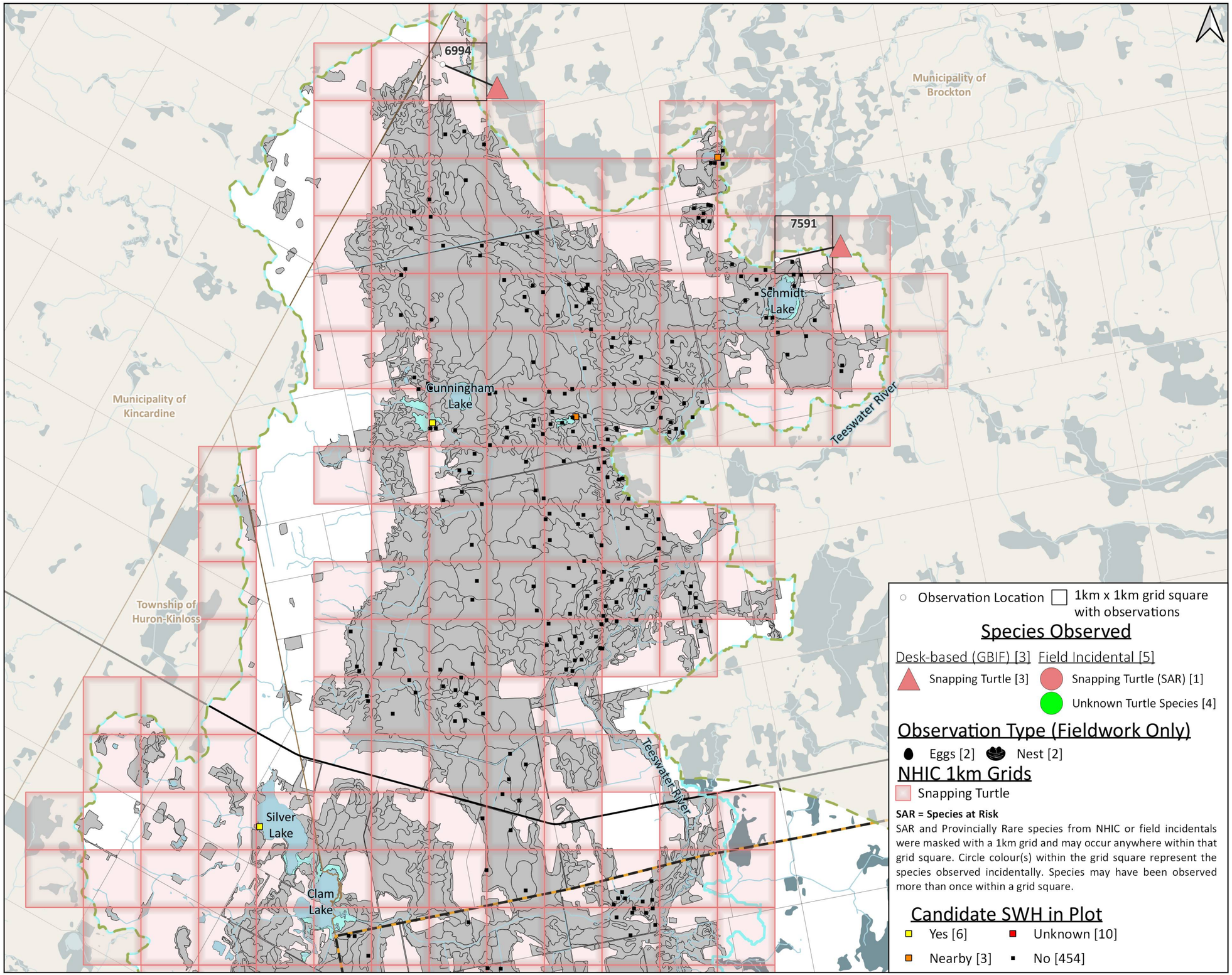
Table D-20. Supplemental data for desk-based observations relevant to Woodland Raptor Nesting Habitat.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
6671	Great Horned Owl	1	466880, 4871681	0	0	1
6771	Merlin	1	467972, 4871853	0	0	1
6975	Merlin	1	469270, 4875269	0	0	1
6975	Merlin	1	469270, 4875269	0	0	1
6975	Merlin	1	469270, 4875269	0	0	1
7070	Red-tailed Hawk	1	470407, 4870701	0	0	1
7168	Red-tailed Hawk	1	471294, 4868777	0	0	1
7271	Coopers Hawk	1	472246, 4871029	1	1	1
7369	Broad-winged Hawk	1	473155, 4869453	0	0	1
7369	Broad-winged Hawk	2	473265, 4869455	0	0	1
7369	Broad-winged Hawk	1	473265, 4869455	0	0	1
7369	Broad-winged Hawk	1	473265, 4869455	0	0	1
7369	Broad-winged Hawk	1	473265, 4869455	0	0	1
7369	Broad-winged Hawk	1	473155, 4869453	0	0	1
7369	Broad-winged Hawk	2	473265, 4869455	0	0	1
7369	Broad-winged Hawk	1	473265, 4869455	0	0	1
7369	Coopers Hawk	2	473155, 4869453	0	0	1
7369	Coopers Hawk	1	473155, 4869453	0	0	1
7369	Great Horned Owl	1	473265, 4869455	0	0	1
7369	Red-tailed Hawk	1	473265, 4869455	0	0	1
7671	Merlin	1	476145, 4871824	0	0	1
7771	Red-tailed Hawk	1	477109, 4871190	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Turtle Nesting Area - North $RSA_{HRP-AQU}$

Figure D-19a



- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2140]

Ecosites that Match SWH Criteria

- Marsh [15]

- Observation Location
- 1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [3] Field Incidental [5]

- Snapping Turtle [3]
- Snapping Turtle (SAR) [1]
- Unknown Turtle Species [4]

Observation Type (Fieldwork Only)

- Eggs [2]
- Nest [2]

NHIC 1km Grids

- Snapping Turtle

SAR = Species at Risk

SAR and Provincially Rare species from NHIC or field incidentals were masked with a 1km grid and may occur anywhere within that grid square. Circle colour(s) within the grid square represent the species observed incidentally. Species may have been observed more than once within a grid square.

Candidate SWH in Plot

- Yes [6]
- Unknown [10]
- Nearby [3]
- No [454]

1:65,000

0 1 2 km

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Turtle Nesting Area - South $RSA_{HRP-AQU}$

Figure D-19b

Hodgins Lake
McFarlane Lake
Oppleck Lake
Teeswater River
7174
7173
7269
7063
See Figure D-19c for results in the AOI
Turtle species
Township of Huron-Kinloss
Municipality of South Bruce
Teeswater
Township of Ashfield-Colborne-Wawanosh
Township of North Huron
Municipality of Morris-Turnberry

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2140]

Ecosites that Match SWH Criteria

- Marsh [15]

See Figure D-19a for Full Legend

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0 50 km
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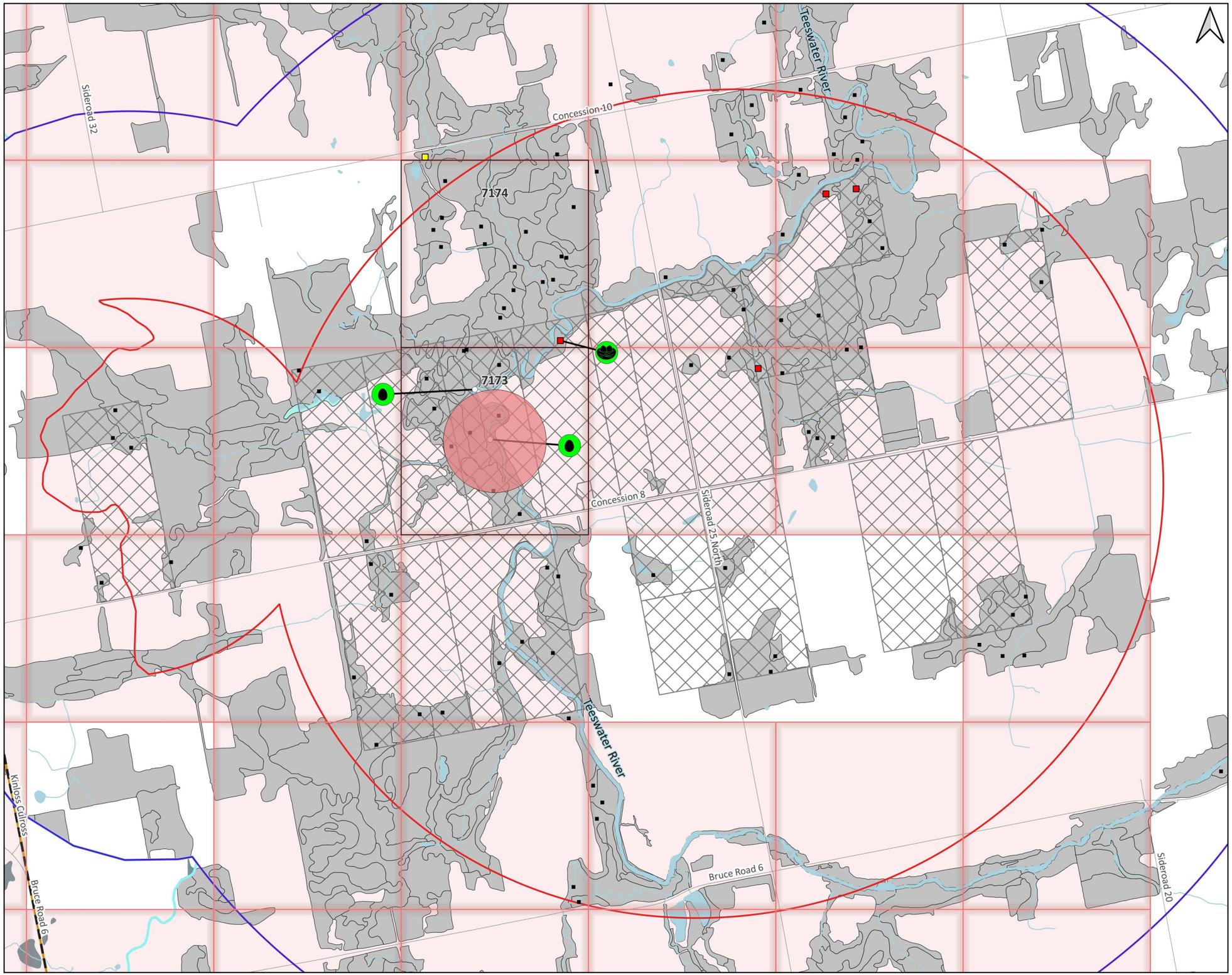
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Turtle Nesting Area - AOI

Figure D-19c



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2140]

Ecosites that Match SWH Criteria

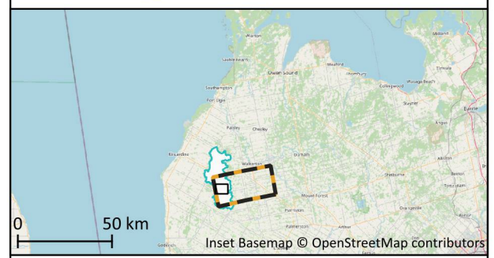
- Marsh [15]

See Figure D-19a for Full Legend

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-21. Supplemental data for 2022 field-based incidental observations relevant to Turtle Nesting Areas.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-.AQU}$
7173	Snapping Turtle	Eggs	-	Potential SWH Incidental	-	1	1	1
7173	Turtle species	Eggs	-	Other Incidental	471393, 4873776	1	1	1
7173	Turtle species	Eggs	-	Other Incidental	471475, 4873509	1	1	1
7173	Turtle species	Eggs	-	Other Incidental	471393, 4873776	1	1	1
7174	Turtle species	Nest	1	TEM SWH	471850, 4874037	1	1	1
7269	Turtle species	Nest	1	TEM SWH	472791, 4869199	0	0	1

Table D-22. Supplemental data for desk-based observations relevant to Turtle Nesting Areas.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
6994	Snapping Turtle	U	-	0	0	1
7063	Snapping Turtle	U	-	0	0	1
7591	Snapping Turtle	U	-	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Seeps and Springs - North LSA_{ECO}

Figure D-20a

- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1314]

Ecosites that Match the SWH Criteria

- Conifer [81]
- Mixedwood [272]
- Hardwood [488]

- Observation Location
- 1km x 1km grid square with observations

Species/Habitat Observed

Desk-based (GBIF) [42]

- Ruffed Grouse [18]
- Wild Turkey [23]
- White-tailed Deer [1]

Field Incidental [77]

- Eastern Rough Sedge [2]
- Ruffed Grouse [3]
- Seeps and Springs [2]
- Eastern Swamp Saxifrage [1]
- Watercress species [2]
- Wild Turkey [2]
- White-tailed Deer [65]

Observation Type (Fieldwork Only)

- Habitat (Seeps and Springs) [2]
- Visual [13]
- Unspecified [4]
- Sign (Deer) [58]

Candidate SWH in Plot

- Yes [29]
- Unknown [29]
- Nearby [1]
- No [414]

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Seeps and Springs - South LSA_{ECO}

Figure D-20b

Hodgins Lake
McFarlane Lake
Oppleck Lake
Teeswater River
Municipality of South Bruce
Teeswater
Municipality of Morris-Turnberry
Township of Huron-Kinloss
Township of Ashfield-Colborne-Wawanosh
Township of North Huron

6478 7278 7077 7477 7476 7375 7174 7274 7374 7073 7173 7373 7473 6872 7072 7172 6970 7370 7169 7269 7369 7168 7167 7066 7266 7065 7165 7265 7465 7064 7264 7764 7163 7263

See Figure D-20c for results in the AOI

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1314]

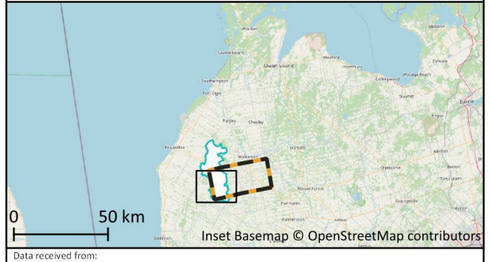
Ecosites that Match the SWH Criteria

- Conifer [81]
- Mixedwood [272]
- Hardwood [488]

See Figure D-20a for Full Legend

1:65,000
0 1 2 km

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Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Seeps and Springs - AOI

Figure D-20c

Area of Interest (AOI)
Local Study Area (LSA_{TER})
Local Study Area (LSA_{ECO})
NWMO Purchased or Optioned Land
Watercourse
Lake
Wetland Outside LSA_{ECO}
South Bruce Boundary
Municipal Boundary
Highway
Local Road
Ecosites that Do Not Match the SWH Criteria [1314]

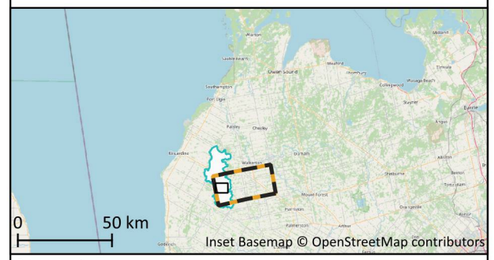
Ecosites that Match the SWH Criteria

Conifer [81]
Mixedwood [272]
Hardwood [488]

See Figure D-20a for Full Legend

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-23. Supplemental data for 2022 field-based incidental observations relevant to Seeps and Springs.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
6779	White-tailed Deer	Unspecified	-	Other Incidental	467516, 4879227	0	0	1
6779	White-tailed Deer	Unspecified	-	Other Incidental	467516, 4879227	0	0	1
6783	White-tailed Deer	Sign	-	TEM SWH	467919, 4883668	0	0	1
6872	White-tailed Deer	Sign	high density	Other Incidental	468168, 4872973	0	1	1
6890	White-tailed Deer	Sign	-	TEM SWH	468509, 4890278	0	0	1
6892	White-tailed Deer	Sign	high density	TEM SWH	468735, 4892074	0	0	1
6983	White-tailed Deer	Sign	-	TEM SWH	469623, 4883241	0	0	1
6988	White-tailed Deer	Sign	-	TEM SWH	469059, 4888409	0	0	1
6990	White-tailed Deer	Sign	high density	TEM SWH	469040, 4890199	0	0	1
6991	Ruffed Grouse	Visual	2	TEM SWH	469914, 4891483	0	0	1
6992	White-tailed Deer	Sign	-	TEM SWH	469309, 4892393	0	0	1
7064	White-tailed Deer	Sign	-	Other Incidental	470411, 4864695	0	0	1
7064	White-tailed Deer	Sign	-	Other Incidental	470747, 4865000	0	0	1
7065	Watercress species	Visual	-	TEM SWH	470786, 4865319	0	0	1
7066	White-tailed Deer	Sign	-	Other Incidental	470694, 4866398	0	0	1
7072	White-tailed Deer	Sign	-	Other Incidental	470913, 4872820	1	1	1
7073	White-tailed Deer	Sign	high density	Other Incidental	470454, 4873877	0	1	1
7077	Eastern Swamp Saxifrage	Visual	-	TEM SWH	470062, 4877777	0	0	1
7080	White-tailed Deer	Sign	high density	TEM SWH	470675, 4880294	0	0	1
7081	White-tailed Deer	Sign	-	Other Incidental	470414, 4881339	0	0	1
7087	White-tailed Deer	Sign	-	TEM SWH	470850, 4887235	0	0	1
7090	White-tailed Deer	Sign	-	TEM SWH	470655, 4890594	0	0	1
7163	White-tailed Deer	Sign	-	Other Incidental	471864, 4863279	0	0	1
7165	White-tailed Deer	Visual	1	Other Incidental	471417, 4865023	0	0	1
7165	White-tailed Deer	Sign	-	Other Incidental	471483, 4865330	0	0	1
7167	White-tailed Deer	Sign	high density	TEM SWH	471406, 4867938	0	0	1
7168	Eastern Rough Sedge	Visual	low density	Potential SWH Incidental	471200, 4868253	0	0	1
7168	Eastern Rough Sedge	Visual	-	TEM SWH	471203, 4868259	0	0	1
7168	Seeps and Springs	Habitat (Seeps and Springs)	1	Potential SWH Incidental	471049, 4868553	0	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
7168	White-tailed Deer	Sign	low density	Other Incidental	471136, 4868011	0	0	1
7168	White-tailed Deer	Sign	-	Other Incidental	471288, 4868009	0	0	1
7169	White-tailed Deer	Sign	-	Other Incidental	471731, 4869876	0	0	1
7169	White-tailed Deer	Sign	-	Other Incidental	471630, 4869782	0	0	1
7172	White-tailed Deer	Sign	-	Other Incidental	471810, 4872369	1	1	1
7173	White-tailed Deer	Sign	-	Other Incidental	471593, 4873370	1	1	1
7173	White-tailed Deer	Sign	-	Other Incidental	471393, 4873776	1	1	1
7174	Watercress species	Visual	-	TEM SWH	471811, 4874362	1	1	1
7174	White-tailed Deer	Sign	-	Other Incidental	471078, 4874946	0	1	1
7185	White-tailed Deer	Sign	-	TEM SWH	471505, 4885581	0	0	1
7186	White-tailed Deer	Sign	high density	TEM SWH	471089, 4886832	0	0	1
7187	White-tailed Deer	Sign	-	Other Incidental	471336, 4887743	0	0	1
7190	Ruffed Grouse	Unspecified	1	TEM SWH	471809, 4890031	0	0	1
7190	White-tailed Deer	Sign	-	TEM SWH	471809, 4890031	0	0	1
7190	White-tailed Deer	Visual	"several"	TEM SWH	471751, 4890807	0	0	1
7263	White-tailed Deer	Sign	-	Other Incidental	472675, 4863639	0	0	1
7264	White-tailed Deer	Sign	-	TEM SWH	472617, 4864086	0	0	1
7265	White-tailed Deer	Sign	-	TEM SWH	472458, 4865965	0	0	1
7266	White-tailed Deer	Sign	-	TEM SWH	472296, 4866083	0	0	1
7266	White-tailed Deer	Sign	-	TEM SWH	472381, 4866286	0	0	1
7269	Seeps and Springs	Habitat (Seeps and Springs)	1	Potential SWH Incidental	472011, 4869382	0	0	1
7269	White-tailed Deer	Sign	-	TEM SWH	472666, 4869792	0	0	1
7269	White-tailed Deer	Sign	-	TEM SWH	472791, 4869199	0	0	1
7271	White-tailed Deer	Sign	med density	Other Incidental	472073, 4871061	1	1	1
7274	White-tailed Deer	Sign	-	Other Incidental	472619, 4874359	1	1	1
7274	White-tailed Deer	Sign	-	Other Incidental	472368, 4874284	1	1	1
7278	White-tailed Deer	Sign	-	Other Incidental	472302, 4878413	0	0	1
7279	Ruffed Grouse	Unspecified	1	Other Incidental	472097, 4879884	0	0	1
7280	White-tailed Deer	Sign	-	Other Incidental	472838, 4880453	0	0	1
7280	White-tailed Deer	Sign	-	Other Incidental	472406, 4880169	0	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
7280	White-tailed Deer	Sign	-	Other Incidental	472406, 4880169	0	0	1
7280	Wild Turkey	Unspecified	>1	Other Incidental	472362, 4880288	0	0	1
7284	White-tailed Deer	Sign	-	Other Incidental	472596, 4884989	0	0	1
7285	White-tailed Deer	Sign	-	Other Incidental	472034, 4885823	0	0	1
7287	White-tailed Deer	Sign	-	TEM SWH	472293, 4887424	0	0	1
7289	White-tailed Deer	Visual	2	Other Incidental	472197, 4889890	0	0	1
7289	White-tailed Deer	Sign	high density	Other Incidental	472168, 4889725	0	0	1
7370	White-tailed Deer	Sign	-	TEM SWH	473378, 4870520	0	1	1
7373	White-tailed Deer	Sign	-	Other Incidental	473042, 4873631	1	1	1
7373	White-tailed Deer	Sign	high density	Other Incidental	473379, 4873989	1	1	1
7373	Wild Turkey	Visual	10	Other Incidental	473528, 4873762	1	1	1
7374	White-tailed Deer	Sign	-	Other Incidental	473248, 4874868	1	1	1
7375	White-tailed Deer	Sign	-	Other Incidental	473132, 4875376	0	1	1
7385	White-tailed Deer	Sign	-	Other Incidental	473526, 4885455	0	0	1
7388	White-tailed Deer	Visual	1	Other Incidental	473182, 4888456	0	0	1
7473	White-tailed Deer	Visual	1	Other Incidental	474130, 4873795	1	1	1
7473	White-tailed Deer	Visual	1	Other Incidental	474577, 4873652	1	1	1
7476	White-tailed Deer	Sign	-	Other Incidental	474967, 4876841	0	0	1
7477	White-tailed Deer	Sign	-	Other Incidental	474799, 4877108	0	0	1
7689	White-tailed Deer	Sign	-	Other Incidental	476166, 4889403	0	0	1

Table D-24. Supplemental data for desk-based observations relevant to Seeps and Springs.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
6478	Ruffed Grouse	U	464570, 4878434	0	0	1
6792	White-tailed Deer	U	467727, 4892522	0	0	1
6882	Wild Turkey	7	468519, 4882206	0	0	1
6887	Wild Turkey	2	468134, 4887028	0	0	1
6889	Wild Turkey	U	468719, 4889066	0	0	1
6891	Wild Turkey	2	468490, 4891288	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
6893	Wild Turkey	3	468122, 4893235	0	0	1
6894	Wild Turkey	3	468965, 4894778	0	0	1
6894	Wild Turkey	1	468965, 4894778	0	0	1
6970	Ruffed Grouse	U	470000, 4870000	0	0	1
6990	Ruffed Grouse	U	470000, 4890000	0	0	1
6994	Wild Turkey	1	469391, 4894512	0	0	1
7079	Ruffed Grouse	U	470000, 4880000	0	0	1
7087	Ruffed Grouse	1	470927, 4887732	0	0	1
7087	Wild Turkey	8	470927, 4887732	0	0	1
7087	Wild Turkey	U	470927, 4887732	0	0	1
7087	Wild Turkey	U	470927, 4887732	0	0	1
7187	Ruffed Grouse	1	471769, 4887884	0	0	1
7187	Wild Turkey	U	471971, 4887831	0	0	1
7187	Wild Turkey	2	471769, 4887884	0	0	1
7187	Wild Turkey	2	471769, 4887884	0	0	1
7188	Wild Turkey	5	471091, 4888080	0	0	1
7188	Wild Turkey	1	471091, 4888080	0	0	1
7188	Wild Turkey	1	471091, 4888080	0	0	1
7189	Ruffed Grouse	1	471067, 4889252	0	0	1
7189	Ruffed Grouse	1	471067, 4889252	0	0	1
7189	Ruffed Grouse	2	471067, 4889252	0	0	1
7189	Ruffed Grouse	1	471067, 4889252	0	0	1
7189	Ruffed Grouse	1	471067, 4889252	0	0	1
7189	Ruffed Grouse	1	471067, 4889252	0	0	1
7189	Ruffed Grouse	2	471067, 4889252	0	0	1
7189	Ruffed Grouse	1	471067, 4889252	0	0	1
7189	Ruffed Grouse	2	471067, 4889252	0	0	1
7189	Wild Turkey	1	471067, 4889252	0	0	1
7189	Wild Turkey	1	471067, 4889252	0	0	1
7189	Wild Turkey	1	471067, 4889252	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
7189	Wild Turkey	3	471067, 4889252	0	0	1
7189	Wild Turkey	2	471067, 4889252	0	0	1
7189	Wild Turkey	1	471067, 4889252	0	0	1
7189	Wild Turkey	2	471067, 4889252	0	0	1
7189	Wild Turkey	1	471067, 4889252	0	0	1
7189	Wild Turkey	1	471067, 4889252	0	0	1
7189	Wild Turkey	12	471067, 4889252	0	0	1
7192	Ruffed Grouse	1	471459, 4892136	0	0	1
7192	Ruffed Grouse	1	471459, 4892136	0	0	1
7192	Wild Turkey	17	471459, 4892136	0	0	1
7192	Wild Turkey	8	471459, 4892136	0	0	1
7192	Wild Turkey	19	471459, 4892136	0	0	1
7192	Wild Turkey	4	471459, 4892136	0	0	1
7192	Wild Turkey	10	471459, 4892136	0	0	1
7192	Wild Turkey	2	471459, 4892136	0	0	1
7192	Wild Turkey	6	471459, 4892136	0	0	1
7192	Wild Turkey	1	471459, 4892136	0	0	1
7290	Ruffed Grouse	12	472462, 4890105	0	0	1
7369	Ruffed Grouse	1	473155, 4869453	0	0	1
7369	Ruffed Grouse	4	473155, 4869453	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	2	473155, 4869453	0	0	1
7369	Ruffed Grouse	2	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	4	473155, 4869453	0	0	1
7369	Ruffed Grouse	3	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	3	473155, 4869453	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	2	473155, 4869453	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	3	473265, 4869455	0	0	1
7369	Ruffed Grouse	3	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473265, 4869455	0	0	1
7369	Ruffed Grouse	2	473265, 4869455	0	0	1
7369	Ruffed Grouse	2	473265, 4869455	0	0	1
7369	Ruffed Grouse	1	473155, 4869453	0	0	1
7369	Ruffed Grouse	2	473155, 4869453	0	0	1
7369	Wild Turkey	2	473265, 4869455	0	0	1
7369	Wild Turkey	1	473265, 4869455	0	0	1
7369	Wild Turkey	3	473265, 4869455	0	0	1
7369	Wild Turkey	6	473265, 4869455	0	0	1
7369	Wild Turkey	2	473265, 4869455	0	0	1
7369	Wild Turkey	60	473265, 4869455	0	0	1
7369	Wild Turkey	1	473265, 4869455	0	0	1
7369	Wild Turkey	1	473155, 4869453	0	0	1
7369	Wild Turkey	2	473265, 4869455	0	0	1
7369	Wild Turkey	U	473155, 4869453	0	0	1
7369	Wild Turkey	1	473265, 4869455	0	0	1
7369	Wild Turkey	2	473155, 4869453	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{ECO}
7369	Wild Turkey	8	473265, 4869455	0	0	1
7369	Wild Turkey	U	473155, 4869453	0	0	1
7369	Wild Turkey	7	473265, 4869455	0	0	1
7369	Wild Turkey	3	473265, 4869455	0	0	1
7369	Wild Turkey	U	473155, 4869453	0	0	1
7369	Wild Turkey	1	473265, 4869455	0	0	1
7370	Ruffed Grouse	3	473144, 4870137	0	1	1
7370	Ruffed Grouse	1	473310, 4870415	0	1	1
7370	Ruffed Grouse	2	473310, 4870415	0	1	1
7370	Ruffed Grouse	1	473310, 4870415	0	1	1
7370	Ruffed Grouse	1	473310, 4870415	0	1	1
7370	Ruffed Grouse	1	473310, 4870415	0	1	1
7370	Ruffed Grouse	1	473310, 4870415	0	1	1
7370	Wild Turkey	2	473310, 4870415	0	1	1
7370	Wild Turkey	2	473310, 4870415	0	1	1
7370	Wild Turkey	U	473144, 4870137	0	1	1
7370	Wild Turkey	14	473310, 4870415	0	1	1
7375	Ruffed Grouse	4	473134, 4875394	0	1	1
7375	Wild Turkey	6	473134, 4875394	0	1	1
7389	Ruffed Grouse	U	473684, 4889663	0	0	1
7465	Ruffed Grouse	10	474044, 4865721	0	0	1
7465	Wild Turkey	4	474044, 4865721	0	0	1
7590	Ruffed Grouse	3	475329, 4890898	0	0	1
7590	Wild Turkey	2	475316, 4890806	0	0	1
7590	Wild Turkey	1	475329, 4890898	0	0	1
7590	Wild Turkey	1	475329, 4890898	0	0	1
7590	Wild Turkey	U	475329, 4890898	0	0	1
7764	Ruffed Grouse	1	477644, 4864129	0	0	1
7764	Wild Turkey	10	477639, 4864107	0	0	1
7764	Wild Turkey	6	477780, 4864202	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Amphibian Breeding Habitat (Woodland) - North $RSA_{HRP-AQU}$

Figure D-21a

- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake or Pond ≥ 500m²
- Pond < 500m²
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [491]

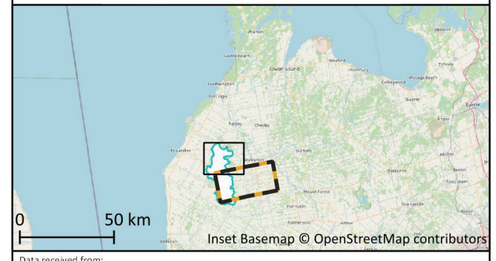
Ecosites that Match SWH Criteria*

- Conifer [81]
- Mixedwood [272]
- Hardwood [488]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]

1:65,000

0 1 2 km

ZOETICA



Observation Location

1km x 1km grid square with observations

Species Observed

Desk-Based (GBIF) [6]

- Eastern Newt [1]
- Gray Treefrog [1]
- Four-toed Salamander [1]
- Wood Frog [2]
- Western Chorus Frog [1]

Field Incidental [91]

- American Toad [9]
- Eastern Newt [1]
- Gray Treefrog [5]
- Spring Peeper [20]
- Wood Frog [37]
- Unk. Frog [12]
- Unk. Amphibian [7]

Observation Type (Fieldwork Only)

- Potential breeding habitat [3]
- Visual [18]
- Visual Juvenile [29]
- Visual Tadpole [4]
- Unspecified [14]
- Vocal [23]

Candidate SWH in Plot

Yes [394] Unknown [38] No [41]

*Amphibian Breeding Habitat (Woodland) require the presence of a wetland, pond, or woodland pool >500m². Lakes or ponds that meet this requirement are highlighted on this map, but field studies are required before ecosite polygons can no longer be considered candidates.

Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: DM
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Amphibian Breeding Habitat (Woodland) - South $RSA_{HRP-AQU}$

Figure D-21b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake or Pond ≥ 500m²
- Pond < 500m²
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [491]

Ecosites that Match SWH Criteria

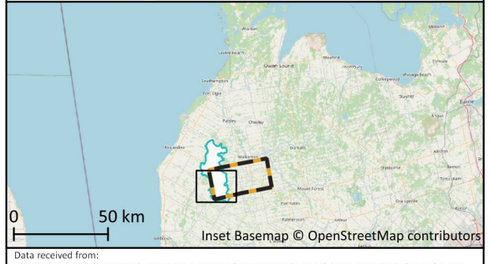
- Conifer [81]
- Mixedwood [272]
- Hardwood [488]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]

See Figure D-21a for Full Legend

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Amphibian Breeding Habitat (Woodland) - AOI

Figure D-21c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake or Pond ≥ $500m^2$
- Pond < $500m^2$
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [491]

Ecosites that Match SWH Criteria

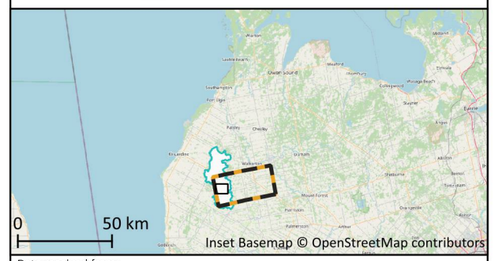
- Conifer [81]
- Mixedwood [272]
- Hardwood [488]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]

See Figure D-21a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI
GBIF.org — GBIF Occurence Download - Accessed Oct 2021

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-25. Supplemental data for 2022 field-based incidental observations relevant to Amphibian Breeding Habitat (Woodland).

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
6783	American Toad	Unspecified	>1	TEM SWH	467919, 4883668	0	0	1
6783	Spring Peeper	Unspecified	>1	TEM SWH	467919, 4883668	0	0	1
6783	Wood Frog	Unspecified	1	TEM SWH	467919, 4883668	0	0	1
6889	Gray Treefrog	Vocal	1	TEM SWH	468743, 4889195	0	0	1
6977	Spring Peeper	Vocal	1	Potential SWH Incidental	469864, 4877947	0	0	1
6977	Wood Frog	Visual (juv)	3	Potential SWH Incidental	469893, 4877775	0	0	1
6977	Wood Frog	Visual (juv)	1	Potential SWH Incidental	469893, 4877775	0	0	1
6977	Wood Frog	Visual	1	Potential SWH Incidental	469867, 4877939	0	0	1
6983	Spring Peeper	Visual (juv)	1	Potential SWH Incidental	469514, 4883727	0	0	1
6983	Wood Frog	Visual	1	Potential SWH Incidental	469514, 4883727	0	0	1
6983	Wood Frog	Visual (juv)	5	Potential SWH Incidental	469514, 4883727	0	0	1
6983	Wood Frog	Visual (juv)	3	Potential SWH Incidental	469228, 4883839	0	0	1
6983	Wood Frog	Visual (juv)	2	Potential SWH Incidental	469228, 4883839	0	0	1
6983	Wood Frog	Unspecified	>1	TEM SWH	469243, 4883836	0	0	1
6984	Wood Frog	Visual (juv)	1	Potential SWH Incidental	469198, 4884127	0	0	1
6984	Wood Frog	Visual	>1	TEM SWH	469193, 4884125	0	0	1
6985	Frog species	Unspecified	>1	TEM SWH	469828, 4885666	0	0	1
7064	Frog species	Vocal	>1	Other Incidental	470411, 4864695	0	0	1
7065	Amphibian species	Unspecified	>1	TEM SWH	470786, 4865319	0	0	1
7066	Frog species	Visual (tadpole)	>1	Other Incidental	470684, 4866395	0	0	1
7073	American Toad	Visual	>1	Other Incidental	470484, 4873689	1	1	1
7073	Wood Frog	Visual (juv)	>1	Other Incidental	470471, 4873683	1	1	1
7077	American Toad	Visual	1	TEM SWH	470163, 4877001	0	0	1
7077	American Toad	Visual	1	TEM SWH	470203, 4877034	0	0	1
7077	Spring Peeper	Visual (juv)	1	TEM SWH	470163, 4877001	0	0	1
7077	Spring Peeper	Visual	1	TEM SWH	470012, 4877082	0	0	1
7077	Wood Frog	Visual	1	TEM SWH	470203, 4877034	0	0	1
7078	Spring Peeper	Vocal	1	Potential SWH Incidental	470143, 4878149	0	0	1
7085	Spring Peeper	Vocal	1	Potential SWH Incidental	470872, 4885147	0	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7087	Frog species	Visual (tadpole)	>1	Other Incidental	470885, 4887400	0	0	1
7087	Frog species	Visual	>1	Other Incidental	470885, 4887400	0	0	1
7088	Frog species	Unspecified	1	TEM SWH	470660, 4888812	0	0	1
7088	Wood Frog	Visual	>1	TEM SWH	470345, 4888155	0	0	1
7090	Wood Frog	Unspecified	>1	TEM SWH	470655, 4890594	0	0	1
7167	Spring Peeper	Vocal	1	Potential SWH Incidental	471409, 4867938	0	0	1
7168	Frog species	Vocal	>1	Other Incidental	471315, 4868750	0	0	1
7168	Frog species	Vocal	>1	Other Incidental	471315, 4868750	0	0	1
7168	Gray Treefrog	Vocal	1	Potential SWH Incidental	471205, 4868259	0	0	1
7168	Spring Peeper	Vocal	1	Potential SWH Incidental	471205, 4868258	0	0	1
7169	Wood Frog	Unspecified	1	TEM SWH	471998, 4869409	0	0	1
7172	Amphibian species	Visual (tadpole)	1	Other Incidental	471575, 4872512	1	1	1
7173	Wood Frog	Visual (juv)	1	TEM SWH	471136, 4873834	1	1	1
7174	Eastern Newt	Visual (juv)	1	Potential SWH Incidental	471519, 4874147	1	1	1
7174	Frog species	Visual (tadpole)	>1	Other Incidental	471066, 4874055	1	1	1
7174	Frog species	Visual (tadpole)	>1	Other Incidental	471066, 4874055	1	1	1
7174	Frog species	Unspecified	>1	Other Incidental	471066, 4874055	1	1	1
7174	Frog species	Unspecified	>1	Other Incidental	471066, 4874055	1	1	1
7174	Gray Treefrog	Vocal	1	Potential SWH Incidental	471548, 4874205	1	1	1
7174	Spring Peeper	Vocal	1	Potential SWH Incidental	471191, 4874530	1	1	1
7174	Spring Peeper	Vocal	3	Potential SWH Incidental	471233, 4874717	1	1	1
7174	Spring Peeper	Vocal	1	Potential SWH Incidental	471512, 4874139	1	1	1
7184	Spring Peeper	Vocal	1	Potential SWH Incidental	471045, 4884549	0	0	1
7184	Spring Peeper	Vocal	1	Potential SWH Incidental	471259, 4884658	0	0	1
7184	Spring Peeper	Vocal	1	Potential SWH Incidental	471530, 4884703	0	0	1
7184	Wood Frog	Visual	1	Potential SWH Incidental	471258, 4884658	0	0	1
7184	Wood Frog	Unspecified	1	TEM SWH	471894, 4884698	0	0	1
7185	American Toad	Visual (juv)	>1	TEM SWH	471423, 4885887	0	0	1
7185	American Toad	Visual (juv)	>1	TEM SWH	471744, 4885404	0	0	1
7185	Amphibian species	Visual (juv)	>1	TEM SWH	471885, 4885648	0	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7185	Amphibian species	Visual (juv)	>1	TEM SWH	471423, 4885887	0	0	1
7185	Wood Frog	Visual (juv)	>1	TEM SWH	471423, 4885887	0	0	1
7185	Wood Frog	Visual (juv)	>1	TEM SWH	471744, 4885404	0	0	1
7186	Wood Frog	Visual	1	TEM SWH	471677, 4886811	0	0	1
7188	Gray Treefrog	Vocal	1	Potential SWH Incidental	471313, 4888871	0	0	1
7188	Spring Peeper	Vocal	1	Potential SWH Incidental	471313, 4888871	0	0	1
7265	Gray Treefrog	Vocal	1	TEM SWH	472499, 4865789	0	0	1
7269	Wood Frog	Visual	1	Potential SWH Incidental	472001, 4869407	0	0	1
7272	Frog species	Vocal	>1	Other Incidental	472818, 4872959	1	1	1
7272	Frog species	Vocal	>1	Other Incidental	472818, 4872959	1	1	1
7277	Amphibian species	Potential breeding habitat	1	Potential SWH Incidental	472387, 4877662	0	0	1
7277	Amphibian species	Potential breeding habitat	1	Potential SWH Incidental	472569, 4877501	0	0	1
7277	Wood Frog	Visual	1	Potential SWH Incidental	472557, 4877866	0	0	1
7278	Spring Peeper	Vocal	1	Potential SWH Incidental	472292, 4878231	0	0	1
7278	Spring Peeper	Vocal	1	Potential SWH Incidental	472366, 4878403	0	0	1
7278	Spring Peeper	Vocal	1	Potential SWH Incidental	472112, 4878203	0	0	1
7278	Wood Frog	Visual (juv)	1	Potential SWH Incidental	472116, 4878200	0	0	1
7278	Wood Frog	Visual (juv)	1	Potential SWH Incidental	472307, 4878403	0	0	1
7279	American Toad	Visual	1	TEM SWH	472525, 4879908	0	0	1
7285	Spring Peeper	Unspecified	1	TEM SWH	472591, 4885500	0	0	1
7285	Wood Frog	Visual (juv)	3	Potential SWH Incidental	472334, 4885686	0	0	1
7285	Wood Frog	Visual (juv)	4	Potential SWH Incidental	472184, 4885604	0	0	1
7285	Wood Frog	Visual (juv)	>1	TEM SWH	472334, 4885686	0	0	1
7289	Amphibian species	Potential breeding habitat	1	Potential SWH Incidental	472686, 4889511	0	0	1
7370	Wood Frog	Visual	"multiple"	TEM SWH	473378, 4870520	0	1	1
7372	Wood Frog	Visual	1	Potential SWH Incidental	473002, 4872292	1	1	1
7384	Wood Frog	Visual (juv)	100	Potential SWH Incidental	473638, 4884965	0	0	1
7384	Wood Frog	Visual (juv)	100	Potential SWH Incidental	473625, 4884934	0	0	1
7384	Wood Frog	Visual (juv)	1	Potential SWH Incidental	473712, 4884786	0	0	1
7384	Wood Frog	Visual (juv)	>1	TEM SWH	473716, 4884792	0	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7385	American Toad	Visual (juv)	1	Potential SWH Incidental	473530, 4885313	0	0	1
7385	American Toad	Visual (juv)	>1	TEM SWH	473395, 4885814	0	0	1
7385	Wood Frog	Visual (juv)	5	Potential SWH Incidental	473607, 4885046	0	0	1
7385	Wood Frog	Visual (juv)	3	Potential SWH Incidental	473530, 4885313	0	0	1
7491	Wood Frog	Visual (juv)	>1	TEM SWH	474836, 4891062	0	0	1
7577	Wood Frog	Visual (juv)	1	TEM SWH	475102, 4877116	0	0	1
7589	Frog species	Unspecified	>1	TEM SWH	475218, 4889592	0	0	1
7589	Wood Frog	Visual	1	Potential SWH Incidental	475540, 4889915	0	0	1
7590	Frog species	Unspecified	"many"	Other Incidental	475131, 4890532	0	0	1

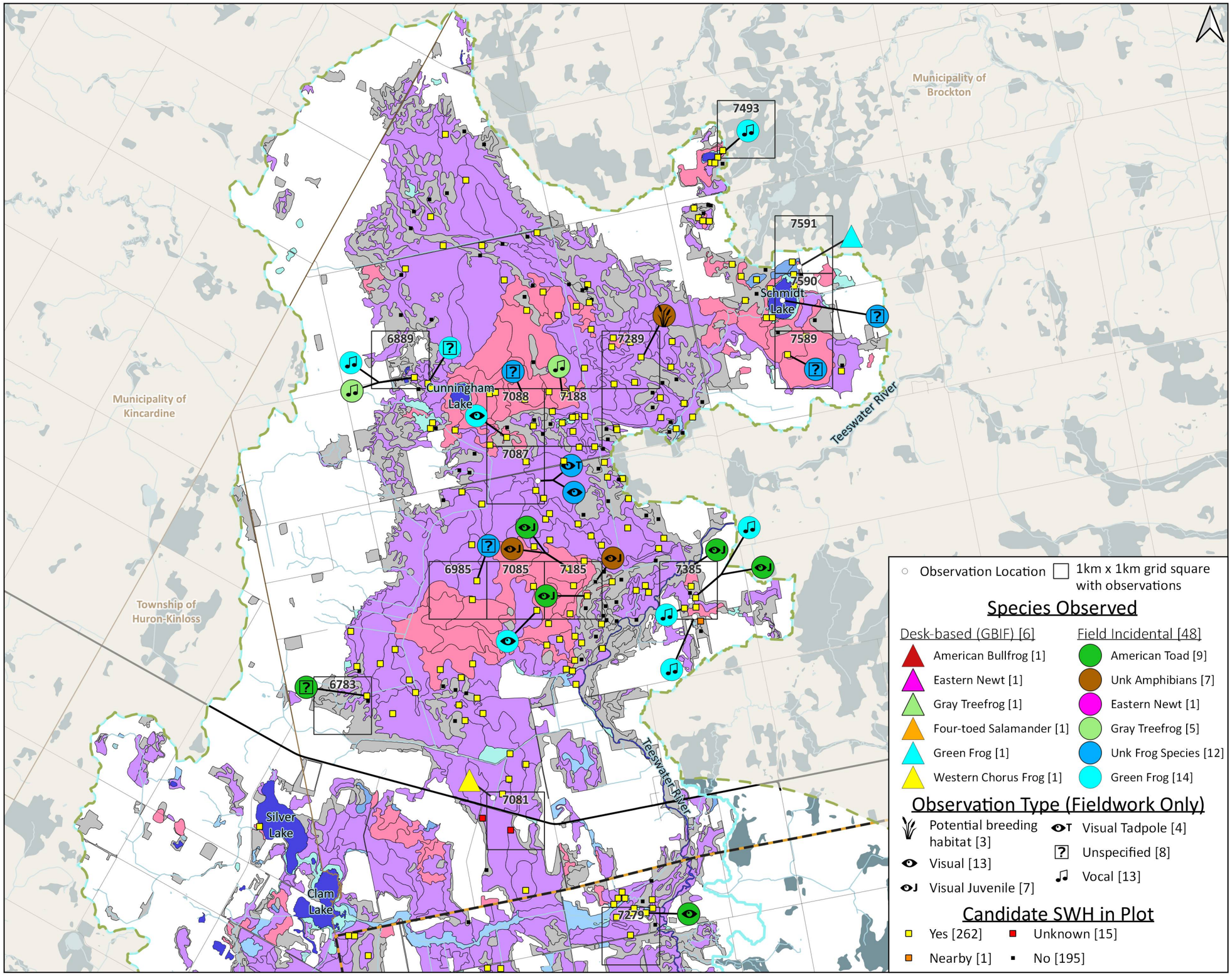
Table D-26. Supplemental data for desk-based observations relevant to Amphibian Breeding Habitat (Woodland).

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
6772	Gray Treefrog	U	467306, 4872059	0	0	1
7081	Western Chorus Frog - Great Lakes - St. Lawrence - Canadian Shield population	U	-	0	0	1
7081	Wood Frog	U	470014, 4881909	0	0	1
7091	Wood Frog	U	470592, 4891480	0	0	1
7164	Four-toed Salamander	U	471443, 4864107	0	0	1
7364	Eastern Newt	U	473465, 4864232	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Amphibian Breeding Habitat (Wetlands) - North $RSA_{HRP-AQU}$

Figure D-22a



- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1085]

Ecosites that Match SWH Criteria

- Lake or River [30]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]
- Shrub Swamp [55]
- Marsh [160]
- Fen [2]

- Observation Location
- 1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [6]

- American Bullfrog [1]
- Eastern Newt [1]
- Gray Treefrog [1]
- Four-toed Salamander [1]
- Green Frog [1]
- Western Chorus Frog [1]

Field Incidental [48]

- American Toad [9]
- Unk Amphibians [7]
- Eastern Newt [1]
- Gray Treefrog [5]
- Unk Frog Species [12]
- Green Frog [14]

Observation Type (Fieldwork Only)

- Potential breeding habitat [3]
- Visual [13]
- Visual Juvenile [7]
- Visual Tadpole [4]
- Unspecified [8]
- Vocal [13]

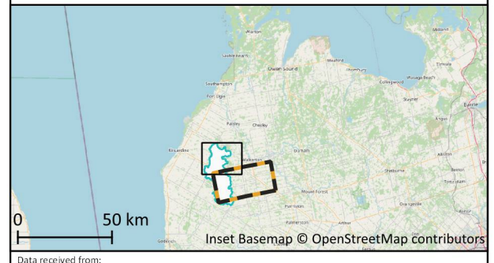
Candidate SWH in Plot

- Yes [262]
- Unknown [15]
- Nearby [1]
- No [195]

1:65,000

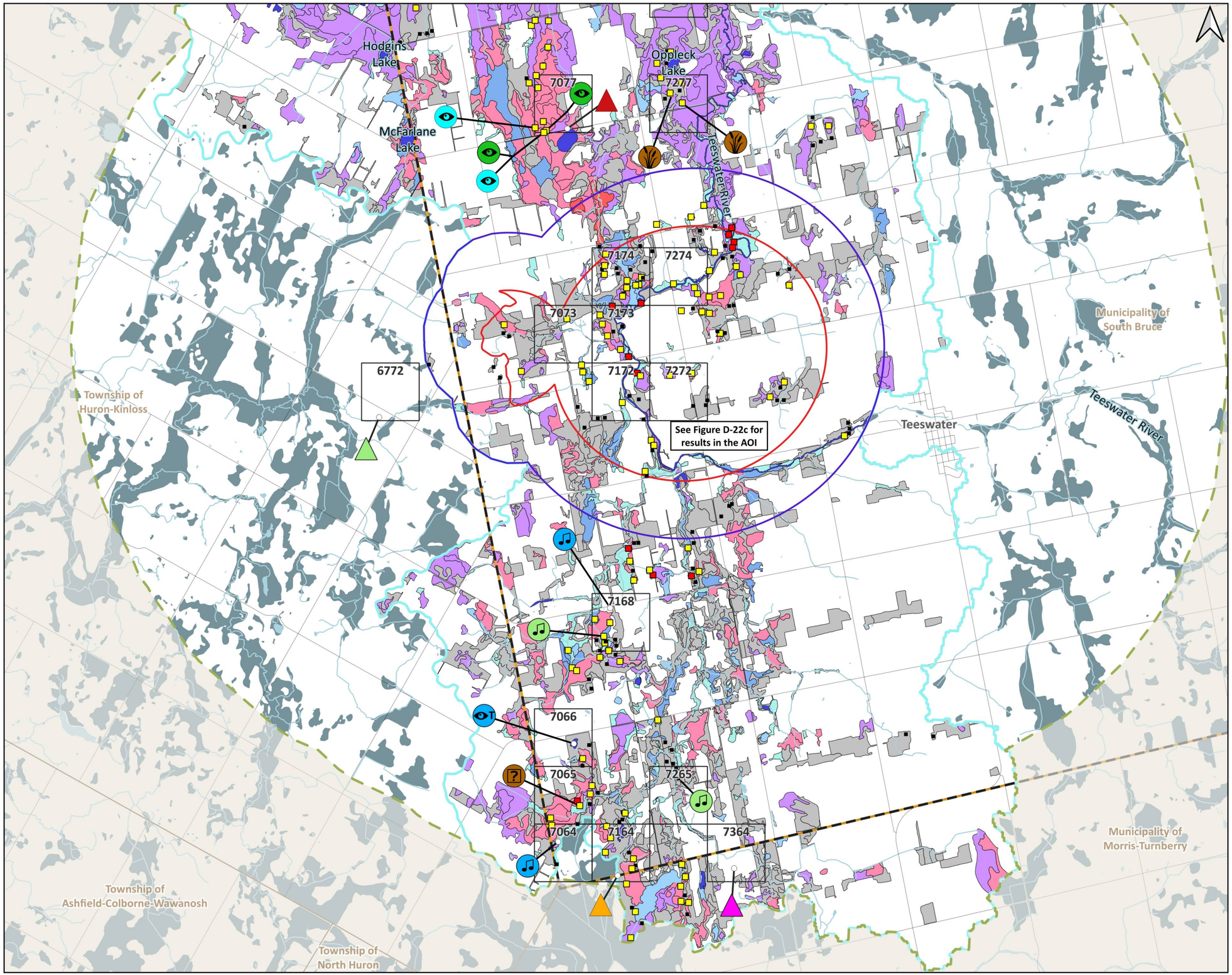
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Amphibian Breeding Habitat (Wetlands) - South $RSA_{HRP-AQU}$

Figure D-22b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1085]

Ecosites that Match SWH Criteria

- Lake or River [30]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]
- Shrub Swamp [55]
- Marsh [160]
- Fen [2]

See Figure D-22a for Full Legend

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Amphibian Breeding Habitat (Wetlands) - AOI

Figure D-22c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1085]

Ecosites that Match SWH Criteria

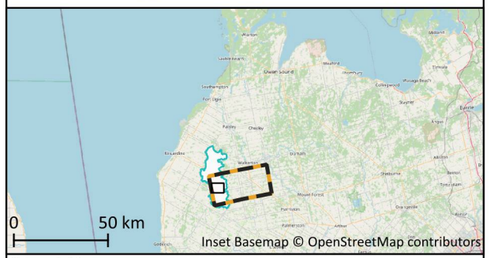
- Lake or River [30]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]
- Shrub Swamp [55]
- Marsh [160]
- Fen [2]

See Figure D-22a for Full Legend

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0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-27. Supplemental data for 2022 field-based incidental observations relevant to Amphibian Breeding Habitat (Wetlands).

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
6783	American Toad	Unspecified	>1	TEM SWH	467919, 4883668	0	0	1
6889	Gray Treefrog	Vocal	1	TEM SWH	468743, 4889195	0	0	1
6889	Green Frog	Vocal	1	TEM SWH	468743, 4889195	0	0	1
6889	Green Frog	Unspecified	"many"	TEM SWH	468978, 4889092	0	0	1
6985	Frog species	Unspecified	>1	TEM SWH	469828, 4885666	0	0	1
7064	Frog species	Vocal	>1	Other Incidental	470411, 4864695	0	0	1
7065	Amphibian species	Unspecified	>1	TEM SWH	470786, 4865319	0	0	1
7066	Frog species	Visual (tadpole)	>1	Other Incidental	470684, 4866395	0	0	1
7073	American Toad	Visual	>1	Other Incidental	470484, 4873689	1	1	1
7077	American Toad	Visual	1	TEM SWH	470163, 4877001	0	0	1
7077	American Toad	Visual	1	TEM SWH	470203, 4877034	0	0	1
7077	Green Frog	Visual	1	TEM SWH	470163, 4877001	0	0	1
7077	Green Frog	Visual	1	TEM SWH	470012, 4877082	0	0	1
7085	Green Frog	Visual	1	Potential SWH Incidental	470873, 4885146	0	0	1
7087	Frog species	Visual (tadpole)	>1	Other Incidental	470885, 4887400	0	0	1
7087	Frog species	Visual	>1	Other Incidental	470885, 4887400	0	0	1
7088	Frog species	Unspecified	1	TEM SWH	470660, 4888812	0	0	1
7088	Green Frog	Visual	>1	TEM SWH	470345, 4888155	0	0	1
7168	Frog species	Vocal	>1	Other Incidental	471315, 4868750	0	0	1
7168	Frog species	Vocal	>1	Other Incidental	471315, 4868750	0	0	1
7168	Gray Treefrog	Vocal	1	Potential SWH Incidental	471205, 4868259	0	0	1
7172	Amphibian species	Visual (tadpole)	1	Other Incidental	471575, 4872512	1	1	1
7173	Green Frog	Visual	1	Potential SWH Incidental	471497, 4873244	1	1	1
7174	Eastern Newt	Visual (juv)	1	Potential SWH Incidental	471519, 4874147	1	1	1
7174	Frog species	Visual (tadpole)	>1	Other Incidental	471066, 4874055	1	1	1
7174	Frog species	Visual (tadpole)	>1	Other Incidental	471066, 4874055	1	1	1
7174	Frog species	Unspecified	>1	Other Incidental	471066, 4874055	1	1	1
7174	Frog species	Unspecified	>1	Other Incidental	471066, 4874055	1	1	1
7174	Gray Treefrog	Vocal	1	Potential SWH Incidental	471548, 4874205	1	1	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7174	Green Frog	Visual	1	Potential SWH Incidental	471507, 4874121	1	1	1
7185	American Toad	Visual (juv)	>1	TEM SWH	471423, 4885887	0	0	1
7185	American Toad	Visual (juv)	>1	TEM SWH	471744, 4885404	0	0	1
7185	Amphibian species	Visual (juv)	>1	TEM SWH	471885, 4885648	0	0	1
7185	Amphibian species	Visual (juv)	>1	TEM SWH	471423, 4885887	0	0	1
7188	Gray Treefrog	Vocal	1	Potential SWH Incidental	471313, 4888871	0	0	1
7265	Gray Treefrog	Vocal	1	TEM SWH	472499, 4865789	0	0	1
7272	Frog species	Vocal	>1	Other Incidental	472818, 4872959	1	1	1
7272	Frog species	Vocal	>1	Other Incidental	472818, 4872959	1	1	1
7274	Green Frog	Visual	1	Potential SWH Incidental	472829, 4874203	1	1	1
7274	Green Frog	Visual	1	Potential SWH Incidental	472773, 4874309	1	1	1
7277	Amphibian species	Potential breeding habitat	1	Potential SWH Incidental	472387, 4877662	0	0	1
7277	Amphibian species	Potential breeding habitat	1	Potential SWH Incidental	472569, 4877501	0	0	1
7279	American Toad	Visual	1	TEM SWH	472525, 4879908	0	0	1
7289	Amphibian species	Potential breeding habitat	1	Potential SWH Incidental	472686, 4889511	0	0	1
7385	American Toad	Visual (juv)	1	Potential SWH Incidental	473530, 4885313	0	0	1
7385	American Toad	Visual (juv)	>1	TEM SWH	473395, 4885814	0	0	1
7385	Green Frog	Vocal	2	Potential SWH Incidental	473607, 4885046	0	0	1
7385	Green Frog	Vocal	3	Potential SWH Incidental	473530, 4885313	0	0	1
7385	Green Frog	Vocal	>1	TEM SWH	473429, 4885191	0	0	1
7493	Green Frog	Vocal	1	TEM SWH	474007, 4893016	0	0	1
7589	Frog species	Unspecified	>1	TEM SWH	475218, 4889592	0	0	1
7590	Frog species	Unspecified	"many"	Other Incidental	475131, 4890532	0	0	1

Table D-28. Supplemental data for desk-based observations relevant to Amphibian Breeding Habitat (Wetlands).

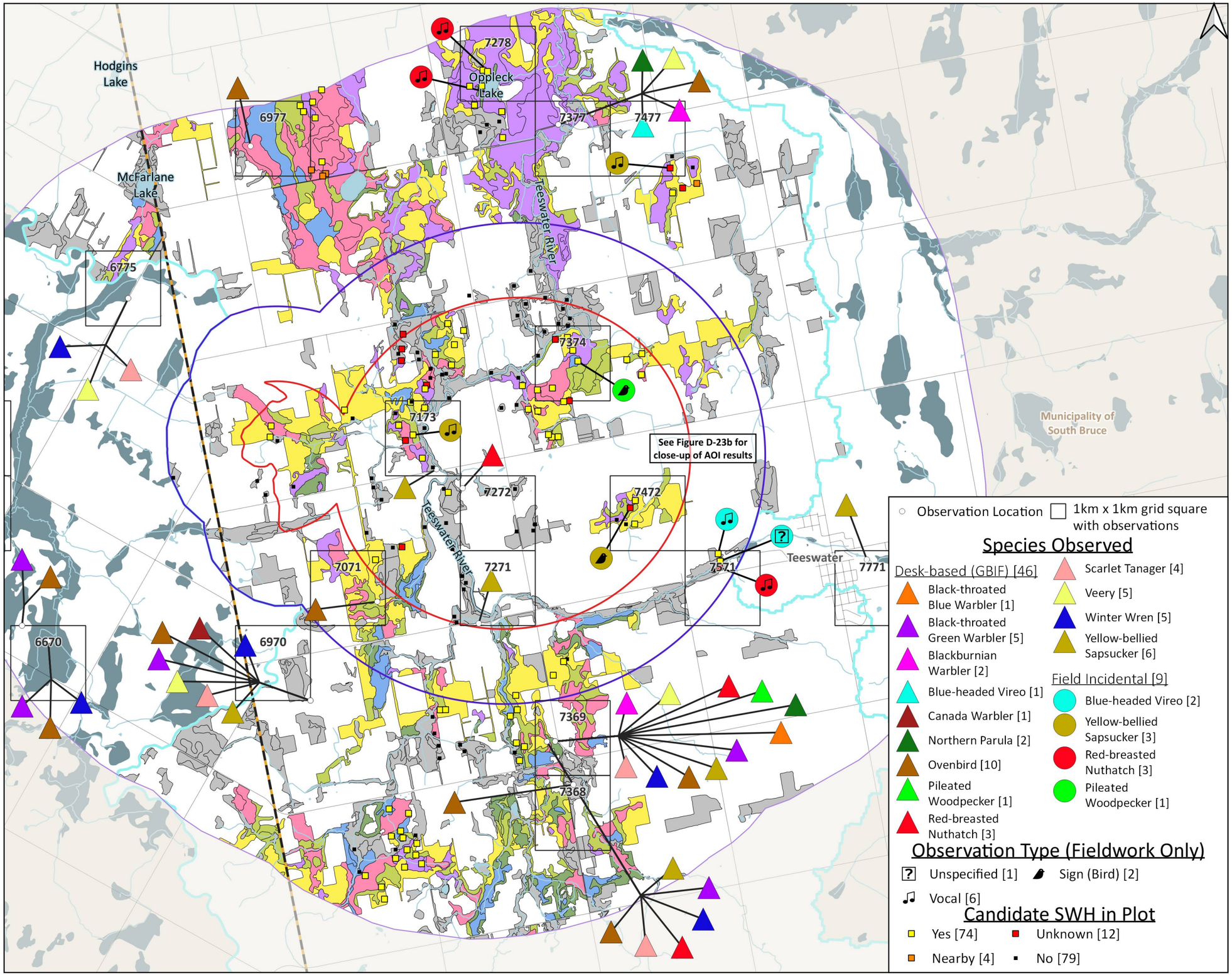
Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
6772	Gray Treefrog	U	467306, 4872059	0	0	1
7077	American Bullfrog	U	470572, 4877067	0	0	1
7081	Western Chorus Frog - Great Lakes - St. Lawrence - Canadian Shield population	U	-	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7164	Four-toed Salamander	U	471443, 4864107	0	0	1
7364	Eastern Newt	U	473465, 4864232	0	0	1
7591	Green Frog	U	475421, 4891116	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Woodland Area-Sensitive Bird Breeding Habitat - RSA_{AVI}

Figure D-23a



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AVI})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [480]

Ecosites that Match SWH Criteria

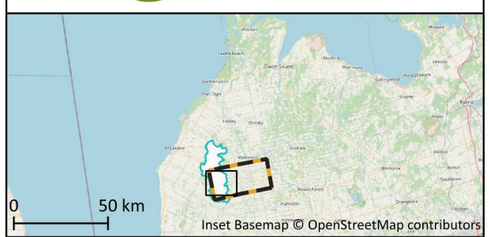
- Conifer [42]
- Mixedwood [101]
- Hardwood [102]
- Conifer Swamp [39]
- Mixedwood Swamp [84]
- Hardwood Swamp [77]

Woodland Area-Sensitive Bird Breeding SWH were refined to only include polygons that meet the area requirement (>30ha).

1:50,000

0 1 2 km

ZOETICA



- Observation Location
- 1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [46]

- Black-throated Blue Warbler [1]
- Black-throated Green Warbler [5]
- Blackburnian Warbler [2]
- Blue-headed Vireo [1]
- Canada Warbler [1]
- Northern Parula [2]
- Ovenbird [10]
- Pileated Woodpecker [1]
- Red-breasted Nuthatch [3]
- Scarlet Tanager [4]
- Veery [5]
- Winter Wren [5]
- Yellow-bellied Sapsucker [6]

Field Incidental [9]

- Blue-headed Vireo [2]
- Yellow-bellied Sapsucker [3]
- Red-breasted Nuthatch [3]
- Pileated Woodpecker [1]

Observation Type (Fieldwork Only)

- Unspecified [1]
- Sign (Bird) [2]
- Vocal [6]

Candidate SWH in Plot

- Yes [74]
- Unknown [12]
- Nearby [4]
- No [79]

Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Woodland Area-Sensitive Bird Breeding Habitat - AOI

Figure D-23b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [480]

Ecosites that Match SWH Criteria

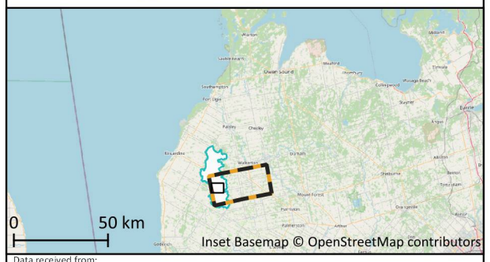
- Conifer [42]
- Mixedwood [101]
- Hardwood [102]
- Conifer Swamp [39]
- Mixedwood Swamp [84]
- Hardwood Swamp [77]

See Figure D-23a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-29. Supplemental data for 2022 field-based incidental observations relevant to Woodland Area-Sensitive Bird Breeding Habitat.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
7173	Yellow-bellied Sapsucker	Vocal	1	TEM SWH	471368, 4873545	1	1	1
7278	Red-breasted Nuthatch	Vocal	1	Other Incidental	472482, 4878093	0	0	1
7278	Red-breasted Nuthatch	Vocal	1	Other Incidental	472366, 4878403	0	0	1
7374	Pileated Woodpecker	Sign	med density	Other Incidental	473574, 4874521	1	1	1
7472	Yellow-bellied Sapsucker	Sign	>1	TEM SWH	474266, 4872573	1	1	1
7477	Yellow-bellied Sapsucker	Vocal	1	Other Incidental	474800, 4877108	0	0	1
7571	Blue-headed Vireo	Vocal	1	TEM SWH	475441, 4871960	0	1	1
7571	Blue-headed Vireo	Unspecified	1	TEM SWH	475467, 4871861	0	1	1
7571	Red-breasted Nuthatch	Vocal	1	TEM SWH	475458, 4871777	0	1	1

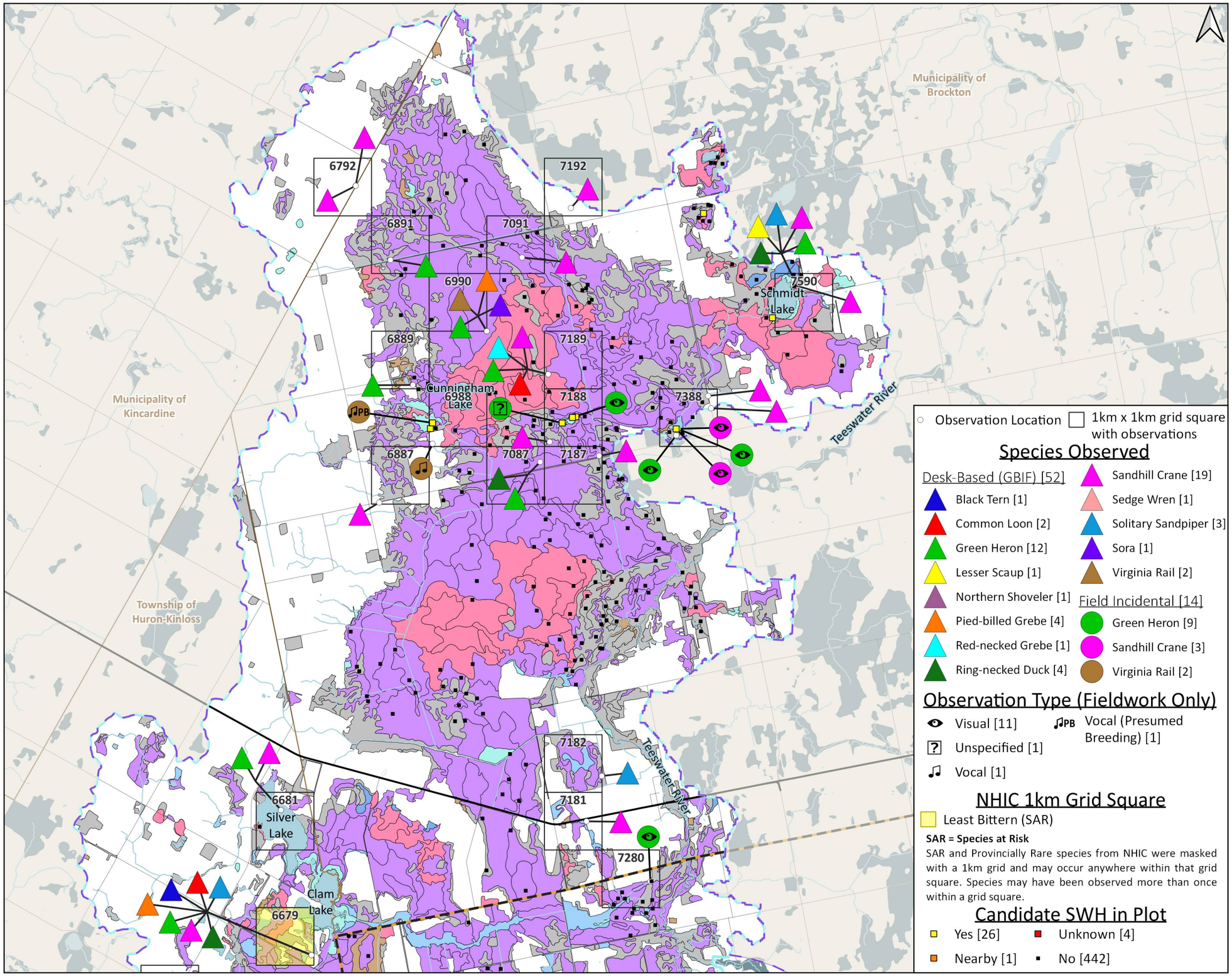
Table D-30. Supplemental data for desk-based observations relevant to Woodland Area-Sensitive Bird Breeding Habitat.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
6572	Veery	1	465404, 4872809	0	0	1
6573	Ovenbird	1	465551, 4873131	0	0	1
6670	Black-throated Green Warbler	1	466500, 4870800	0	0	1
6670	Black-throated Green Warbler	1	466500, 4870800	0	0	1
6670	Black-throated Green Warbler	1	466150, 4871000	0	0	1
6670	Black-throated Green Warbler	1	466500, 4870800	0	0	1
6670	Ovenbird	2	466500, 4870800	0	0	1
6670	Ovenbird	2	466500, 4870800	0	0	1
6670	Ovenbird	2	466500, 4870800	0	0	1
6670	Ovenbird	2	466150, 4871000	0	0	1
6670	Winter Wren	1	466500, 4870800	0	0	1
6670	Winter Wren	1	466500, 4870800	0	0	1
6670	Winter Wren	1	466500, 4870800	0	0	1
6775	Scarlet Tanager	1	467567, 4875369	0	0	1
6775	Scarlet Tanager	1	467567, 4875369	0	0	1
6775	Scarlet Tanager	1	467567, 4875369	0	0	1
6775	Veery	1	467567, 4875369	0	0	1
6775	Veery	1	467567, 4875369	0	0	1
6775	Veery	1	467567, 4875369	0	0	1
6775	Winter Wren	1	467567, 4875369	0	0	1
6775	Winter Wren	1	467567, 4875369	0	0	1
6775	Winter Wren	1	467567, 4875369	0	0	1
6970	Black-throated Green Warbler	U	470000, 4870000	0	0	1
6970	Canada Warbler	U	-	0	0	1
6970	Ovenbird	U	470000, 4870000	0	0	1
6970	Scarlet Tanager	U	470000, 4870000	0	0	1
6970	Veery	U	470000, 4870000	0	0	1
6970	Winter Wren	U	470000, 4870000	0	0	1
6970	Yellow-bellied Sapsucker	U	470000, 4870000	0	0	1
6977	Ovenbird	1	469200, 4877400	0	0	1
7071	Ovenbird	2	470892, 4871320	0	1	1
7173	Yellow-bellied Sapsucker	1	471682, 4873088	1	1	1
7271	Yellow-bellied Sapsucker	1	472246, 4871029	1	1	1
7272	Red-breasted Nuthatch	1	472032, 4872835	1	1	1
7368	Ovenbird	3	473509, 4868877	0	0	1
7369	Blackburnian Warbler	1	473265, 4869455	0	0	1
7369	Blackburnian Warbler	1	473265, 4869455	0	0	1
7369	Blackburnian Warbler	1	473265, 4869455	0	0	1
7369	Blackburnian Warbler	1	473265, 4869455	0	0	1
7369	Blackburnian Warbler	1	473265, 4869455	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
7369	Blackburnian Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Blue Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Blue Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Blue Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Blue Warbler	2	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	4	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	2	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	2	473155, 4869453	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	3	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	4	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	1	473265, 4869455	0	0	1
7369	Black-throated Green Warbler	2	473265, 4869455	0	0	1
7369	Northern Parula	1	473265, 4869455	0	0	1
7369	Ovenbird	1	473265, 4869455	0	0	1
7369	Ovenbird	2	473265, 4869455	0	0	1
7369	Ovenbird	3	473155, 4869453	0	0	1
7369	Ovenbird	3	473265, 4869455	0	0	1
7369	Ovenbird	1	473265, 4869455	0	0	1
7369	Ovenbird	6	473155, 4869453	0	0	1
7369	Ovenbird	1	473265, 4869455	0	0	1
7369	Ovenbird	1	473265, 4869455	0	0	1
7369	Ovenbird	2	473265, 4869455	0	0	1
7369	Ovenbird	1	473265, 4869455	0	0	1
7369	Ovenbird	2	473265, 4869455	0	0	1
7369	Ovenbird	1	473265, 4869455	0	0	1
7369	Pileated Woodpecker	1	473265, 4869455	0	0	1
7369	Pileated Woodpecker	1	473265, 4869455	0	0	1
7369	Pileated Woodpecker	1	473265, 4869455	0	0	1
7369	Pileated Woodpecker	1	473265, 4869455	0	0	1
7369	Red-breasted Nuthatch	1	473265, 4869455	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
7369	Red-breasted Nuthatch	2	473265, 4869455	0	0	1
7369	Red-breasted Nuthatch	1	473155, 4869453	0	0	1
7369	Red-breasted Nuthatch	1	473155, 4869453	0	0	1
7369	Red-breasted Nuthatch	1	473155, 4869453	0	0	1
7369	Red-breasted Nuthatch	1	473265, 4869455	0	0	1
7369	Scarlet Tanager	1	473265, 4869455	0	0	1
7369	Scarlet Tanager	1	473265, 4869455	0	0	1
7369	Scarlet Tanager	2	473265, 4869455	0	0	1
7369	Scarlet Tanager	1	473265, 4869455	0	0	1
7369	Scarlet Tanager	1	473265, 4869455	0	0	1
7369	Scarlet Tanager	2	473265, 4869455	0	0	1
7369	Scarlet Tanager	2	473155, 4869453	0	0	1
7369	Scarlet Tanager	2	473265, 4869455	0	0	1
7369	Scarlet Tanager	1	473265, 4869455	0	0	1
7369	Scarlet Tanager	2	473265, 4869455	0	0	1
7369	Scarlet Tanager	1	473265, 4869455	0	0	1
7369	Scarlet Tanager	1	473265, 4869455	0	0	1
7369	Veery	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	2	473265, 4869455	0	0	1
7369	Winter Wren	2	473265, 4869455	0	0	1
7369	Winter Wren	5	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	2	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Winter Wren	1	473155, 4869453	0	0	1
7369	Winter Wren	1	473155, 4869453	0	0	1
7369	Winter Wren	1	473265, 4869455	0	0	1
7369	Yellow-bellied Sapsucker	2	473155, 4869453	0	0	1
7369	Yellow-bellied Sapsucker	1	473265, 4869455	0	0	1
7369	Yellow-bellied Sapsucker	1	473265, 4869455	0	0	1
7369	Yellow-bellied Sapsucker	2	473265, 4869455	0	0	1
7369	Yellow-bellied Sapsucker	2	473265, 4869455	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
7369	Yellow-bellied Sapsucker	2	473265, 4869455	0	0	1
7369	Yellow-bellied Sapsucker	2	473265, 4869455	0	0	1
7369	Yellow-bellied Sapsucker	1	473265, 4869455	0	0	1
7369	Yellow-bellied Sapsucker	3	473265, 4869455	0	0	1
7369	Yellow-bellied Sapsucker	2	473265, 4869455	0	0	1
7369	Yellow-bellied Sapsucker	1	473265, 4869455	0	0	1
7369	Yellow-bellied Sapsucker	1	473265, 4869455	0	0	1
7377	Blackburnian Warbler	1	473308, 4877689	0	0	1
7377	Blue-headed Vireo	1	473308, 4877689	0	0	1
7377	Northern Parula	1	473308, 4877689	0	0	1
7377	Ovenbird	1	473308, 4877689	0	0	1
7377	Veery	1	473308, 4877689	0	0	1
7771	Yellow-bellied Sapsucker	1	477425, 4871882	0	0	1



Observation Location | 1km x 1km grid square with observations

Species Observed

Desk-Based (GBIF) [52]

- Black Tern [1]
- Common Loon [2]
- Green Heron [12]
- Lesser Scaup [1]
- Northern Shoveler [1]
- Pied-billed Grebe [4]
- Red-necked Grebe [1]
- Ring-necked Duck [4]
- Sandhill Crane [19]
- Sedge Wren [1]
- Solitary Sandpiper [3]
- Sora [1]
- Virginia Rail [2]

Field Incidental [14]

- Green Heron [9]
- Sandhill Crane [3]
- Virginia Rail [2]

Observation Type (Fieldwork Only)

- Visual [11]
- Unspecified [1]
- Vocal [1]
- Vocal (Presumed Breeding) [1]

NHIC 1km Grid Square

- Least Bittern (SAR)

SAR = Species at Risk

SAR and Provincially Rare species from NHIC were masked with a 1km grid and may occur anywhere within that grid square. Species may have been observed more than once within a grid square.

Candidate SWH in Plot

- Yes [26]
- Unknown [4]
- Nearby [1]
- No [442]

NWMO Biodiversity Impact Studies

Candidate SWH for Marsh Breeding Bird Habitat - North $RSA_{AVI-AQU}$

Figure D-24a

- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1058]

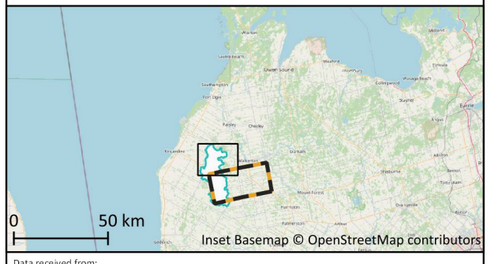
Ecosites that Match SWH Criteria

- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]
- Shrub Swamp [55]
- Marsh [160]
- Meadow [59]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Marsh Breeding Bird Habitat - South $RSA_{AVI-AQU}$

Figure D-24b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1058]

Ecosites that Match SWH Criteria

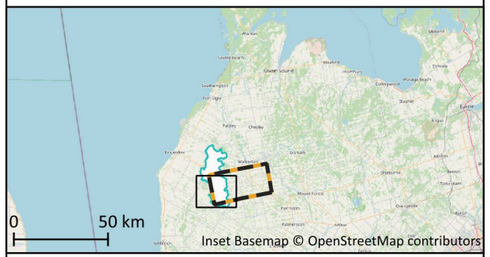
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]
- Shrub Swamp [55]
- Marsh [160]
- Meadow [59]

See Figure D-24a for Full Legend

1:65,000

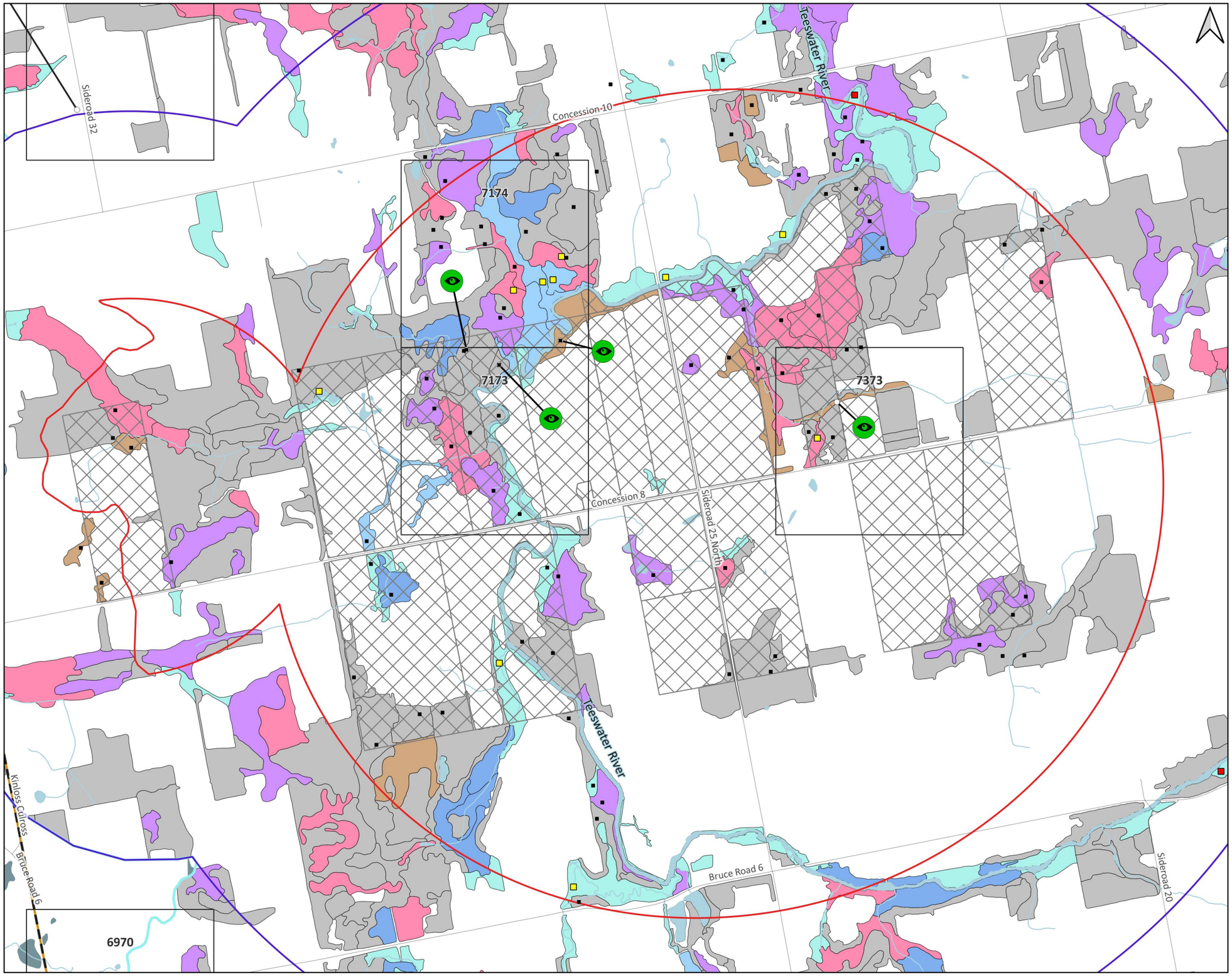
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Marsh Breeding Bird Habitat - AOI

Figure D-24c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1058]

Ecosites that Match SWH Criteria

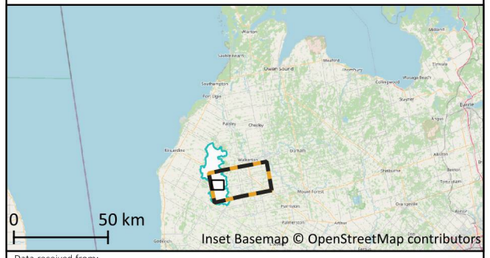
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]
- Shrub Swamp [55]
- Marsh [160]
- Meadow [59]

See Figure D-24a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-31. Supplemental data for 2022 field-based incidental observations relevant to Marsh Bird Breeding Habitat.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6988	Virginia Rail	Vocal	>1	Potential SWH Incidental	469059, 4888048	0	0	1
6988	Virginia Rail	Vocal (pb)	1	TEM SWH	469059, 4888409	0	0	1
7165	Sandhill Crane	Visual	3	Other Incidental	471489, 4865337	0	0	1
7173	Green Heron	Visual	"multiple"	TEM SWH	471523, 4873907	1	1	1
7173	Green Heron	Visual	1	TEM SWH	471349, 4873988	1	1	1
7174	Green Heron	Visual	1	TEM SWH	471850, 4874037	1	1	1
7188	Green Heron	Unspecified	3	TEM SWH	471308, 4888407	0	0	1
7188	Green Heron	Visual	3	TEM SWH	471487, 4888503	0	0	1
7280	Green Heron	Visual	1	Other Incidental	472838, 4880453	0	0	1
7373	Green Heron	Visual	1	Other Incidental	473326, 4873709	1	1	1
7388	Green Heron	Visual	1	Other Incidental	473316, 4888307	0	0	1
7388	Green Heron	Visual	1	Other Incidental	473287, 4888192	0	0	1
7388	Sandhill Crane	Visual	2	Potential SWH Incidental	473283, 4888304	0	0	1
7388	Sandhill Crane	Visual	>1	TEM SWH	473285, 4888305	0	0	1

Table D-32. Supplemental data for desk-based observations relevant to Marsh Bird Breeding Habitat.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
6478	Green Heron	U	464570, 4878434	0	0	/	1
6478	Green Heron	U	464570, 4878434	0	0	/	1
6478	Pied-billed Grebe	U	464570, 4878434	0	0	/	1
6478	Pied-billed Grebe	U	464570, 4878434	0	0	/	1
6478	Ring-necked Duck	3	464790, 4878460	0	0	/	1
6478	Ring-necked Duck	6	464790, 4878460	0	0	/	1
6478	Ring-necked Duck	3	464790, 4878460	0	0	/	1
6478	Ring-necked Duck	3	464790, 4878460	0	0	/	1
6478	Ring-necked Duck	6	464790, 4878460	0	0	/	1
6478	Virginia Rail	U	464570, 4878434	0	0	/	1
6478	Virginia Rail	U	464570, 4878434	0	0	/	1
6675	Green Heron	1	466227, 4875196	0	0	/	1
6675	Green Heron	1	466227, 4875196	0	0	/	1
6675	Green Heron	1	466227, 4875196	0	0	/	1
6675	Northern Shoveler	2	466310, 4875396	0	0	/	1
6679	Black Tern	1	-	0	0	/	1
6679	Common Loon	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	6	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	10	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	7	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	7	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	8	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	18	466958, 4879176	0	0	/	1
6679	Green Heron	6	466958, 4879176	0	0	/	1
6679	Green Heron	6	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1
6679	Green Heron	7	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	5	466958, 4879176	0	0	/	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
6679	Green Heron	8	466958, 4879176	0	0	/	1
6679	Green Heron	4	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	3	466958, 4879176	0	0	/	1
6679	Green Heron	1	466958, 4879176	0	0	/	1
6679	Green Heron	2	466958, 4879176	0	0	/	1
6679	Pied-billed Grebe	2	466958, 4879176	0	0	/	1
6679	Pied-billed Grebe	1	466958, 4879176	0	0	/	1
6679	Ring-necked Duck	3	466958, 4879176	0	0	/	1
6679	Ring-necked Duck	2	466958, 4879176	0	0	/	1
6679	Ring-necked Duck	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	4	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	4	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	4	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	8	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	4	466958, 4879176	0	0	/	1
6679	Sandhill Crane	4	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	3	466958, 4879176	0	0	/	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	5	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	4	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	3	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	4	466958, 4879176	0	0	/	1
6679	Sandhill Crane	3	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	5	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	4	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
6679	Sandhill Crane	4	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	2	466958, 4879176	0	0	/	1
6679	Sandhill Crane	1	466958, 4879176	0	0	/	1
6679	Solitary Sandpiper	1	466958, 4879176	0	0	/	1
6681	Green Heron	1	466430, 4881693	0	0	/	1
6681	Green Heron	1	466430, 4881693	0	0	/	1
6681	Green Heron	3	466430, 4881693	0	0	/	1
6681	Sandhill Crane	1	466430, 4881693	0	0	/	1
6681	Sandhill Crane	3	466430, 4881693	0	0	/	1
6792	Sandhill Crane	4	467725, 4892523	0	0	/	1
6792	Sandhill Crane	U	467727, 4892522	0	0	/	1
6887	Sandhill Crane	1	468134, 4887028	0	0	/	1
6889	Green Heron	2	468719, 4889066	0	0	/	1
6891	Green Heron	1	468329, 4891236	0	0	/	1
6891	Green Heron	1	468329, 4891236	0	0	/	1
6970	Green Heron	U	470000, 4870000	0	0	/	1
6970	Pied-billed Grebe	U	470000, 4870000	0	0	/	1
6970	Sedge Wren	U	470000, 4870000	0	0	1	/
6975	Sandhill Crane	2	469270, 4875269	0	0	/	1
6975	Sandhill Crane	2	469270, 4875269	0	0	/	1
6975	Sandhill Crane	2	469270, 4875269	0	0	/	1
6990	Green Heron	U	470000, 4890000	0	0	/	1
6990	Pied-billed Grebe	U	470000, 4890000	0	0	/	1
6990	Sora	U	470000, 4890000	0	0	/	1
6990	Virginia Rail	U	470000, 4890000	0	0	/	1
7087	Green Heron	U	470927, 4887732	0	0	/	1
7087	Ring-necked Duck	4	470927, 4887732	0	0	/	1
7091	Sandhill Crane	1	470611, 4891279	0	0	/	1
7177	Green Heron	1	471693, 4877991	0	0	/	1
7181	Sandhill Crane	1	471730, 4881497	0	0	/	1
7182	Solitary Sandpiper	1	471995, 4882283	0	0	/	1
7187	Sandhill Crane	1	471949, 4887839	0	0	/	1
7188	Sandhill Crane	3	471091, 4888080	0	0	/	1
7189	Common Loon	6	471067, 4889252	0	0	/	1
7189	Green Heron	1	471067, 4889252	0	0	/	1
7189	Green Heron	1	471067, 4889252	0	0	/	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
7189	Red-necked Grebe	1	-	0	0	/	1
7189	Sandhill Crane	4	471067, 4889252	0	0	/	1
7189	Sandhill Crane	1	471067, 4889252	0	0	/	1
7189	Sandhill Crane	1	471067, 4889252	0	0	/	1
7189	Sandhill Crane	U	471067, 4889252	0	0	/	1
7192	Sandhill Crane	2	471459, 4892136	0	0	/	1
7192	Sandhill Crane	3	471459, 4892136	0	0	/	1
7192	Sandhill Crane	2	471459, 4892136	0	0	/	1
7192	Sandhill Crane	4	471459, 4892136	0	0	/	1
7369	Sandhill Crane	2	473265, 4869455	0	0	/	1
7369	Sandhill Crane	2	473265, 4869455	0	0	/	1
7369	Sandhill Crane	2	473155, 4869453	0	0	/	1
7369	Sandhill Crane	1	473155, 4869453	0	0	/	1
7369	Sandhill Crane	1	473265, 4869455	0	0	/	1
7369	Sandhill Crane	2	473265, 4869455	0	0	/	1
7369	Sandhill Crane	2	473265, 4869455	0	0	/	1
7388	Sandhill Crane	1	473892, 4888663	0	0	/	1
7388	Sandhill Crane	1	473840, 4888876	0	0	/	1
7590	Green Heron	1	475329, 4890898	0	0	/	1
7590	Lesser Scaup	40	475329, 4890898	0	0	/	1
7590	Ring-necked Duck	1	475329, 4890898	0	0	/	1
7590	Sandhill Crane	1	475329, 4890898	0	0	/	1
7590	Sandhill Crane	3	475329, 4890898	0	0	/	1
7590	Sandhill Crane	2	475316, 4890806	0	0	/	1
7590	Sandhill Crane	U	475329, 4890898	0	0	/	1
7590	Sandhill Crane	1	475329, 4890898	0	0	/	1
7590	Sandhill Crane	6	475329, 4890898	0	0	/	1
7590	Solitary Sandpiper	1	475329, 4890898	0	0	/	1
7672	Sandhill Crane	3	476709, 4872356	0	0	/	1

NWMO Biodiversity Impact Studies

Candidate SWH for Open Country Bird Breeding Habitat - North $RSA_{AVI-AQU}$

Figure D-25a

Municipality of Brockton

Municipality of Kincardine

Township of Huron-Kinloss

Schmidt Lake

Cunningham Lake

Silver Lake

Clam Lake

Teeswater River

7187

6685

6782

- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AVI})
- Regional Study Area ($RSA_{AVI-AQU}$)
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2154]

Ecosites that Match the SWH Criteria

- Meadow [1]

Observation Location

1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [50]

- American Kestrel [4]
- Bobolink (SAR) [9]
- Eastern Meadowlark (SAR) [9]
- Grasshopper Sparrow [1]
- Horned Lark [1]
- Northern Harrier [3]
- Savannah Sparrow [12]
- Upland Sandpiper [5]
- Vesper Sparrow [6]

Field Incidental [3]

- Bobolink (SAR) [2]
- Eastern Meadowlark (SAR) [1]

Observation Type (Fieldwork Only)

Visual [1] Vocal, Visual [1]

Vocal [1]

NHIC 1km Grid Square

Bobolink (SAR) Eastern Meadowlark (SAR)

SAR = Species at Risk

SAR and Provincially Rare species from NHIC or field incidentals were masked with a 1km grid and may occur anywhere within that grid square. Circle colour(s) within the grid square represent the species observed incidentally. Species may have been observed more than once within a grid square.

Candidate SWH in Plot

Yes [1] Unknown [4]

Nearby [1] No [467]

1:65,000

0 1 2 km

ZOETICA

0 50 km

Inset Basemap © OpenStreetMap contributors

Data received from:

Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)

NWMO — AOI; NWMO Purchased or Optioned Land

GBIF.org — GBIF Occurence Download - Accessed Oct 2021

Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet

Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Open Country Bird Breeding Habitat - South $RSA_{AVI-AQU}$

Figure D-25b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AVI})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2154]

Ecosites that Match the SWH Criteria

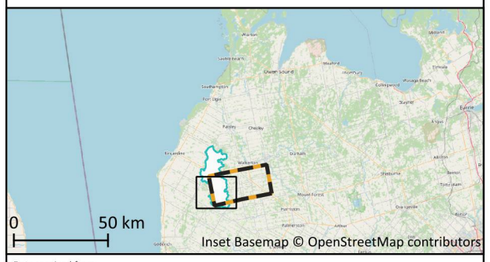
- Meadow [1]

See Figure D-25a for Full Legend

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Open Country Bird Breeding Habitat - AOI

Figure D-25c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AVI})
- Regional Study Area ($RSA_{AVI-AQU}$)
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [2154]

Ecosites that Match the SWH Criteria

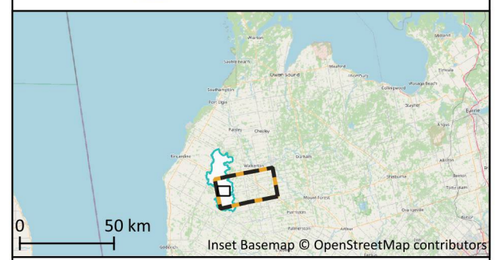
- Meadow [1]

See Figure D-25a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

Table D-33. Supplemental data for 2022 field-based incidental observations relevant to Open Country Bird Breeding Habitat.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
6972	Bobolink	Vocal	1	Other Incidental	-	1	1	1
7072	Eastern Meadowlark	Visual	1	Other Incidental	-	1	1	1
7274	Bobolink	Vocal, Visual	1	Other Incidental	-	1	1	1

Table D-34. Supplemental data for desk-based observations relevant to Open Country Bird Breeding Habitat.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
6478	Upland Sandpiper	U	-	0	0	/	1
6478	Upland Sandpiper	U	-	0	0	/	1
6573	Bobolink	1	-	0	0	1	/
6672	American Kestrel	4	466868, 4872476	0	0	1	/
6675	Savannah Sparrow	1	466227, 4875196	0	0	1	/
6675	Savannah Sparrow	1	466227, 4875196	0	0	1	/
6675	Savannah Sparrow	1	466227, 4875196	0	0	1	/
6685	Upland Sandpiper	2	-	0	0	/	1
6775	Bobolink	2	-	0	0	1	/
6775	Bobolink	2	-	0	0	1	/
6775	Bobolink	2	-	0	0	1	/
6775	Savannah Sparrow	2	467567, 4875369	0	0	1	/
6775	Savannah Sparrow	2	467567, 4875369	0	0	1	/
6775	Savannah Sparrow	2	467567, 4875369	0	0	1	/
6782	Upland Sandpiper	1	-	0	0	/	1
6871	Eastern Meadowlark	1	-	0	1	1	/
6871	Eastern Meadowlark	1	-	0	1	1	/
6871	Eastern Meadowlark	1	-	0	1	1	/
6874	Eastern Meadowlark	1	-	0	1	1	/
6874	Eastern Meadowlark	1	-	0	1	1	/
6874	Eastern Meadowlark	1	-	0	1	1	/
6874	Savannah Sparrow	3	468605, 4874565	0	1	1	/

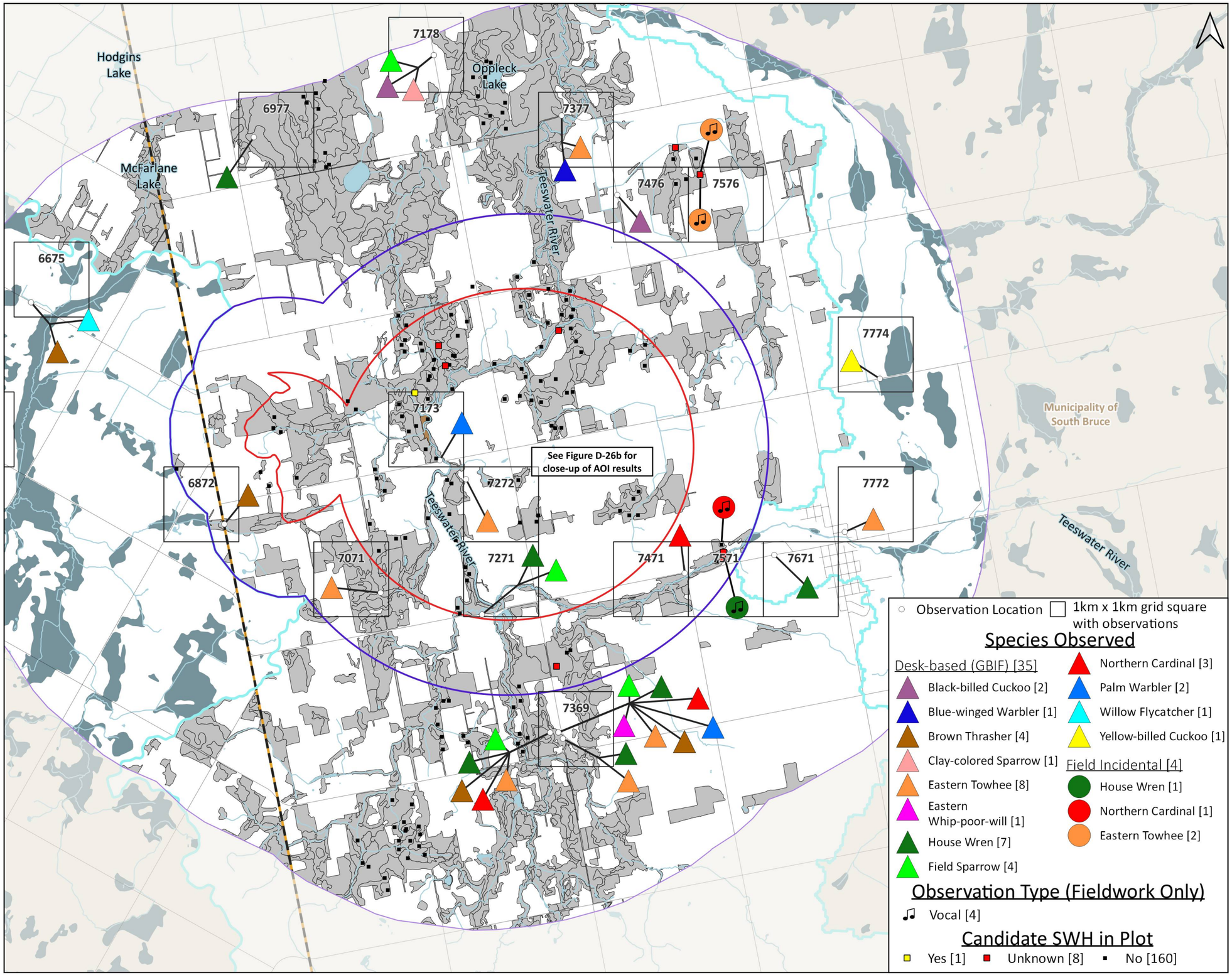
Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
6874	Savannah Sparrow	3	468605, 4874565	0	1	1	/
6874	Savannah Sparrow	3	468605, 4874565	0	1	1	/
6874	Vesper Sparrow	1	468605, 4874565	0	1	1	/
6874	Vesper Sparrow	1	468605, 4874565	0	1	1	/
6874	Vesper Sparrow	1	468605, 4874565	0	1	1	/
6968	Savannah Sparrow	1	469659, 4868472	0	0	1	/
6969	American Kestrel	1	469009, 4869649	0	0	1	/
6970	Bobolink	U	-	0	0	1	/
6970	Eastern Meadowlark	U	-	0	0	1	/
6970	Horned Lark	U	470000, 4870000	0	0	1	/
6970	Northern Harrier	U	470000, 4870000	0	0	1	/
6970	Savannah Sparrow	U	470000, 4870000	0	0	1	/
6970	Vesper Sparrow	U	470000, 4870000	0	0	1	/
6975	American Kestrel	1	469270, 4875269	0	0	1	/
6975	American Kestrel	1	469270, 4875269	0	0	1	/
6975	American Kestrel	1	469270, 4875269	0	0	1	/
7187	Upland Sandpiper	1	-	0	0	/	1
7271	Bobolink	1	-	1	1	1	/
7271	Eastern Meadowlark	1	-	1	1	1	/
7272	Eastern Meadowlark	1	-	1	1	1	/
7273	Upland Sandpiper	1	-	1	1	/	1
7369	American Kestrel	3	473265, 4869455	0	0	1	/
7369	Bobolink	1	-	0	0	1	/
7369	Bobolink	1	-	0	0	1	/
7369	Bobolink	1	-	0	0	1	/
7369	Bobolink	4	-	0	0	1	/
7369	Eastern Meadowlark	2	-	0	0	1	/
7369	Eastern Meadowlark	1	-	0	0	1	/
7369	Grasshopper Sparrow	1	-	0	0	1	/
7369	Northern Harrier	1	473155, 4869453	0	0	1	/

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}	$RSA_{AVI-AQU}$
7369	Northern Harrier	2	473155, 4869453	0	0	1	/
7369	Savannah Sparrow	1	473265, 4869455	0	0	1	/
7369	Savannah Sparrow	2	473265, 4869455	0	0	1	/
7369	Savannah Sparrow	1	473265, 4869455	0	0	1	/
7369	Savannah Sparrow	1	473265, 4869455	0	0	1	/
7369	Savannah Sparrow	1	473265, 4869455	0	0	1	/
7369	Savannah Sparrow	2	473265, 4869455	0	0	1	/
7369	Vesper Sparrow	1	473265, 4869455	0	0	1	/
7369	Vesper Sparrow	1	473155, 4869453	0	0	1	/
7377	Eastern Meadowlark	1	-	0	0	1	/
7476	Bobolink	1	-	0	0	1	/
7476	Savannah Sparrow	4	474050, 4876630	0	0	1	/
7476	Vesper Sparrow	1	474050, 4876630	0	0	1	/
7671	Savannah Sparrow	2	476145, 4871824	0	0	1	/
7671	Savannah Sparrow	1	476976, 4871951	0	0	1	/
7672	Vesper Sparrow	2	476996, 4872142	0	0	1	/
7676	Eastern Meadowlark	1	-	0	0	1	/
7676	Savannah Sparrow	1	476425, 4876098	0	0	1	/
7678	Bobolink	4	-	0	0	1	/
7776	Bobolink	6	-	0	0	1	/
7776	Northern Harrier	1	477844, 4876368	0	0	1	/
7776	Savannah Sparrow	3	477844, 4876368	0	0	1	/
7872	Savannah Sparrow	2	478064, 4872257	0	0	1	/
7874	Bobolink	1	-	0	0	1	/

NWMO Biodiversity Impact Studies

Candidate SWH for Shrub/Early Successional Bird Breeding Habitat - RSA_{AVI}

Figure D-26a



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AVI})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [924]

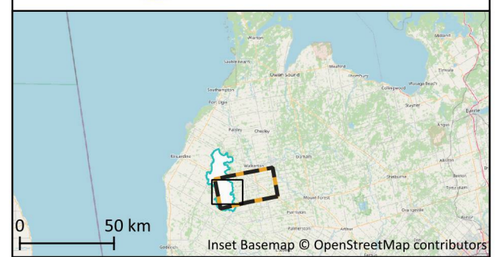
Ecosites that Match SWH Criteria

- Shrub [1]

1:50,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

○ Observation Location ☐ 1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [35]

- Black-billed Cuckoo [2]
- Blue-winged Warbler [1]
- Brown Thrasher [4]
- Clay-colored Sparrow [1]
- Eastern Towhee [8]
- Eastern Whip-poor-will [1]
- House Wren [7]
- Field Sparrow [4]
- Northern Cardinal [3]
- Palm Warbler [2]
- Willow Flycatcher [1]
- Yellow-billed Cuckoo [1]

Field Incidental [4]

- House Wren [1]
- Northern Cardinal [1]
- Eastern Towhee [2]

Observation Type (Fieldwork Only)

- Vocal [4]

Candidate SWH in Plot

Yes [1] Unknown [8] No [160]

NWMO Biodiversity Impact Studies

Candidate SWH for Shrub/Early Successional Bird Breeding Habitat - AOI

Figure D-26b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [924]

Ecosites that Match SWH Criteria

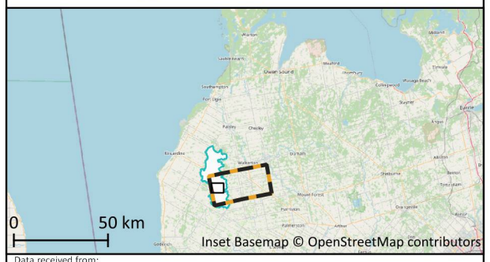
- Shrub [1]

See Figure D-26a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

Table D-35. Supplemental data for 2022 field-based incidental observations relevant to Shrub/Early Successional Bird Breeding Habitat.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
7571	House Wren	Vocal	1	TEM SWH	475467, 4871861	0	1	1
7571	Northern Cardinal	Vocal	1	TEM SWH	475441, 4871960	0	1	1
7576	Eastern Towhee	Vocal	1	Other Incidental	475160, 4876879	0	0	1
7576	Eastern Towhee	Vocal	1	TEM SWH	475156, 4876902	0	0	1

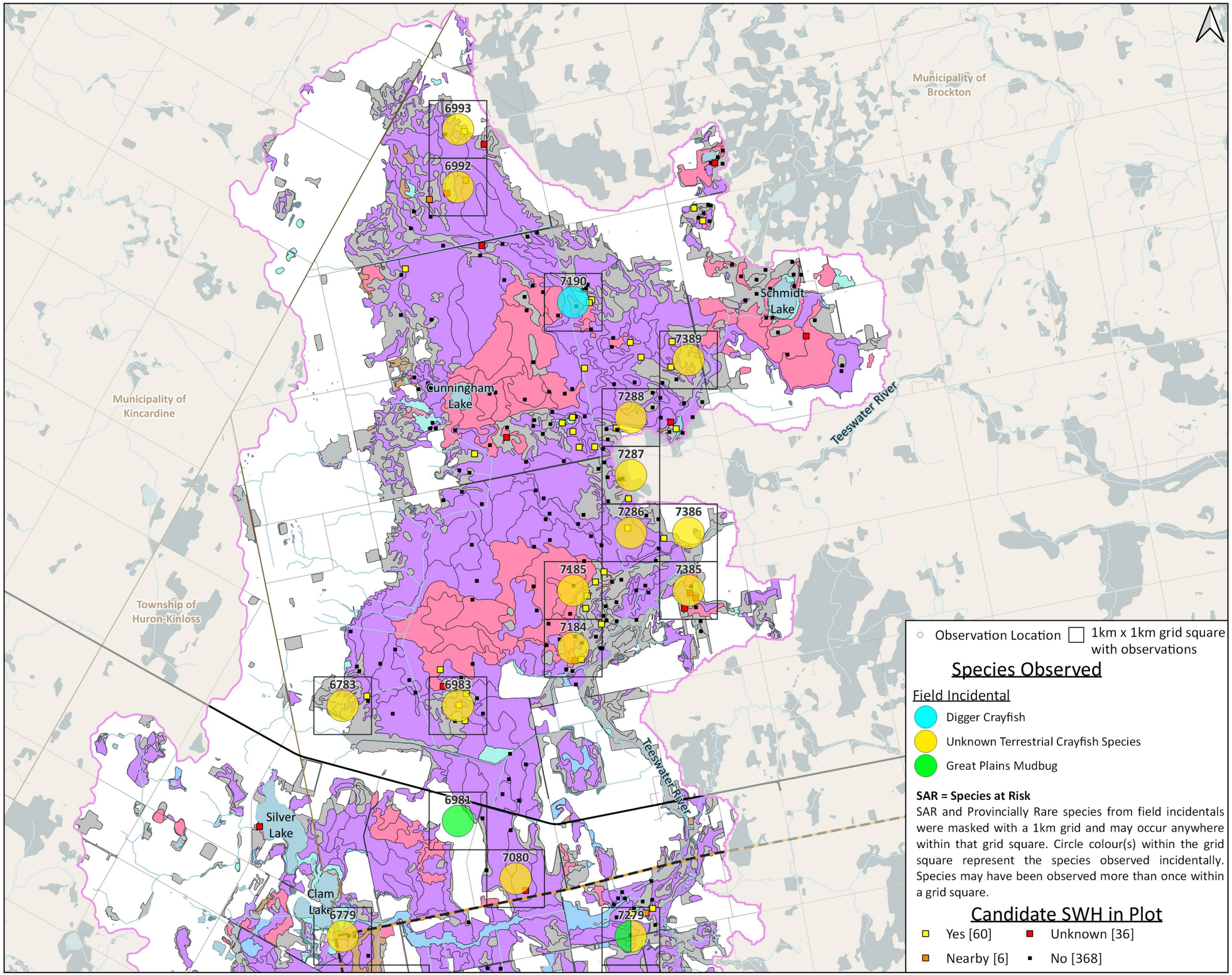
Table D-36. Supplemental data for desk-based observations relevant to Shrub/Early Successional Bird Breeding Habitat.

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
6573	Eastern Towhee	2	465551, 4873131	0	0	1
6573	House Wren	1	465551, 4873131	0	0	1
6675	Brown Thrasher	1	466227, 4875196	0	0	1
6675	Brown Thrasher	1	466227, 4875196	0	0	1
6675	Brown Thrasher	1	466227, 4875196	0	0	1
6675	Willow Flycatcher	1	466227, 4875196	0	0	1
6675	Willow Flycatcher	1	466227, 4875196	0	0	1
6675	Willow Flycatcher	1	466227, 4875196	0	0	1
6872	Brown Thrasher	1	468807, 4872235	0	1	1
6977	House Wren	1	469200, 4877400	0	0	1
7071	Eastern Towhee	1	470892, 4871320	0	1	1
7173	Palm Warbler	4	471682, 4873088	1	1	1
7178	Black-billed Cuckoo	1	471602, 4878496	0	0	1
7178	Clay-colored Sparrow	1	471602, 4878496	0	0	1
7178	Field Sparrow	1	471602, 4878496	0	0	1
7271	Field Sparrow	1	472246, 4871029	1	1	1
7271	House Wren	2	472246, 4871029	1	1	1
7272	Eastern Towhee	1	472032, 4872835	1	1	1
7369	Brown Thrasher	1	473155, 4869453	0	0	1
7369	Brown Thrasher	1	473265, 4869455	0	0	1
7369	Brown Thrasher	1	473155, 4869453	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
7369	Brown Thrasher	1	473155, 4869453	0	0	1
7369	Brown Thrasher	1	473265, 4869455	0	0	1
7369	Brown Thrasher	1	473265, 4869455	0	0	1
7369	Brown Thrasher	1	473155, 4869453	0	0	1
7369	Brown Thrasher	1	473265, 4869455	0	0	1
7369	Brown Thrasher	1	473265, 4869455	0	0	1
7369	Brown Thrasher	1	473265, 4869455	0	0	1
7369	Brown Thrasher	1	473265, 4869455	0	0	1
7369	Eastern Towhee	1	473265, 4869455	0	0	1
7369	Eastern Towhee	1	473155, 4869453	0	0	1
7369	Eastern Towhee	1	473325, 4869373	0	0	1
7369	Eastern Towhee	1	473265, 4869455	0	0	1
7369	Eastern Towhee	2	473155, 4869453	0	0	1
7369	Eastern Towhee	1	473155, 4869453	0	0	1
7369	Eastern Towhee	1	473265, 4869455	0	0	1
7369	Eastern Towhee	1	473155, 4869453	0	0	1
7369	Eastern Whip-poor-will	1	-	0	0	1
7369	Field Sparrow	1	473265, 4869455	0	0	1
7369	Field Sparrow	1	473265, 4869455	0	0	1
7369	Field Sparrow	2	473155, 4869453	0	0	1
7369	Field Sparrow	2	473155, 4869453	0	0	1
7369	House Wren	2	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	2	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	3	473265, 4869455	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	2	473265, 4869455	0	0	1
7369	House Wren	1	473155, 4869453	0	0	1
7369	House Wren	4	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	2	473265, 4869455	0	0	1
7369	House Wren	1	473325, 4869373	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	2	473265, 4869455	0	0	1
7369	House Wren	2	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	3	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	2	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	1	473265, 4869455	0	0	1
7369	House Wren	4	473265, 4869455	0	0	1
7369	House Wren	2	473265, 4869455	0	0	1
7369	House Wren	2	473265, 4869455	0	0	1
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Northern Cardinal	2	473155, 4869453	0	0	1
7369	Northern Cardinal	2	473265, 4869455	0	0	1
7369	Northern Cardinal	2	473265, 4869455	0	0	1
7369	Northern Cardinal	2	473265, 4869455	0	0	1
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Northern Cardinal	2	473265, 4869455	0	0	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	RSA_{AVI}
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Northern Cardinal	4	473155, 4869453	0	0	1
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Northern Cardinal	2	473155, 4869453	0	0	1
7369	Northern Cardinal	2	473155, 4869453	0	0	1
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Northern Cardinal	1	473265, 4869455	0	0	1
7369	Palm Warbler	2	473265, 4869455	0	0	1
7377	Blue-winged Warbler	2	473308, 4877689	0	0	1
7377	Eastern Towhee	1	473308, 4877689	0	0	1
7471	Northern Cardinal	1	474950, 4871582	0	1	1
7476	Black-billed Cuckoo	1	474050, 4876630	0	0	1
7671	House Wren	2	476145, 4871824	0	0	1
7772	Eastern Towhee	1	477086, 4872131	0	0	1
7774	Yellow-billed Cuckoo	1	477556, 4874176	0	0	1



NWMO Biodiversity Impact Studies

Candidate SWH for Terrestrial Crayfish - North LSA_{AQU}

Figure D-27a

- Local Study Area (LSA_{AQU})
- Watercourse
- Lake
- Wetland Outside LSA_{AQU}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1136]

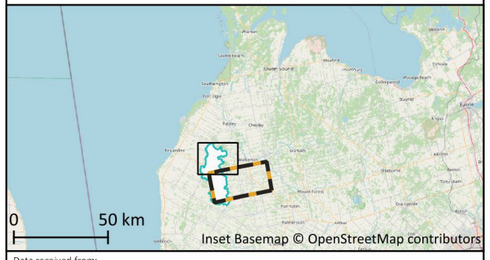
Ecosites that Match the SWH Criteria

- Mixedwood Swamp [248]
- Hardwood Swamp [501]
- Shrub Swamp [55]
- Marsh [157]
- Meadow [31]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Terrestrial Crayfish - South LSA_{AQU}

Figure D-27b

Hodgins Lake
McFarlane Lake
Opeck Lake
Teeswater River
Municipality of South Bruce
Township of Huron-Kinloss
Teeswater
Township of Ashfield-Colborne-Wawanosh
Township of North Huron
Municipality of Morris-Turnberry

6878
7278
7174
7273
7373
6972
7072
7172
7271
7065
7164
7163

See Figure D-27c for results in the AOI

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Watercourse
- Lake
- Wetland Outside LSA_{AQU}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1136]

Ecosites that Match the SWH Criteria

- Mixedwood Swamp [248]
- Hardwood Swamp [501]
- Shrub Swamp [55]
- Marsh [157]
- Meadow [31]

See Figure D-27a for Full Legend

1:65,000
0 1 2 km

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0 50 km
Inset Basemap © OpenStreetMap contributors

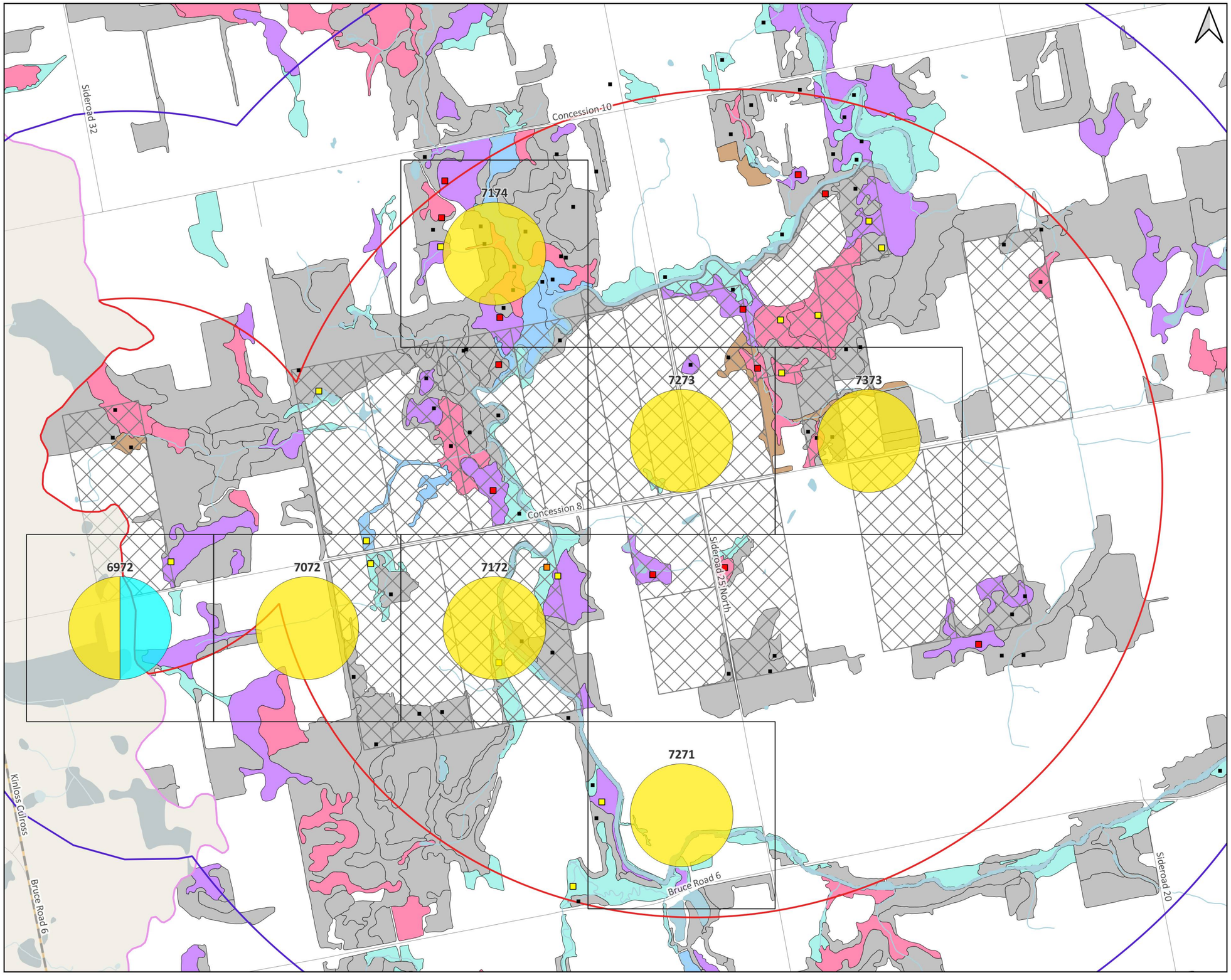
Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Candidate SWH for Terrestrial Crayfish - AOI

Figure D-27c



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{AQU}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [1136]

Ecosites that Match the SWH Criteria

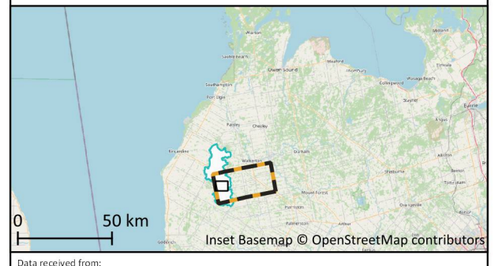
- Mixedwood Swamp [248]
- Hardwood Swamp [501]
- Shrub Swamp [55]
- Marsh [157]
- Meadow [31]

See Figure D-27a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
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Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

Table D-37. Supplemental data for 2022 field-based incidental observations relevant to Terrestrial Crayfish.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{AQU}
6779	Terrestrial Crayfish species	Burrow	1	Potential SWH Incidental	-	0	1
6783	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
6878	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
6972	Digger Crayfish	Burrow	med density	Potential SWH Incidental	-	1	1
6972	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	1	1
6981	Great Plains Mudbug	Burrow	high density	Potential SWH Incidental	-	0	1
6983	Terrestrial Crayfish species	Visual	>1	TEM SWH	-	0	1
6992	Terrestrial Crayfish species	Burrow	1	Potential SWH Incidental	-	0	1
6992	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
6992	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
6993	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
7065	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
7065	Terrestrial Crayfish species	Burrow	1	TEM SWH	-	0	1
7072	Terrestrial Crayfish species	Burrow	1	Potential SWH Incidental	-	1	1
7072	Terrestrial Crayfish species	Burrow	1	TEM SWH	-	1	1
7080	Terrestrial Crayfish species	Burrow	3	TEM SWH	-	0	1
7163	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
7164	Terrestrial Crayfish species	Burrow	med density	Potential SWH Incidental	-	0	1
7164	Terrestrial Crayfish species	Burrow	med density	Potential SWH Incidental	-	0	1
7164	Terrestrial Crayfish species	Burrow	low density	TEM SWH	-	0	1
7172	Terrestrial Crayfish species	Burrow	low density	Potential SWH Incidental	-	1	1
7172	Terrestrial Crayfish species	Burrow	med density	Potential SWH Incidental	-	1	1
7172	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	1	1
7172	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	1	1
7174	Terrestrial Crayfish species	Burrow	low density	Potential SWH Incidental	-	1	1
7174	Terrestrial Crayfish species	Burrow	3	TEM SWH	-	1	1
7184	Terrestrial Crayfish species	Burrow	low density	Potential SWH Incidental	-	0	1
7184	Terrestrial Crayfish species	Burrow	med density	Potential SWH Incidental	-	0	1

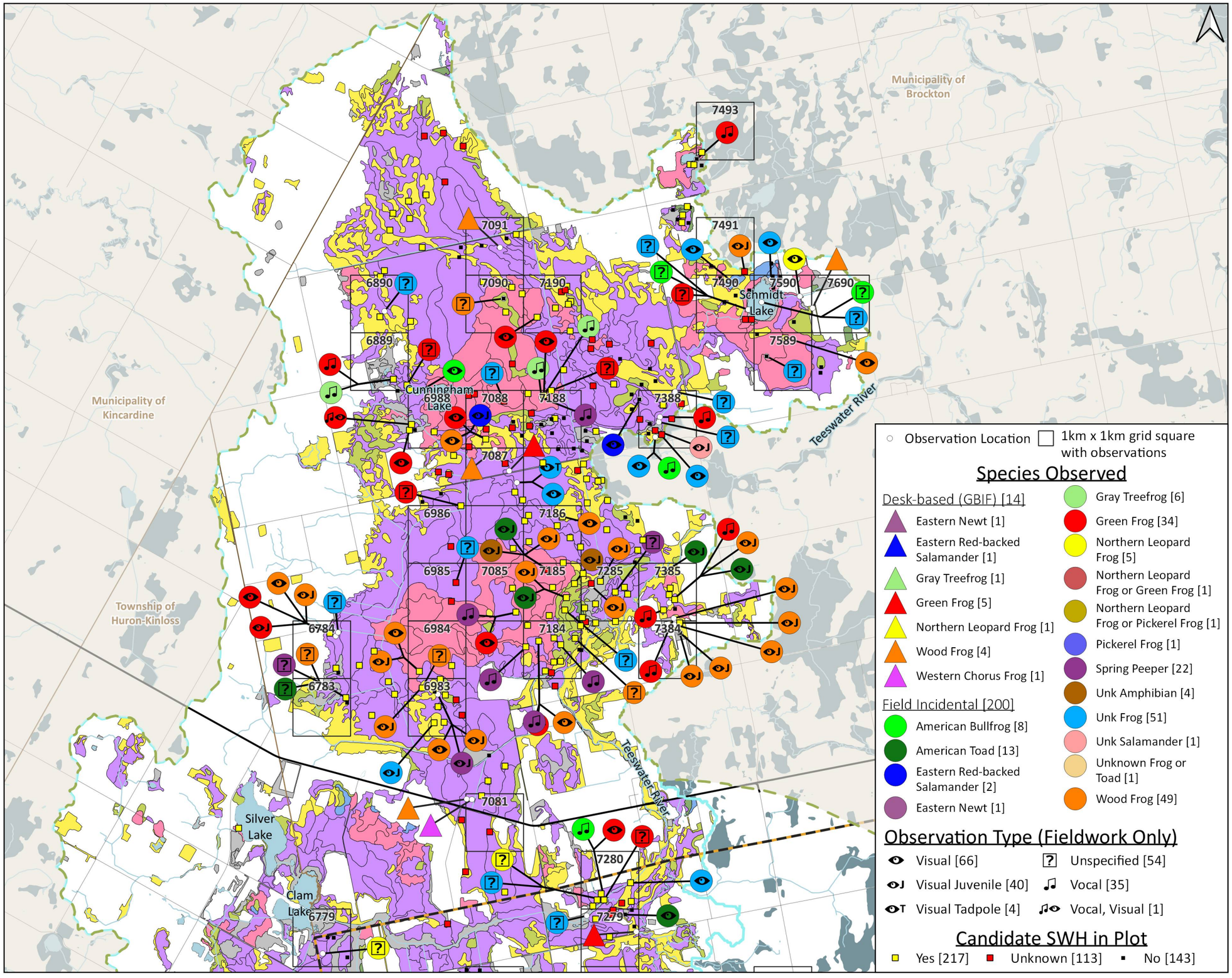
Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{AQU}
7184	Terrestrial Crayfish species	Burrow	1	TEM SWH	-	0	1
7184	Terrestrial Crayfish species	Burrow	>10	TEM SWH	-	0	1
7185	Terrestrial Crayfish species	Burrow	1	Potential SWH Incidental	-	0	1
7185	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
7185	Terrestrial Crayfish species	Burrow	1	TEM SWH	-	0	1
7190	Digger Crayfish	Burrow	1	Potential SWH Incidental	-	0	1
7271	Terrestrial Crayfish species	Burrow	low density	Potential SWH Incidental	-	1	1
7271	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	1	1
7273	Terrestrial Crayfish species	Burrow	low density	TEM SWH	-	1	1
7278	Terrestrial Crayfish species	Burrow	low density	Potential SWH Incidental	-	0	1
7278	Terrestrial Crayfish species	Burrow	low density	Potential SWH Incidental	-	0	1
7278	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
7279	Great Plains Mudbug	Burrow	low density	Potential SWH Incidental	-	0	1
7279	Great Plains Mudbug	Burrow	1	Potential SWH Incidental	-	0	1
7279	Terrestrial Crayfish species	Burrow	med density	Potential SWH Incidental	-	0	1
7279	Terrestrial Crayfish species	Burrow	1	Potential SWH Incidental	-	0	1
7279	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
7279	Terrestrial Crayfish species	Visual	1	TEM SWH	-	0	1
7286	Terrestrial Crayfish species	Burrow	low density	Potential SWH Incidental	-	0	1
7286	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	0	1
7287	Terrestrial Crayfish species	Burrow	1	Potential SWH Incidental	-	0	1
7288	Terrestrial Crayfish species	Burrow	med density	Potential SWH Incidental	-	0	1
7288	Terrestrial Crayfish species	Burrow	med density	TEM SWH	-	0	1
7373	Terrestrial Crayfish species	Burrow	low density	Potential SWH Incidental	-	1	1
7373	Terrestrial Crayfish species	Burrow	>1	TEM SWH	-	1	1
7385	Terrestrial Crayfish species	Burrow	low density	Potential SWH Incidental	-	0	1
7386	Terrestrial Crayfish species	Visual	1	TEM SWH	-	0	1
7389	Terrestrial Crayfish species	Visual (juv)	1	Potential SWH Incidental	-	0	1
7389	Terrestrial Crayfish species	Burrow	1	Potential SWH Incidental	-	0	1
7389	Terrestrial Crayfish species	Burrow	1	TEM SWH	-	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{AQU}
7389	Terrestrial Crayfish species	Visual	1	TEM SWH	-	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Amphibian Movement Corridors - North $RSA_{HRP-AQU}$

Figure D-28a



- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [491]

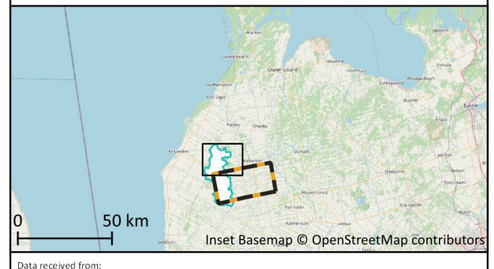
Ecosites that Match SWH Criteria

- Conifer [81]
- Mixedwood [272]
- Hardwood [488]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]

1:65,000

0 1 2 km

ZOETICA



○ Observation Location ☐ 1km x 1km grid square with observations

Species Observed

Desk-based (GBIF) [14]

- Eastern Newt [1]
- Eastern Red-backed Salamander [1]
- Gray Treefrog [1]
- Green Frog [5]
- Northern Leopard Frog [1]
- Wood Frog [4]
- Western Chorus Frog [1]

Field Incidental [200]

- American Bullfrog [8]
- American Toad [13]
- Eastern Red-backed Salamander [2]
- Eastern Newt [1]
- Gray Treefrog [6]
- Green Frog [34]
- Northern Leopard Frog [5]
- Northern Leopard Frog or Green Frog [1]
- Northern Leopard Frog or Pickerel Frog [1]
- Pickerel Frog [1]
- Spring Peeper [22]
- Unk Amphibian [4]
- Unk Frog [51]
- Unk Salamander [1]
- Unknown Frog or Toad [1]
- Wood Frog [49]

Observation Type (Fieldwork Only)

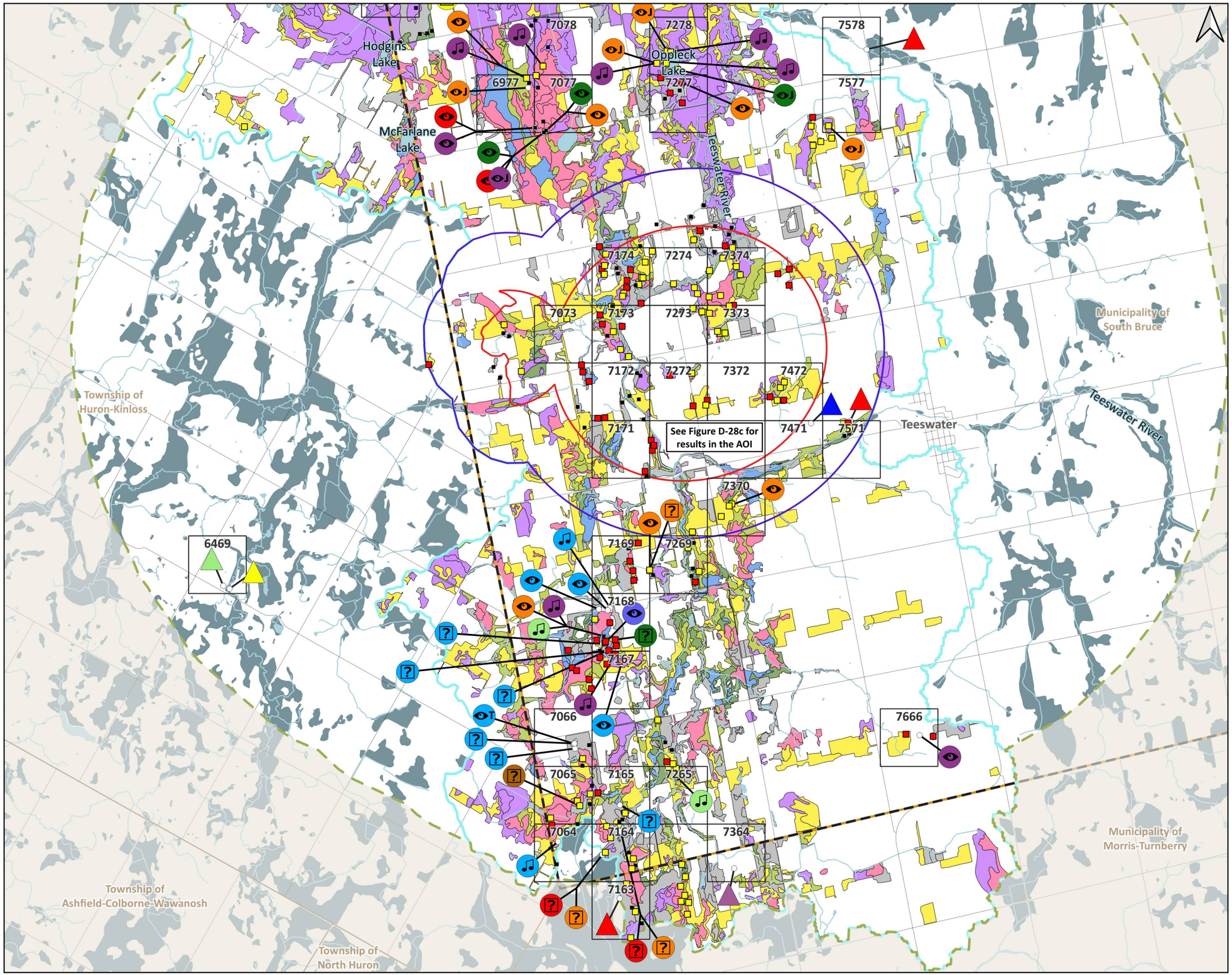
- Visual [66]
- Unspecified [54]
- Visual Juvenile [40]
- Vocal [35]
- Visual Tadpole [4]
- Vocal, Visual [1]

Candidate SWH in Plot

Yes [217] Unknown [113] No [143]

Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Amphibian Movement Corridors - South $RSA_{HRP-AQU}$

Figure D-28b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Ecosites that Do Not Match the SWH Criteria [491]

Ecosites that Match SWH Criteria

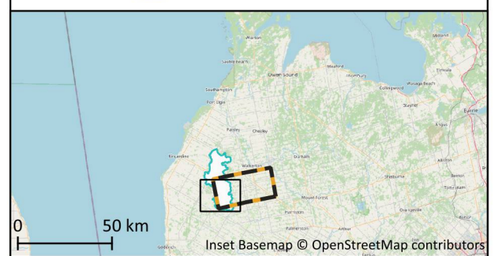
- Conifer [81]
- Mixedwood [272]
- Hardwood [488]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]

See Figure D-28a for Full Legend

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

NWMO Biodiversity Impact Studies

Candidate SWH for Amphibian Movement Corridors - AOI

Figure D-28c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [491]

Ecosites that Match SWH Criteria

- Conifer [81]
- Mixedwood [272]
- Hardwood [488]
- Conifer Swamp [65]
- Mixedwood Swamp [252]
- Hardwood Swamp [506]

See Figure D-28a for Full Legend

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
GBIF.org — GBIF Occurence Download - Accessed Oct 2021
Noun Project — CC BY 3.0: "Cattails" by Melissa Schmitt; "Eye" by Nicholas Menghini; "Egg" by Vectors Point; "Bird Nest" by MihiMihi; "Bird" by Chocolate Icon; "Snake" by Adrien Coquet
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 25, 2024	Map ID: NWMO_BIS_D178	

Table D-38. Supplemental data for 2022 field-based incidental observations relevant to Amphibian Movement Corridors.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
6779	Northern Leopard Frog	Unspecified	1	Other Incidental	467516, 4879227	0	0	1
6783	American Toad	Unspecified	>1	TEM SWH	467919, 4883668	0	0	1
6783	Spring Peeper	Unspecified	>1	TEM SWH	467919, 4883668	0	0	1
6783	Wood Frog	Unspecified	1	TEM SWH	467919, 4883668	0	0	1
6784	Frog species	Unspecified	>1	Other Incidental	467784, 4884801	0	0	1
6784	Frog species	Unspecified	>1	Other Incidental	467784, 4884801	0	0	1
6784	Green Frog	Visual	2	Potential SWH Incidental	467742, 4884736	0	0	1
6784	Green Frog	Visual (juv)	3	Potential SWH Incidental	467742, 4884736	0	0	1
6784	Wood Frog	Visual	2	Potential SWH Incidental	467742, 4884736	0	0	1
6784	Wood Frog	Visual (juv)	10	Potential SWH Incidental	467742, 4884736	0	0	1
6889	Gray Treefrog	Vocal	1	TEM SWH	468743, 4889195	0	0	1
6889	Green Frog	Vocal	1	TEM SWH	468743, 4889195	0	0	1
6889	Green Frog	Unspecified	"many"	TEM SWH	468978, 4889092	0	0	1
6890	Frog species	Unspecified	>1	Other Incidental	468589, 4890374	0	0	1
6890	Frog species	Unspecified	>1	Other Incidental	468589, 4890374	0	0	1
6890	Frog species	Unspecified	>1	Other Incidental	468589, 4890374	0	0	1
6890	Frog species	Unspecified	>1	Other Incidental	468589, 4890374	0	0	1
6977	Spring Peeper	Vocal	1	Potential SWH Incidental	469864, 4877947	0	0	1
6977	Wood Frog	Visual (juv)	3	Potential SWH Incidental	469893, 4877775	0	0	1
6977	Wood Frog	Visual (juv)	1	Potential SWH Incidental	469893, 4877775	0	0	1
6977	Wood Frog	Visual	1	Potential SWH Incidental	469867, 4877939	0	0	1
6983	Frog species	Visual (juv)	2	Potential SWH Incidental	469452, 4883234	0	0	1
6983	Spring Peeper	Visual (juv)	1	Potential SWH Incidental	469514, 4883727	0	0	1
6983	Wood Frog	Visual	1	Potential SWH Incidental	469514, 4883727	0	0	1
6983	Wood Frog	Visual (juv)	5	Potential SWH Incidental	469514, 4883727	0	0	1
6983	Wood Frog	Visual (juv)	3	Potential SWH Incidental	469228, 4883839	0	0	1
6983	Wood Frog	Visual (juv)	2	Potential SWH Incidental	469228, 4883839	0	0	1
6983	Wood Frog	Unspecified	>1	TEM SWH	469243, 4883836	0	0	1
6984	Wood Frog	Visual (juv)	1	Potential SWH Incidental	469198, 4884127	0	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
6984	Wood Frog	Visual	>1	TEM SWH	469193, 4884125	0	0	1
6985	Frog species	Unspecified	>1	TEM SWH	469828, 4885666	0	0	1
6986	Green Frog	Unspecified	"many"	TEM SWH	469914, 4886998	0	0	1
6988	American Bullfrog	Visual	4	Potential SWH Incidental	469156, 4888959	0	0	1
6988	Green Frog	Visual	1	TEM SWH	469021, 4888311	0	0	1
6988	Green Frog	Vocal, Visual	"many"	TEM SWH	469059, 4888409	0	0	1
7064	Frog species	Vocal	>1	Other Incidental	470411, 4864695	0	0	1
7065	Amphibian species	Unspecified	>1	TEM SWH	470786, 4865319	0	0	1
7066	Frog species	Visual (tadpole)	>1	Other Incidental	470684, 4866395	0	0	1
7066	Frog species	Unspecified	>1	Other Incidental	470704, 4866311	0	0	1
7066	Frog species	Unspecified	>1	Other Incidental	470694, 4866398	0	0	1
7073	American Bullfrog	Vocal	>1	Other Incidental	470471, 4873683	1	1	1
7073	American Bullfrog	Vocal	>1	Other Incidental	470471, 4873683	1	1	1
7073	American Bullfrog	Vocal	1	Other Incidental	470570, 4873744	1	1	1
7073	American Bullfrog	Vocal	1	Other Incidental	470570, 4873744	1	1	1
7073	American Bullfrog	Visual	>1	Other Incidental	470570, 4873744	1	1	1
7073	American Bullfrog	Vocal	1	Other Incidental	470471, 4873683	1	1	1
7073	American Toad	Visual	>1	Other Incidental	470484, 4873689	1	1	1
7073	Frog species	Unspecified	>1	Other Incidental	470815, 4873551	1	1	1
7073	Frog species	Visual	>1	Other Incidental	470484, 4873689	1	1	1
7073	Frog species	Visual	>1	Other Incidental	470550, 4873721	1	1	1
7073	Green Frog	Visual	>1	Other Incidental	470570, 4873744	1	1	1
7073	Green Frog	Visual	>1	Other Incidental	470471, 4873683	1	1	1
7073	Wood Frog	Visual (juv)	>1	Other Incidental	470471, 4873683	1	1	1
7073	Wood Frog	Visual	>1	Other Incidental	470570, 4873744	1	1	1
7073	Wood Frog	Visual	1	Other Incidental	470570, 4873744	1	1	1
7077	American Toad	Visual	1	TEM SWH	470163, 4877001	0	0	1
7077	American Toad	Visual	1	TEM SWH	470203, 4877034	0	0	1
7077	Green Frog	Visual	1	TEM SWH	470163, 4877001	0	0	1
7077	Green Frog	Visual	1	TEM SWH	470012, 4877082	0	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7077	Spring Peeper	Visual (juv)	1	TEM SWH	470163, 4877001	0	0	1
7077	Spring Peeper	Visual	1	TEM SWH	470012, 4877082	0	0	1
7077	Wood Frog	Visual	1	TEM SWH	470203, 4877034	0	0	1
7078	Spring Peeper	Vocal	1	Potential SWH Incidental	470143, 4878149	0	0	1
7085	Green Frog	Visual	1	Potential SWH Incidental	470873, 4885146	0	0	1
7085	Spring Peeper	Vocal	1	Potential SWH Incidental	470872, 4885147	0	0	1
7087	Frog species	Visual (tadpole)	>1	Other Incidental	470885, 4887400	0	0	1
7087	Frog species	Visual	>1	Other Incidental	470885, 4887400	0	0	1
7088	Eastern Red-backed Salamander	Visual (juv)	1	Other Incidental	470346, 4888164	0	0	1
7088	Frog species	Unspecified	1	TEM SWH	470660, 4888812	0	0	1
7088	Green Frog	Visual	>1	TEM SWH	470345, 4888155	0	0	1
7088	Wood Frog	Visual	>1	TEM SWH	470345, 4888155	0	0	1
7090	Wood Frog	Unspecified	>1	TEM SWH	470655, 4890594	0	0	1
7164	Green Frog	Unspecified	1	Other Incidental	471178, 4864470	0	0	1
7164	Green Frog	Unspecified	1	Other Incidental	471497, 4864878	0	0	1
7164	Wood Frog	Unspecified	1	Other Incidental	471178, 4864470	0	0	1
7164	Wood Frog	Unspecified	1	Other Incidental	471497, 4864878	0	0	1
7165	Frog species	Unspecified	>1	Other Incidental	471483, 4865330	0	0	1
7167	Frog species	Unspecified	>1	Other Incidental	471255, 4867999	0	0	1
7167	Frog species	Visual	>1	Other Incidental	471509, 4867784	0	0	1
7167	Spring Peeper	Vocal	1	Potential SWH Incidental	471409, 4867938	0	0	1
7168	American Toad	Unspecified	1	TEM SWH	471402, 4868200	0	0	1
7168	Frog species	Vocal	>1	Other Incidental	471315, 4868750	0	0	1
7168	Frog species	Vocal	>1	Other Incidental	471315, 4868750	0	0	1
7168	Frog species	Unspecified	1	Other Incidental	471260, 4868007	0	0	1
7168	Frog species	Unspecified	1	Other Incidental	471183, 4868124	0	0	1
7168	Frog species	Visual	>1	Other Incidental	471118, 4868727	0	0	1
7168	Frog species	Visual	>1	Other Incidental	471272, 4868710	0	0	1
7168	Frog species	Visual	>1	Other Incidental	471118, 4868727	0	0	1
7168	Frog species	Visual	>1	Other Incidental	471118, 4868727	0	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7168	Gray Treefrog	Vocal	1	Potential SWH Incidental	471205, 4868259	0	0	1
7168	Pickerel Frog	Visual	1	TEM SWH	471222, 4868142	0	0	1
7168	Spring Peeper	Vocal	1	Potential SWH Incidental	471205, 4868258	0	0	1
7168	Wood Frog	Visual	5	Potential SWH Incidental	471204, 4868258	0	0	1
7169	Wood Frog	Unspecified	1	TEM SWH	471998, 4869409	0	0	1
7171	Frog species	Unspecified	>1	Other Incidental	471921, 4871242	1	1	1
7171	Frog species	Unspecified	>1	Other Incidental	471925, 4871246	1	1	1
7171	Frog species	Unspecified	>1	Other Incidental	471925, 4871246	1	1	1
7171	Frog species	Unspecified	>1	Other Incidental	471925, 4871246	1	1	1
7172	American Toad	Visual	1	TEM SWH	471099, 4872042	1	1	1
7172	Amphibian species	Visual (tadpole)	1	Other Incidental	471575, 4872512	1	1	1
7172	Frog species	Visual	1	TEM SWH	471221, 4872051	1	1	1
7172	Frog species	Unspecified	>1	Other Incidental	471567, 4872220	1	1	1
7172	Wood Frog	Visual	"several"	TEM SWH	471099, 4872042	1	1	1
7173	Frog species	Visual	>1	Other Incidental	471203, 4873384	1	1	1
7173	Frog species	Visual	>1	Other Incidental	471475, 4873509	1	1	1
7173	Green Frog	Visual	1	Potential SWH Incidental	471497, 4873244	1	1	1
7173	Green Frog	Visual	1	TEM SWH	471493, 4873235	1	1	1
7173	Wood Frog	Visual (juv)	1	TEM SWH	471136, 4873834	1	1	1
7174	Eastern Newt	Visual (juv)	1	Potential SWH Incidental	471519, 4874147	1	1	1
7174	Frog species	Visual (tadpole)	>1	Other Incidental	471066, 4874055	1	1	1
7174	Frog species	Visual (tadpole)	>1	Other Incidental	471066, 4874055	1	1	1
7174	Frog species	Unspecified	>1	Other Incidental	471066, 4874055	1	1	1
7174	Frog species	Unspecified	>1	Other Incidental	471066, 4874055	1	1	1
7174	Frog species	Unspecified	>1	TEM SWH	471850, 4874037	1	1	1
7174	Frog species	Visual	>1	Other Incidental	471852, 4874256	1	1	1
7174	Frog species	Unspecified	>1	Other Incidental	471066, 4874055	1	1	1
7174	Gray Treefrog	Vocal	1	Potential SWH Incidental	471548, 4874205	1	1	1
7174	Green Frog	Visual	1	Potential SWH Incidental	471507, 4874121	1	1	1
7174	Northern Leopard Frog	Visual	"many"	Other Incidental	471066, 4874055	1	1	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7174	Northern Leopard Frog	Unspecified	1	Other Incidental	471806, 4874102	1	1	1
7174	Spring Peeper	Vocal	1	Potential SWH Incidental	471191, 4874530	1	1	1
7174	Spring Peeper	Vocal	3	Potential SWH Incidental	471233, 4874717	1	1	1
7174	Spring Peeper	Vocal	1	Potential SWH Incidental	471512, 4874139	1	1	1
7174	Spring Peeper	Vocal	>1	TEM SWH	471172, 4874628	1	1	1
7184	Green Frog	Visual	1	Potential SWH Incidental	471259, 4884658	0	0	1
7184	Spring Peeper	Vocal	1	Potential SWH Incidental	471045, 4884549	0	0	1
7184	Spring Peeper	Vocal	1	Potential SWH Incidental	471259, 4884658	0	0	1
7184	Spring Peeper	Vocal	1	Potential SWH Incidental	471530, 4884703	0	0	1
7184	Wood Frog	Visual	1	Potential SWH Incidental	471258, 4884658	0	0	1
7184	Wood Frog	Unspecified	1	TEM SWH	471894, 4884698	0	0	1
7185	American Toad	Visual (juv)	>1	TEM SWH	471423, 4885887	0	0	1
7185	American Toad	Visual (juv)	>1	TEM SWH	471744, 4885404	0	0	1
7185	Amphibian species	Visual (juv)	>1	TEM SWH	471885, 4885648	0	0	1
7185	Amphibian species	Visual (juv)	>1	TEM SWH	471423, 4885887	0	0	1
7185	Frog species	Unspecified	>1	TEM SWH	471717, 4885190	0	0	1
7185	Wood Frog	Visual (juv)	>1	TEM SWH	471423, 4885887	0	0	1
7185	Wood Frog	Visual (juv)	>1	TEM SWH	471744, 4885404	0	0	1
7186	Wood Frog	Visual	1	TEM SWH	471677, 4886811	0	0	1
7188	Gray Treefrog	Vocal	1	Potential SWH Incidental	471313, 4888871	0	0	1
7188	Gray Treefrog	Vocal	1	TEM SWH	471353, 4888915	0	0	1
7188	Green Frog	Unspecified	>1	TEM SWH	471482, 4888997	0	0	1
7188	Green Frog	Visual	>1	TEM SWH	471353, 4888915	0	0	1
7188	Spring Peeper	Vocal	1	Potential SWH Incidental	471313, 4888871	0	0	1
7190	Green Frog	Visual	1	TEM SWH	471236, 4890270	0	0	1
7265	Gray Treefrog	Vocal	1	TEM SWH	472499, 4865789	0	0	1
7269	Wood Frog	Visual	1	Potential SWH Incidental	472001, 4869407	0	0	1
7272	Frog species	Vocal	>1	Other Incidental	472818, 4872959	1	1	1
7272	Frog species	Vocal	>1	Other Incidental	472818, 4872959	1	1	1
7272	Frog species	Unspecified	1	Other Incidental	472410, 4872793	1	1	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7272	Northern Leopard Frog or Green Frog	Unspecified	1	Other Incidental	472818, 4872959	1	1	1
7272	Northern Leopard Frog or Green Frog	Unspecified	1	Other Incidental	472818, 4872959	1	1	1
7272	Northern Leopard Frog or Green Frog	Unspecified	1	Other Incidental	472818, 4872959	1	1	1
7272	Wood Frog	Unspecified	1	TEM SWH	472973, 4872269	1	1	1
7273	Frog species	Unspecified	1	Other Incidental	472549, 4873083	1	1	1
7273	Wood Frog	Visual (juv)	4	Potential SWH Incidental	472909, 4873886	1	1	1
7274	Frog species	Unspecified	>1	Other Incidental	472786, 4874399	1	1	1
7274	Green Frog	Visual	1	Potential SWH Incidental	472829, 4874203	1	1	1
7274	Green Frog	Visual	1	Potential SWH Incidental	472773, 4874309	1	1	1
7277	Wood Frog	Visual	1	Potential SWH Incidental	472557, 4877866	0	0	1
7278	American Toad	Visual (juv)	1	Potential SWH Incidental	472476, 4878094	0	0	1
7278	Spring Peeper	Vocal	1	Potential SWH Incidental	472292, 4878231	0	0	1
7278	Spring Peeper	Vocal	1	Potential SWH Incidental	472366, 4878403	0	0	1
7278	Spring Peeper	Vocal	1	Potential SWH Incidental	472112, 4878203	0	0	1
7278	Wood Frog	Visual (juv)	1	Potential SWH Incidental	472116, 4878200	0	0	1
7278	Wood Frog	Visual (juv)	1	Potential SWH Incidental	472307, 4878403	0	0	1
7279	American Toad	Visual	1	TEM SWH	472525, 4879908	0	0	1
7279	Frog species	Unspecified	1	Other Incidental	472097, 4879884	0	0	1
7280	American Bullfrog	Vocal	>1	Other Incidental	472401, 4880163	0	0	1
7280	Frog species	Unspecified	>1	TEM SWH	472398, 4880157	0	0	1
7280	Frog species	Visual	>1	Other Incidental	472838, 4880453	0	0	1
7280	Green Frog	Visual	1	Other Incidental	472401, 4880163	0	0	1
7280	Green Frog	Unspecified	1	Other Incidental	472406, 4880169	0	0	1
7280	Northern Leopard Frog	Unspecified	1	TEM SWH	472398, 4880157	0	0	1
7285	Spring Peeper	Unspecified	1	TEM SWH	472591, 4885500	0	0	1
7285	Wood Frog	Visual (juv)	3	Potential SWH Incidental	472334, 4885686	0	0	1
7285	Wood Frog	Visual (juv)	4	Potential SWH Incidental	472184, 4885604	0	0	1
7285	Wood Frog	Visual (juv)	>1	TEM SWH	472334, 4885686	0	0	1
7370	Wood Frog	Visual	"multiple"	TEM SWH	473378, 4870520	0	1	1
7372	Wood Frog	Visual	1	Potential SWH Incidental	473002, 4872292	1	1	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7373	Frog species	Visual	>1	Other Incidental	473326, 4873709	1	1	1
7373	Frog/Toad species	Visual	1	Other Incidental	473189, 4873440	1	1	1
7373	Green Frog	Visual (juv)	1	Potential SWH Incidental	473014, 4873861	1	1	1
7373	Green Frog	Visual	1	Other Incidental	473043, 4873631	1	1	1
7373	Wood Frog	Visual (juv)	1	Potential SWH Incidental	473380, 4873991	1	1	1
7373	Wood Frog	Visual	1	Potential SWH Incidental	473014, 4873861	1	1	1
7373	Wood Frog	Visual (juv)	1	TEM SWH	473379, 4873989	1	1	1
7374	American Toad	Visual (juv)	1	TEM SWH	473501, 4874674	1	1	1
7374	Northern Leopard Frog or Pickerel Frog	Visual	>1	TEM SWH	473037, 4874603	1	1	1
7384	Wood Frog	Visual (juv)	100	Potential SWH Incidental	473638, 4884965	0	0	1
7384	Wood Frog	Visual (juv)	100	Potential SWH Incidental	473625, 4884934	0	0	1
7384	Wood Frog	Visual (juv)	1	Potential SWH Incidental	473712, 4884786	0	0	1
7384	Wood Frog	Visual (juv)	>1	TEM SWH	473716, 4884792	0	0	1
7385	American Toad	Visual (juv)	1	Potential SWH Incidental	473530, 4885313	0	0	1
7385	American Toad	Visual (juv)	>1	TEM SWH	473395, 4885814	0	0	1
7385	Green Frog	Vocal	2	Potential SWH Incidental	473607, 4885046	0	0	1
7385	Green Frog	Vocal	3	Potential SWH Incidental	473530, 4885313	0	0	1
7385	Green Frog	Vocal	>1	TEM SWH	473429, 4885191	0	0	1
7385	Wood Frog	Visual (juv)	5	Potential SWH Incidental	473607, 4885046	0	0	1
7385	Wood Frog	Visual (juv)	3	Potential SWH Incidental	473530, 4885313	0	0	1
7388	American Bullfrog	Vocal	1	Other Incidental	473287, 4888192	0	0	1
7388	Eastern Red-backed Salamander	Visual	1	Other Incidental	473019, 4888849	0	0	1
7388	Frog species	Unspecified	>1	Other Incidental	473348, 4888451	0	0	1
7388	Frog species	Visual	1	Other Incidental	473316, 4888307	0	0	1
7388	Frog species	Unspecified	1	Other Incidental	473631, 4888977	0	0	1
7388	Frog species	Unspecified	1	Other Incidental	473631, 4888977	0	0	1
7388	Frog species	Visual	>1	Other Incidental	473287, 4888192	0	0	1
7388	Green Frog	Vocal	>1	Other Incidental	473368, 4888539	0	0	1
7388	Salamander species	Visual (juv)	1	Other Incidental	473327, 4888299	0	0	1
7472	Frog species	Unspecified	>1	Other Incidental	474247, 4872301	1	1	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7490	American Bullfrog	Unspecified	1	Other Incidental	474900, 4890402	0	0	1
7490	Frog species	Unspecified	1	Other Incidental	474900, 4890402	0	0	1
7490	Frog species	Visual	1	Other Incidental	474688, 4890834	0	0	1
7490	Green Frog	Unspecified	>1	Other Incidental	474900, 4890402	0	0	1
7490	Green Frog	Unspecified	1	Other Incidental	474900, 4890402	0	0	1
7491	Wood Frog	Visual (juv)	>1	TEM SWH	474836, 4891062	0	0	1
7493	Green Frog	Vocal	1	TEM SWH	474007, 4893016	0	0	1
7577	Wood Frog	Visual (juv)	1	TEM SWH	475102, 4877116	0	0	1
7589	Frog species	Unspecified	>1	TEM SWH	475218, 4889592	0	0	1
7589	Wood Frog	Visual	1	Potential SWH Incidental	475540, 4889915	0	0	1
7590	American Bullfrog	Unspecified	"many"	Other Incidental	475131, 4890532	0	0	1
7590	Frog species	Unspecified	"many"	Other Incidental	475131, 4890532	0	0	1
7590	Frog species	Visual	>1	Other Incidental	475296, 4890927	0	0	1
7590	Northern Leopard Frog	Visual	1	Other Incidental	475793, 4890632	0	0	1
7666	Spring Peeper	Visual	1	Other Incidental	476682, 4866542	0	0	1

Table D-39. Supplemental data for desk-based observations relevant to Amphibian Movement Corridors.

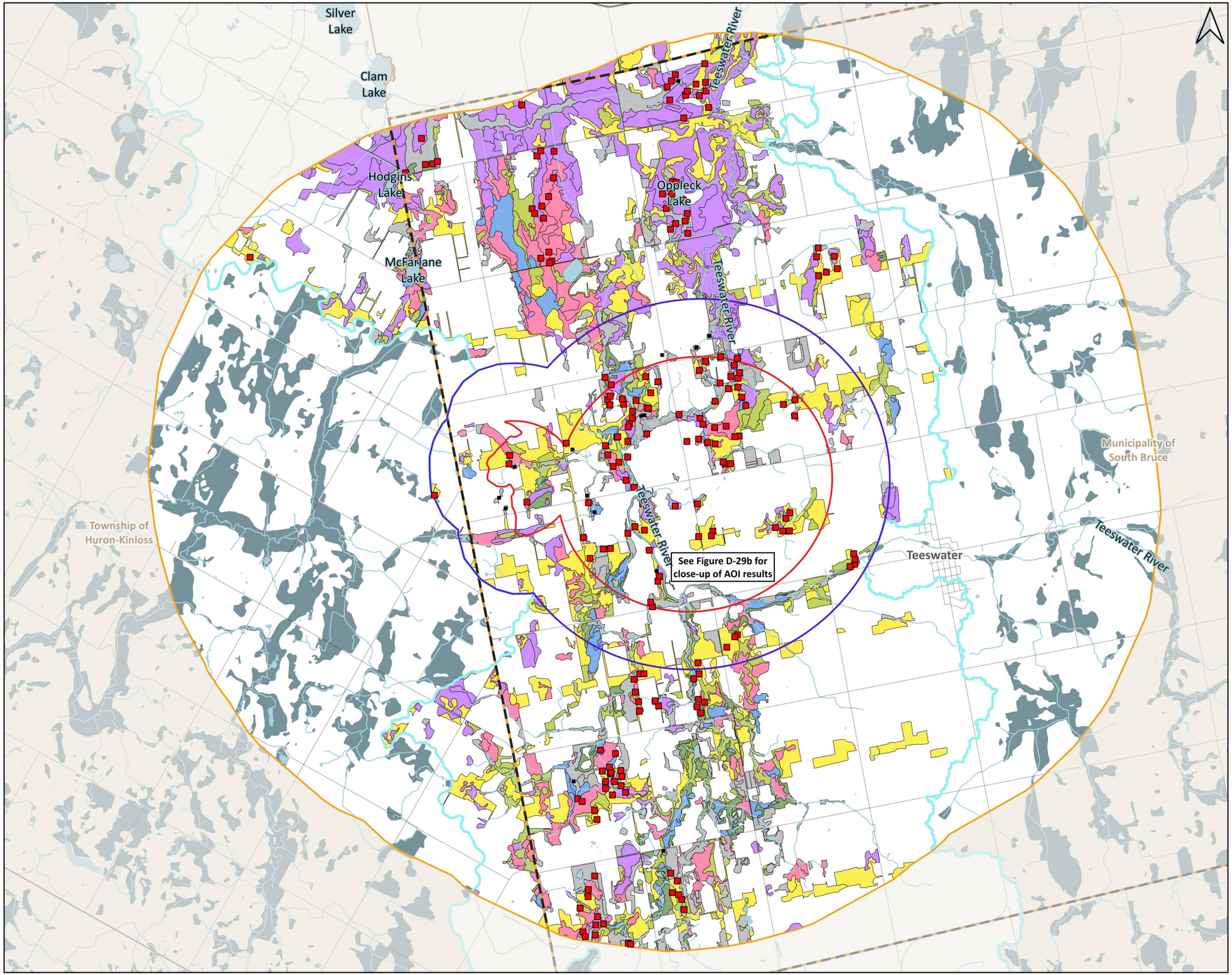
Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
6469	Gray Treefrog	U	464601, 4869134	0	0	1
6469	Northern Leopard Frog	U	464709, 4869084	0	0	1
7081	Western Chorus Frog - Great Lakes - St. Lawrence - Canadian Shield population	U	-	0	0	1
7081	Wood Frog	U	470014, 4881909	0	0	1
7087	Green Frog	U	470751, 4887603	0	0	1
7087	Wood Frog	U	470507, 4887973	0	0	1
7091	Wood Frog	U	470592, 4891480	0	0	1
7163	Green Frog	U	471479, 4863711	0	0	1
7279	Green Frog	U	472957, 4879606	0	0	1
7364	Eastern Newt	U	473465, 4864232	0	0	1
7471	Eastern Red-backed Salamander	U	474799, 4871953	0	1	1

Grid	Species	Count	Coordinates	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7571	Green Frog	U	475478, 4871998	0	1	1
7578	Green Frog	49	475763, 4878440	0	0	1
7690	Wood Frog	1	476015, 4890428	0	0	1

NWMO Biodiversity Impact Studies

Candidate SWH for Deer Movement Corridors - RSA_{UNG}

Figure D-29a



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{UNG})
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [332]

Ecosites that Match SWH Criteria

- Conifer [67]
- Mixedwood [181]
- Hardwood [237]
- Conifer Swamp [57]
- Mixedwood Swamp [157]
- Hardwood Swamp [229]

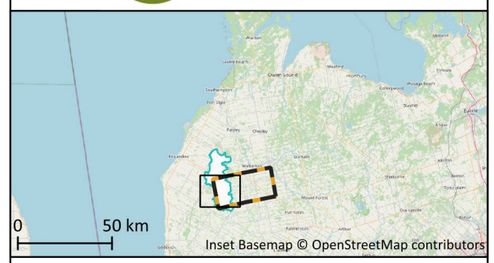
Candidate SWH in Plot [213]

- Unknown [197]
- No [16]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	



NWMO Biodiversity Impact Studies

Candidate SWH for Deer Movement Corridors - AOI

Figure D-29b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Ecosites that Do Not Match the SWH Criteria [332]

Ecosites that Match SWH Criteria

- Conifer [67]
- Mixedwood [181]
- Hardwood [237]
- Conifer Swamp [57]
- Mixedwood Swamp [157]
- Hardwood Swamp [229]

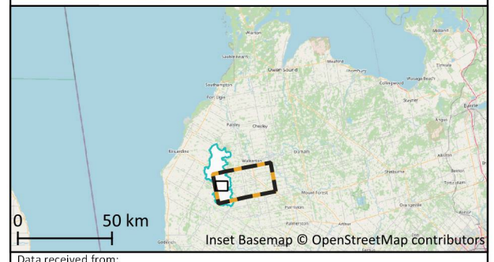
Candidate SWH in Plot [213]

- Unknown [197]
- No [16]

1:20,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); UTM 1km Grid (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
January 23, 2024	Map ID: NWMO_BIS_D178	

APPENDIX E – RESULTS OF ECOSITE SCREENING FOR CANDIDATE SWH

Table E-1. Ecosite matches for each SWH within the AOI, LSA_{TER} or LSA_{AQU}, and TEM-completed portions of BV-specific RSAs. GLSE ecosites determined through desk- and field-based TEM were converted to the ELC-1998 codes (see **Table C-2**) and compared with the ecosite criteria listed in the 6E ECS. Additional ecosite screening steps are also noted. Where minimum area sizes are required to fulfill SWH requirements, Zoetica included ecosite polygons even if the larger habitat patch extended outside the applicable study areas. That is, habitat patch size was considered holistically and not artificially cut off at the study area boundary.

SWH type	GLSE ecosite matches
Waterfowl Stopover and Staging Areas (Terrestrial) Figure D-1	MEO-k1, MEO-k2, MEO-k3, MEO-k4, MEO-n2, MEO-n3, MEW-Sk1, MEW-Sk2, MEW-Sk3, MEW-Sk4, MEW-Sn1, MEW-Sn2, MEW-Tk1, MEW-Tk3, MEW-Tk4, SLT-Hn1, SLT-Hn2 (62 polygons)
Waterfowl Stopover and Staging Areas (Aquatic) Figure D-2	MAE-m1, MAE-o1, MAS-o2, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm13, SWT-Hm15, SWT-Hm2, SWT-Hm3, SWT-Hm5, SWT-Hm6, SWT-Hm7, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3 (521 polygons)
Shorebird Migratory Stopover Area Figure D-3	MAM-m1, MAM-o1 (145 polygons)
Raptor Wintering Area Figure D-4 – Bald Eagle Figure D-5 – Hawk/Owl	SWT-Cm1, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co8, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm15, SWT-Hm2, SWT-Hm5, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm2, SWT-Mm5, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo6, TRT-CNd1, TRT-CNd3, TRT-CNd4, TRT-CNd6, TRT-CNd8, TRT-CNf1, TRT-CNf3, TRT-HNd1, TRT-HNd10, TRT-HNd3, TRT-HNd4, TRT-HNd7, TRT-HNd8, TRT-HNf1, TRT-HNf11, TRT-HNf18, TRT-HNf25, TRT-HNf40, TRT-HNf5, TRT-HNf7, TRT-HNf8, TRT-MNd1, TRT-MNd11, TRT-MNd14, TRT-MNd15, TRT-MNd2, TRT-MNd3, TRT-MNd5, TRT-MNd8, TRT-MNf1, TRT-MNf10, TRT-MNf2, TRT-MNf3, TRT-MNf8, TRT-MNf9 (307 polygons – Bald Eagle only; mapped polygons screened for proximity to large rivers and lakes (i.e., within 200 m of Teeswater River; lakes >1 ha). Desk-based ecosite screening for minimum size requirements for hawks and owls (>15 ha upland and >20 ha forest/upland together) did not result in any ecosite matches.
Bat Hibernacula	None
Bat Maternity Colonies Figure D-6	SWT-Hm1, SWT-Hm10, SWT-Hm12, SWT-Hm2, SWT-Hm5, SWT-Hm8, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm4, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6, TRT-HNd1, TRT-HNd10, TRT-HNd3, TRT-HNd7, TRT-HNd8, TRT-HNf1, TRT-HNf11, TRT-HNf18, TRT-HNf39, TRT-HNf40, TRT-HNf5, TRT-HNf8, TRT-MNd1, TRT-MNd15, TRT-MNd18, TRT-MNd2, TRT-MNd3, TRT-MNd4, TRT-MNd5, TRT-MNd6, TRT-MNd7, TRT-MNd8, TRT-MNf1, TRT-MNf10, TRT-MNf11, TRT-MNf12, TRT-MNf2, TRT-MNf3, TRT-MNf4, TRT-MNf7, TRT-MNf8, TRT-MNf9 (740 polygons)
Turtle Wintering Areas Figure D-7	AOO-1, MAE-m1, MAE-o1, MAM-m1, MAM-o1, MAS-o2, OAL-m1, OAL-o1, OAR-m1, SSL-m1, SSL-o1, SST-m1, SST-o1, SWT-Cm1, SWT-Cm2, SWT-Cm3, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co6, SWT-Co8, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm13, SWT-Hm15, SWT-Hm2, SWT-Hm3, SWT-Hm5, SWT-Hm6, SWT-Hm7, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm2, SWT-Mm3, SWT-Mm4, SWT-Mm5, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6 (1,068 polygons)
Reptile Hibernaculum Figure D-8	TRT-CNd1, TRT-CNd3, TRT-CNd6, TRT-CNd7, TRT-CNf1, TRT-HNd1, TRT-HNd10, TRT-HNd11, TRT-HNd3, TRT-HNd4, TRT-HNd7, TRT-HNd8, TRT-HNd9, TRT-HNf1, TRT-HNf11, TRT-HNf15, TRT-HNf17, TRT-HNf18, TRT-HNf25, TRT-HNf26, TRT-HNf39, TRT-HNf40, TRT-HNf5, TRT-HNf7, TRT-HNf8, TRT-MNd1, TRT-MNd11, TRT-MNd14, TRT-MNd15, TRT-MNd16, TRT-MNd17, TRT-MNd18, TRT-MNd2, TRT-MNd3, TRT-MNd4, TRT-MNd5, TRT-MNd6, TRT-MNd7, TRT-MNd8, TRT-MNf1, TRT-MNf10, TRT-MNf11, TRT-MNf12, TRT-MNf13, TRT-MNf2, TRT-MNf3, TRT-MNf4 (784 polygons)
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) Figure D-9	MEO-k1, MEO-k3, MEO-n2, MEW-Sk1, MEW-Sk3, MEW-Sn1, MEW-Sn2, MEW-Tk1, MEW-Tk3, SLT-Hn1 (29 polygons)

SWH type	GLSE ecosite matches
Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs) Figure D-10	FEW-T1, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm13, SWT-Hm15, SWT-Hm2, SWT-Hm3, SWT-Hm5, SWT-Hm6, SWT-Hm7, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm2, SWT-Mm3, SWT-Mm4, SWT-Mm6, SWT-Mo2, SWT-Mo3, SWT-Mo6 (657 polygons)
Colonially-Nesting Bird Breeding Habitat (Ground) Figure D-11 – Brewer's Blackbird	MAE-m1, MAE-o1, MAM-m1, MAM-o1, MAS-o2, MEO-k1, MEO-k3, MEO-n2, MEW-Sk1, MEW-Sk3, MEW-Sn1, MEW-Sn2, MEW-Tk1, MEW-Tk3, SLT-Hn1 (124 polygons – Brewer's Blackbird only
Deer Yarding Areas Figure D-12	AGW-2, AGW-3, SLT-Hn1, SLT-Hn2, SWT-Cm1, SWT-Cm2, SWT-Cm3, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co6, SWT-Co8, SWT-Mm1, SWT-Mm4, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6, TRT-CNd1, TRT-CNd3, TRT-CNd4, TRT-CNd6, TRT-CNd8, TRT-CNf1, TRT-CNf3, TRT-CNf6, TRT-CZ1, TRT-CZ12, TRT-CZ2, TRT-CZ3, TRT-MNd1, TRT-MNd15, TRT-MNd18, TRT-MNd2, TRT-MNd3, TRT-MNd4, TRT-MNd5, TRT-MNd6, TRT-MNd7, TRT-MNd8, TRT-MNf1, TRT-MNf10, TRT-MNf11, TRT-MNf12, TRT-MNf2, TRT-MNf3, TRT-MNf4, TRT-MNf7, TRT-MNf8, TRT-MNf9, TRT-MZ21, TRT-MZ6, TRT-MZ7 (577 polygons)
Deer Winter Congregation Areas Figure D-13	SWT-Cm1, SWT-Cm3, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co6, SWT-Co8, SWT-Hm1, SWT-Hm12, SWT-Hm2, SWT-Hm5, SWT-Hm8, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6, TRT-CNd1, TRT-CNd3, TRT-CNd4, TRT-CNd8, TRT-CNf1, TRT-CNf3, TRT-HNd1, TRT-HNd10, TRT-HNd3, TRT-HNd7, TRT-HNd8, TRT-HNf1, TRT-HNf18, TRT-HNf39, TRT-HNf40, TRT-HNf5, TRT-MNd1, TRT-MNd18, TRT-MNd2, TRT-MNd3, TRT-MNd4, TRT-MNd5, TRT-MNd6, TRT-MNd7, TRT-MNd8, TRT-MNf1, TRT-MNf11, TRT-MNf2, TRT-MNf3, TRT-MNf4, TRT-MNf7, TRT-MNf9 (423 polygons, screened for suitable/typical size requirements of >100 ha)
Cliffs and Talus Slopes	None
Sand Barren	None
Alvar Figure D-14	TRT-CNd1, TRT-CNd3, TRT-CNd4, TRT-CNd6, TRT-CNd7, TRT-CNd8 (58 polygons, screened for minimum size requirement of >0.5 ha)
Old Growth Forest Figure D-15	SWT-Cm1, SWT-Cm2, SWT-Cm3, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co6, SWT-Co8, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm13, SWT-Hm15, SWT-Hm2, SWT-Hm3, SWT-Hm5, SWT-Hm6, SWT-Hm7, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm2, SWT-Mm3, SWT-Mm4, SWT-Mm5, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6, TRT-CNd1, TRT-CNd3, TRT-CNd4, TRT-CNd8, TRT-CNf1, TRT-CNf3, TRT-CNf6, TRT-HNd1, TRT-HNd10, TRT-HNd11, TRT-HNd3, TRT-HNd4, TRT-HNd7, TRT-HNd8, TRT-HNd9, TRT-HNf1, TRT-HNf11, TRT-HNf15, TRT-HNf17, TRT-HNf18, TRT-HNf25, TRT-HNf26, TRT-HNf39, TRT-HNf40, TRT-HNf5, TRT-HNf7, TRT-HNf8, TRT-MNd1, TRT-MNd11, TRT-MNd14, TRT-MNd16, TRT-MNd18, TRT-MNd2, TRT-MNd3, TRT-MNd4, TRT-MNd5, TRT-MNd6, TRT-MNd7, TRT-MNd8, TRT-MNf1, TRT-MNf10, TRT-MNf11, TRT-MNf12, TRT-MNf13, TRT-MNf2, TRT-MNf3, TRT-MNf4, TRT-MNf7, TRT-MNf8, TRT-MNf9 (1,135 polygons, screened for minimum size requirements of ≥30 ha overall or ≥10 ha interior habitat)
Savannah	None
Tallgrass Prairie	None
Other Rare Vegetation Communities	To be determined through discussions with MNRF and NHIC
Waterfowl Nesting Area Figure D-16	MAE-m1, MAE-o1, MAM-m1, MAM-o1, MAS-o2, SSL-m1, SST-m1, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm13, SWT-Hm15, SWT-Hm2, SWT-Hm3, SWT-Hm5, SWT-Hm6, SWT-Hm7, SWT-Hm8 (355 polygons, including upland habitats within 120 m of ecosite matches)

SWH type	GLSE ecosite matches
Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat Figure D-17	SWT-Cm1, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co8, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm15, SWT-Hm2, SWT-Hm5, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm2, SWT-Mm5, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo6, TRT-CNd1, TRT-CNd3, TRT-CNd4, TRT-CNd6, TRT-CNd8, TRT-CNf1, TRT-CNf3, TRT-HNd1, TRT-HNd10, TRT-HNd3, TRT-HNd4, TRT-HNd7, TRT-HNd8, TRT-HNf1, TRT-HNf11, TRT-HNf18, TRT-HNf25, TRT-HNf40, TRT-HNf5, TRT-HNf7, TRT-HNf8, TRT-MNd1, TRT-MNd11, TRT-MNd14, TRT-MNd15, TRT-MNd2, TRT-MNd3, TRT-MNd5, TRT-MNd8, TRT-MNf1, TRT-MNf10, TRT-MNf2, TRT-MNf3, TRT-MNf8, TRT-MNf9 (307 polygons, screened for proximity to large rivers and lakes; i.e., within 200 m of Teeswater River, lakes >1 ha)
Woodland Raptor Nesting Habitat Figure D-18	SWT-Co1, SWT-Co5, SWT-Hm1, SWT-Hm5, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6, TRT-CZ1, TRT-HNd1, TRT-HNd3, TRT-HNf1, TRT-MNd1, TRT-MNd6, TRT-MNf1, TRT-MNf3, TRT-MNf7 (54 polygons, screened for minimum size requirements of >30 ha overall with >10 ha interior habitat)
Turtle Nesting Areas Figure D-19	MAE-m1, MAE-o1, MAS-o2 (15 polygons)
Seeps and Springs Figure D-20	TRT-CNd1, TRT-CNd3, TRT-CNd4, TRT-CNd6, TRT-CNd7, TRT-CNd8, TRT-CNf1, TRT-CNf3, TRT-CNf6, TRT-HNd1, TRT-HNd10, TRT-HNd11, TRT-HNd3, TRT-HNd4, TRT-HNd7, TRT-HNd8, TRT-HNd9, TRT-HNf1, TRT-HNf11, TRT-HNf15, TRT-HNf17, TRT-HNf18, TRT-HNf25, TRT-HNf26, TRT-HNf39, TRT-HNf40, TRT-HNf5, TRT-HNf7, TRT-HNf8, TRT-MNd1, TRT-MNd11, TRT-MNd14, TRT-MNd15, TRT-MNd16, TRT-MNd17, TRT-MNd18, TRT-MNd2, TRT-MNd3, TRT-MNd4, TRT-MNd5, TRT-MNd6, TRT-MNd7, TRT-MNd8, TRT-MNf1, TRT-MNf10, TRT-MNf11, TRT-MNf12, TRT-MNf13, TRT-MNf2, TRT-MNf3, TRT-MNf4, TRT-MNf7, TRT-MNf8, TRT-MNf9 (841 polygons)
Amphibian Breeding Habitat (Woodland) Figure D-21	SWT-Cm1, SWT-Cm2, SWT-Cm3, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co6, SWT-Co8, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm13, SWT-Hm15, SWT-Hm2, SWT-Hm3, SWT-Hm5, SWT-Hm6, SWT-Hm7, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm2, SWT-Mm3, SWT-Mm4, SWT-Mm5, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6, TRT-CNd1, TRT-CNd3, TRT-CNd4, TRT-CNd6, TRT-CNd7, TRT-CNd8, TRT-CNf1, TRT-CNf3, TRT-CNf6, TRT-HNd1, TRT-HNd10, TRT-HNd11, TRT-HNd3, TRT-HNd4, TRT-HNd7, TRT-HNd8, TRT-HNd9, TRT-HNf1, TRT-HNf11, TRT-HNf15, TRT-HNf17, TRT-HNf18, TRT-HNf25, TRT-HNf26, TRT-HNf39, TRT-HNf40, TRT-HNf5, TRT-HNf7, TRT-HNf8, TRT-MNd1, TRT-MNd11, TRT-MNd14, TRT-MNd15, TRT-MNd16, TRT-MNd17, TRT-MNd18, TRT-MNd2, TRT-MNd3, TRT-MNd4, TRT-MNd5, TRT-MNd6, TRT-MNd7, TRT-MNd8, TRT-MNf1, TRT-MNf10, TRT-MNf11, TRT-MNf12, TRT-MNf13, TRT-MNf2, TRT-MNf3, TRT-MNf4, TRT-MNf7, TRT-MNf8, TRT-MNf9 (1,664 polygons, not screened for presence of wetland, pond, or woodland pool >500 m^2)
Amphibian Breeding Habitat (Wetlands) Figure D-22	AOO-1, FEW-T1, MAE-m1, MAE-o1, MAM-m1, MAM-o1, MAS-o2, OAL-m1, OAL-o1, OAR-m1, SSL-m1, SSL-o1, SST-m1, SST-o1, SWT-Cm1, SWT-Cm2, SWT-Cm3, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co6, SWT-Co8, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm13, SWT-Hm15, SWT-Hm2, SWT-Hm3, SWT-Hm5, SWT-Hm6, SWT-Hm7, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm2, SWT-Mm3, SWT-Mm4, SWT-Mm5, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6 (1,070 polygons, screened for suitable size >500 m^2)
Woodland Area-Sensitive Bird Breeding Habitat Figure D-23	SWT-Cm1, SWT-Cm2, SWT-Cm3, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co6, SWT-Co8, SWT-Hm1, SWT-Hm12, SWT-Hm2, SWT-Hm5, SWT-Hm8, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm4, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6, TRT-CNd1, TRT-CNd3, TRT-CNd4, TRT-CNd8, TRT-CNf1, TRT-CNf3, TRT-HNd1, TRT-HNd10, TRT-HNd3, TRT-HNd8, TRT-HNf1, TRT-HNf11, TRT-HNf18, TRT-HNf40, TRT-HNf5, TRT-MNd1, TRT-MNd18, TRT-MNd2, TRT-MNd3, TRT-MNd4, TRT-MNd5, TRT-MNd6, TRT-MNd7, TRT-MNd8, TRT-MNf1, TRT-MNf10, TRT-MNf11, TRT-MNf12, TRT-MNf2, TRT-MNf3, TRT-MNf4, TRT-MNf7, TRT-MNf8 (445 polygons, screened for minimum size requirements of >30 ha overall)

SWH type	GLSE ecosite matches
Marsh Bird Breeding Habitat Figure D-24	MAE-m1, MAE-o1, MAM-m1, MAM-o1, MAS-o2, MEO-k1, MEO-k2, MEO-k3, MEO-k4, MEO-n2, MEO-n3, MEW-Sk1, MEW-Sk2, MEW-Sk3, MEW-Sk4, MEW-Sn1, MEW-Sn2, MEW-Tk1, MEW-Tk3, MEW-Tk4, SSL-m1, SSL-o1, SST-m1, SST-o1, SWT-Cm1, SWT-Cm2, SWT-Cm3, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co6, SWT-Co8, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm13, SWT-Hm15, SWT-Hm2, SWT-Hm3, SWT-Hm5, SWT-Hm6, SWT-Hm7, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm2, SWT-Mm3, SWT-Mm4, SWT-Mm5, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6 (1,097 polygons)
Open Country Bird Breeding Habitat Figure D-25	None after screening for minimum size requirement of >30 ha
Shrub/Early Successional Bird Breeding Habitat Figure D-26	SLT-Hn1 (1 polygon, screened for minimum size requirement of >10 ha)
Terrestrial Crayfish Figure D-27	MAE-m1, MAE-o1, MAM-m1, MAM-o1, MAS-o2, MEO-k1, MEO-k2, MEO-k3, MEO-k4, MEO-n2, MEO-n3, MEW-Sk1, MEW-Sk3, MEW-Sk4, MEW-Sn1, MEW-Sn2, MEW-Tk1, MEW-Tk3, MEW-Tk4, SSL-m1, SSL-o1, SST-m1, SST-o1, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm13, SWT-Hm15, SWT-Hm2, SWT-Hm3, SWT-Hm5, SWT-Hm6, SWT-Hm7, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm2, SWT-Mm3, SWT-Mm4, SWT-Mm5, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6 (992 polygons)
Special Concern and Rare Wildlife Species	N/A
Amphibian Movement Corridors Figure D-28	SWT-Cm1, SWT-Cm2, SWT-Cm3, SWT-Co1, SWT-Co4, SWT-Co5, SWT-Co6, SWT-Co8, SWT-Hm1, SWT-Hm10, SWT-Hm11, SWT-Hm12, SWT-Hm13, SWT-Hm15, SWT-Hm2, SWT-Hm3, SWT-Hm5, SWT-Hm6, SWT-Hm7, SWT-Hm8, SWT-Hm9, SWT-Ho1, SWT-Ho2, SWT-Ho3, SWT-Mm1, SWT-Mm2, SWT-Mm3, SWT-Mm4, SWT-Mm5, SWT-Mm6, SWT-Mo1, SWT-Mo2, SWT-Mo3, SWT-Mo6, TRT-CNd1, TRT-CNd3, TRT-CNd4, TRT-CNd6, TRT-CNd7, TRT-CNd8, TRT-CNf1, TRT-CNf3, TRT-CNf6, TRT-HNd1, TRT-HNd10, TRT-HNd11, TRT-HNd3, TRT-HNd4, TRT-HNd7, TRT-HNd8, TRT-HNd9, TRT-HNf1, TRT-HNf11, TRT-HNf15, TRT-HNf17, TRT-HNf18, TRT-HNf25, TRT-HNf26, TRT-HNf39, TRT-HNf40, TRT-HNf5, TRT-HNf7, TRT-HNf8, TRT-MNd1, TRT-MNd11, TRT-MNd14, TRT-MNd15, TRT-MNd16, TRT-MNd17, TRT-MNd18, TRT-MNd2, TRT-MNd3, TRT-MNd4, TRT-MNd5, TRT-MNd6, TRT-MNd7, TRT-MNd8, TRT-MNf1, TRT-MNf10, TRT-MNf11, TRT-MNf12, TRT-MNf13, TRT-MNf2, TRT-MNf3, TRT-MNf4, TRT-MNf7, TRT-MNf8, TRT-MNf9 (1,664 polygons)
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Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 AQUATIC HABITAT MAPPING REPORT

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO
Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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GLOSSARY AND ABBREVIATIONS

AOI	Area of Interest
AHM	Aquatic Habitat Mapping
ARA	Aquatic Resource Area
BIS	Biodiversity Impact Studies
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
BV	Biodiversity Value; The biotic environmental components that will be considered for study within the Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components.
CNSC	Canadian Nuclear Safety Commission
Critical Habitat	Habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species (*Species at Risk Act*, S.C. 2002, c. 29). Identification of critical habitat is not a required component of a recovery strategy under the Ontario *Endangered Species Act*. However, the approach used to identify critical habitat, in conjunction with the best scientific information available, is recommended when developing a habitat regulation. A habitat regulation is a legal instrument under the *ESA* that prescribes an area that will be protected as the habitat of the species.
DFO	Fisheries and Oceans Canada
Ecosite	Second lowest level of the Ecological Land Classification hierarchy. The land within an ecosite will generally contain similar substrate and vegetation.
eDNA	Environmental DNA
EMBP	Environmental Media Baseline Program
GRTS	Generalized Random Tessellation Stratified
GSWC	Greenock Swamp Wetland Complex
IA	Impact Assessment
IAAC	Impact Assessment Agency of Canada
Lake	An open waterbody with a depth greater than 2 m and with less than 25% of its surface area covered with wetland vegetation. For the purposes of study design lakes were also defined as being >1 ha in size.
LSA	Local Study Area
LSA_{AQU}	Aquatic Local Study Area

Marl	Soft, light-coloured (white to pale gray) mud-like sediment, typically in shallow waters of some small lakes or ponds, or under swamp lands, where it is often covered by black organic sediment.
MNRF	Ontario Ministry of Natural Resources and Forestry
MTO	Ontario Ministry of Transportation
NWMO	Nuclear Waste Management Organization
OHN	Ontario Hydro Network
OSAP	Ontario Stream Assessment Protocol
OWES	Ontario Wetland Evaluation System
Pond	A small body of still water formed naturally or by hollowing or embanking. Ponds differ from lakes in that they do not have an atrophic zone (an area deep enough that sunlight cannot reach the bottom). For the purposes of study design ponds were also defined as being ≤1 ha in size.
RIC / RISC	Resources Inventory Committee / Resources Information Standards Committee
Riparian Zone	Riparian zone includes riparian habitat from approximately 1.5 m upshore of the shoreline to 100 m upshore of the shoreline. Three riparian zones were delineated for data collection purposes: i) 1.5 – 10 m; ii) 11 – 30 m; and iii) 31 – 100 m.
RSA	Regional Study Area
RSA_{AQU}	Aquatic Regional Study Area
SAR	Species at Risk
SARA	Federal *Species at Risk Act*
Shoreline Cover	Shoreline cover includes cover provided to fish and other biodiversity for shade, protection from predation, and opportunistic feeding. It includes overhanging vegetation and woody debris, in-water vegetation and woody debris, larger substrates such as boulder and cobble that provide larger interstitial spaces for hiding, deep pools and organic debris; all within 1.5 m of the shoreline.
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SOP	Standard Operating Procedure
Sumac	Sumac Geomatics; air photo interpreter for the Project at SON-South Bruce
SVCA	Saugeen Valley Conservation Authority
SWOOP	South Western Ontario Orthophotography Project 2020

The Project	The Adaptive Phased Management Project ('the Project') is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines
VC	Valued Component
Waterbody	Includes, lakes ponds, and wetlands that do not have a defined channel running through it.
Watercourse	A natural or artificial channel through which water flows and includes streams, rivers and wetlands that include a defined channel that flows through them.
Wetland	Areas where the water table is at or near the surface, or where soils are saturated with water for sufficient time such that the principal determinants of vegetation and soil development are excess water and low oxygen. Wetlands are defined as being less than 2 m in depth and having greater than 25% of its surface covered with wetland vegetation.

1.0 BACKGROUND

The Adaptive Phased Management Project (hereafter, 'the Project') must be studied and assessed for its potential to impact fish and fish habitat. Aquatic habitats and the species, ecological services, and recreational opportunities they support are valued by land users, Indigenous communities, and the public for social, recreational, commercial, domestic, and spiritual reasons. Fishing is a popular activity in Southwestern Ontario, highlighting the important link between biodiversity values, ecosystem services, and socio-economic impact considerations. Fish habitat, which includes any watercourse, waterbody, or wetland that provides functions for the life history stages of fish, is protected by the *Fisheries Act* (R.S.C. 1985, c. F-14; updated in 2019). Habitats that support fish species and other aquatic and semi-aquatic species listed under the federal *Species at Risk Act (SARA;* S.C. 2002, c. 29) or the Ontario *Endangered Species Act* (S.O. 2007, c. 6) may be afforded further habitat protections. In addition, aquatic habitats that are defined as Significant Wildlife Habitat in the Ontario Provincial Policy Statement (MMAH 2020) under the *Planning Act* are also afforded protection (see Appendix C, Chapter 1).

The Canadian Nuclear Safety Commission's (CNSC) *Guidance on Deep Geological Repository Site Characterization* includes fish habitat as an element of aquatic ecology that should be characterized in the Area of Interest (AOI) (CNSC 2018). In addition, the Tailored Impact Statement Guidelines Template ('TISG Template'[1]) identifies fish and fish habitat as elements of the biophysical environment (IAAC 2022) that could be scoped into the Impact Assessment (IA) as Valued Components (VCs), which would require a detailed baseline description and project effects assessment in the impact statement (IAAC 2020). The characterization of fish habitat will also serve to describe the available habitat required by semi-aquatic species (such as amphibians and turtles).

1.1 Objectives

The primary objectives of the aquatic habitat mapping (AHM) for the Biodiversity Impact Studies (BIS) at the Saugeen Ojibway Nation (SON)- South Bruce siting area are to:

1. Characterize the presence and distribution of fish habitat within the AOI and the aquatic Local Study Area (LSA_{AQU}; Section 3.2, Chapter 1);
2. Detect areas of importance to aquatic and semi-aquatic biodiversity values (BVs), including habitat potentially used to carry out various life history requirements and habitats that could support species at risk (SAR)[2] and other species of interest in the LSA_{AQU};
3. Identify suitable sampling sites for Tier 2 studies for aquatic and semi-aquatic BVs (including sampling sites within the LSA_{AQU} and control sites within and outside of the aquatic regional study area (RSA_{AQU}); and
4. Provide additional baseline data to inform infrastructure siting and a potential future Impact Assessment, mitigation measures, and associated monitoring program(s) to address the environmental, regulatory, and stakeholder/rights-holder concerns relevant to the Project.

[1] See Chapter 1 for limitations and updates to the TISG Template.

[2] See Appendix D and Section 3.1 in Zoetica's BPPA Report (Zoetica 2021) for a comprehensive list of SAR, and methods used to compile this list.

The AHM studies begin to fulfill the requirements of the TISG Template for fish and fish habitat as well as TISG requirements for describing habitat for other aquatic and semi-aquatic wildlife (see Appendix C in Zoetica™'s *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach* (BPPA) Report (Zoetica 2021)). The AHM began with a desk-based mapping exercise, followed by field surveys. The initial desk-based AHM provided draft watercourse reach delineations and identified areas where potential barriers to fish passage may exist. Desk-based mapping may also provide an overview of suitable habitat for fish to complete various life history stages and potential sensitivity of habitats to future change throughout the area. Field surveys improve desk-based mapping by verifying connectivity between waterbodies, identifying potential ephemeral aquatic habitats and flooded areas, and collecting information on habitat features (sediment, vegetation, and bank characteristics) at a sub-set of reaches. Collecting these data during Tier 1 studies will inform where future detailed habitat characterization may be required and where Tier 2 fish community characterization studies should be conducted.

1.2 Best Practices

A full description of best practices considered for the AHM study design is available in the BPPA Report (Zoetica 2021). Methods outlined in the Ontario Stream Assessment Protocol (OSAP (Stanfield 2017)) and the Ontario Ministry of Transportation's (MTO) *Environmental Guide for Fish and Fish Habitat* (MTO 2009) were used for desk-based watershed mapping and field verification. These methods were supplemented with the *Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures* (RIC 2001). The Resource Inventory Committee (RIC) standards (RIC 2001) are designed to assess desk-based AHM at a more detailed scale (1:20,000) relative to methods described in Ontario protocols, and are generally more comprehensive.

2.0 STUDY AREAS

AHM was conducted to collect aquatic habitat information within the area of interest (AOI) and the aquatic local study area (LSA_{AQU}), and within select areas outside of the LSA_{AQU}. Outside the LSA_{AQU}, sites within and outside the aquatic regional study area (RSA_{AQU}) (see Section 3.0, Chapter 1, for study area delineations) were included to capture appropriate control sites and areas known to support critical habitats for SAR. The BPPA Report (Zoetica 2021) also contains additional details on the rationale for delineating study areas.

3.0 METHODS

3.1 Collation of Habitat Data

Desk-based investigations began with collating existing information from government, citizen science, and other datasets on aquatic habitat (e.g., existing barriers) that could potentially occur within the BIS study areas. **Table 3-1** summarizes the datasets, data layers, and reports investigated and analyzed for aquatic habitat data for the 2023 BIS Baseline Report. See also Appendix A, Chapter 1 for data quality scoring of datasets. A full list of the species mentioned in this report, including common and scientific names, is available in **Table H-1** in Appendix H.

Table 3-1. Spatial datasets and reports analyzed for aquatic habitat for the 2023 BIS Baseline Report.

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains relevant[1] data?
Zoetica / Sumac Geomatics *BIS Tier 1 studies*	Ecosite Classification Dataset	Shapefile	07/2020	Y
Ontario Ministry of Natural Resources and Forestry (MNRF)	Beaver Dam - discontinued (GeoHub)	Shapefile	10/2021	Y
	OHN Hydrographic Line	Shapefile	10/2021	Y
	OHN Hydrographic Point	Shapefile	10/2021	Y
	OHN Hydrographic Polygon	Shapefile	10/2021	N

Note:
1. Zoetica determined dataset relevance based on geographic and temporal relevance, as well as relevance to aquatic habitats. For example, data that were not within the relevant BIS study areas, and data that were too old to be considered relevant were labelled "N".

If Zoetica identifies additional datasets that are relevant to aquatic habitat in the applicable study areas, they will be investigated and incorporated into baseline data maps in future years of the BIS baseline program. Any future projects that overlap with the BIS study areas may provide data or identify data sources that can be integrated into future iterations of baseline reports. Additional projects that may come online and overlap with the RSA_{AQU} will be considered in future years where relevant.

3.2 Habitat Classifications

AHM mapping uses watercourses and waterbodies as the most coarse-grained definitions of aquatic features. Using AHM Best Practices outlined in the BPPA report (Zoetica 2021), wetlands are defined as watercourses if they have a defined channel and are otherwise defined as waterbodies. Zoetica divided protocols for characterizing aquatic habitats into survey methods for: (1) watercourses (including wetlands with distinct channels flowing through them) and (2) waterbodies such as lakes, ponds, and wetlands (without distinct channels).

3.3 Desk-based Reach Characterization

Before fieldwork, Zoetica conducted desk-based aquatic reach mapping using available data and orthophotos to classify aquatic habitat in the LSA_{AQU} into watercourse (streams and rivers), waterbody (lakes and ponds) and wetland reaches. Additional watercourses and waterbodies in and outside of the RSA_{AQU} were classified in select areas for use as potential control sites. The data sources used in the reach characterization included:

- Ontario Hydro Network (OHN) products, which include a watercourse and waterbody layer (available from Ontario GeoHub and mapped at a scale of 1:20,000 in Southern Ontario);
- Ontario Ministry of Natural Resources and Forestry (MNRF) Wetlands dataset (available from Ontario GeoHub); and
- South Western Ontario Orthophotography Project (SWOOP) Imagery collected in April 2020, used to classify the landscape into ecosites and define wetlands (see Appendix B, Chapter 1 for details).

See Appendix A, Chapter 1 for data quality scoring.

Sumac Geomatics interpreted the SWOOP air photos to create the ecosite classification dataset only within the natural and naturalized areas of the LSA_{AQU} (see Appendix B, Chapter 1), with the potential to expand into other areas in future years. Zoetica used ecosite classification dataset to delineate waterbodies and wetlands within the LSA_{AQU} for consistency across all BIS programs and due to the dataset's increased accuracy relative to the MNRF and OHN Waterbody datasets. However, as the ecosite classification dataset was limited to the LSA_{AQU}, Zoetica used the OHN Waterbodies and MNRF Wetlands datasets to characterize reaches outside the LSA_{AQU}. Wetland ecosites in the ecosite classification dataset were grouped into four major wetland groups that are consistent with the Ontario Wetland Evaluation System (OWES) (MNRF 2014): fen, bog, swamp, and marsh. The MNRF Wetlands dataset used in the RSA_{AQU} contains the same wetland groups, plus an additional 'unknown' wetland group.

3.3.1 Watercourses

Zoetica delineated watercourse reaches manually using the OHN Watercourse layer as a base map. Reaches are sections of a stream or river with uniform characteristics and reach boundaries signify locations where these characteristics change. Where needed, Zoetica digitally edited the watercourses to align them better with SWOOP 2020 imagery. Reach boundaries were delineated based on:

- River confluences (e.g., where a tributary meets a larger river);
- A distance of at least 100 m from the last boundary (unless tributaries were closer than 100 m);
- Locations where watercourse channel patterns change (e.g., change from straight to meandering);
- Locations where watercourse habitat attributes change (e.g., change from no wetland to a wetland, change in wetland type, or change in the size of the wetland surrounding the watercourse);
- Locations where the permanently vegetated islands change (e.g., no islands to occasional islands); and
- Locations where the confinement changes (e.g., change from unconfined to occasionally confined).

Zoetica considered obstructions or potential barriers to fish passage to be reach boundaries if their lengths were less than either 100 m or 10 times bankfull width, and if they were consistent with changes in physical criteria (e.g., falls with characteristics different from both upstream and downstream reaches).

Reaches on a watercourse were assigned a unique number (in an upstream-ascending order), with the first reach defined at the mouth of the watercourse. Zoetica derived a preliminary watercourse reach table, including all second-order or greater reaches in the LSA_{AQU}, as well as reaches for control sites (e.g., along the Teeswater River upstream of the LSA_{AQU} and the Beatty Saugeen River), for planning purposes and to determine a subset of watercourse reaches to be field surveyed (see Section 3.4). Watercourse reaches selected for survey are summarized in a watercourse reach table in the *Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design* (BPD) Report (Zoetica 2022), which includes referencing and basic desk-based classification information (see Section 2.3 of the BPD Report (Zoetica 2022)). A breakdown of the number of watercourse reaches selected for survey is presented in **Table A-1**.

3.3.2 Waterbodies

Waterbodies within the AOI, LSA_{AQU}, and in select areas outside of the LSA_{AQU} (for selection of control sites) were first classified as:

- Lakes: open waterbodies with depths greater than 2 m, with less than 25% of surface area covered with wetland vegetation and > 1 ha in size; or

- Ponds: small bodies of still water formed naturally or by hollowing or embanking, and ≤ 1 ha in size. Ponds differ from lakes because they do not have an atrophic zone (an area deep enough that sunlight cannot reach the bottom).

Reaches were defined by the waterbody's extent (length). Zoetica assigned a unique reach number to each waterbody in an upstream sequential order and integrated with the watercourse reach numbering system. Zoetica derived a preliminary waterbody reach table, including all waterbody reaches in the LSA_{AQU} and select reaches for control sites within and outside of the RSA_{AQU} (i.e., Robson Lake, Hines Lake, and Cargill Mill Pond) for planning purposes and to determine a subset of reaches to be field surveyed (see Section 3.4). The waterbody reaches selected for survey are in a final waterbody reach table in the BPD Report (Zoetica 2022) which includes referencing information and basic desk-based information (see Section 2.3.2 of the BPD Report for further details (Zoetica 2022)). A breakdown of the number of waterbody reaches selected for survey is presented in **Table A-1**.

3.3.3 Wetlands

Wetlands are "*lands that are seasonally or permanently flooded by shallow water (i.e., with depths less than 2 m) or where the water table is close to the surface where the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic or water tolerant plants*" (MNRF 2014).

Zoetica used the ecosite classification dataset (see Appendix B, Chapter 1) to group all wetland ecosites within the natural and naturalized areas of the LSA_{AQU} into four types based on the OWES for Southern Ontario (MNRF 2013): marsh, swamp, fen, and bog. Swamps dominated the mapped area and were further divided into conifer, hardwood, mixedwood, and shrub swamps. No bogs were identified within the natural and naturalized areas of the LSA_{AQU}. Zoetica defined wetland reaches by the full extent of the wetland and assigned each wetland in the LSA_{AQU} a polygon ID. A preliminary table of wetland reaches in the LSA_{AQU} was derived for planning purposes and used to determine the subset of reaches to be field surveyed (see Section 3.4). The wetland reaches selected for survey are in a final waterbody reach table in the BPD Report along with referencing and basic desk-based information (see *Standard Operating Procedure for Aquatic Habitat Mapping - Southwestern Ontario Site* (AHM SOP; Appendix B of the BPD Report (Zoetica 2022)). A breakdown of the number of wetland reaches selected for survey is presented in **Table A-1**, excluding fen wetlands as they were not accessible during the 2022 field season.

3.4 Study Design and Survey Site Selection

In 2022, AHM data collection was focused on surveys within all types of aquatic habitats in the AOI and LSA_{AQU} and in select areas of the RSA_{AQU}. The BIS baseline program aims to survey all watercourses and waterbodies that the Project may directly impact within the AOI and LSA_{AQU} (e.g., the Teeswater River and lakes, ponds, and wetlands within the AOI and downstream of the AOI within the Greenock Swamp Wetland Complex), along with some control sites outside of the LSA_{AQU} (within the RSA_{AQU} and potentially beyond, as needed). However, the final Project location and design have not yet been determined. It is not feasible to survey all watercourses and waterbodies in the AOI, select areas of the LSA_{AQU}, and control sites in the RSA_{AQU} in a single field season. The survey design for 2022 included a subset of all aquatic habitat types in the AOI, representative areas of the LSA_{AQU}, and potential control sites. A full description of the watercourse, waterbody, and wetland reach selection, and rationale is provided in the 2022 BPD Report (Zoetica 2022). Additional surveys can be undertaken in future years once more information about the Project is known (including location, components, activities, and predicted extent of potential

impacts) and based on results from initial environmental DNA (eDNA) metabarcoding studies (see Appendix E, Chapter 1).

3.4.1 Watercourses

Zoetica's study design for 2022 focused on surveying a subset of watercourse reaches in the AOI that were in second-order or higher streams, along with rivers and first-order tributaries where SAR were detected before BIS baseline studies began. Zoetica also included surveys on second-order or higher reaches of the Teeswater River downstream of the AOI, and within reaches on tributaries to the Teeswater within the Greenock Swamp Wetland Complex (GSWC). Additional far-reaching sites were included on the Teeswater River outside GSWC and downstream of the LSA_{AQU}. Reaches upstream of the AOI on the Teeswater River and Alps Creek were also selected to act as potential control locations for reaches within the AOI. A breakdown of the number of sites selected for survey can be found in **Table A-1** in **Appendix A**. Full details for the selection of watercourse reaches and survey locations for the 2022 BIS study design can be found in the 2022 BPD Report (Zoetica 2022).

3.4.2 Waterbodies

In 2022, Zoetica's study design focussed on surveying all accessible lakes and ponds within the AOI and all large, named lakes in the LSA_{AQU}, all of which occur within the GSWC. However, Cunningham Lake was deemed to be inaccessible and unsafe for survey based on feedback received from the Saugeen Valley Conservation Authority (SVCA) indicating that this lake is surrounded by a floating bog; thus, it was excluded from the study design. Zoetica may look at other ways to assess habitat at Cunningham Lake if the SON-South Bruce site is selected. Additional unnamed lakes/ponds were selected for survey within the LSA_{AQU} but outside of the AOI. Cargill Mill Pond was included for survey in the RSA_{AQU} because it is known to contain critical habitat for pugnose shiner and occurs downstream of the AOI and LSA_{AQU} on the Teeswater River. In addition, Robson and Hines lakes were selected outside of the RSA_{AQU} as potential control sites for the large, named lakes within the GSWC. A breakdown of the number of sites selected for survey can be found in **Table A-1** in **Appendix A**. Full details for selecting waterbody reaches and survey locations for the 2022 BIS study design can be found in the 2022 BPD Report (Zoetica 2022).

3.4.3 Wetlands

In 2022, Zoetica's study design prescribed surveys of approximately one-third of wetlands within the AOI (see Section 2.3.2.3.1.3 in the 2022 BPD Report (Zoetica 2022)). A stratified random study design (i.e., Generalized Random Tessellation Stratified (GRTS)) was used to select potential wetland survey sites in the AOI based on selecting all polygons of rare wetland types (conifer swamp and shrub swamp) and then proportional representation of the remaining wetland types (hardwood swamp, mixedwood swamp, marsh) resulting in 30 wetland sampling locations in the AOI. In the southern LSA_{AQU} a proportionally equal number of wetland sites were paired to the same wetland types as those found within the AOI. For example, 30% of sites selected within the AOI were represented by hardwood swamps, thus, a similar proportion of hardwood swamps were selected south of the AOI. In the southern LSA_{AQU}, a total of 26 survey sites were selected. An additional 25 survey sites were chosen in the LSA_{AQU} north of the AOI. Each wetland type had at least two survey locations, and the remaining survey locations were allocated to wetland types to approximately match the proportion of the mapped area north of the AOI that was covered by each wetland type. Full details on the selection of wetland reaches and survey locations for the 2022 BIS study design can be found in the 2022 BPD Report (Zoetica 2022).

3.5 Field Survey Methods

Field-based AHM was conducted using methods outlined in the AHM SOP (Appendix B of the BPD Report (Zoetica 2022)). These methods primarily followed steps found in the OSAP, enhanced using procedures outlined in the MTO's *Environmental Guide for Fish and Fish Habitat* (MTO 2009), and the *Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures* (RIC 2001). Field mapping was conducted at watercourse, waterbody, and wetland sites according to the AHM SOP (Zoetica 2022), and at major inflow and outflow of select lakes and ponds. Field methods focused on checking the accuracy of reach delineations derived via desk-based mapping (outlined in Section 3.3) and included collecting detailed habitat characteristics that could not be ascertained using aerial imagery alone. Field methods were also aimed at collecting habitat information to predict whether habitat is suitable for supporting fish species of interest during various life history stages, to inform methods needed for fish presence and community surveys in future baseline fieldwork (i.e., Tier 2 studies), to identify where detailed fish and fish habitat assessments will likely be required (e.g., SAR habitat, habitat that may be lost or altered due to the Project), and to identify areas to avoid and potential areas suitable for offsetting, should a future IA illustrate a need.

3.5.1 Survey Timing

Aquatic habitat field surveys were conducted between July 13th and September 29th, 2022, to characterize watercourse, waterbody, and wetland habitat information. This timing window follows the standard survey period for AHM in Ontario (MTO 2009, Stanfield 2017). The survey timing coincides with low flow periods to optimize visibility into the water and ensure that seasonal aquatic and riparian vegetation is present (MTO 2009). Surveys were conducted during weather conditions suitable for good visibility through the water column (i.e., not during or after periods of heavy rain and other weather events that can increase runoff, stir up sediments, and reduce water clarity).

3.5.2 Survey Crew

The Nuclear Waste Management Organization (NWMO) contracted North South Consultants Inc and their subconsultants (Morrison Hershfield) to conduct field surveys outlined in the BIS BPD Report (Zoetica 2022). The field contractor crews consisted of a minimum of two team members, including at least one vegetation specialist from Morrison Hershfield to identify riparian and aquatic vegetation.

3.5.3 Reconnaissance Survey

Zoetica recommended conducting a reconnaissance survey in the spring (after freshet) before field surveys to:

1. provide an overview of each watercourse reach and waterbody to be surveyed;
2. determine ephemeral connections;
3. determine whether reach breaks on watercourses required further subdivision (e.g., an unrecorded barrier is detected);
4. assist in selecting representative sites on reaches for survey; and,
5. confirm access plans based on satellite imagery.

Due to the late procurement of the field data collection contractor, a reconnaissance survey was not conducted before field surveys. Zoetica recommends a spring reconnaissance survey be conducted in future years to identify ephemeral streams and potential connections within the study area. During a preliminary site visit by Zoetica in June 2022, many areas on the eastern side of GSWC were dry. During

discussions with SVCA staff, Zoetica learned that the eastern side of the swamp is generally only wetted during the early spring. Zoetica suggests revisiting the GSWC during a future spring reconnaissance to determine the potential connectivity of wetland areas with the Teeswater River, to understand the potential use of the swamp by fish, and to understand the potential migration by fish species during the spring season.

3.5.4 Watercourse Surveys

At each watercourse reach (see Section 3.3.1 for reach definition), the field survey team selected a representative site for the survey. Sites were defined by a stretch of watercourse of a minimum of 40 m in length and beginning and ending at a crossover point (i.e., a half meander where the thalweg of the watercourse crosses to the opposite bank). At some sites, multiple crossover sites were required to define a survey site to achieve the minimum required survey length. For long straight reaches, where no obvious meanders occurred, the site length was determined using the formula: 10 x bankfull width unless the result is less than the 40 m minimum length criteria.

Detailed methods for completing surveys at watercourse sites, including required equipment, are outlined in the AHM SOP in Appendix B of the BPD Report (Zoetica 2022). At each watercourse survey site, five forms were filled out:

1. Reach Overview Form: including details of the survey crew, weather conditions, reach UTM coordinates, access, and determination of whether the reach is sampleable.
2. Reach Features Form: including notes on site conditions.
3. Watercourse Site ID and Mapping Form: including UTM coordinates of site boundaries and a hand sketch of the site and habitat conditions to scale.
4. Watercourse Characterization Form: including measurements of water conditions, reach section type and morphology (e.g., associated wetlands, gradient, discharge, reach subsections (run, pool, riffle, flats), substrate, and bank stability), cover and habitat measurements (instream and bank), and information on migratory obstructions, critical or limiting habitat, and enhancement opportunities.
5. Photograph Logsheet Form: to document photos taken at the site.

3.5.5 Waterbody Surveys

Waterbody surveys include a shoreline survey of the lake or pond reach and surveys of the main inlet and outlet of the waterbody (if the waterbody has an inlet or outlet). Inlets and outlets were surveyed following the watercourse methods and forms outlined in Section 3.5.4.

Detailed methods for completing the survey at waterbody sites, including required equipment, are outlined in the AHM SOP in Appendix B of the BPD Report (Zoetica 2022). During the shoreline survey, the same five survey forms listed in Section 3.5.4 were filled out, except that the mapping form was specific for each waterbody and included a georeferenced form to accommodate hand sketches of shoreline habitat. In addition, a waterbody characterization form replaces the watercourse characterization form and includes fields for information within shoreline zones depicted by changes in shoreline habitat.

3.5.6 Wetland Surveys

For wetlands, the minimum information collected at each survey location included site referencing, cover estimates, water quality, habitat characteristics and photography of the site. Wetland reaches where the

open water formed a channel through the wetland were surveyed following the watercourse survey methods and forms.

Survey site selection within a wetland polygon was primarily determined by using Geographic Information System software (QGIS) to randomize the location of the survey site within the wetland polygon. However, the field contractor was instructed to move the selected GRTS point to the nearest wetted area for AHM surveys and collecting eDNA samples (see Appendix E, Chapter 1).

Detailed methodology for completing the survey at wetland sites, including required equipment, is outlined in the AHM SOP in Appendix B of the BPD Report (Zoetica 2022). During the wetland survey, the same five survey forms listed in Section 3.5.4 were filled out, except a wetland mapping form and wetland characterization form replace the watercourse mapping and characterization forms.

3.6 Data Analysis

Field data, once quality checked by the field data collection contractor, were provided to Zoetica for data analysis and interpretation. Data received by Zoetica were assumed to be cleaned following a QA/QC procedure undertaken by the field contractor and error-free. A summary of reaches surveyed by the field contractor is provided in **Table A-1**. Many reaches visited during field efforts were dry at the time of survey and thus excluded from the analysis. Additional reaches planned for survey were not visited due to landowner permissions not received in time for survey or due to unsafe conditions (e.g., flooding of land). These reaches may be surveyed in future years if conditions allow.

3.6.1 Watercourses

Zoetica uploaded field data into R statistical software and cleaned the files of any errors (e.g., formatting errors, spelling consistency errors). Zoetica separated unsampled and dry sites from sampled sites, and further separated sampled sites into categories based on location (AOI, LSA_{AQU}, RSA_{AQU}, and Reference) and watercourse (e.g., Unnamed, Teeswater River, Alps Creek). For LSA_{AQU} and RSA_{AQU} sites on the Teeswater River, Zoetica combined the sites into three groups based on their locations relative to each other: sites S049 and S078 upstream of the AOI within the LSA_{AQU}, sites S031 and S019 downstream of the AOI within the RSA_{AQU}, and the remaining 11 sites downstream of the AOI within the LSA_{AQU}. A list of site IDs by each category is provided in **Table A-2**. For water chemistry variables (water temperature, pH, conductivity, turbidity, dissolved oxygen) and waterbody length, width, and depth, Zoetica calculated mean, minimum, maximum, and standard error. For numeric habitat variables (e.g., substrate type), Zoetica calculated minimum, mean, maximum, and standard deviation. Zoetica summed total site lengths for each watercourse-location combination. For categorical habitat variables (e.g., source type, percent stream shaded, bank stability, bank stage), Zoetica tallied the count and percent of sites in each category. Dominant vegetation type at different locations in the riparian zone[3] were summarized by percent of sites reporting each distance-vegetation type category.

[3] Riparian zone includes riparian habitat from approximately 1.5 m upshore of the shoreline to 100 m upshore of the shoreline. Three riparian zones were delineated for data collection purposes: i) 1.5 – 10 m; ii) 11 – 30 m; and iii) 31 – 100 m.

3.6.2 Waterbodies

Data were uploaded and cleaned as in Section 3.6.1. Zoetica separated unsampled and dry sites from sampled sites, and further separated sampled waterbodies into groups of unnamed lakes in the AOI, unnamed lakes outside of the AOI, reference lakes (Hines, Robson, and Cargill), and other named lakes / lakes in and near Greenock Swamp (Silver, Schmidt, and Oppleck). A list of site IDs by each category is provided in **Table A-2**. Some habitat variables were reported for the overall waterbody. For waterbody-wide water chemistry and spatial variables (water temperature, pH, conductivity, turbidity, dissolved oxygen, waterbody length, width, and depth), Zoetica calculated mean, minimum, maximum, and standard error. For numeric habitat variables (e.g., shoreline cover[4]), Zoetica calculated minimum, mean, maximum, and standard deviation. For categorical habitat variables (e.g., flow type), Zoetica tallied the count of sites in each category.

Zoetica provided the field data collection contractor a customized mapping form for each waterbody, which included an outline of the waterbody to aid the accuracy of the hand-drawn mapping in the field. In addition to the drawn maps, the field surveyors supplied Zoetica with spatial datasets of the perimeter of each lake and where the zone breaks occur. Using the drawn map forms, the lake perimeter spatial dataset, and SWOOP imagery, Zoetica delineated zone breaks to split the riparian buffers (i.e., 1.5 - 10, 11 - 30, and 31 – 100 m) into zones. The associated field data was joined to each zone and mapped. In addition to the zone breaks, Zoetica digitized other information from the hand-drawn map forms, including vegetation types, barriers, potential locations for future fieldwork, and other features of interest.

3.6.3 Wetlands

Data were uploaded and cleaned as in Section 3.6.1. Zoetica separated unsampled and dry sites from sampled sites, and further grouped sampled sites based on location – AOI, north of the AOI, and south of the AOI – and wetland type for summarizations. A list of site IDs by each category is provided in **Table A-2**. For each study area-wetland type combination, Zoetica calculated mean, minimum, maximum, and standard error for water chemistry variables (water temperature, pH, conductivity, turbidity, and dissolved oxygen). For numeric habitat variables, such as substrate type, Zoetica calculated minimum, mean, maximum, and standard deviation. Categorical habitat variables, such as reach type, were tallied to report an overall count per category. Dominant vegetation type at different locations in the riparian zone were summarized by percent of sites in each distance-vegetation type category.

4.0 RESULTS

This section presents desk-based AHM results and field results from the first year of Tier 1 data collection at the SON-South Bruce location.

[4] Shoreline cover includes cover provided to fish and other biodiversity for providing shade, protection from predation, and opportunistic feeding and includes overhanging vegetation and woody debris, in-water vegetation and woody debris, larger substrates such as boulder and cobble that provide larger interstitial spaces for hiding, deep pools and organic debris all within 1.5 m of the shoreline.

4.1 Habitat

4.1.1 Watercourses

A total of 80 sites (including inlet and outlet reaches to lakes) containing water were surveyed on watercourse reaches within the AOI, LSA_{AQU}, and RSA_{AQU} to document aquatic habitat. Three wetlands were reclassified as streams during AHM surveys and are summarized along with watercourse reaches in this section. Sections 4.1.1.1 and 4.1.1.2 describe habitat characteristics recorded within each of the watercourse groupings surveyed. Habitat characteristics are presented in **Appendix B**. Riparian and aquatic vegetation (common and scientific names) documented during AHM surveys of watercourses and mentioned in this report are presented in **Appendix G.**

4.1.1.1 Teeswater River

The Teeswater River has an overall length of 89.5 km and a slope of approximately 1.5 m/km from its headwaters to its mouth where it empties into the Saugeen River, which then flows towards Lake Huron. The Teeswater flows from its headwaters through the AOI and into the GSWC north of the AOI. The Teeswater is anticipated to have strong flows in the fall and spring, due to heavier rainfall and snow melt, respectively, with groundwater base flow during the summer. The Teeswater River has a cold/cool water regime with tributaries that are cold, cool, or warm. According to the Aquatic Resource Area (ARA) database (MNRF 2021), sections of the Teeswater River between its headwaters and the GSWC are known to be cold water and change to cool water from the GSWC to approximately the Cargill Mill Ponds; sections of the Teeswater north of the Cargill Mill Ponds are known to have a warm water thermal regime.

The Teeswater River is a popular fishing stream in southwestern Ontario for smallmouth bass, northern pike, and white crappie. The Teeswater River is known to support populations of rainbow mussel, a freshwater mussel species listed as endangered under Schedule 1 of the *SARA*, and pugnose shiner, a species listed as Threatened under Schedule 1 of the *SARA*. Critical habitat for pugnose shiner has been defined in its Federal recovery strategy near the town of Cargill at the Cargill Mill Ponds (DFO 2012). Pugnose shiner prefer habitats that are highly vegetated with sandy or marl substrate and low turbidity (OMNR 2013).

4.1.1.1.1 Teeswater River in the AOI

In the AOI, field crews surveyed a total of 22 sites along the Teeswater River for aquatic habitat characteristics. The Teeswater River within the AOI has permanent flow with low discharge and primarily a natural stream channel with structure with only one site (S038) being channelized (**Table B-1**). Water chemistry in reaches of the Teeswater River in the AOI is presented in **Table B-2**. This section of the Teeswater River had a mean temperature of 21.6 ± 0.3 °C, normal pH (between 6.5 and 8.2) and conductivity (between 200 – 1000 µS/cm), moderate to high turbidity (between 8 and 50 NTU), and a healthy dissolved oxygen profile (of above 8 mg/L and 80%).

Examples of habitat and features on the Teeswater River within the AOI are presented in **Figure 4-1**. Associated wetlands along this section of the Teeswater River are presented on **Figure B-1**. Shore cover providing shade on reaches on the Teeswater in the AOI was < 30% and riparian stage was primarily mature forest (**Table B-3**). Riparian vegetation within 10 m of the Teeswater River in the AOI consisted primarily (> 90%) of meadow followed by shrub (ca. 27 – 36%) and wetlands (ca. 23%) with smaller proportions of cropland, coniferous, deciduous, and mixed forests, and lawn (**Table B-4**; also see Figure D-4 in Chapter 3). Greater proportions of cropland and forest were found in the 11-30 m and 31-100 m

riparian zones from the watercourses (**Table B-4**; Figure D-4 in Chapter 3). Riparian species recorded on the shores of the reaches of the Teeswater surveyed in the AOI are presented in **Appendix G**. Habitat on the Teeswater River within the AOI is characterized primarily by flats, with riffle habitat occurring at four reaches (**Table B-5**; **Figure B-2**). Similar bankfull widths and depths were reported for flats and riffles along the Teeswater River in the AOI (**Table B-5**). Substrate in the Teeswater River within the AOI was comprised of a variety of substrate types (**Table B-5**; **Figure B-3**). Silt substrates were recorded on every reach surveyed, followed by clay, sand, and cobble (**Table B-5**). Reaches of the Teeswater in the southern portion of the AOI were primarily comprised of cobble sediments with smaller proportions of silt, sand, and gravel. Sediments gradually change to more silt and clay in the sections of the Teeswater in the central AOI and then change back to primarily cobble and silt with a small amount of clay as the Teeswater River exits the AOI in the northern portion.

All reaches surveyed within the Teeswater River in the AOI had some instream cover; however, instream cover was greatest for reaches in the northeastern portion of the AOI before the Teeswater River exits the AOI into the GSWC (**Figure B-4**). Of the instream cover types present, vascular instream vegetation was present at 21 of the 22 sites surveyed and comprised a mean of approximately 18% of cover at these sites. Vascular overhanging vegetation and instream woody debris were also recorded frequently (at 17 of the 22 sites surveyed) but provided lower (approximately 4 - 5.5%) instream cover. Cobble was present at 15 of the sites surveyed but provided proportionally larger amounts of instream cover relative to other cover types (**Table B-5**). Other cover types were present at some of the sites surveyed but constituted proportionally lower amounts of instream cover (**Table B-5**). Aquatic vegetation was present at all reaches surveyed on the Teeswater River within the AOI, with all reaches containing emergent vegetation, 15 reaches containing submergent vegetation, and 11 reaches containing floating vegetation (**Table B-5**). Within the reaches containing aquatic vegetation, emergent vegetation was present in the greatest abundance followed by floating vegetation and then submergent vegetation (**Table B-5**). Predominant aquatic vegetation species recorded during AHM surveys in the Teeswater River within the AOI are presented in **Appendix G**.



a) Riffle habitat and woody debris on reach S007



b) Floating vegetation on reach S004



c) Cobble and gravel sediment on reach S016



d) Submergent vegetation on reach S074



e) Reach S069 deadended with road built up



f) Reach S070 filled in at road with cobble

Figure 4-1. Examples of reaches surveyed on the Teeswater River in AOI.

4.1.1.1.2 Tributaries to the Teeswater River within the AOI

Field teams surveyed a total of 21 reaches on tributaries to the Teeswater River within the AOI. Many of the smaller reaches on first order tributaries in the AOI were dry. Water chemistry of Teeswater tributary reaches in the AOI is presented in **Table B-2**. These tributaries had a mean temperature of 17.0 ± 1.0 °C, normal pH (between 6.5 and 8.2) and conductivity (between 200 – 1000 µS/cm), low turbidity (below 8 NTU), and a healthy dissolved oxygen profile (of above 8 mg/L and 80%).

Examples of habitat and features on tributaries to the Teeswater River within the AOI are presented in **Figure 4-2**. Associated wetlands along tributaries to the Teeswater River are presented on **Figure B-1**. Shore cover providing shade on reaches of the Teeswater tributaries in the AOI was variable and riparian stage was primarily mature forest (**Table B-3**). Riparian vegetation within 10 m of the Teeswater tributaries in the AOI consisted primarily (> 70%) of meadow followed by shrub and wetlands (ca. 33% each) with smaller proportions of coniferous, deciduous, and mixed forests, and cropland (**Table B-4**; also see Figure D-4 in Chapter 3). Greater proportions of cropland and forest were found in the 11-30 m and 31-100 m riparian zones from the watercourse (**Table B-4**; Figure D-4 in Chapter 3). Riparian species recorded on the tributaries to the Teeswater River within the AOI are presented in **Appendix G**. Most Teeswater tributaries within the AOI contained flats, many (16 reaches) comprised riffle habitat and several (5 reaches) contained pool habitat (**Table B-5**; **Figure B-2**). Sediment within the smaller tributaries to the Teeswater River within the AOI consisted of a variety of substrate types (**Table B-5**). Sand substrates were recorded most often (at 18 reaches) followed by silt, muck, gravel, and cobble. Other substrate types were recorded at less than half of the reaches surveyed. Where present, muck substrates comprised the largest proportion of substrate types followed by silt and then sand. Larger substrate types were recorded in lower proportions relative to smaller substrates (**Table B-5**). Sediments in the smaller tributaries on the western side of the AOI were comprised mainly of muck and sand, with smaller amounts of detritus and gravel, while the tributary on the eastern side of the AOI had a variety of substrate types including cobble, gravel, silt, sand, clay, and muck (**Figure B-3**).

All reaches surveyed within the tributaries to the Teeswater River in the AOI had some instream cover. Vascular overhanging vegetation was present at all reaches surveyed and comprised a mean of approximately 28% of cover at these sites. However, vascular instream vegetation, where present (at 20 reaches), comprised the greatest proportion of cover (**Table B-5**). Undercut banks, cobble, deep pools, and instream woody debris also provided >10% cover at sites where present. Other cover types were present at some of the sites surveyed but constituted proportionally lower amounts of instream cover or were only present at a few reaches surveyed (**Table B-5**). Aquatic vegetation was present at most Teeswater tributary reaches surveyed within the AOI, with submergent and emergent vegetation recorded at 16 reaches and floating vegetation at 12 reaches (**Table B-5**). Overall, aquatic vegetation types were present in similar proportions (**Table B-5**). Predominant aquatic vegetation species recorded during AHM surveys in the tributaries to the Teeswater River within the AOI are presented in **Appendix G**.



a) An example of a dry reach (S012)



b) An example reach (S095) with habitat units comprising flats



c) An example of instream cover found on reach S034



d) An example of a tributary running through agricultural fields (S008)



e) An example of floating vegetation on reach S009 running through swamp habitat



f) An example of reach S100 near the confluence with the Teeswater River

Figure 4-2. Examples of reaches surveyed on tributaries to the Teeswater River in the AOI.

4.1.1.1.3 Teeswater River Upstream of the AOI

Upstream of the AOI, two sites were assessed along the Teeswater. Water chemistry in reaches of the Teeswater River upstream of the AOI is presented in **Table B-2**. This section of the Teeswater River had a mean temperature of 20.6 ± 0.2 °C, a slightly higher pH (>8.2), moderate conductivity (between 200 – 1000 µS/cm), low turbidity (below 8 NTU), and low dissolved oxygen (below 8 mg/L and 80%).

Examples of habitat and features on the Teeswater River upstream of the AOI are presented in **Figure 4-3**. Wetlands associated with this section of the Teeswater River are presented on **Figure B-1**. Shore cover providing shade on the two Teeswater reaches surveyed upstream of the AOI was < 30% and riparian stage was primarily young forest with some mature forest on the right upstream bank (**Table B-3**). Riparian vegetation within 10 m of the Teeswater River upstream of the AOI consisted entirely of meadow and deciduous forest (**Table B-4**; Figure D-4 in Chapter 3). Shrub and coniferous forest were found alongside meadow and deciduous forest in the 11-30 m and 31-100 m riparian zones adjacent to the watercourse (**Table B-4**; Figure D-4 in Chapter 3). Riparian species recorded on the shores of both Teeswater reaches upstream of the AOI are presented in **Appendix G**. Both reaches surveyed contained riffle habitat, one also contained flats and the other contained pool and run habitat (**Table B-5**; **Figure B-2**b). Sediments in this section of the Teeswater River were comprised primarily of cobble and gravel substrates with a smaller proportion of silt (**Table B-5**; **Figure B-3**). Both reaches surveyed within the Teeswater River upstream of the AOI had some in-stream cover (**Table B-5**; **Figure B-4**). Cobble was present at both sites and was present in the greatest proportion relative to other types of cover. Vascular instream vegetation and deep pools were also present at both reaches surveyed and provided a greater proportion of cover relative to other cover types. Boulders and overhanging vegetation were also present at both reaches surveyed but provided proportionally lower cover. Other cover types were present at only one of the reaches surveyed and provided proportionally smaller amounts of cover (**Table B-5**). All types of aquatic vegetation were present at both reaches surveyed on the Teeswater River upstream of the AOI, with submergent vegetation in greater proportion than emergent and submergent vegetation (**Table B-5**). Predominant aquatic vegetation species recorded during AHM surveys in the Teeswater River upstream of the AOI are presented in **Appendix G**.



a) Flats and riffles on reach S049



b) Cobble sediment on reach S049



c) In-water cover and vegetation in reach S078



d) Submergent vegetation on reach S078

Figure 4-3. Examples of reaches on the Teeswater River upstream of the AOI.

4.1.1.1.4 Teeswater River Downstream of the AOI within the LSA_{AQU}

Eleven reaches were surveyed on the Teeswater River downstream of the AOI but within the LSA_{AQU}. Water chemistry in reaches of the Teeswater River downstream of the AOI is presented in **Table B-2**. Reaches surveyed had a mean temperature of 20.3 ± 0.1 °C, normal pH (between 6.5 and 8.2) and conductivity (between 200 – 1000 µS/cm), moderate to high turbidity (between 8 and 50 NTU), and low dissolved oxygen (below 8 mg/L and 80%).

Examples of habitat and features within reaches surveyed on the Teeswater River downstream of the AOI within the LSA_{AQU} are presented in **Figure 4-4**. Wetlands associated with this section of the Teeswater River are presented on **Figure B-1**. Shore cover providing shade on reaches surveyed in the Teeswater downstream of the AOI was primarily 61 – 90% and riparian stage was mature forest (**Table B-3**). Riparian vegetation within 10 m of the Teeswater River downstream of the AOI consisted primarily of deciduous forest, wetlands, shrub, and meadow with smaller proportions of mixed forest (**Table B-4**; Figure D-4 in Chapter 3). Greater proportions of deciduous forest were found relative to wetlands, shrub, and meadow in the 11-30 m and 31-100 m riparian zones from the watercourse (**Table B-4**; Figure D-4 in Chapter 3). Riparian species recorded on the shores of the Teeswater reaches surveyed downstream of the AOI are presented in **Appendix G**. As the Teeswater River exists the AOI and enters the GSWC, habitat units are

comprised mainly of flats with the occasional pool habitat (**Table B-5**; **Figure B-2**). Sediments in the Teeswater River through the Greenock Swamp were primarily muck (at nine reaches surveyed) with small amounts of sand, silt, and clay (**Table B-5**; **Figure B-3**). Sediments change to primarily sand with smaller amounts of silt and clay as the Teeswater River exits the GSWC (**Figure B-3**). All 11 reaches surveyed had some instream cover (**Table B-5**; **Figure B-4**). Of the instream cover types present, overhanging woody debris and instream woody debris were present at all reaches surveyed and comprised the greatest proportion of cover. Vascular overhanging vegetation was also present at all reaches surveyed but provided lower proportion of cover relative to woody debris. Undercut banks, deep pools, and vascular instream vegetation were present at some of the sites surveyed but constituted proportionally lower amounts of instream cover (**Table B-5**). Aquatic vegetation was only present at a few reaches surveyed, with emergent vegetation recorded at two reaches and submergent and floating vegetation each recorded at only one reach (**Table B-5**). Overall, aquatic vegetation types, when present, were found in small proportions (**Table B-5**). Predominant aquatic vegetation species recorded during AHM surveys in the Teeswater River downstream of the AOI are presented in **Appendix G**.



a) An example of flat habitat on reach S002



b) An example of in-water cover on reach S058



c) An example of sediment on reach S046



d) Bank sloughing evident on reach S064

Figure 4-4. Examples reaches surveyed on the Teeswater River downstream of the AOI in the LSA_{AQU}.

4.1.1.2 Larger Tributaries to the Teeswater River

4.1.1.2.1 Alps Creek

Alps Creek is a cold-water tributary to the Teeswater River, which is in the southern portion of the LSA_{AQU}. Waters from the Teeswater Wetland Complex drain to Alps Creek and flow northward to the Teeswater River. Alps Creek was selected as a potential reference area for other tributaries to the Teeswater River that occur within the AOI.

A total of nine reaches were surveyed on Alps Creek. Alps Creek has a natural channel structure with permanent flow and a low to medium discharge (**Table B-1**). Water chemistry in reaches of Alps Creek is presented in **Table B-2**. Reaches surveyed on Alps Creek had a mean temperature of 16.6 ± 0.6 °C, a slightly elevated pH (> 8.2), normal conductivity (between 200 – 1000 µS/cm), low turbidity (below 8 NTU), and a healthy dissolved oxygen profile (of above 8 mg/L and 80%).

Examples of habitat and features on reaches surveyed in Alps Creek are presented in **Figure 4-5**. Wetlands associated with this section of Alps Creek are presented on **Figure B-1**. Shore cover providing shade on reaches surveyed in Alps Creek was variable and riparian stage was primarily mature forest with some young forest (**Table B-3**). Riparian vegetation within 10 m of Alps Creek consisted primarily of meadow and wetland followed by deciduous forest with smaller proportions of mixedwood forest, shrub, and conifer forest (**Table B-4**; Figure D-4 in Chapter 3). Similar proportions of these riparian vegetation types were found in the 11-30 m and 31-100 m riparian zones from the watercourse (**Table B-4**; Figure D-4 in Chapter 3). Riparian species recorded on the shores of reaches surveyed on Alps Creek are presented in **Appendix G**. Habitat along Alps Creek was characterized primarily by riffle and run (**Table B-5**; **Figure B-2**). Of the nine reaches surveyed, two contained pool habitat and six contained flats, of which one reach was comprised entirely of flats (**Table B-5**; **Figure B-2**). Sediment in reaches along Alps Creek were comprised of a variety of substrate types with cobble, and gravel comprising the dominant sediment types (**Table B-5**; **Figure B-3**). Cobble, gravel, and silt were present at all nine reaches surveyed. Smaller amounts of sand, silt, clay, and muck were also found at most reaches on Alps Creek. Boulder habitat was found in the three furthest upstream reaches surveyed.

All nine reaches surveyed had some instream cover (**Table B-5**; **Figure B-4**). Of the instream cover types present, cobble, instream woody debris, overhanging woody debris, vascular instream vegetation, and vascular overhanging vegetation were present at all reaches surveyed. Cobble and vascular instream vegetation comprised the greatest proportion of cover. Undercut banks were also present at eight of the nine reaches surveyed and provided proportionally large amounts of cover. Boulders, deep pools, and other types of cover were present at some sites in smaller proportions (**Table B-5**). Aquatic vegetation was present at all nine reaches surveyed, with submergent vegetation recorded at all reaches, emergent vegetation at seven reaches and floating vegetation at five reaches (**Table B-5**). However, where present, floating vegetation was recorded in proportionally greater amounts relative to submergent and emergent vegetation (**Table B-5**). Predominant aquatic vegetation species recorded during AHM surveys in Alps Creek are presented in **Appendix G**.



a) Reach S018 running through marsh habitat

b) Riparian shade at reach S018

c) Cobble and gravel sediment at reach S080

d) Woody debris at reach S045

e) In water woody debris at reach S081

f) Submergent vegetation at reach S047

Figure 4-5. Examples of reaches surveyed on Alps Creek.

4.1.1.2.2 Kinlough Creek

Kinlough Creek is a cool water tributary to the Teeswater River and is located within the GSWC. Waters from Silver Lake drain to Clam Lake and then into the Kinlough Creek before flowing through the southern portion of the GSWC and into the Teeswater River near Riversdale.

Four reaches were surveyed along Kinlough Creek. Kinlough Creek has a natural channel with permanent flow and low discharge (**Table B-1**). Water chemistry in reaches surveyed in Kinlough Creek is presented in **Table B-2**. Reaches surveyed in Kinlough Creek had a mean temperature of 19.6 ± 1.0 °C, normal pH (between 6.5 and 8.2) and conductivity (between 200 – 1000 µS/cm), low turbidity (below 8 NTU), and low dissolved oxygen (below 8 mg/L and 80%).

Examples of habitat and features in surveyed reaches in Kinlough Creek are presented in **Figure 4-6**. Wetlands associated with this section of Kinlough Creek are presented on **Figure B-1**. Shore cover providing shade on reaches surveyed in Kinlough Creek was variable and riparian stage was primarily mature forest with some young forest (**Table B-3**). Riparian vegetation within 10 m of Kinlough Creek consisted primarily of meadow and wetlands with smaller proportions of shrub, deciduous forest, and mixed forest (**Table B-4**; Figure D-4 in Chapter 3). Similar proportions of these riparian habitat types were found in the 11-30 m and 31-100 m riparian zones from the watercourse except for deciduous forest which was found in slightly greater proportion (**Table B-4**; Figure D-4 in Chapter 3). Riparian species recorded on the shores of reaches surveyed on Kinlough Creek are presented in **Appendix G**. Habitat along Kinlough Creek was characterized primarily by flats (**Table B-5**; **Figure A-1**). One reach surveyed on Kinlough Creek near where it meets the Teeswater River comprised riffle and pool habitat (**Figure B-2**). Sediment in Kinlough Creek was mainly muck substrate with small amounts of detritus present at three reaches and sand at one reach (**Table B-5**; **Figure B-3**).

All four reaches surveyed had some instream cover (**Table B-5**; **Figure B-4**). Of the instream cover types present, instream woody debris was present at all reaches surveyed. Overhanging woody debris and vascular instream vegetation were present at three of the reaches surveyed. Vascular instream vegetation comprised the greatest proportion of cover. Vascular overhanging vegetation was present at two reaches surveyed and was present in the greatest proportion relative to all other cover types (**Table B-5**). Aquatic vegetation was present at some of the reaches surveyed, with floating vegetation recorded at three reaches, and emergent and submergent vegetation each reported at two reaches (**Table B-5**). However, where present, submergent vegetation was recorded in proportionally greater amounts relative to floating and emergent vegetation (**Table B-5**). Predominant aquatic vegetation species recorded in reaches surveyed within Kinlough Creek are presented in **Appendix G**.



a) Flats on reach S026 b) Reach S030 with muck substrate

Figure 4-6. Examples of reaches surveyed on Kinlough Creek.

4.1.1.2.3 Schmidt Creek

Schmidt Creek is a cool water tributary to the Teeswater River located in the northeastern portion of the GSWC. Waters from Schmidt Lake drain into Schmidt Creek and flow southward and then eastward, draining into the Teeswater River south of Chepstow. In a map created in 2015 by Fisheries and Oceans Canada (DFO) outlining the distribution of mussel species at risk, rainbow mussels occurred within Schmidt Creek. However, the updated DFO Webmap does not show a distribution of any mussel SAR.

Three reaches were surveyed along Schmidt Creek. Two additional reaches (the inlet and outlet of Schmidt Lake) were dry at the time of survey. Schmidt Creek has a natural channel with permanent flow and low discharge (**Table B-1**). Water chemistry in reaches of Schmidt Creek is presented in **Table B-2**. Reaches surveyed in Schmidt Creek had a mean water temperature of 20.7 ± 1.3 °C, normal pH (between 6.5 and 8.2) and conductivity (between 200 – 1000 µS/cm), low turbidity (below 8 NTU), and low dissolved oxygen (below 8 mg/L and 80%).

Examples of habitat and features in surveyed reaches in Schmidt Creek are presented in **Figure 4-7**. Wetlands associated with this section of Schmidt Creek are presented on **Figure B-1**. Shore cover providing shade on reaches surveyed in Schmidt Creek was primarily between 31 – 60% with some reaches having 61-90% shade cover and riparian stage was mature forest (**Table B-3**). Riparian vegetation within 10 m of Schmidt Creek consisted primarily of wetland followed by deciduous forest and smaller proportions of meadow and shrub (**Table B-4**; Figure D-4 in Chapter 3). Greater proportions of deciduous forest relative to wetland were found in the 11-30 m and 31-100 m riparian zones from the watercourse (**Table B-4**; Figure D-4 in Chapter 3). Riparian species recorded on the shores of reaches surveyed on Schmidt Creek are presented in **Appendix G**. Habitat along Schmidt Creek at the three sites was characterized almost completely by flats (**Table B-5**; **Figure B-2**). One reach (S057) had a small amount (2%) of riffle habitat. Sediment in Schmidt Creek was comprised primarily of muck and detritus with one reach (S057) also containing sand and gravel (**Table B-5**; **Figure B-3**).

All three reaches surveyed had some instream cover (**Table B-5**; **Figure B-4**). Of the instream cover types present, instream woody debris, overhanging woody debris, vascular instream vegetation, and vascular overhanging vegetation were present at all reaches surveyed. Instream woody debris was present in the greatest proportion and vascular instream vegetation was present in the lowest proportion relative to all

cover types present (**Table B-5**). Aquatic vegetation was present in low proportion at two reaches surveyed, with floating vegetation recorded at one reach, and emergent vegetation reported at two reaches (**Table B-5**). Predominant aquatic vegetation species recorded in reaches surveyed within Schmidt Creek are presented in **Appendix G**.



a) Reach S037 demonstrating in-water cover



b) Reach S037 with abundant aquatic vegetation



c) Reach S044 running through swamp wetland



d) Culverts at reach S057

Figure 4-7. Examples of reaches surveyed on Schmidt Creek.

4.1.2 Waterbodies

A total of 16 lakes and ponds were surveyed within the AOI, LSA_{AQU}, and outside the LSA_{AQU} in the summer of 2022 (see **Table A-1**; **Figure A-2**). Perimeter surveys were conducted in lakes and ponds and the shoreline was characterized into zones based on differences in shoreline habitat. The major inlets and outlets (if wet) were also surveyed in all connected ponds and lakes. The sections below describe summarized habitat characteristics recorded within waterbodies in each study area. A summary of waterbody habitat characteristics is presented in **Appendix C**. Riparian and aquatic vegetation species

(common and scientific names) documented during AHM surveys of waterbodies are presented in **Appendix G.**

4.1.2.1 Lakes and Ponds in the AOI

A total of two waterbodies (one lake and one pond) were surveyed within the AOI during AHM surveys.

4.1.2.1.1 Lake L006

Lake L006 occurs in the northern portion of the AOI, north of the Teeswater River (see **Figure A-2**). Lake L006 is classified as an intermittently fed lake associated with marsh habitat and no known migratory obstructions (**Table C-1**a). At the time of survey, the outlet of the lake was dry. The lake does not have an inlet channel but rather is fed through a wetland at the north end of the lake. Water chemistry in Lake L006 is presented in **Table C-2**. Lake L006 had a mean water temperature of 14.3, normal pH (7.6) and conductivity (between 200 – 1000 µS/cm), low turbidity (below 8 NTU), and low dissolved oxygen (below 8 mg/L and 80%).

Examples of habitat and features in Lake L006 are presented in **Figure 4-8**. Habitat and features of interest mapped on Lake L006 during AHM surveys are presented in **Figure C-2**a. A total of four zones of differing shoreline habitat were ascribed to Lake L006 during field surveys. L006 was primarily surrounded by meadow except for a small amount of wetland habitat on the northwest side of the lake within the 1-10 and 11-30 m riparian zones, and mixedwood forest within the 31-100 m riparian zone (**Table C-3**; Figure D-4 in Chapter 3). Predominant riparian species recorded on the shores of L006 are presented in **Appendix G**. Lake L006 had a primarily vegetated shoreline type with a small amount of wetland shore on the northwestern side. Tall grasses were mapped on the southern side of the lake and significant riparian trees were mapped on the southwestern and northern sides of the lake. Additional riparian trees were noted on a peninsula on the western side of the lake and a cedar tree and dead standing tree were noted on an island within Lake L006 (**Figure C-2**a). Shoreline sediment consisted primarily of muck substrate with much smaller amounts of cobble, gravel, silt, and sand. A variety of shoreline cover primarily consisting of overhanging vascular macrophytes and in-water vascular macrophytes were present in Lake L006 (**Table C-4**a). Smaller amounts of cover were provided by boulders, cobble, in-water woody debris and overhanging woody debris. Lake L006 had a moderate amount of aquatic vegetation with 30% submergent vegetation, 10% emergent vegetation, and 5% cover as floating vegetation present (**Table C-4**a). Floating vegetation was mapped primarily in a large patch on the western side of the lake. Predominant aquatic vegetation species recorded in Lake L006 during AHM surveys are presented in **Appendix G**.



a) Shoreline habitat consisting of meadow and forest



b) In-water cover and aquatic vegetation present at L006

Figure 4-8. Examples of habitat on Lake L006.

4.1.2.1.2 Pond P010

Pond P010 occurs in the southern portion of the AOI, southwest of the Teeswater River (see **Figure A-2**). Pond P010 is classified as a pond fed by runoff and was associated with marsh habitat and no known migratory obstructions (**Table C-1**a). The outlet of the pond was dry at the time of survey. Water chemistry in Pond P010 is presented in **Table C-2**. Pond P010 had a mean water temperature of 24.0 °C, normal pH (7.6), low turbidity (below 8 NTU), and low dissolved oxygen (below 8 mg/L and 80%). Pond P010 did not have a recorded conductivity measurement.

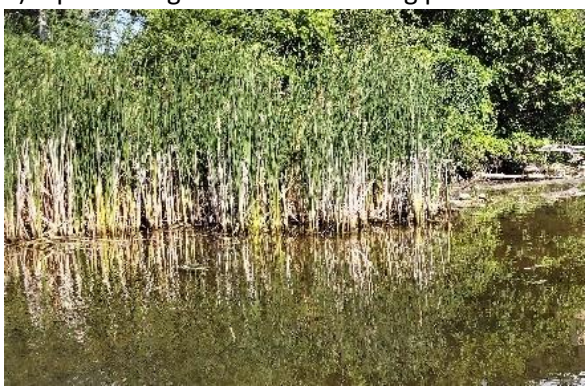
Examples of habitat in Pond P010 are presented in **Figure 4-9**. Habitat and features of interest mapped on Pond P010 during AHM surveys are presented in **Figure C-3**. A total of two zones of differing shoreline habitat were ascribed to Pond P010 during field surveys. Pond P010 was primarily surrounded by meadow except had a small amount of wetland habitat on the northwest side of the lake within the 1-10 and 11-30 m riparian zones and mixedwood forest within the 31-100 m riparian zone (**Table C-3**; Figure D-4 in Chapter 3). Predominant riparian species recorded on the shores of Pond P010 are presented in **Appendix G**. Pond P010 had a primarily vegetated shoreline type with a small amount of wetland shore on the northwestern side. Shoreline sediment consisted primarily of muck substrate with much smaller amounts of cobble, gravel, silt, and sand. Shoreline cover in P010 primarily consisted of in-water vascular macrophytes with smaller amounts of cobble, in-water woody debris, overhanging vascular vegetation, organic debris, and other (gravel) cover type (**Table C-4**a). Significant aquatic vegetation was present in P010 with 70% submergent vegetation, 15% emergent vegetation and 5% of the lake surface containing floating vegetation (**Table C-4**a). Emergent and floating vegetation were mapped on the southern side of the lake and cattails were mapped surrounding the northern and eastern sides of the lake with small patches on the west side. Predominant aquatic vegetation species recorded in Pond P010 during AHM surveys are presented in **Appendix G**.



a) Riparian vegetation surrounding pond P010



b) Aquatic vegetation in pond P010



c) Cattails near the northeast end of the pond.



d) Aquatic vegetation along the shoreline

Figure 4-9. Examples of habitat on Pond P010.

4.1.2.2 Named Lakes

No named lakes are present within the AOI. Four named lakes were selected for survey within the GSWC due to the importance of the wetland complex in the region. In addition, Cargill Mill Pond was surveyed as it occurs along the Teeswater River downstream of the AOI and contains pugnose shiner, a *SARA*-listed species. Hines and Robson Lake were also included for survey for their potential as reference lakes to the named lakes within the GSWC. A general description of each of the larger named lakes selected for survey for AHM is described below.

4.1.2.2.1 Silver Lake

Silver Lake (L001) is located within the southwestern portion of the GSWC in the $LSA_{AQU.}$ Silver Lake was selected for AHM surveys as it is important to the community for recreational use and fishing. Silver Lake has a cool water regime and commonly caught species include largemouth bass, northern pike, and sunfish (see Chapter 8). According to the ecosite classification dataset, Silver Lake is primarily surrounded by marsh habitat to the south (see Appendix B, Chapter 1). Examples of habitat in Silver Lake are presented in **Figure 4-10**.

Silver Lake is characterized as a stream fed lake with associated marsh wetland adjacent to the lake with no migratory barriers (**Table C-1**a). Silver Lake is approximately 1.1 km in length and 690 m wide. The inlet

(S052) to Silver Lake, which feeds the lake through a culvert on its west side, is characterized by flats with a mean bankfull width and depth of 6.98 m and 1.63 m respectively. Substrate in the inlet was 100% muck and instream cover primarily consisting of overhanging vascular macrophytes. The outlet (S011) to Silver Lake is a wide channel that exits the lake on its southeast side and is characterized primarily by muck substrate (75%) with detritus (15%) and silt (10%). Instream cover at the outlet is comprised of overhanging and instream vegetation.

Water chemistry in Silver Lake is presented in **Table C-2**. Silver Lake had a water temperature of 23.9 °C, a slightly higher pH (8.6), moderate conductivity (295.0 µS/cm), low turbidity (2.6 NTU), and low dissolved oxygen (6.6 mg/L and 78%). Habitat and features of interest mapped on Silver Lake during AHM surveys are presented on **Figure C-4**. A total of eight zones of differing shoreline habitat were ascribed to Silver Lake during field surveys. Wetland marsh habitat primarily occurred on the southern portion of Silver Lake and was surrounded by deciduous forest beyond the marsh habitat. A small amount of marsh habitat was also located on the northwestern side of Silver Lake. The remaining zones were characterized by having deciduous forest, mixed forest, or grass/lawn surrounding the lake with a small amount of cropland on the eastern side of the lake within the 31-100 m riparian zone (**Table C-3**; Figure D-4 in Chapter 3). Predominant riparian species recorded on the shores of Silver Lake (L001) are presented in **Appendix G**. Silver Lake had primarily vegetated and wetland shoreline types with small amounts of sand/gravel or low/rocky shoreline. Shoreline sediment consisted of a variety of substrate types dominated by muck on the southern side of the lake and a mix of cobble and sand on the northeastern side. Clay, silt, sand, and gravel were found in greatest proportion on the northern section of the lake. A variety of shoreline cover primarily consisting of in-water vascular macrophytes and in-water woody debris were present in Silver Lake (**Table C-4**a). Silver Lake had a significant amount of aquatic vegetation with 55% submergent vegetation present, 10% emergent vegetation present and 5% of the lake surface containing floating vegetation (**Table C-4**a). Floating vegetation was mapped surrounding the eastern side of the lake and in a bay on the west side of the lake. Additionally, a small patch of floating vegetation was mapped in a bay on the northern side of the lake. Predominant aquatic vegetation species recorded in Silver Lake (L001) during AHM surveys is presented in **Appendix G**.



a) Inlet reach (S052) to Silver Lake



b) Inlet reach (S052) culvert



c) Outlet reach (S011) looking at Silver Lake



d) Outlet reach (S011) looking downstream



e) Silver Lake looking north with cabins at far end.



f) Aquatic vegetation on Silver Lake

Figure 4-10. Examples of habitat in Silver Lake.

4.1.2.2.2 Clam Lake

Clam Lake is located adjacent to and east of Silver Lake in the southwestern portion of the GSWC in the LSA_{AQU}. Similar to Silver Lake, Clam Lake was selected for AHM surveys as it is important to the community for recreational use and fishing. Clam Lake has a cool water regime and commonly caught species include northern pike, largemouth and smallmouth bass, and yellow perch (see Chapter 8). According to the ecosite classification dataset, Clam Lake is primarily surrounded by marsh habitat (see Appendix B, Chapter 1) and cottage developments.

While planned for survey, Clam Lake was not surveyed during the 2022 field season due to accessibility logistics. Additional habitat data for Clam Lake will be provided in future iterations of the BIS Baseline Report after field data have been collected by the field data collection contractor and received and analyzed by Zoetica.

4.1.2.2.3 Oppleck Lake

Oppleck Lake (L007) is located near Concession Rd 12 and Sideroad 25N in Bruce County. Oppleck Lake is the local name used for the lake, according to the adjacent landowners. According to the ecosite classification dataset, the lake is surrounded by hardwood swamp on the eastern side and mixedwood forest on the western side. Access to Oppleck Lake is granted from the landowner on the adjacent property.

Oppleck Lake is characterized as an intermittently fed lake with no migratory obstructions (**Table C-1**a). Oppleck Lake is 240 m long and 165 m wide, with a maximum depth of 3.1 m. Oppleck Lake does not have an inlet and the outlet (S120) was dry at the time of survey. Water chemistry in Oppleck Lake is presented in **Table C-2**. Oppleck Lake had a water temperature of 23.2 °C, a normal pH (8.5), moderate conductivity (244.4 µS/cm), low turbidity (1.8 NTU), and low dissolved oxygen (6.1 mg/L and 72%).

Examples of habitat and features in Oppleck Lake are presented in **Figure 4-11**. Habitat and features of interest mapped on Oppleck Lake during AHM surveys are presented on **Figure C-5**. There were two zones of differing shoreline habitat ascribed to Oppleck Lake during field surveys. Mixed forest surrounds most of the lake with a small proportion of grass/lawn on the lake's east side (**Table C-3**; Figure D-4 in Chapter 3). Oppleck Lake had an entirely vegetated shoreline type. Predominant riparian species recorded on the shores of Oppleck Lake (L007) are presented in **Appendix G**. Shoreline sediment consisted of a variety of substrate types dominated by sand with small proportions of cobble and gravel surrounding most of the lake and a combination of muck and silt on the eastern side of the lake. A variety of shoreline cover primarily consisting of in-water vascular macrophytes, in-water woody debris, and overhanging woody debris were present in Oppleck Lake (**Table C-4**a). Two instream logs were mapped by the field data collection contractor: one on the southern side and one on the western side of the lake (**Figure C-5**). Oppleck Lake had a significant amount of aquatic vegetation with 50% submergent vegetation present, and 5% of the lake surface containing floating vegetation (**Table C-4**a). Floating vegetation was mapped in small patches surrounding the lake (**Figure C-5**). A dock and shore stabilization were also mapped on the eastern side of the lake. Predominant aquatic vegetation species recorded in Oppleck Lake (L007) during AHM surveys is presented in **Appendix G**.



a) Oppleck Lake looking west



b) In-water and overhanging woody debris on the shoreline of Oppleck Lake



c) Large log (woody cover) on Oppleck Lake



d) Aquatic vegetation and back stabilization adjacent to lawn area

Figure 4-11. Examples of habitat on Oppleck Lake.

4.1.2.2.4 Schmidt Lake

Schmidt Lake (L003) occurs in the northeastern portion of the GSWC and is a popular destination for public visits. Access to Schmidt Lake is managed by the SVCA. The lake includes a boardwalk and lookout platform with a floating boardwalk that leads to a unique floating bog mat. The lake is surrounded mainly by lowland forest or swamp and is dominated by white cedar. Schmidt Lake flows into Schmidt Creek which has previously been noted by DFO to contain the SAR rainbow mussel. However, an updated version of the webmap does not depict any rainbow (mussel) near Schmidt Lake. Examples of habitat and features in Schmidt Lake are presented in **Figure 4-12**.

Schmidt Lake is characterized as a stream fed lake with associated wetland adjacent to the lake with no migratory obstructions (**Table C-1**a). The inlet (S021) on the east side of the lake and outlet (S001) on the west side were dry at the time of survey. Schmidt Lake is 680 m long and 475 m wide, with a maximum depth of 1.3 m. Water chemistry in Schmidt Lake is presented in **Table C-2**. Schmidt Lake had a water

temperature of 29.4 °C, a high pH (9.5), moderate conductivity (214.3 µS/cm), and low turbidity (2.7 NTU). Dissolved oxygen was not reported in Schmidt Lake.

Habitat and features of interest mapped on Schmidt Lake during AHM surveys are presented on **Figure C-6**. Field crews delineated four zones of differing shoreline habitat on Schmidt Lake. Wetland habitat surrounds Schmidt Lake but occurs in the largest proportion on the northern side where it extends out to the 100 m riparian buffer zone (**Table C-3**; Figure D-4 in Chapter 3). Wetland habitat on the east and west sides of Schmidt Lake extended to the 30 m riparian buffer zone and on the southern side extended only to the 10 m riparian buffer zone. On the east, south, and west sides of Schmidt Lake, wetland habitat was surrounded by primarily mixed forest where wetland habitat did not extend to the 100 m riparian buffer zone. Schmidt Lake had a wetland shoreline type. Predominant riparian species recorded on the shores of Schmidt Lake (L003) are presented in **Appendix G**. Shoreline sediment consisted of silt substrates. Shoreline cover consisted entirely of in-water vascular macrophytes (**Table C-4**a). Schmidt Lake had a significant amount of aquatic vegetation with 95% submergent vegetation present and 5% of the lake surface containing floating vegetation (**Table C-4**a). Cattails were mapped on the west side of the lake (**Figure C-6**). In addition, a dock was mapped on the west side of the lake and a boardwalk was mapped on the north side within wetland habitat (**Figure C-6**). Predominant aquatic vegetation species recorded in Schmidt Lake (L003) during AHM surveys are presented in **Appendix G**.



a) Schmidt Lake looking south



b) Overhanging vegetation on Schmidt Lake



c) Submergent vegetation on Schmidt Lake



d) Wetland habitat on perimeter of Schmidt Lake

Figure 4-12. Examples of habitat on Schmidt Lake.

4.1.2.2.1 Cargill Mill Pond

Cargill Mill Pond (L012) is located along the Teeswater River south of the town of Cargill and downstream of the AOI and LSA_{AQU}. Cargill Mill Pond is a reservoir that was formed by damming the Teeswater River and is included as a lake/pond because it now functions as a lentic environment due to its contained structure. Cargill Mill Pond was included in the biodiversity studies because it: 1) is known to include critical habitat for pugnose shiner, a species listed as Threatened under Schedule 1 of the *SARA*, and 2) is located downstream of the AOI and the LSA_{AQU}, but within the RSA_{AQU} Examples of habitat and features in Cargill Mill Pond are presented in **Figure 4-13**.

Cargill Mill Pond is a stream fed reservoir with associated marsh wetland and a permanent migratory obstruction due to a dam at its northern end (**Table C-1**a). Cargill Mill Pond is 560 m long and 140 m wide, with a maximum depth of 1.7 m. The inlet (S019) to Cargill Mill Pond on the south side is characterized entirely by flats with a sediment mixture of even parts (30% each) cobble, gravel, and sand, and a small proportion (10%) of muck. Most of the inlet (80%) did not have in-stream cover; the remaining 20% primarily consisted of instream vascular macrophytes with a small proportion of in-stream and overhanging woody debris and overhanging vascular macrophytes. A dam at the north end of Cargill Mill Pond divides the reservoir from its outlet (S031). The outlet is characterized as primarily (80%) run habitat with the remaining 20% riffle habitat. Mean bankfull width was 18.6 m in run habitat and 20.4 m in riffle habitat; mean bankfull depth was 1.29 m and 1.13 m in run and riffle habitat, respectively. Sediment at the outlet was comprised primarily of cobble (60%), followed by boulder (30%) and gravel (10%). In-stream cover was primarily cobble (60%) and boulder (20%) with a small proportion (< 5%) instream and overhanging woody debris.

Water chemistry in Cargill Mill Pond is presented in **Table C-2**. Cargill Mill Pond had a water temperature of 20.4 °C, a normal pH (8.2), moderate conductivity (550.0 µS/cm), low turbidity (1.4 NTU), and normal dissolved oxygen (7.5 mg/L and 83%). Habitat and features of interest mapped on Cargill Mill Pond during AHM surveys are presented on **Figure C-7**. A total of three zones of differing shoreline habitat were delineated on Cargill Mill Pond during field surveys. Grass and lawn habitat primarily occurred on the eastern and southern portion of Cargill Mill Pond and deciduous forest occurred within the first 30 m of riparian habitat on the western side. Cropland occurred in the 30 – 100 m riparian zone beyond the deciduous forest habitat on the western side of the reservoir (**Table C-3**; Figure D-4 in Chapter 3). Cargill Mill Pond had a primarily vegetated shoreline type. Predominant riparian species recorded on the shores of Cargill Mill Pond (L012) are presented in **Appendix G**. Shoreline sediment consisted of various substrate types dominated by muck on the western and northeastern sides and by cobble on the south and southeastern side. A variety of shoreline cover primarily consisting of in-water vascular macrophytes was present in Cargill Mill Pond (**Table C-4**a). Other shoreline cover types in lesser proportion were cobble, organic debris, boulders, overhanging vascular macrophytes, in-water woody debris, and overhanging woody debris. Cargill Mill Pond had a significant amount of aquatic vegetation with 70% submergent vegetation, 40% emergent vegetation and 40% of the surface containing floating vegetation (**Table C-4**a). Predominant aquatic vegetation species recorded in Cargill Mill Pond (L012) during AHM surveys are presented in **Appendix G**. Field data collection contractors mapped cattails surrounding the perimeter of the reservoir (**Figure C-7**), and a large area of cattails in the southwest portion adjacent to a shallow depositional area containing emergent vegetation. However, during a previous site visit conducted by Zoetica on 3 June 2022, the large patch of cattails in the southwest portion was not visible. Several boat launches were also situated on the eastern side of the reservoir.



a) Inlet (S019) looking downstream



b) Vascular macrophytes at inlet S019



c) Outlet (S031) looking upstream at dam



d) S031 outlet at dam looking downstream



e) Looking south at north end of reservoir



f) Dam at north end of reservoir



g) Aquatic vegetation on south end of reservoir



h) Boat launch on east side of reservoir

Figure 4-13. Examples of habitat and features on Cargill Mill Pond.

4.1.2.2.2 Robson Lake

Robson Lake (L011) is at 380 masl in Grey County, east of the LSA_{AQU}. Robson Lake has a cool water regime and is a popular fishing lake with commonly caught species including northern pike, smallmouth bass, and pumpkinseed. Robson Lake was selected as a potential reference lake for named lakes within the GSWC as it was most similar to popular fishing lakes within and near the GSWC (e.g., Silver and Clam Lakes) with respect to temperature regime and species composition, based on desk-based analysis of the ARA dataset (see Chapter 8). Examples of habitat and features on Robson Lake are presented in **Figure 4-14**.

Robson Lake is characterized as stream fed with no known migratory obstructions (**Table C-1**a). Robson Lake is 650 m long and 270 m wide. Water chemistry in Robson Lake is presented in **Table C-2**. Robson Lake had a water temperature of 20.8 °C, a normal pH (8.5), moderate conductivity (462.0 µS/cm), low turbidity (1.0 NTU), and normal dissolved oxygen (7.2 mg/L and 80%).

Habitat and features of interest mapped on Robson Lake during AHM surveys are presented on **Figure C-8**. Seven zones of differing shoreline habitat were delineated on Robson Lake during field surveys. Robson Lake is primarily surrounded by mixed forest on its north, east, south, and southwestern shores with coniferous forest on the northwestern shore (**Table C-3**; Figure D-4 in Chapter 3). The western side of the lake had grass/lawn within the 1 – 10 m riparian buffer zone and then mixed forest in the 11 – 100 m riparian zone (**Table C-3**; Figure D-4 in Chapter 3). Predominant riparian species recorded on the shores of Robson Lake (L011) are presented in **Appendix G**. Shoreline was primarily vegetated with some low rocky shore found on the northwest side of the lake and other shoreline types found on the western side. The north and south sides of the lake were surrounded by logs and submerged vegetation. Shoreline sediment consisted of a variety of substrate types dominated by muck on the northwest, east, and southern zones of the lake, sand on the western side of the lake and an even distribution of muck, clay, and silt on the northern and northeastern sides. Robson Lake had a variety of shoreline cover primarily consisting of in-water vascular macrophytes (**Table C-4**a). Other types of shoreline cover in lesser proportion include cobble, organic debris, boulders, in-water woody debris, overhanging woody debris, and a dock. Robson Lake had a significant amount of aquatic vegetation with 60% submergent vegetation present, 5% emergent vegetation present, and 10% of the lake surface containing floating vegetation (**Table C-4**a). Predominant aquatic vegetation species recorded in Robson Lake (L011) during AHM surveys are presented in **Appendix G**. Field data collection contractors mapped a patch of cattails on the eastern side of the lake. Three islands were situated on the eastern side of the lake near the channel connecting Clarke's and Robson lakes (**Figure C-8**). Beach and docks were located on the western side of Robson Lake.



a) Robson Lake looking north with forested riparian habitat



b) Submergent vegetation on Robson Lake



c) Beach and cottages on Robson Lake (west side)



d) Aquatic vegetation on Robson Lake

Figure 4-14. Examples of habitat and features on Robson Lake.

4.1.2.2.3 Hines Lake

Hines Lake (L010) is in Grey County east of the LSA_{AQU} and north of Robson Lake at an elevation of 379 meters. Hines Lake has a cold-water regime and is a popular fishing lake with commonly caught species including northern pike, smallmouth bass, and lake trout. Hines Lake was selected as a potential reference lake for named lakes within the GSWC as it was most similar to popular fishing lakes within and near the GSWC (e.g., Silver and Clam Lakes) with respect to species composition, based on desk-based analysis of the ARA dataset (see Chapter 8). Examples of habitat and features on Hines Lake are presented in **Figure 4-15**.

Hines Lake is a stream fed lake with no recorded migratory obstructions (**Table C-1**a). Hines Lake is 540 m long and 382 m wide. Water chemistry in Hines Lake is presented in **Table C-2**. Hines Lake had a water temperature of 23.2 °C, a slightly high pH (8.7), moderate conductivity (310.0 µS/cm), low turbidity (2.3 NTU), and low dissolved oxygen (6.4 mg/L and 76%).

Habitat and features of interest mapped on Hines Lake during AHM surveys are presented on **Figure C-9**. Field crews delineated six zones of differing shoreline habitat in Hines Lake. Coniferous forest habitat was the dominant shoreline vegetation surrounding the lake except on the northwest and northeast sides of the lake (**Table C-3**; Figure D-4 in Chapter 3). On the northwest side, grass and lawn occurred within the 1-10 m riparian habitat zone and on the northeastern side a small amount of wetland and mixed forest occurred within the 1 – 10 m riparian habitat zone. Coniferous forest was dominant in the 11 – 30 and 31 – 100 m riparian zones except on the northeastern side of the lake where mixed forest and grass/lawn was present within these riparian zones (**Table C-3**; Figure D-4 in Chapter 3). Predominant riparian species recorded on the shores of Hines Lake (L010) are presented in **Appendix G**. The northern section of Hines Lake had no riparian vegetation present. The northeastern, southern, and western sides of Hines Lake had a primarily vegetated shoreline type. The northern side of the lake had a low rocky shore and other types of shore with small amounts of sand/gravel. The eastern side of Hines Lake consisted primarily of sand/gravel shoreline type with some vegetated shore. Shoreline sediment varied, with most areas dominated by sand with cobble dominating in the northern side of the lake. Gravel was also present in larger proportions on the northeastern side of the lake relative to other areas. On the northwestern side of the lake, other substrate types were present. A variety of shoreline cover consisting primarily of in-water vascular macrophytes, overhanging vascular macrophytes, in-water woody debris, and overhanging woody debris were present in Hines Lake (**Table C-4**a). Field data collection contractors mapped two instream logs on the southeast side of the lake and a large patch of woody debris in a bay on the southern side of the lake (**Figure C-9**). Hines Lake had a significant amount of aquatic vegetation with 50% submergent vegetation present, 5% emergent vegetation present, and 5% of the lake surface containing floating vegetation (**Table C-4**a). Predominant aquatic vegetation species recorded in Hines Lake (L010) during AHM surveys are presented in **Appendix G**. Cabins and stabilization were situated on the north and northwest sides of the lake (**Figure C-9**), with additional cabins on the east side.



a) Hines Lake example of forested riparian habitat



b) Cattails at the north end of Hines Lake



c) Example cottage on Hines Lake



d) Culvert at north end of Hines Lake

Figure 4-15. Examples of habitat and features on Hines Lake.

4.1.2.3 <u>Unnamed Lakes and Ponds in the LSA_{AQU}</u>

Seven unnamed waterbodies within the LSA_{AQU} were field surveyed in 2022 including two lakes and five ponds. One additional pond (P003), north of the AOI, was selected for survey but was dry during the time of sampling (see **Figure A-2**). Of the seven unnamed waterbodies surveyed, four were considered intermittent, two were considered not connected, and one had an unknown water source (**Table C-1**b). Three of the waterbodies had no associated wetlands, two had associated swamp habitat, one had marsh habitat, and one had bog habitat (**Table C-1**b). Water chemistry summaries in unnamed lakes and ponds in the LSA_{AQU} are presented in **Table C-2**. Unnamed waterbodies in the LSA_{AQU} had a mean temperature of 21.5 ± 1.1 °C. Most waterbodies had a normal pH (between 6.5 and 8.2), although the minimum recorded pH was 5.2. Conductivity was within normal range (between 200 – 1000 µS/cm), and the minimum recorded conductivity was 160 (just below normal). Turbidity was generally low (below 8 NTU), although the maximum turbidity was 23.1 which is considered moderate to high. Dissolved oxygen was low (below 8 mg/L and 80%) in all unnamed lakes surveyed within the LSA_{AQU}.

Most unnamed lakes in the LSA_{AQU} were surrounded primarily by a vegetated shoreline with three waterbodies partially surrounded by wetland habitat (mean of 40% of wetland) and one lake partially surrounded (5%) by sand/gravel beach (**Table C-4**b). Predominant riparian species recorded on the shores of unnamed lakes in the LSA_{AQU} are presented in **Appendix G**. Most unnamed waterbodies in the LSA_{AQU} contained muck substrate in the greatest proportion (mean of ca. 65%). However, three waterbodies contained relatively large proportions (> 40%) of detritus. Other substrate types found in some of the unnamed waterbodies in the LSA_{AQU} include boulder, cobble, sand, silt, and clay (**Table C-4**b).

All seven waterbodies surveyed had some in-water cover (**Table C-4**b). In-water vascular vegetation and overhanging vascular macrophytes were present at all waterbodies surveyed. Organic debris, in-water woody debris, and overhanging woody debris were present in more than half of the waterbodies surveyed and undercut banks and cobble were present in one waterbody each. In-water vascular macrophytes were present in the greatest proportion relative to other cover types followed by overhanging vascular macrophytes. Aquatic vegetation was present at all waterbodies surveyed (**Table C-4**b). Submergent and emergent vegetation was present at all waterbodies surveyed with submergent vegetation comprising the greatest proportion of aquatic vegetation relative to emergent and floating vegetation. Floating vegetation was present at four of the waterbodies surveyed. Predominant aquatic vegetation species recorded in unnamed lakes in the LSA_{AQU} during AHM surveys are presented in **Appendix G**.

4.1.3 Wetlands

A total of 81 wetlands were planned during 2022 AHM field surveys, however during field surveys, nine reaches originally classified as streams or ponds were reclassified as wetlands due to their characteristics and are summarized within this section. One wetland (W064) selected for survey was reclassified as a watercourse. Eight wetlands selected for survey were not visited including three conifer swamps, Including ponds reclassified as wetlands only 10 wetlands contained water and were surveyed for habitat characteristics with 71 deemed dry at the time of survey (**Table A-1**; **Figure A-3**). Additionally, one wetland originally classified as a marsh was reclassified as a swamp during AHM field surveys. A summary of wetland habitat characteristics is presented in **Appendix D**. Riparian and aquatic vegetation documented during AHM surveys of wetlands is presented in **Appendix G.**

4.1.3.1 Wetlands within the AOI

Field teams surveyed five wetlands within the AOI including three marshes and two swamps. The following sections describe habitat within each type of wetland in the AOI.

4.1.3.1.1 Marsh Wetlands

Two of the marshes were palustrine with intermittent flow and one was isolated. One of the marshes (P013) had a seasonal migratory obstruction (**Table D-1**). Marshes in the AOI had a mean water temperature of 18.2 ± 19.6 °C, moderate pH and conductivity, and low turbidity and dissolved oxygen (**Table D-2**). Substrate in marshes consisted of detritus and silt with one marsh consisting of 40% vegetated bottom (**Table D-3**). In-water cover was primarily vascular macrophytes with organic debris, overhanging vascular macrophytes, and large woody debris comprising a mean of >20% (**Table D-3**). Other in-water cover in smaller proportions include large and small overhanging woody debris, and small in-water woody debris. All types of aquatic vegetation (submergent, emergent, floating) were present in marshes in the AOI (**Table D-3**). Emergent vegetation comprised the largest proportion of aquatic vegetation with submergent and floating vegetation comprising <10% (**Table D-3**).

4.1.3.1.2 Swamp Wetlands

Of the two swamps surveyed within the AOI, one swamp was isolated and the other was palustrine with intermittent flow (**Table D-1**). One swamp (P012) in the AOI had a seasonal migratory obstruction (log jam). Swamps in the AOI had a mean water temperature of 19.4 ± 0.4 °C, moderate pH and conductivity, and low turbidity and dissolved oxygen (**Table D-2**). Substrate in swamps consisted primarily of detritus with a small proportion (< 10%) of silt (**Table D-3**). In-water cover was primarily vascular macrophytes with organic debris, overhanging vascular macrophytes, and overhanging large woody debris comprising a mean of >20% (**Table D-3**). Other in-water cover in smaller proportions included large and small in-water woody debris, and small overhanging woody debris. Emergent vegetation was present in both swamps and submergent and floating vegetation were present in one swamp each (**Table D-3**). Emergent and floating vegetation comprised the largest proportion (mean of 50%) of aquatic vegetation where present with submergent vegetation comprising 10% of aquatic vegetation.

4.1.3.2 Wetlands within the LSA_{AQU}

All wetlands surveyed in the LSA_{AQU} that contained water at the time of survey were swamps. Of the swamps surveyed, two occurred south of the AOI and three occurred north of the AOI.

Swamps surveyed south of the AOI were isolated and did not contain migratory obstructions. Both were surrounded by mature forest and had abundant riparian vegetation providing shade cover (**Table D-1**). Swamps south of the AOI had a mean water temperature of 17.0 ± 0.7 °C, moderate pH and conductivity, and low turbidity and dissolved oxygen (**Table D-2**). Substrate in swamps south of the AOI consisted of detritus (**Table D-3**) with the other half comprised of peat in one swamp (S113; a watercourse reclassified as a swamp) and muck in the other (W053). In-water cover was primarily in-water and overhanging vascular macrophytes (**Table D-3**), with organic debris comprising 100% of in-water cover in one swamp (S113), and small overhanging woody debris comprising 80% in one swamp (S113; a watercourse reclassified as a swamp). Other in-water cover types in smaller proportions included small and large in-water woody debris, and large overhanging woody debris (**Table D-3**). Aquatic vegetation in swamps south of the AOI included large proportions (>90%) of floating vegetation in both swamps and a small proportion of emergent vegetation in one swamp (S113) (**Table D-3**).

Swamps surveyed north of the AOI consisted of a variety of reach types (**Table D-1**). One swamp (W009) was isolated, one (W013) was palustrine with permanent flow, and one (W038) was riverine. Swamps north of the AOI were surrounded by young or mature forest and had abundant riparian vegetation providing shade cover (**Table D-1**). Swamps north of the AOI had a mean water temperature of 22.6 ± 2.5 °C, moderate pH and conductivity, and low turbidity and dissolved oxygen (**Table D-2**). Substrate in swamps north of the AOI consisted of detritus, muck, and silt (**Table D-3**). In-water cover was primarily in-water and overhanging vascular macrophytes and organic debris (**Table D-3**). Other in-water cover types in smaller proportions included small and large in-water and overhanging woody debris. Aquatic vegetation in swamps north of the AOI included floating vegetation in low proportion (<35%) in all swamps, emergent vegetation in small proportion (ca. 20%) in two swamps, and submergent vegetation in relatively larger proportion (40%) in one swamp (**Table D-3**).

4.2 Potentially Important Fish Habitat

During searches of existing datasets, two important fish habitats were identified including critical habitat for pugnose shiner in Cargill Mill Pond (outside and north of the LSA_{AQU}) and a brook trout spawning area in the southern end of the LSA_{AQU}. Ten locations were characterized as potentially important habitat for fish during AHM field surveys in 2022: four within the AOI, and six in the LSA_{AQU} south of the AOI (**Figure E-1**a - c). Of these potentially important habitats, most were seeps or springs with one groundwater interaction. Within the AOI, one spring and/or seep was located on a tributary to the Teeswater River on the western side of the AOI and two seeps were located on a smaller first order tributary to this tributary at the southern end of a wetland. A groundwater source was also located on this first order tributary just north of the seeps. In the LSA_{AQU} south of the AOI, two springs, two seeps, and an inflow and source of a seep were located on Alps Creek.

4.3 Barrier Identification

Barriers are features preventing the movement of fish between connected waterways during all seasons. Obstacles are features that make it more difficult for the passage of fish between connected waterways and may become barriers to fish movement during low flow periods.

4.3.1 Existing Datasets

During desk-based searches of existing aquatic habitat information, 69 potential barriers to fish passage were identified within the BIS aquatic study areas (**Figure F-1**a - c). No barriers were reported within the AOI. In the LSA_{AQU}, nine potential natural barriers were reported: eight beaver dams and one rock barrier. Beaver dams in the LSA_{AQU} were primarily south of the AOI, with one reported in the GSWC south of Cunningham Lake (**Figure F-1**). The potential rock barrier was in the southwest side of the LSA_{AQU} (**Figure F-1**). In the RSA_{AQU}, an additional nine beaver dams, 35 rocks, and four rapids were reported as potential natural barriers (**Figure F-1**). In addition, 12 human-made dams were reported in the RSA_{AQU}. Four human-made dams were located on the Teeswater River upstream of the LSA_{AQU} (**Figure F-1**). The remaining human-made dams were north of the LSA_{AQU} on the Teeswater River (seven) or on the Saugeen River (one) (**Figure F-1**).

4.3.2 AHM Field Surveys

A total of 53 potential barriers or obstacles to fish movement were detected during AHM field studies in 2022 (**Figure F-1**). The sections below describe barriers and obstacles detected within various watercourse, waterbody, and wetland sections within the BIS study areas.

4.3.2.1 Area of Interest

Twenty-five barriers or obstacles to fish movement were reported in the AOI during AHM field studies (**Figure F-1**a). Of the barriers and obstacles recorded, 11 were culverts located on tributaries to the Teeswater River of which six were classified as obstacles (no obvious barrier), one was classified as a seasonal barrier (e.g., did not pass enough water during the summer season) and five were classified as permanent barriers (e.g., they were perched). Beaver dams and log jams were the next most reported obstacles with five beaver dams and one beaver lodge on tributaries to the Teeswater River in the northwest portion of the AOI and four log jams spread across the northern half of the AOI. Other obstacles and barriers in the AOI observed during AHM field surveys included a blockage from overgrowth of vegetation located on a tributary to the Teeswater on the eastern side of the AOI, a human-made crossing

and a road located on the Teeswater River in the northern portion of the AOI, and a dry channel leading to a pond located on the western side of the AOI.

4.3.2.1.1 LSA_{AQU} South of AOI

Field teams reported six barriers or obstacles upstream of the AOI in the southern portion of the LSA_{AQU}, during 2022 AHM surveys (**Figure F-1**b). One beaver dam was on Alps Creek and four beaver lodges were on a small lake north of the Wingham Wetland Complex, which may be the same as those reported in existing datasets (see Section 4.3.1). In addition, one culvert was also located in a wetland in the Wingham Wetland Complex and was classified as a potential seasonal barrier.

4.3.2.1.2 LSA_{AQU} North of the AOI

Field teams reported 14 barriers or obstacles downstream of the AOI in the northern portion of the LSA_{AQU} (**Figure F-1**c). Two culverts classified as obstacles (no obvious barrier) and three beaver dams were located on Schmidt Creek. An additional beaver dam, a log jam, and a dry channel were located on a wetland (W013) connected with Schmidt Creek. Three beaver dams and a beaver lodge were located on Kinlough Creek in the GSWC and one blockage from overgrowth was on the outlet of Silver Lake.

4.3.2.1.3 In RSA_{AQU} Downstream of AOI

In the RSA_{AQU} at the northern end of Cargill Mill Pond, one barrier, a human-made dam, and one beaver dam, were reported during AHM field surveys (**Figure F-1**c). The human-made dam was previously reported in existing datasets (see Section 4.3.1). No other barriers or obstacles to fish passage were recorded during AHM field surveys downstream of the AOI.

4.3.2.1.4 Additional Barriers

Field teams reported six barriers or obstacles in watercourses and waterbodies outside of the BIS study areas on Robson and Hines Lakes (**Figure F-1**). One human-made weir was at the outlet of Robson Lake, four docks were on Robson Lake, and one culvert classified as a potential seasonal barrier was near the inlet to Hines Lake.

5.0 DISCUSSION

This Appendix D of the 2023 BIS Baseline Report focused on desk-based analyses of aquatic habitat and results from the first year of Tier 1 field data collection. Complete results from Tier 1 AHM field surveys will be included in future iterations of the BIS Baseline Report once field data have been received and analyzed by Zoetica.

5.1 Presence and Distribution of Aquatic Habitat within the BIS Study Areas

Aquatic habitat data collected in the BIS aquatic study areas will allow Zoetica to: (1) characterize watercourse and waterbody habitat characteristics to meet the requirements laid out in the TISG Template, and (2) select potential control sites within or outside the greater RSA_{AQU} if no suitable control sites exist within the LSA_{AQU}. The TISG Template requires fish habitat data and descriptions of habitat by mesohabitat (pool, riffle, run), including channel measurements, substrate characterization, and aquatic and riparian vegetation surveys (IAAC 2022). In addition, the TISG Template requires the identification of natural obstacles (e.g., falls, beaver dams) or existing structures (e.g., water crossings) that may hinder the free passage of fish (IAAC 2022). AHM data collection in 2022 provides a first step in characterizing aquatic habitats within the AOI, LSA_{AQU}, and select areas of the RSA_{AQU}.

The AOI was characterized primarily by low discharge streams and tributaries that meander through wetlands, deciduous forests, and agricultural lands. Streams were mainly run habitat with some riffle habitat primarily on tributaries to the Teeswater. Riffle habitat is often used for spawning by many species, and plays a key role in food production as these areas tend to be abundant in insects and other invertebrates (Kobayashi et al. 2013). Substrates in surveyed reaches changed from more cobble-dominated substrates in the southern portion of the AOI to more silt-dominated substrates in the northern reaches of the Teeswater in the AOI. Muck[5] substrates were most prevalent in tributaries to the Teeswater that run through wetlands. In-water cover was more prevalent in watercourse reaches in the northern portion of the AOI that ran through wetland and forest habitat relative to the central and southern portions of the AOI which were more dominated by agricultural lands.

Very few waterbodies were present in the AOI, except for a few small ponds and lakes (< 5 ha). The two waterbodies surveyed in the AOI had primarily vegetated shores adjacent to wetland habitat, primarily muck substrates with smaller amounts of cobble, gravel, silt and sand, shoreline cover consisting primarily of in-water and overhanging vascular vegetation, and significant (>30%) amounts of submergent vegetation. These substrates and cover types are consistent with lakes and ponds found in wetland areas. Several ponds were reclassified as marsh or swamp wetlands at the time of survey and contained little water. Most of the other wetlands surveyed within the AOI were dry at the time of survey except for one additional marsh in the northern portion of the AOI. Wetlands in the AOI were primarily comprised of detritus and silt sediments with in-water and overhanging vascular macrophytes and woody debris comprising most in-water cover. Emergent vegetation was most predominant in wetland habitats within the AOI, which is common for wetlands.

Within the LSA_{AQU}, habitat south of the AOI was most similar to the AOI and consisted of tributaries that primarily flowed into the AOI as well as small waterbodies and wetlands. Habitat in surveyed tributaries flowing into the Teeswater River in the AOI was similar to tributaries within the AOI, consisting primarily of riffle and run habitat with a few reaches containing pools. Pools are often found downstream of riffle habitat and offer deeper slower moving areas that act as refuge areas for fish (Hodges and Magoulick 2011) and may also be important overwintering areas for smaller fish such as minnows (Brown et al. 2011).

Substrate and cover within the LSA_{AQU} south of the AOI were similar to the southern portion of the AOI. In the LSA_{AQU} north of the AOI, reaches surveyed on the Teeswater River and major tributaries to the Teeswater (e.g., Kinlough and Schmidt Creeks) were primarily flats with muck substrates and in-water cover comprised of vascular vegetation and woody debris. These reaches were indicative of streams that run primarily through wetland habitat.

Field teams surveyed several larger waterbodies within the LSA_{AQU} north of the AOI, including Silver, Oppleck, and Schmidt Lakes. These lakes are upstream of the Teeswater River where water intake and output are anticipated to occur, and so should not be impacted by downstream effects from the Project. However, the lakes were included to ensure that effects of the Project are contained within the immediate downstream area from the AOI. At the time of survey, Clam Lake was not accessible, and Cunningham Lake was deemed to be inaccessible and unsafe to survey as it is surrounded by a floating bog. Each surveyed lake was unique in habitat characteristics. Schmidt Lake is completely contained within the

[5] See AHM SOP in the BPD Report (Zoetica 2022) for definitions of substrate types.

GSWC, and surrounded by wetland and deciduous forest, thus was the least impacted by adjacent land use. Schmidt Lake is publicly accessed by trails, boardwalk, and a dock for nature viewing purposes. Silver Lake is a popular lake for fishing and is surrounded by cottages, forest, and meadow/agricultural land. Oppleck Lake is on privately owned property and surrounded by forest and a cottage on a grassy property.

Lakes outside of the LSA_{AQU} were surveyed for several purposes. Cargill Mill Pond was surveyed as it was deemed Critical Habitat within the federal recovery strategy for pugnose shiner (DFO 2012) and occurs downstream of the site. Habitat within Cargill Mill Pond was characteristic of a stream-fed lake adjacent to wetland habitat but is unique as it is a human-made dammed lake. BIS surveys in Cargill Mill Pond are primarily to assure stakeholders and rights-holders that no effects of the Project reach Cargill Mill Pond and that any effects would be localized and not carried far downstream (e.g., not exceed 20 km or the LSA_{AQU}). Robson and Hines Lakes were surveyed outside of the RSA_{AQU} as potential reference lakes for Silver and Clam Lakes. Robson and Hines Lakes were similar in habitat, water quality and anthropogenic characteristics to Silver and Clam Lakes and have similar fish species present (see Chapter 8).

5.2 Habitat Potentially used by Fish and other Aquatic and Semi-aquatic BVs for Various Life History Phases

Fish require a diversity of habitats to carry out various life history phases and for protection from predators. The TISG Template requires characterization of fish habitat features that may demonstrate the presence of fish species, including water quality and quantity, sediment types, prey, shelter, refuge, feeding, spawning habitats, nursery habitats, rearing habitats, overwintering, migration routes and sensitive times for these activities (IAAC 2022). Data collected through AHM field studies can aid in identifying suitable habitat for fish species of interest and establishing areas for further studies to identify potential spawning, rearing, overwintering, and migratory habitats (see Chapter 8). Aquatic habitat data are also relevant for determining suitable habitat for other aquatic and semi-aquatic BVs such as semi-aquatic mammals, birds (e.g., marsh bird breeding habitat), amphibians, and reptiles (e.g., nesting and overwintering habitat for turtles) and to meet the TISG Template requirements for riparian and wetland environments outlined in Chapter 3.

Water quality and quantity studies were conducted as part of the Environmental Media Baseline Program (EMBP) (CanNorth 2020) and at the time of writing the 2023 BIS Baseline Report, these data were not available to Zoetica. However, general water chemistry parameters were collected during BIS AHM studies. In general, watercourses in all BIS aquatic study areas had neutral pH (with slightly elevated (> 8.2) pH in the Teeswater River upstream of the AOI and Alps Creek), low turbidity (except for reaches in the Teeswater in the AOI and downstream of the AOI with moderate turbidity) and moderate conductivity. Dissolved oxygen was low (< 6.5 mg/L and <80%) in many of the reaches surveyed within the Teeswater River and its tributaries. Dissolved oxygen was within the normal healthy range for fish habitat (between 6.5 – 8 mg/L and 80 – 120%) (H2OU 2019) in the Teeswater within the AOI and Alps Creek. Similarly, waterbodies within the AOI and LSA_{AQU} were within normal range for most water quality characteristics and have the potential to support fish populations. However, dissolved O_2 was generally low in surveyed lakes. Full dissolved O_2 profiles were conducted in lakes as part of the EMBP limnology program. Results of full limnological and bathymetric surveys conducted as part of the EMBP, once available, will help to further determine the potential for fish habitat within these lakes.

Considerations of prey, feeding preferences, and sensitive times are typically species-specific for fish and are discussed in Chapter 8. The AHM studies were designed to identify potentially important habitats for

fish species of various ecotypes (e.g., benthic, benthopelagic, pelagic) and trophic classes (e.g., herbivore, planktivore, detritivore, insectivore, invertivore, carnivore) to carry out various life history phases. Data on habitat characteristics may also inform potentially important habitats for other aquatic and semi-aquatic wildlife species to carry out various life history phases. For example, several Significant Wildlife Habitats, including turtle nesting and wintering areas, amphibian breeding habitats, and marsh bird breeding habitats, require various aquatic habitat features to support species (see Appendix C, Chapter 1).

Within the AOI, field teams identified several groundwater sources and seeps, which are considered potentially important fish habitats. Typically, groundwater-surface water interactions can be important areas for fish spawning and rearing for certain species such as brook trout (Curry and Neakes 2011). Field teams identified groundwater seeps and springs in several reaches along Alps Creek in the LSA_{AQU} south of the AOI. No seeps or groundwater areas were reported within the LSA_{AQU} north of the AOI. The first year of AHM studies identified only limited habitat that may be important for fish. However, this data will be combined with additional years of Tier 1 data, bathymetric and limnological data from the EMBP (CanNorth 2020), and Tier 2 data after site selection to characterize fish communities. Together, these data will help identify potentially important areas for fish within the BIS aquatic study areas.

5.3 Barriers to Fish Passage

To date, desk-based and field-based assessments focused on identifying potential barriers to fish passage in aquatic habitats. A total of 122 barriers or obstacles to fish passage, most of them beaver dams, were reported within the BIS study areas. However, some barriers may be represented in both the desk-based and field surveyed areas, and so 122 may be an overestimate. Twenty-five barriers or obstacles to fish passage were reported in the AOI during AHM field surveys, most of which were culverts followed by beaver dams. Culverts can pose barriers to fish passage if they are perched and can be obstacles if they do not pass sufficient water. Beaver dams can pose barriers to fish passage if they do not allow enough flow through the structure and may pose obstacles if they have enough flow. In addition, beaver dams are sometimes abandoned by beavers and rebuilt elsewhere within the watercourse potentially creating multiple obstacles and barriers to fish passage within a given section of the watercourse. A human-made road crossing was located on the Teeswater River in the northern section of the AOI, which could pose an obstacle or barrier to fish passage during lower flow periods.

5.4 Identification of Suitable Sampling Sites for Tier 2 Studies

Information collected as part of Tier 1 studies will help to direct future Tier 2 studies aimed at characterizing community composition of various aquatic and semi-aquatic BVs that use these aquatic habitats. AHM data collected during Tier 1 studies will ultimately help determine suitable sampling sites for Tier 2 biodiversity studies. Some data collected during AHM studies to date (e.g., reaches with riffle and pool habitat, seeps and groundwater, and good cover) can help select Tier 2 sampling locations for fish community characterization and studies on other aquatic and semi-aquatic species. However, additional relevant data is required to determine where future Tier 2 fish studies will be undertaken. Such data include water quality, sediment quality, limnology, bathymetry, and primary and secondary producers from the EMBP (CanNorth 2020), results of other BIS Tier 1 studies such as eDNA metabarcoding (see Appendix E, Chapter 1), future years of AHM habitat data, and potential infrastructure siting. Sites for Tier 2 fish characterization studies will include all watercourse and waterbody reaches potentially impacted by the Project, as well as locations within the AOI and LSA_{AQU} that are potentially

important for fish spawning, rearing, overwintering, and migration life history phases. Additional control sites will be included for Tier 2 studies outside of potentially affected areas (within the LSA_{AQU} and RSA_{AQU}). In addition, sites that are currently impacted by other anthropogenic activities may also be investigated for their use as eventual offsetting locations if required.

5.5 Limitations and Next Steps

Field surveys in the SON-South Bruce siting area were limited to watercourses, waterbodies and wetlands that were accessible on public lands, NWMO-owned/optioned lands, and private lands where owners had granted permission to survey. As a result, many reaches within the AOI and the LSA_{AQU} south of the AOI could not be surveyed as they were on private lands where permission was not granted. Future efforts to collect AHM information on watercourses, waterbodies, and wetlands within the AOI and LSA_{AQU} south of the AOI are anticipated for the 2024 field season. However, additional aquatic habitat surveys within these areas will require the NWMO to attain agreements for additional property access.

In addition to access, the summer of 2022 was an exceptionally dry season in the SON-South Bruce region. Approximately 12% of wetlands surveyed during summer 2022 contained water. As a result, summaries of AHM data in wetlands by wetland type (i.e., marsh, swamp, fen, bog) are limited, and more field work within these habitat types will be required to adequately characterize wetland habitat within the study areas. It is anticipated that a spring wetland reconnaissance survey will be conducted in the spring of 2024 to characterize the extent of flooding within the AOI and LSA_{AQU}. Wetlands may be revisited during the summer season to provide additional insight as to whether the wetlands were dry because 2022 was an abnormally dry year, or because the wetlands naturally dry during the summer season. After site selection, if the SON-South Bruce site is selected, more in-depth wetland surveys (OWES surveys) will be planned in wetlands anticipated to be impacted by the Project. In addition to wetlands, some of the surveyed first order streams and other small watercourses connecting ponds and lakes selected for survey in 2022 were also dry during the summer of 2022 when they were surveyed. The BIS design in 2022 primarily surveyed second order or greater watercourses, except for inlet and outlet streams, and first order tributaries with known presence of SAR. While primary order streams were not the focus of 2022 field surveys, they may be surveyed in accessible areas in 2024 to understand whether they hold water throughout the year or are intermittent in nature. In future years, after a site is selected and once more is known about infrastructure placement, a survey of all reaches potentially affected by the Project, including first order streams, will be required, and potential reference sites will be selected based on considerations of habitat similarity.

The Project is still in early stages of baseline data collection. Tier 1 studies were aimed at characterizing basic habitat information to determine the suitability of various aquatic habitats for species of interest and provide insight on where more detailed studies (i.e., Tier 2 and 3 studies) should be focussed. More detailed information will be required to inform a future IA should the SON-South Bruce siting area be selected. However, these early AHM data can help inform infrastructure siting by identifying areas to avoid that contain unique or potentially important habitat.

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APPENDIX A – SUMMARY OF PLANNED AND SURVEYED REACHES IN THE BIS STUDY AREAS

Table A-1. Summary of planned and surveyed reaches within the BIS aquatic study areas.

	Study Area	Number of Reaches Selected for Survey	Number of Reaches Surveyed in 2022	Number of Dry Reaches Visited in 2022	Total Reaches Visited in 2022
Watercourses					
Second order or higher watercourses	AOI	46	41	2	43
First order watercourses with SAR	AOI	3	1	2	3
Caslick Drain	LSA_{AQU}	1	1	0	1
Alps Creek	LSA_{AQU}	18	9	0	9
Teeswater River downstream of AOI	LSA_{AQU}	13	11	0	11
Kinlough Creek	LSA_{AQU}	3	2	0	2
Schmidt Creek	LSA_{AQU}	4	3	0	3
Teeswater River upstream of AOI and upstream of City of Teeswater	RSA_{AQU}	3	0	0	0
Teeswater River upstream of AOI and downstream of City of Teeswater	RSA_{AQU}	2	2	0	2
Teeswater River downstream of LSA_{AQU}	RSA_{AQU}	4	0	0	0
Inlets and Outlets for Waterbody Surveys	All	31	7	11	18
Reclassified Stream[1]	AOI	0	1 (conifer swamp to stream)	0	1
	LSA_{AQU} (south)	0	2 (marsh to stream)	0	2
Total Watercourses		**128**	**80**	**15**	**95**
Waterbodies					
Clam Lake	LSA_{AQU}	1	0	0	0
Silver Lake	LSA_{AQU}	1	1	0	1
Oppleck Lake	LSA_{AQU}	1	1	0	1
Hodgins Lake	LSA_{AQU}	1	0	0	0
McFarlane Lake	LSA_{AQU}	1	0	0	0
Schmidt Lake	LSA_{AQU}	1	1	0	1

Hines Lake	Outside	1	1	0	1
Robson Lake	Outside	1	1	0	1
Cargill Mill Pond[3]	RSA_{AQU}	1	1	0	1
Unnamed Lakes/Pond	AOI	8	2	0	2
Unnamed Lakes/Ponds	LSA_{AQU}	13	8	0	8
Total Lakes/Ponds		**30**	**16**	**0**	**16**
Wetlands					
Hardwood Swamps	AOI	9	0	9	9
	LSA_{AQU} (south)	8	1	7	8
	LSA_{AQU} (north)	12	2	9	11
Mixedwood Swamps	AOI	5	0	5	5
	LSA_{AQU} (south)	5	0	3	3
	LSA_{AQU} (north)	7	0	7	7
Conifer Swamps	AOI	4	0	3	3
	LSA_{AQU} (south)	2	0	1	1
	LSA_{AQU} (north)	2	0	1	1
Shrub Swamps	AOI	2	0	2	2
	LSA_{AQU} (south)	2	0	2	2
	LSA_{AQU} (north)	2	0	2	2
Reclassified Wetland[1]	AOI	0	2 (ponds to swamps) 2 (ponds to marsh)	1 (pond to dry site)	5
	LSA_{AQU} (south)	0	1 (stream to swamp)	3 (ponds to dry site)	4
	LSA_{AQU} (north)	0	1 (marsh to swamp)	0	1
Marshes	AOI	10	3	9	10
	LSA_{AQU} (south)	9	0	6	6
	LSA_{AQU} (north)	2	0	1	1
Total Wetlands		**81**	**12**	**71**	**81**
Total Survey Locations		**239**	**108**	**86**	**192**

Note: [1]Assessed as watercourse, waterbody, or different type of wetland as per Zoetica.

Table A-2. Site IDs of surveyed watercourses, waterbodies, and wetlands within the AOI, LSA_{AQU}, RSA_{AQU}, and reference areas outside the BIS study areas.

Grouping	Sites Included
Watercourses	
AOI	
Tributaries to Teeswater (21 sites)	S006, S008 - S009, S014, S029, S032, S034, S050, S053, S093 - S096, S099 - S103, S105, S108, W139
Teeswater River (22 sites)	S004, S007, S013, S015 - S016, S035, S038 - S040, S042, S051, S056, S067 - S068, S070 - S077
LSA_{AQU}	
Teeswater River Upstream of AOI (2 sites)	S049, S078
Teeswater River Downstream of AOI (11 sites)	S002, S003, S010, S046, S058, S059, S061, S062, S063, S064, S065
Caslick Municipal Drain (1 site)	S126
Alps Creek (9 sites)	S018, S033, S045, S047, S079, S080, S081, S089, S090
Kinlough Creek (4 sites)	S011, S026, S030, S052
Schmidt Creek (3 sites)	S037, S044, S057
RSA_{AQU} & Outside	
Inlets and Outlets to Reference Lakes (4 sites)	S124, S125, S019, S031
Waterbodies	
AOI	
Unnamed Waterbodies	L006, P010
LSA_{AQU}	
Named Lakes	Silver Lake (L001), Schmidt Lake (L003), Oppleck Lake (L007)
Unnamed Waterbodies	L004, L005, P005, P007, P008, P009, P015
RSA_{AQU} & Outside	
Named Lakes	Cargill Mill Pond (L012), Hines Lake (L010), Robson Lake (L011)
Wetlands	
AOI	
Marshes (3 sites)	P002, P013, W132
Swamps (2 sites)	P012, P016
LSA_{AQU}	
Swamps north of AOI (3 sites)	W009, W013, W038
Swamps south of AOI (2 sites)	S113, W053

NWMO Biodiversity Impact Studies

AHM Mapping: Planned and Surveyed Watercourses - AOI

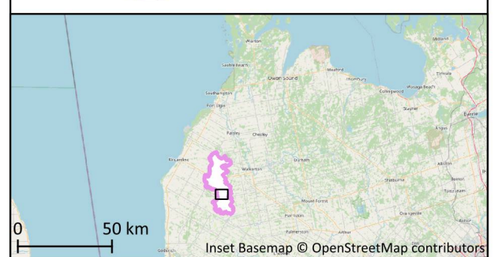
Figure A-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [43]
- Dry Site [9]

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A093a	

NWMO Biodiversity Impact Studies

AHM Mapping: Planned and Surveyed Watercourses - South LSA_{AQU}

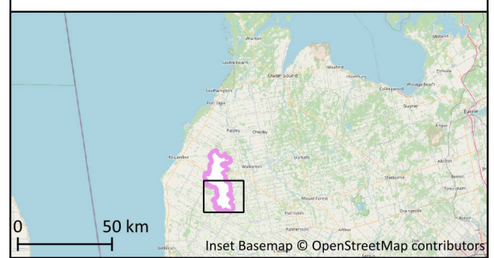
Figure A-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [15]
- Dry Site [4]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A093b	

NWMO Biodiversity Impact Studies

AHM Mapping: Planned and Surveyed Watercourses - North LSA_{AQU}

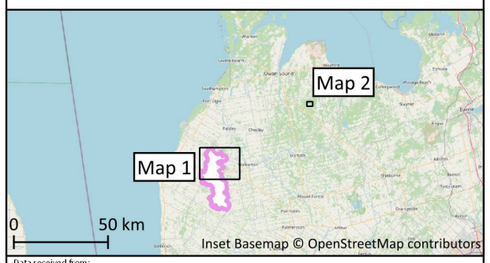
Figure A-1c

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [22]
- Dry Site [2]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A093c	

NWMO Biodiversity Impact Studies

AHM Mapping: Planned and Surveyed Lakes and Ponds - South LSA_{AQU}

Figure A-2a

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

Surveyed Lakes and/or Ponds

- Pond (<1 ha) [6]
- Small Lake (<5 ha) [4]

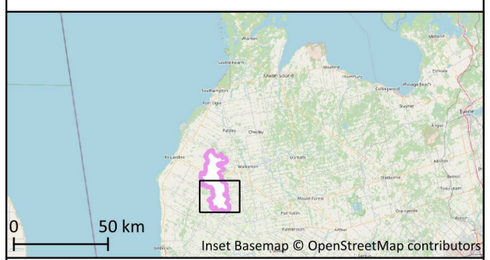
Lakes and/or Ponds that were not Surveyed

- Dry Site [1]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A092a	

NWMO Biodiversity Impact Studies

AHM Mapping: Planned and Surveyed Lakes and Ponds - North LSA_{AQU}

Figure A-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

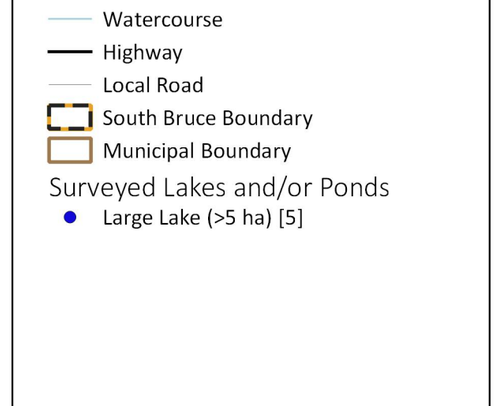
Surveyed Lakes and/or Ponds

- Large Lake (>5 ha) [5]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A092b	

NWMO Biodiversity Impact Studies

AHM Mapping: Planned and Surveyed Wetlands - AOI

Figure A-3a

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land
- Planned Wetland Not Visited in 2022 [1]

Surveyed Wetlands

- Marsh [3]
- Swamp [2]

Wetlands that were not Surveyed

- Dry Site [29]

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI-2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. E (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A091a	

NWMO Biodiversity Impact Studies

AHM Mapping: Planned and Surveyed Wetlands - South LSA_{AQU}

Figure A-3b

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Planned Wetland Not Visited in 2022 [6]

Surveyed Wetlands

- Swamp [2]

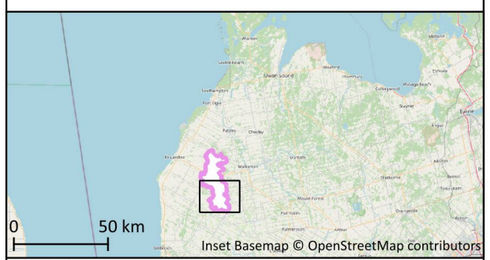
Wetlands that were not Surveyed

- Dry Site [22]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A091b	

NWMO Biodiversity Impact Studies

AHM Mapping: Planned and Surveyed Wetlands - North LSA_{AQU}

Figure A-3c

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Planned Wetland Not Visited in 2022 [2]

Surveyed Wetlands

- Swamp [3]

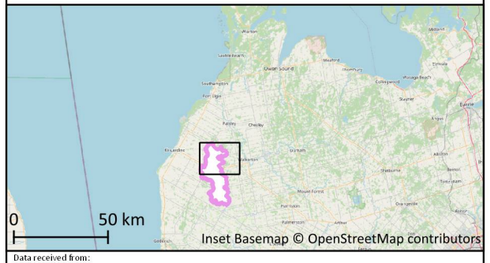
Wetlands that were not Surveyed

- Dry Site [19]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: AB
December 13, 2023	Map ID: NWMO_BIS_A091c	

APPENDIX B – WATERCOURSE SUMMARY OF HABITAT CHARACTERISTICS

Table B-1. Count of sites within each habitat categorical variable in watercourse reaches surveyed in the AOI and LSA_{AQU}.

Variable	AOI		LSA_{AQU}					
	Tributaries to Teeswater	**Teeswater River**	**Alps Creek**	**Kinlough Creek**	**Schmidt Creek**	**Caslick Municipal Drain**	**Teeswater River upstream of AOI**	**Teeswater River downstream of AOI**
***Number of Sites*[1]**	21	22	9	4	3	1	2[2]	11
Stream Type - structure								
N	21	22	9	4	3	1	2	11
Natural	21	21	9	4	3	1	2	11
Channelized	0	1	0	0	0	0	0	0
Stream Type - Flow								
N	21	22	9	4	3	1	2	11
Intermittent	0	0	0	0	0	0	0	0
Ephemeral	0	0	0	0	0	0	0	0
Permanent	21	22	9	4	3	1	2	11
None specified	0	0	0	0	0	0	0	0
Associated Wetland								
N	21	22	9	4	3	1	2	11
Bog	0	0	0	0	0	0	0	0
Fen	0	0	0	0	0	0	0	0
Marsh	3	5	2	1	0	0	0	3
Swamp	6	0	2	3	3	0	0	9
None	12	17	5	1	0	1	2	2
Stream Discharge								
N	21	22	9	4	3	1	2	11
Low	21	22	8	4	3	1	2	11
Moderate	0	0	1	0	0	0	0	0
High	0	0	0	0	0	0	0	0
Migratory Obstruction								
Seasonal	4	0	1	0	2	0	0	0
Permanent	3	1	0	2	0	0	0	0
Potential Critical Habitat / Limiting Habitat								
Spawning	0	0	0	0	0	0	0	0
Groundwater	1	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0

Notes:

[1]Site IDs included in each category are provided in **Table A-2**.

[2]In the Teeswater River upstream category, one site is technically in the RSA_{AQU} but borders closely with the LSA_{AQU} and is geographically proximal to the other site in this category, so it has been included in the LSA_{AQU} for data summarization.

Table B-2. Water chemistry characteristics of watercourse reaches in the AOI and LSA_{AQU}.

Variable	Units	AOI								LSA_{AQU}																			
		Tributaries to the Teeswater River				Teeswater River				Teeswater River upstream[1]				Teeswater River downstream				Alps Creek				Kinlough Creek				Schmidt Creek				Caslick Municipal Drain
Collection Date Range		July 13 – Sep 20th, 2022				July 18th – July 28th, 2022				August 31st, 2022				July 26th – July 29th, 2022				Aug 22nd – Sept 9th, 2022				July 17th – Sept 6th, 2022				July 21st – July 22nd, 2022				Aug 6th, 2022
		N	Min	Mean (± SE)	Max	N	Min	Mean (± SE)	Max	N	Min	Mean (± SE)	Max	N	Min	Mean (± SE)	Max	N	Min	Mean (± SE)	Max	N	Min	Mean (± SE)	Max	N	Min	Mean (± SE)	Max	Value
Water Temperature	°C	21	9.9	17.0 (1.0)	27	22	19.6	21.6 (0.27)	24.6	2	20.3	20.6 (0.2)	20.8	11	19.7	20.3 (0.1)	20.9	9	14.2	16.6 (0.6)	19	4	17.6	19.6 (1.0)	22.2	3	19.4	20.7 (1.3)	23.4	19.2
Water pH		21	7.4	8.1 (0.1)	8.5	22	8.1	8.2 (<0.1)	8.3	2	8.3	8.3 (0)	8.3	11	8.1	8.1 (0)	8.3	9	8.2	8.3 (<0.1)	8.4	4	7.5	7.6 (0.1)	7.8	3	7.3	7.5 (0.1)	7.7	8.2
Conductivity	µS /cm	21	31.6	636.5 (61.5)	1195	22	639	646.5 (1.2)	658	2	561	562.5 (1.5)	564	11	595	600.3 (1.4)	613	9	490	594.4 (26.0)	684	4	361.1	540.5 (69.6)	657	3	440.4	511.7 (58.2)	627	600
Turbidity		21	1.4	7.9 (2.5)	53.5	22	5.3	9.4 (0.6)	16.1	2	1.8	2.1 (0.4)	2.5	11	15.7	21.1 (1.2)	27.6	9	3.5	6.0 (1.0)	12	4	1.1	4.6 (1.8)	9.5	3	4.1	6.2 (1.1)	7.7	3.3
Dissolved O_2	mg / L	21	5.7	9.0 (0.3)	11.5	22	6	8.9 (0.3)	10.9	2	6.6	6.8 (0.2)	6.9	11	6.2	6.9 (0.2)	8.6	9	7	7.8 (0.2)	8.3	4	2.1	3.4 (0.6)	4.8	3	0.9	4.0 (1.6)	5.6	9.3
Dissolved O_2	%	21	50.8	92.5 (3.7)	114.5	22	69.5	102.0 (4.0)	131	2	73	75 (2.0)	77	11	69	77.5 (2.4)	96	9	69	80.2 (2.6)	90	4	20.5	36.2 (6.9)	54	3	9.5	41.2 (15.9)	60.1	101.0

Table B-3. Percent of sites by categorical habitat characteristics within the AOI and the LSA_{AQU}.

Variable	AOI		LSA_{AQU}					
	Tributaries to Teeswater River	Teeswater River	Teeswater River upstream of AOI[1]	Teeswater River downstream of AOI	Alps Creek	Kinlough Creek	Schmidt Creek	Caslick Municipal Drain
	(n = 21)	(n = 22)	(n = 2)	(n = 11)	(n = 9)	(n = 4)	(n = 3)	(n = 1)
Shore Cover								
N	21	22	2	11	9	4	3	1
1-30%	28.6	95.5	100	0	22.2	25	0	100
31-60%	28.6	4.5	0	9.1	22.2	25	66.7	0
61-90%	38.1	0	0	81.8	11.1	50	33.3	0
>90%	4.5	0	0	9.1	44.4	0	0	0
Riparian Stage Right Upper bank								
N	12	10	2	11	9	3	3	1
Initial (<5% total cover)	0	0	0	0	0	0	0	0
Shrub/herb (<10% total cover)	0	0	0	0	0	0	0	0
Pole Sapling	0	0	0	0	0	0	0	0
Young forest	8.3	10	50	0	11.1	33.3	0	0
Mature forest	91.7	90	50	100	88.9	66.7	100	100
Riparian Stage Left Upper Bank								
N	12	11	2	11	9	3	3	0
Initial (<5% total cover)	0	0	0	0	0	0	0	NA
Shrub/herb (<10% total cover)	0	0	0	0	0	0	0	NA
Pole Sapling	0	0	0	0	0	0	0	NA
Young forest	8.3	0	100	0	11.1	0	0	NA
Mature forest	91.7	100	0	100	88.9	100	100	NA
Left Upstream Bank Stability								
N	21	22	2	11	9	3	3	1
Protected	0	0	0	0	0	0	0	0
Vulnerable	81	72.7	100	18.2	100	0	100	0
Erosional	42.9	45.4	0	100	44.4	66.7	0	0
Depositional	0	0	0	9.1	0	0	0	0
Stable	14.3	18.2	50	72.7	33.3	66.7	0	100
Right Upstream Bank Stability								
N	21	22	2	11	9	3	3	1
Protected	0	0	0	0	0	0	0	0
Vulnerable	66.7	72.7	100	27.3	100	0	100	0
Erosional	52.4	45.5	0	100	44.4	66.7	0	0
Depositional	0	0	0	0	0	0	0	0
Stable	19	18.2	50	72.7	33.3	66.7	0	100

Notes:
[1]Site IDs included in each data analysis category are provided in **Table A-2**.
[2]In the Teeswater River upstream category, one site is technically in the RSA_{AQU} but borders closely with the LSA_{AQU} and is geographically proximal to the other site in this category, so it has been included in the LSA_{AQU} for data summarization.

Table B-4. Riparian vegetation types and proportions documented during AHM surveys of watercourses.

	N	Grass/Lawn L	Grass/Lawn R	Meadow L	Meadow R	Shrub L	Shrub R	Wetlands L	Wetlands R	Cropland L	Cropland R	Conifer Forest L	Conifer Forest R	Deciduous Forest L	Deciduous Forest R	Mixed Forest L	Mixed Forest R	None L	None R
AOI																			
Teeswater River 1.5-10 m	22	0	4.5	90.9	90.9	36.4	27.3	22.7	22.7	18.2	0	13.6	9.1	4.5	4.5	0	4.5	0	0
Teeswater River 11-30 m	22	0	9.1	59.1	45.5	27.3	27.3	18.2	13.6	22.7	27.3	18.2	9.1	22.7	4.5	0	4.5	0	0
Teeswater River 31-100 m	22	0	9.1	31.8	18.2	9.1	18.2	0	0	45.5	40.9	9.1	0	27.3	27.3	4.5	4.5	4.5	9.1
Tributaries to Teeswater 1.5-10 m	21	0	0	71.4	71.4	33.3	33.3	33.3	33.3	4.8	4.8	9.5	14.3	9.5	9.5	4.8	4.8	0	0
Tributaries to Teeswater 11-30 m	21	0	0	52.4	33.3	23.8	14.3	33.3	38.1	19.0	28.6	14.3	14.3	23.8	9.5	9.5	9.5	0	0
Tributaries to Teeswater 31-100 m	21	0	0	38.1	19.0	14.3	9.5	23.8	19.0	47.6	57.1	9.5	9.5	33.3	23.8	14.3	14.3	0	4.8
LSA																			
Teeswater River Upstream AOI 1.5-10 m	2	0	0	100	100	0	0	0	0	0	0	0	0	0	100	0	0	0	0
Teeswater River Upstream AOI 11-30 m	2	0	0	100	100	50	50	0	0	0	0	0	50	50	100	0	0	0	0
Teeswater River Upstream AOI 31-100 m	2	0	0	50	100	0	50	0	0	0	0	50	50	50	50	0	0	0	0
Teeswater River Downstream AOI 1.5-10 m	11	0	0	81.1	54.5	63.6	72.7	81.8	81.8	0	0	0	0	100	100	0	9.1	0	0
Teeswater River Downstream AOI 11-30 m	11	0	0	45.5	45.5	18.2	18.2	81.8	72.7	0	0	0	0	100	100	0	9.1	0	0
Teeswater River Downstream AOI 131-100 m	11	0	0	54.5	45.5	9.09	0	72.7	81.8	63.6	81.8	0	0	100	81.8	0	9.1	0	0
Alps Creek 1.5-10 m	9	0	0	66.7	77.8	22.2	22.2	66.7	66.7	0	0	11.1	11.1	55.6	55.6	33.3	33.3	0	0
Alps Creek 11-30 m	9	0	0	44.4	55.6	11.1	11.1	66.7	55.6	0	0	0	0	55.6	55.6	33.3	44.4	0	0
Alps Creek 31-100 m	9	0	0	44.4	44.4	11.1	11.1	66.7	55.6	0	11.1	0	0	55.6	55.6	44.4	44.4	0	0
Kinlough Creek 1.5-10 m	4	0	0	25	50	50	25	50	50	0	0	0	0	25	25	25	0	0	0
Kinlough Creek 11-30 m	4	0	0	25	25	25	25	50	50	0	0	0	0	50	25	25	0	0	0
Kinlough Creek 31-100 m	4	0	0	25	0	25	0	50	25	0	0	0	0	50	75	25	0	0	0
Schmidt Creek 1.5-10 m	3	0	0	33.3	33.3	33.3	33.3	100	100	0	0	0	0	66.7	66.7	0	0	0	0
Schmidt Creek 11-30 m	3	0	0	0	0	0	0	66.7	66.7	0	0	0	0	100	66.7	0	0	0	0
Schmidt Creek 31-100 m	3	0	0	0	0	0	0	66.7	66.7	0	0	0	0	100	100	0	0	0	0
Caslick Municipal Drain 1.5-10 m	1	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0
Caslick Municipal Drain 11-30 m	1	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0
Caslick Municipal Drain 31-100 m	1	0	0	0	0	0	0	0	0	100	100	0	0	0	100	0	0	0	0

Notes:
[1]Site IDs included in each data analysis category are provided in Table A-2.
[2]In the Teeswater River upstream category, one site is technically in the RSA_{AQU} but borders closely with the LSA_{AQU} and is geographically proximal to the other site in this category, so it has been included in the LSA_{AQU} for data summarization.

Table B-5. Habitat characteristics of watercourse habitat survey units in the AOI and LSA_{AQU}.

Characteristic	Units	AOI										LSA_{AQU}																											
		Tributaries to the Teeswater River					Teeswater River					Teeswater River upstream[1] of AOI					Teeswater River downstream of AOI					Alps Creek					Kinlough Creek					Schmidt Creek					Caslick Municipal Drain
		N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	Value
Length Surveyed	m	21	41	105.5	35.3	200	22	100	144.5	55	300	2	135	142.5	11	150	11	130	155	24	200	9	100	100	0	100	4	70	171	163	414	3	100	100	0	100	
Total Length Surveyed	m	2216.5					3180															900					684					300					100
Habitat Type																																							
Run	%	0	NA	NA	NA	NA	0	NA	NA	NA	NA	1	40	40	NA	40	0	NA	NA	NA	NA	7	5	36.4	17	60	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Bankfull width	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	1	14	14.2	NA	14.2	0	NA	NA	NA	NA	7	3.5	5.9	1.7	8.6	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Bankfull depth	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	1	0.8	0.8	NA	0.8	0	NA	NA	NA	NA	7	0.7	0.9	0.2	1.2	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Wetted width	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	1	12	12.2	NA	12.2	0	NA	NA	NA	NA	7	2.9	4.7	1.4	6.6	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Wetted depth	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	1	0.3	0.3	NA	0.3	0	NA	NA	NA	NA	7	0.2	0.3	0.1	0.5	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Pool	%	5	2	9	6.9	20	0	NA	NA	NA	NA	1	20	20	NA	20	1	5	5	NA	5	2	10	12.5	3.5	15	1	35	35	NA	35	0	NA	NA	NA	NA	NA
Bankfull width	m	5	2.7	5.2	1.8	7	0	NA	NA	NA	NA	1	21	21.1	NA	21.1	0	NA	NA	NA	NA	1	7	7	NA	7	1	11	11.1	NA	11.1	0	NA	NA	NA	NA	NA
Bankfull depth	m	5	0.4	0.9	0.4	1.4	0	NA	NA	NA	NA	1	1.7	1.7	NA	1.7	1	3.7	3.7	NA	3.7	2	1	1.4	0.6	1.8	1	1.3	1.3	NA	1.3	0	NA	NA	NA	NA	NA
Wetted width	m	5	1.7	3.9	2.2	6.9	0	NA	NA	NA	NA	1	19	19.2	NA	19.2	1	13	13.3	NA	13.3	2	6.5	6.9	0.7	7.4	1	6.2	6.2	NA	6.2	0	NA	NA	NA	NA	NA
Wetted depth	m	5	0.3	0.5	24	0.8	0	NA	NA	NA	NA	1	1.2	1.2	NA	1.2	1	1.5	1.5	NA	1.5	2	0.5	0.7	0.3	0.9	1	0.6	0.6	NA	0.6	0	NA	NA	NA	NA	NA
Riffle	%	16	2	42.4	24	90	4	15	40	29	80	2	40	60	28	80	0	NA	NA	NA	NA	8	20	48.8	17	75	1	5	5	NA	5	1	2	2	NA	2	60
Bankfull width	m	16	1	3.4	2	8.9	4	12	21.5	7.2	28.7	2	14	17.4	5	20.9	0	NA	NA	NA	NA	8	4.1	7	2.5	11	0	NA	NA	NA	NA	0	NA	NA	NA	NA	3.4
Bankfull depth	m	16	0.2	0.6	0.2	1	4	0.2	0.7	0.4	1.2	2	0.7	0.7	0	0.7	0	NA	NA	NA	NA	8	0.7	0.8	0.1	0.8	1	2.4	2.4	NA	2.4	0	NA	NA	NA	NA	0.4
Wetted width	m	16	0.5	1.7	1.1	4.5	4	11	19.2	6.7	27.5	2	13	15	3.2	17.2	0	NA	NA	NA	NA	8	2.7	5.1	1.9	8.1	1	2.8	2.8	NA	2.8	1	0.5	0.5	NA	0.5	2.2
Wetted depth	m	16	<0.1	0.1	<0.1	0.2	4	0.1	0.2	0.1	0.3	2	0.2	0.2	0	0.2	0	NA	NA	NA	NA	8	0.1	0.1	<0.1	0.2	1	0.1	0.1	NA	0.1	1	<0.1	<0.1	NA	<0.1	0.1
Flats	%	21	10	65	26.9	100	22	20	92.8	19	101	1	20	20	NA	20	11	95	99.5	1.5	100	7	0	32.9	32	100	4	60	90	20	100	3	98	99.3	1.2	100	40
Bankfull width	m	20	0.9	3.6	1.9	8.7	22	15	19.2	2.7	26.3	1	20	20	NA	20	7	13	15.5	2.2	18.3	6	4.3	7.4	2.4	10.2	2	7	7.6	0.9	8.3	1	2.2	2.2	NA	2.2	3
Bankfull depth	m	20	0.3	0.6	0.2	1.3	22	0.4	1.6	0.5	2.3	1	0.8	0.8	NA	0.8	10	2.5	3.4	0.7	4.7	6	0.8	1.3	0.6	2.3	2	1	1.3	0.4	1.6	1	0.7	0.7	NA	0.7	0.6
Wetted width	m	21	0.7	2.5	1.8	8.5	22	13	18.2	2.7	24.1	1	18	17.9	NA	17.9	11	11	12.7	1.4	15.2	6	3.8	6.2	1.9	8.3	4	3	5.2	1.5	6.4	3	1.9	2.5	0.6	3.1	2.3
Wetted depth	m	21	0.1	0.2	0.1	0.6	22	0.3	1.6	3	14.7	1	0.4	0.4	NA	0.4	11	0.7	1.3	0.4	1.8	6	0.2	0.4	0.2	0.7	4	0.4	0.8	0.3	1.2	3	0.1	0.2	0.1	0.3	0.2
Culvert	%	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Bankfull width	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Bankfull depth	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Wetted width	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Wetted depth	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Bankfull width	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Bankfull depth	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Wetted width	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Wetted depth	m	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	NA
Substrate																																							
Bedrock	%	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0
Boulder	%	6	1	2	1.5	5	2	3	4	1.4	5	0	NA	NA	NA	NA	0	NA	NA	NA	NA	3	2	10.7	9	20	0	NA	NA	NA	NA	0	NA	NA	NA	NA	10
Cobble	%	12	3	18.8	23.9	80	15	10	45.5	30	80	2	50	55	7.1	60	0	NA	NA	NA	NA	9	20	36.7	12	60	0	NA	NA	NA	NA	0	NA	NA	NA	NA	10
Gravel	%	13	5	16.2	9.9	30	3	2	2.7	0.6	3	2	30	35	7.1	40	0	NA	NA	NA	NA	9	5	22.8	12	40	0	NA	NA	NA	NA	1	20	20	NA	20	60
Sand	%	18	5	22.5	12.4	40	15	5	10.7	5.6	20	0	NA	NA	NA	NA	6	5	24.2	20	50	7	5	17.9	9.9	30	1	5	5	NA	5	1	20	20	NA	20	20
Silt	%	16	10	31.5	18.4	70	22	7	47.4	31	90	2	10	10	0	10	2	30	30	0	30	9	10	14.4	9.8	40	0	10	10	NA	10	2	10	10	0	10	0
Clay	%	9	5	14.4	7.3	25	18	5	16.1	10	40	0	NA	NA	NA	NA	4	5	12.5	8.7	20	3	5	8.3	2.9	10	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0

Characteristic	Units	AOI										LSA_{AQU}																											
		Tributaries to the Teeswater River					Teeswater River					Teeswater River upstream[1] of AOI					Teeswater River downstream of AOI					Alps Creek					Kinlough Creek					Schmidt Creek					Caslick Municipal Drain
		N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	Value
Length Surveyed	m	21	41	105.5	35.3	200	22	100	144.5	55	300	2	135	142.5	11	150	11	130	155	24	200	9	100	100	0	100	4	70	171	163	414	3	100	100	0	100	
Total Length Surveyed	m	2216.5					3180															900					684					300					100
Muck	%	14	10	36.4	23.2	70	1	10	10	NA	10	0	NA	NA	NA	NA	9	80	93.9	8.6	100	6	3	6	2.5	10	4	75	88.8	11.1	100	3	30	50	25	80	0
Detritus	%	7	5	13.6	12.1	40	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	4	2	4.3	1.5	5	3	5	10	5	15	3	20	30	17	50	0
In-stream Cover																																							
Undercut banks	%	12	2	12.5	14	55	11	1	1.5	1.2	5	1	5	5	NA	5	3	1	2.7	2.1	5	8	5	16.3	11	40	1	5	5	NA	5	0	NA	NA	NA	NA	0
Boulders	%	6	1	1.8	1.6	5	9	1	3.1	3.1	10	2	2	2.5	0.7	3	0	NA	NA	NA	NA	1	1	1	NA	1	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0
Cobble	%	11	1	18	27.5	90	15	5	39	28	80	2	25	32.5	11	40	0	NA	NA	NA	NA	9	5	29.4	15	50	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0
Deep Pool	%	3	1	11.3	12.3	25	0	NA	NA	NA	NA	1	20	20	NA	20	1	5	5	NA	5	2	3	6.5	4.9	10	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0
Instream woody debris	%	18	1	12.1	14.9	50	17	1	3.9	4.7	15	1	5	5	NA	5	11	5	19.5	17	60	9	2	14.1	6	20	4	2	5.5	3.3	10	3	5	13.3	7.6	20	0
Overhanging woody debris	%	14	1	9.1	8.6	30	10	1	4.2	4.7	15	1	1	1	NA	1	11	5	20	12	50	9	5	9.4	5.3	20	3	2	4	1.7	5	3	5	7.7	2.5	10	0
Vascular instream veg	%	20	1	30.3	36.2	130	21	1	18	15	55	2	20	26.5	9.2	33	2	2	5.5	4.9	9	9	2	27.7	24	65	3	1	19.7	16.2	30	3	1	2.7	2.1	5	15
Vascular overhanging veg	%	21	1	28.4	20.7	80	17	1	5.5	4.8	20	2	5	5	0	5	11	5	5.9	2	10	9	5	16.7	11	40	2	40	65	35.4	90	3	2	9	6.6	15	10
Other	%	2	10	10.5	0.7	11	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	1	10	10	NA	10	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0
None	%	20	2	37.7	24.2	85	21	17	67	25	85	2	20	25	7.1	30	11	28	56	18	80	8	5	14.9	13	35	3	28	68.7	35.4	93	2	58	64	8.5	70	75
Vegetation Type																																							
Submergent	%	16	1	13.1	19.6	80	15	2	5.1	2.9	10	2	10	17.5	11	25	1	2	2	NA	2	9	2	8.1	5.5	15	2	20	42.5	31.8	65	0	NA	NA	NA	NA	0
Floating	%	12	1	10.8	15	50	11	1	9.1	8.8	25	2	5	5	0	5	1	5	5	NA	5	5	10	24	12	50	3	0.5	3.5	2.6	5	1	3	3	NA	3	0
Emergent	%	16	1	16.8	22.1	90	22	1	14	18	90	2	3	4	1.4	5	2	2	2	0	2	7	3	8	4.5	15	2	1	2	1.4	2	2	2	2	0	2	15

Notes:
[1]Site IDs included in each data analysis category are provided in **Table A-2**.
[2]In the Teeswater River upstream category, one site is technically in the RSA_{AQU} but borders closely with the LSA_{AQU} and is geographically proximal to the other site in this category, so it has been included in the LSA_{AQU} for data summarization.

Assosiated Wetland Type (Pie Chart)
Marsh
Swamp
None

Concession 10
Concession 8
Sideroad 25 North
Bruce Road 6
Kinloss Culross
Teeswater River
Sideroad 20
oad 32

S104 S034 S008 S053 S103 S032 S102 S042 S048 S101 S016 S015 S051 S106 S121 S012 S076 S077 S006 S007 S107 S108 S038 S109 S105 S029 W139-S S050 S100 S039 S072 S009 S075 S073 S074 S013 S071 S004 S069 S117 S067 S040 S056 S068 S070 S035 S093 S094 S014 S096 S095 S099

NWMO Biodiversity Impact Studies

AHM Mapping: Watercourse Associated Wetland - AOI

Figure B-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland outside LSA
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [43]
- Dry Site [9]

1:20,000
0 0.5 1 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A123a	

Assosiated Wetland Type (Pie Chart)
Marsh
Swamp
None

See Figure B-1a for results in the AOI

Bruce Road 1
McFarlane Lake
Oppleck Lake
S120
S126
S115
Bruce Road 4
Bruce Road 12
Municipality of South Bruce
Township of Huron-Kinloss
Bruce Road 6
Teeswater River
Teeswater
S049
S078
S079
W061
S080
S081
S033
S110
S112
Teeswater Wetland Complex
S114
S047
S018
S089
S045
S090
W064
London Road
Bruce Road 86
Township of Ashfield-Colborne-Wawanosh
Township of North Huron
Municipality of Morris-Turnberry
Howick Turnberry Road

NWMO Biodiversity Impact Studies

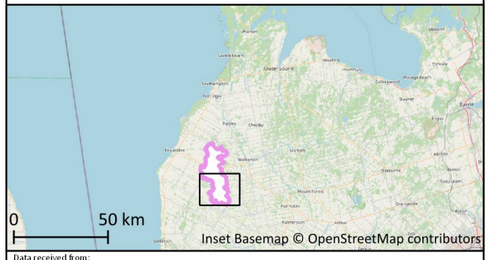
AHM Mapping: Watercourse Associated Wetland - South LSA_{AQU}

Figure B-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland outside LSA
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [15]
- Dry Site [4]

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A123b	

Assossiated Wetland Type (Pie Chart)
- Marsh
- Swamp
- None

Map 1

Bruce Road 15
Bruce Road 20
Municipality of Kincardine
S031
Cargill Mill Pond
S019
S021
Schmidt Lake
S001
Bruce Road 3
Chepstow Road
S057
S044
Cunningham Lake
S037
Concession 6
Municipality of Brockton
Greenock Swamp Wetland Complex
Bruce Road 1
S061
S062
S063
S064
S065
S059
S058
S002
S046
S003
S010
Bruce Road 20
Teeswater River
Highway 9
S052
Silver Lake
S011
Clam Lake
S030
S026
Municipality of South Bruce
Bruce Road 4
Bruce Road 12

Map 2

Hines Lake
S125
Clarke's Lake
Robson Lake
S124
Township of Chatsworth

NWMO Biodiversity Impact Studies

AHM Mapping: Watercourse Associated Wetland - North LSA_{AQU}

Figure B-1c

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland outside LSA
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [22]
- Dry Site [2]

1:65,000
0 1 2 km

ZOETICA

Map 2
Map 1
0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A123c	

Habitat Unit (%)
- Run
- Pool
- Riffle
- Flat
- Other

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Bruce Road 6
Kinloss Culross
Teeswater River

S104 S034 S008 S053 S103 S032 S102 S042 S101 S016 S015 S051 S048 S076 S071 S006 S007 S038 S108 S107 S136 S009 S050 S100 S039 S072 S075 S073 S074 S013 S093 S094 S004 S071 S117 S069 S067 S040 S056 S068 S070 S035 S014 S096 S095 S106 S121 S012 S099 S109 S105 S029

NWMO Biodiversity Impact Studies

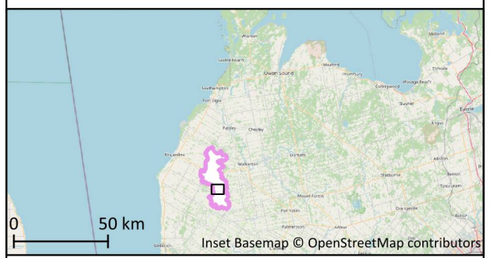
AHM Mapping: Watercourse Habitat Units - AOI

Figure B-2a

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [43]
- Dry Site [9]

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A096a	

Habitat Unit (%)
- Run
- Pool
- Riffle
- Flat
- Other

Hodgins Lake
McFarlane Lake
Oppleck Lake
S120
S126
S115
S112
S114
W061
W064
S079
S080
S081
S110
S033
S047
S018
S089
S090
S045
S049
S078
See Figure B-2a for results in the AOI
Teeswater Wetland Complex
Teeswater
Teeswater River
Bruce Road 4
Bruce Road 6
Bruce Road 12
Bruce Road 86
London Road
Howick Turnberry Road
Township of Huron-Kinloss
Municipality of South Bruce
Township of Ashfield-Colborne-Wawanosh
Township of North Huron
Municipality of Morris-Turnberry

NWMO Biodiversity Impact Studies

AHM Mapping: Watercourse Habitat Units - South LSA_{AQU}

Figure B-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [15]
- Dry Site [4]

1:65,000
0 1 2 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N

Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A096b	

Habitat Unit (%)
- Run
- Pool
- Riffle
- Flat
- Other

Map 1

Bruce Road 15
Bruce Road 20
Municipality of Kincardine
S031
Cargill Mill Pond
S019
S021
Schmidt Lake
S001
S057
S044
S037
Cunningham Lake
Concession 6
Chepstow Road
Bruce Road 3
Bruce Road 1
Municipality of Brockton
Greenock Swamp Wetland Complex
S061
S046
S062
S063
S064
S065
S003
S010
S059
S058
S002
Teeswater River
Bruce Road 20
Highway 9
S052
Silver Lake
S011
Clam Lake
S030
S026
Municipality of South Bruce
Bruce Road 4
Bruce Road 12

Map 2

Hines Lake
S125
Clarke's Lake
Robson Lake
S124
Township of Chatsworth

NWMO Biodiversity Impact Studies

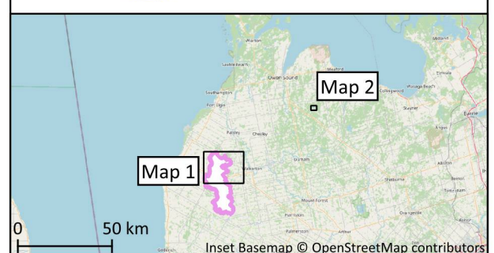
AHM Mapping: Watercourse Habitat Units - North LSA_{AQU}

Figure B-2c

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [22]
- Dry Site [2]

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A096c	

Substrate Type (%)
- Bedrock
- Boulder
- Cobble
- Gravel
- Sand
- Silt
- Clay
- Muck
- Detritus

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Kinloss Culross
Bruce Road 6
Teeswater River
Bruce Road 6

S104 S034 S008 S053 S103 S032 S102 S101 S009 S042 S016 S015 S051 S048 S076 S071 S006 S007 S038 S108 S107 W139-5 S105 S109 S029 S106 S121 S012 S050 S100 S039 S072 S075 S073 S074 S013 S071 S004 S117 S069 S067 S040 S056 S068 S070 S035 S093 S094 S014 S096 S095 S099

NWMO Biodiversity Impact Studies

AHM Mapping: Watercourse Substrate Proportions - AOI

Figure B-3a

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [43]
- Dry Site [9]

1:20,000
0 0.5 1 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A095a	

NWMO Biodiversity Impact Studies

AHM Mapping: Watercourse Substrate Proportions - South LSA_{AQU}

Figure B-3b

Substrate Type (%)
- Bedrock
- Boulder
- Cobble
- Gravel
- Sand
- Silt
- Clay
- Muck
- Detritus

Hodgins Lake
McFarlane Lake
Oppleck Lake
S120
S126
S115
S110
S112
S114
W061
W064
S079
S080
S081
S033
S047
S018
S089
S090
S045
S049
S078
See Figure B-3a for results in the AOI
Teeswater Wetland Complex
Bruce Road 4
Bruce Road 6
Bruce Road 12
Bruce Road 86
London Road
Howick Turnberry Road
Teeswater River
Teeswater
Municipality of South Bruce
Municipality of Morris-Turnberry
Township of Huron-Kinloss
Township of Ashfield-Colborne-Wawanosh
Township of North Huron

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [15]
- Dry Site [4]

1:65,000
0 1 2 km

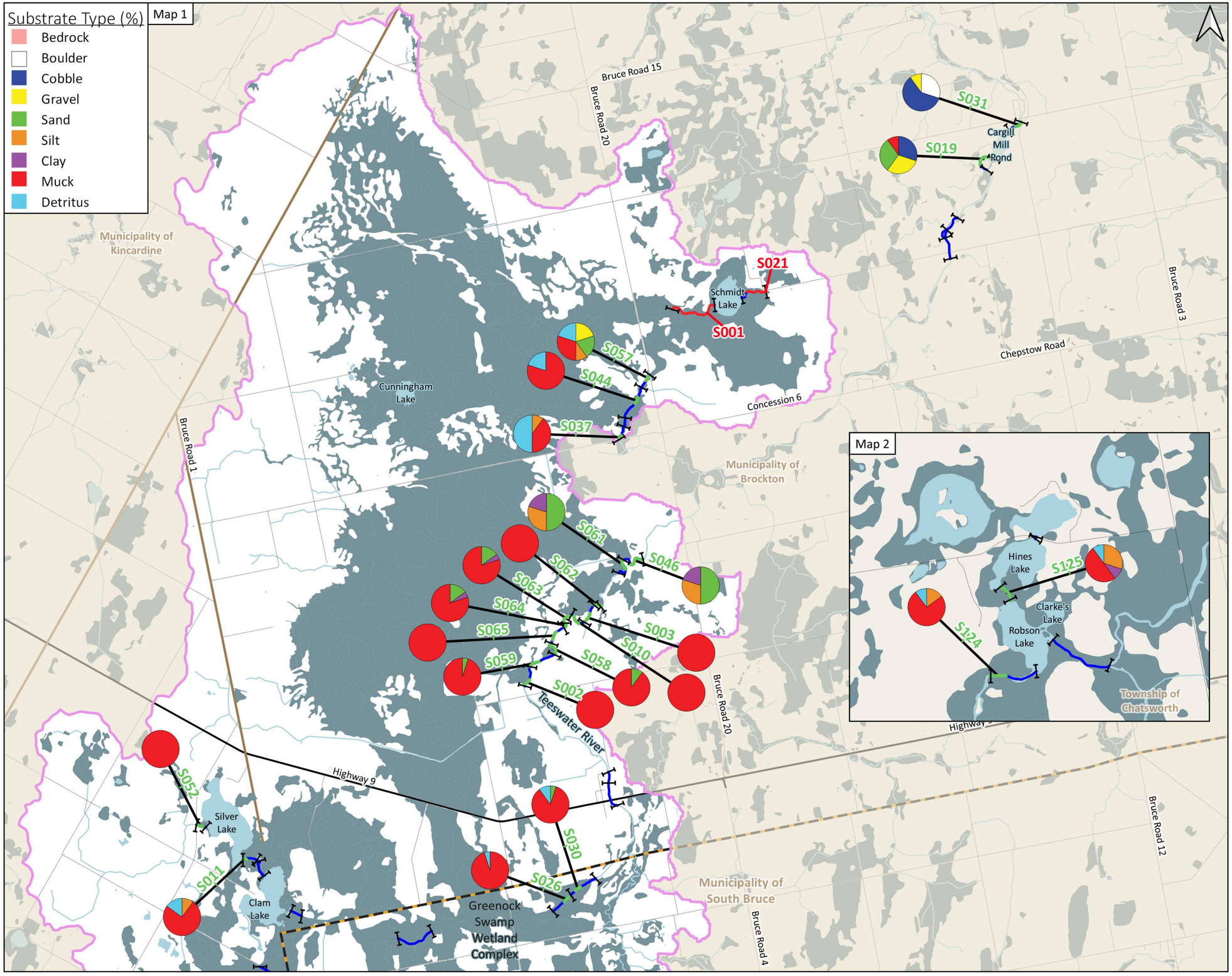
ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N

Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A095b	



NWMO Biodiversity Impact Studies

AHM Mapping: Watercourse Substrate Proportions - North LSA_{AQU}

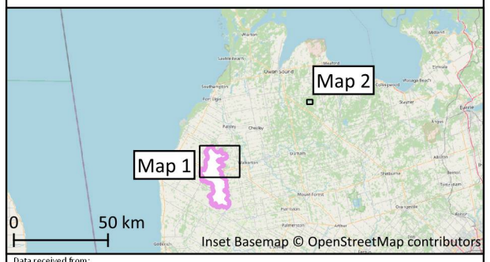
Figure B-3c

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [43]
- Dry Site [9]

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A095c	

Proportion of Cover Present (Bar Chart)
- Cover
- No Cover

Relative Proportion of Cover Type (Pie Chart)
- Undercut Banks
- Boulder
- Cobble
- Deep Pool
- Woody Debris (In-water)
- Woody Debris (Overhanging)
- Vascular Macrophytes (In-water)
- Vascular Macrophytes (Overhanging)
- Other

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Bruce Road 6
Kinloss Culross
Teeswater River
S004
S006
S007
S009
S013
S014
S015
S016
S029
S032
S034
S035
S038
S039
S040
S042
S050
S051
S053
S056
S067
S068
S069
S070
S071
S072
S073
S074
S075
S076
S077
S094
S095
S096
S099
S100
S101
S102
S103
S105
S108
W139-s

NWMO Biodiversity Impact Studies

AHM Mapping: Watercourse In-Water Cover - AOI

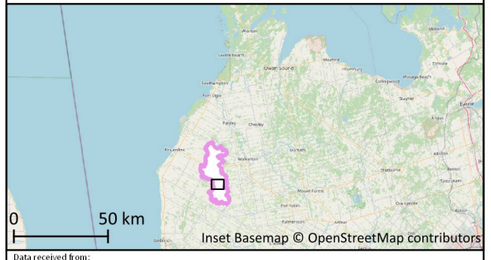
Figure B-4a

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [43]
- Dry Site [9]

Shoreline cover is the area within 1.5 m of the shoreline and provides in-water cover.

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A097a	

Proportion of Cover Present (Bar Chart)
- Cover
- No Cover

Relative Proportion of Cover Type (Pie Chart)
- Undercut Banks
- Boulder
- Cobble
- Deep Pool
- Woody Debris (In-water)
- Woody Debris (Overhanging)
- Vascular Macrophytes (In-water)
- Vascular Macrophytes (Overhanging)
- Other

S120
Oppleck Lake
S126
S115
Bruce Road 4
Bruce Road 12
Municipality of South Bruce
See Figure B-4a for results in the AOI
Township of Huron-Kinloss
Bruce Road 6
Teeswater
Teeswater River
S049
S078
S079
S080
W061
S081
S033
S110
S112
Teeswater Wetland Complex
S018
S047
S089
S114
W064
S090
S045
London Road
Bruce Road 86
Township of Ashfield-Colborne-Wawanosh
Township of North Huron
Municipality of Morris-Turnberry
Howick Turnberry Road

NWMO Biodiversity Impact Studies

AHM Mapping: Watercourse In-Water Cover - South LSA_{AQU}

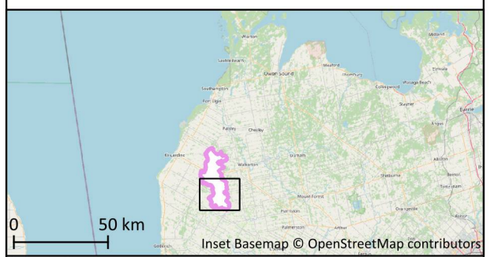
Figure B-4b

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [15]
- Dry Site [4]

Shoreline cover is the area within 1.5 m of the shoreline and provides in-water cover.

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A097b	

Proportion of Cover Present (Bar Chart)
- Cover
- No Cover

Relative Proportion of Cover Type (Pie Chart)
- Undercut Banks
- Boulder
- Cobble
- Deep Pool
- Woody Debris (In-water)
- Woody Debris (Overhanging)
- Vascular Macrophytes (In-water)
- Vascular Macrophytes (Overhanging)
- Other

Map 1

Map 2

Bruce Road 15
Bruce Road 20
Bruce Road 1
Bruce Road 3
Bruce Road 12
Bruce Road 4
Chepstow Road
Concession 6
Highway 9
Teeswater River
Municipality of Brockton
Municipality of South Bruce
Greenock Swamp Wetland Complex
Cunningham Lake
Schmidt Lake
Silver Lake
Clam Lake
Cargill Mill Pond
Hines Lake
Clarke's Lake
Robson Lake

S001
S002
S003
S010
S011
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S044
S046
S052
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S062
S063
S064
S065
S124
S125

NWMO Biodiversity Impact Studies

AHM Mapping: Watercourse In-Water Cover - North LSA_{AQU}

Figure B-4c

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Reach Break
- Planned 2022 Field Location
- Surveyed Watercourse [22]
- Dry Site [2]

Shoreline cover is the area within 1.5 m of the shoreline and provides in-water cover.

1:65,000
0 1 2 km

ZOETICA

Map 2
Map 1
0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A097c	

APPENDIX C – WATERBODY SUMMARY OF HABITAT CHARACTERISTICS

Table C-1a. Habitat category of lakes in the AOI and named lakes.

Variable	AOI		Named Lakes in LSA_{AQU}			Named Lakes outside LSA_{AQU}		
	L006	P010	Oppleck	Schmidt	Silver	Hines	Robson	Cargill
Migratory Obstruction	None	None	None	None	None	None	None	Permanent
Source	Runoff	Intermittent	Intermittent	In-stream	In-stream	In-stream	In-stream	In-stream
Associated Wetland	Marsh	Marsh	Unknown	Marsh	Marsh	Unknown	Unknown	Marsh

Table C-1a. Habitat category of lakes in the AOI and named lakes. Site IDs included as unnamed lakes in the LSA_{AQU} are provided in **Table A-2**.

Variable	Count
Migratory Obstruction	
N	7
None	7
Seasonal	0
Permanent	0
Reach Source	
N	7
Not Connected	2
Intermittent	4
Runoff	0
In-stream	0
Spring-fed	0
Bypass	0
Unknown	1
Associated Wetlands	
N	7
Bog	1
Fen	0
Marsh	1
Swamp	2
Unknown	0
None	3

Table C-2. Water chemistry characteristics of waterbody sites in the AOI and LSA_{AQU}.

Variable	Unnamed Lakes and Ponds in the AOI		Named Lakes in LSA_{AQU}			Named Lakes outside of LSA_{AQU}			Unnamed Lakes and Ponds in LSA_{AQU}			
	L006	P010	Oppleck	Schmidt	Silver	Hines	Robson	Cargill				
	Value	Value	Value	Value	Value	Value	Value	Value	*N*	Min	Mean (± SE)	Max
Survey Date	Sept 29th, 2022	July 31st, 2022	Sept 2nd, 2022	July 23rd, 2022	Aug 5th, 2022	Aug 30th, 2022	Sept 8th, 2022	Sept 19th, 2022	July 29th – Sept 5th, 2022			
Water Temperature (°C)	14.3	24.0	23.2	29.4	23.9	23.2	20.8	20.4	7	16.5	21.5 (1.1)	25.4
Water pH	7.6	7.6	8.5	9.5	8.6	8.7	8.5	8.2	7	5.2	7.3 (0.4)	8
Conductivity (µS /cm)	310	NA	244.4	214.3	295	310	462	550	6	160	404.0 (114.9)	859
Turbidity (NTU)	1.5	3.2	1.8	2.7	2.6	2.3	1	1.4	7	1.2	7.0 (3.3)	23.1
Dissolved O_2 (mg/L)	7.6	4.4	6.1	NA	6.6	6.4	7.2	7.5	7	0.1	4.3 (0.9)	7.2
Dissolved O_2 (%)	75	54	72	NA	78	76	80	83	7	2	49.0 (9.8)	74
Total Waterbody Length (m)	167	47.2	240	680	1105	510	650	560	7	16	85.1 (32.2)	238
Total Waterbody Width (m)	57	21	165	475	690	382	270	140	7	11	57.4 (22.9)	153
Maximum Depth (m)	2.4	2.6	3.1	1.3	11.4	11.5	8.1	1.7	7	0.8	1.4 (0.3)	2.8
Number of Shoreline Zones	4	2	2	4	8	6	7	3	7	1	1.9 (0.5)	4

Notes:
Site IDs included as named lakes inside and outside of the LSA_{AQU} and unnamed lakes in the LSA_{AQU} are provided in **Table A-2.**

Table C-3a. Dominant riparian types in three riparian zones from the shoreline of lakes in the AOI and named lakes surveyed inside and outside of the LSA_{AQU} in 2022.

Riparian Zone	Grass/Lawn	Meadow	Shrub	Wetland	Cropland	Coniferous Forest	Deciduous Forest	Mixed Forest	None
Lakes and Ponds in AOI									
L006									
1.5-10m	0.0	100.0	22.1	100.0	0.0	0.0	0.0	22.1	0.0
11-30m	77.9	100.0	0.0	77.9	0.0	5.7	22.2	50.0	0.0
31-100m	100.0	100.0	0.0	100.0	0.0	0.0	0.0	100.0	0.0
P010									
1.5-10m	100.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
11-30m	100.0	100.0	0.0	100.0	56.6	0.0	0.0	0.0	0.0
31-100m	43.4	43.4	0.0	100.0	100.0	0.0	0.0	56.6	0.0
Named Lakes in LSA_{AQU}									
Silver Lake (L001)									
1.5-10m	16.6	0.0	22.4	59.8	0.0	0.0	31.1	16.4	0.0
11-30m	5.8	0.0	0.0	52.5	2.4	0.0	41.4	16.4	0.0
31-100m	10.6	0.0	0.0	42.2	2.4	0.0	72.8	27.2	0.0
Schmidt Lake (L003)									
1.5-10m	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
11-30m	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
31-100m	0.0	0.0	0.0	33.6	0.0	0.0	11.6	88.4	0.0
Oppleck Lake (L007)									
1.5-10m	92.2	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0
11-30m	92.2	0.0	92.2	0.0	0.0	0.0	0.0	7.7	0.0
31-100m	92.2	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0
Named Lakes outside LSA_{AQU}									
Cargill Mill Pond (L012)									
1.5-10m	56.4	56.4	0.0	0.0	0.0	0.0	43.6	0.0	0.0
11-30m	56.4	0.0	0.0	0.0	43.6	0.0	43.6	0.0	0.0
31-100m	56.4	0.0	0.0	0.0	43.6	0.0	0.0	0.0	0.0
Hines Lake (L010)									
1.5-10m	11.9	0.0	0.0	2.4	0.0	83.00	0.0	5.1	13.6
11-30m	20.4	0.0	0.0	0.0	0.0	92.3	0.0	5.1	2.5
31-100m	11.0	0.0	0.0	0.0	0.0	92.3	0.0	5.1	2.5
Robson Lake (L011)									
1.5-10m	17.6	0.0	11.5	11.5	0.0	14.1	0.0	85.9	9.4
11-30m	17.6	0.0	0.0	0.0	0.0	14.1	0.0	85.9	9.4
31-100m	15.3	0.0	0.0	0.0	0.0	14.1	0.0	85.9	9.4

Table C-3a. Dominant riparian types in three riparian zones from the shoreline of lakes in the AOI and named lakes surveyed inside and outside of the LSAAQU in 2022.

Riparian Zone	Grass/Lawn	Meadow	Shrub	Wetland	Cropland	Coniferous forest	Deciduous forest	Mixed forest
1.5-10m	36.2	36.0	32.6	70.0	0.0	21.6	27.1	15.1
11-30m	36.2	59.0	35.6	70.0	14.3	21.6	8.6	41.3
31-100m	21.9	70.0	29.9	70.0	24.5	28.6	22.9	62.9

Table C-4a. Habitat cover variables from habitat survey units in the AOI and LSA_{AQU}.

Variable	Lakes and Ponds in the AOI		Named Lakes in the LSA_{AQU}			Named Lakes outside the LSA_{AQU}		
	L006	P010	Oppleck	Schmidt	Silver	Hines	Robson	Cargill
Shoreline Cover (AKA in-water cover)								
Undercut Banks	0	0	0	0	0	0	0	0
Boulders	2	0	2	0	0	2	0	5
Cobble	5	5	0	0	10	10	0	10
Deep Pools	0	0	0	0	0	0	0	0
In-Water Woody Debris	5	5	60	0	30	40	10	1
Overhanging Woody Debris	3	0	60	0	0	30	5	1
In-Water Vascular Macrophytes	40	80	90	100	40	60	70	90
Overhanging Vascular Macrophytes	60	5	5	0	5	50	5	5
Organic Debris	0	5	10	0	5	0	0	10
Other	0	5	1	0	10	2	1	1
None	5	5	0	0	0	10	9	0
If Other, List:	NA	Gravel	Dock	NA	Dock	Dock	Dock	Cement Block on North
Aquatic Vegetation								
Submergent	30	70	50	95	55	50	60	70
Floating	5	5	5	5	5	5	15	40
Emergent	10	15	0	0	10	5	5	40

Table C-4a. Habitat cover variables from habitat survey units in the AOI and LSAAQU.

Variable	LSA_{AQU}				
	Unnamed Lakes				
	N	**Min**	**Mean**	**SD**	**Max**
Substrate					
Bedrock	0	NA	NA	NA	NA
Boulder	1	0.6	0.6	NA	0.6
Cobble	1	5.5	5.5	NA	5.5
Gravel	0	NA	NA	NA	NA
Sand	1	10	10	NA	10
Silt	1	5	5		5
Clay	2	7.6	8.8	1.7	10
Muck	6	16.1	65.6	38.8	100
Marl	0	NA	NA	NA	NA
Detritus	3	41.9	55.9	24.2	83.9
Other	1	100	100	NA	100
If other substrate type, list	Floating Mat				
Shoreline Type					
Sand/Gravel Beach	1	5	5	NA	5
Low Rocky Shore	0	NA	NA	NA	NA
Cliff or Bluff	0	NA	NA	NA	NA
Wetland	3	7	40	45.5	91.8
Vegetated	7	8.2	82.2	33.6	100
Other	0	NA	NA	NA	NA
Shoreline Cover (AKA in water cover)					
Undercut Banks	1	2	2	NA	2
Boulders	0	NA	NA	NA	NA
Cobble	1	2	2	NA	2
Deep Pools	0	NA	NA	NA	NA
In-Water Woody Debris	4	2	15.5	14.1	35
Overhanging Woody Debris	4	1	4	2	5
In-Water Vascular Macrophytes	7	20	80.9	28.5	100
Overhanging Vascular Macrophytes	7	5	32.1	39.1	95
Organic Debris	5	5	7	2.7	10
Other	0	NA	NA	NA	NA
None	0	NA	NA	NA	NA
If Other, List:	NA				
Aquatic Vegetation					
Submergent	7	5	60.9	35.3	91
Floating	4	1	15.8	16.5	30
Emergent	7	5	10.3	9	30
Note: Site IDs included as unnamed lakes in the LSA_{AQU} are provided in **Table A-2.**					

Proportion of Cover Present (Bar Chart)
- Cover
- No Cover

Relative Proportion Cover Type (Pie Chart)
- Undercut Banks
- Boulder
- Cobble
- Deep Pool
- Woody Debris (In-water)
- Woody Debris (Overhanging)
- Vascular Macrophytes (In-water)
- Vascular Macrophytes (Overhanging)
- Organic Debris
- Other

L007
Oppleck Lake
L006
P003
P010
P015
P008
P009
P007
Teeswater Wetland Complex
L005
P005
L004
Bruce Road 4
Bruce Road 12
Bruce Road 6
Bruce Road 86
Municipality of South Bruce
Teeswater
Teeswater River
Township of Huron-Kinloss
Township of Ashfield-Colborne-Wawanosh
Township of North Huron
Municipality of Morris-Turnberry
London Road
Howick Turnberry Road

NWMO Biodiversity Impact Studies

AHM Mapping: Waterbody Shoreline Cover - South LSA_{AQU}

Figure C-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

Surveyed Lakes and/or Ponds
- Pond (<1 ha) [6]
- Small Lake (<5 ha) [4]

Lakes and/or Ponds that were not Surveyed
- Dry Site [1]

Shoreline cover is the area within 1.5 m of the shoreline and provides in-water cover.

1:65,000
0 1 2 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A094a	

Proportion of Cover Present (Bar Chart)
- Cover
- No Cover

Relative Proportion Cover Type (Pie Chart)
- Undercut Banks
- Boulder
- Cobble
- Deep Pool
- Woody Debris (In-water)
- Woody Debris (Overhanging)
- Vascular Macrophytes (In-water)
- Vascular Macrophytes (Overhanging)
- Organic Debris
- Other

Map 1

Map 2

L012
Cargill Mill Pond
L003
Schmidt Lake
L010
Hines Lake
Robson Lake
Clarke's Lake
L011
L001
Clam Lake
Silver Lake
Cunningham Lake
Greenock Swamp Wetland Complex
Bruce Road 15
Bruce Road 20
Bruce Road 3
Bruce Road 1
Bruce Road 12
Bruce Road 4
Concession 6
Chepstow Road
Highway 9
Teeswater River
Municipality of Brockton
Township of Chatsworth
Municipality of South Bruce

NWMO Biodiversity Impact Studies

AHM Mapping: Waterbody Shoreline Cover - North LSA_{AQU}

Figure C-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

Surveyed Lakes and/or Ponds
- Large Lake (>5 ha) [5]

Shoreline cover is the area within 1.5 m of the shoreline and provides in-water cover.

1:65,000
0 1 2 km

ZOETICA

Map 2
Map 1
0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A094b	



NWMO Biodiversity Impact Studies

Habitat and Features - Lake L006 in the AOI

Figure C-2

Watercourse

Aquatic Vegetation and Features
- Floating
- Island
- Tall Grasses

Shoreline Features*
- Lawn
- Riparian Trees

Features of Interest
- Cedar Tree
- Dead Standing Tree

*Recorded within 100m from the shoreline

1:800

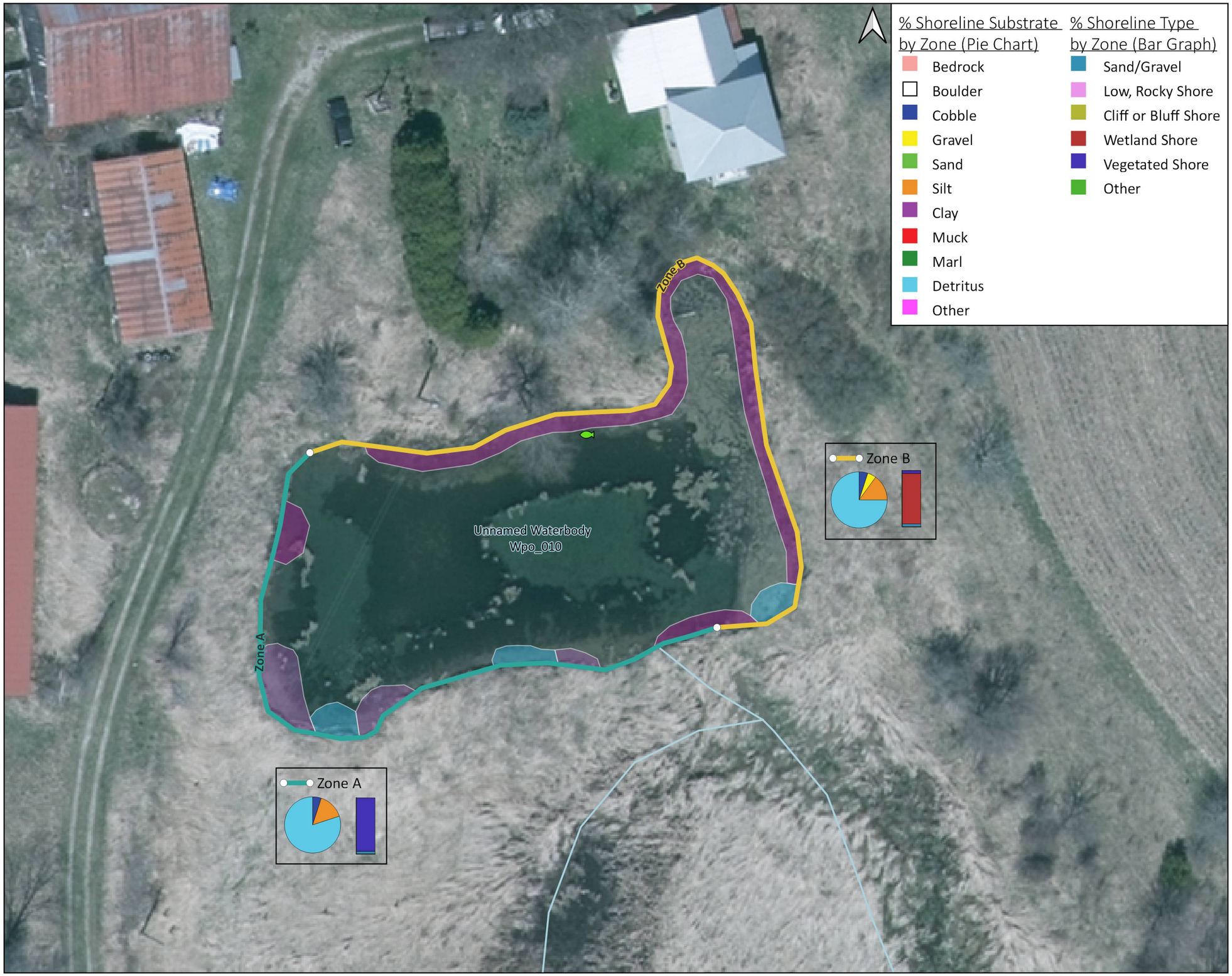
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ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
September 14, 2023	Map ID: NWMO_BIS_D181a	



NWMO Biodiversity Impact Studies

Habitat and Features - Pond P010 in the AOI

Figure C-3

Watercourse

Aquatic Vegetation and Features

- Emergent
- Floating
- Cattails

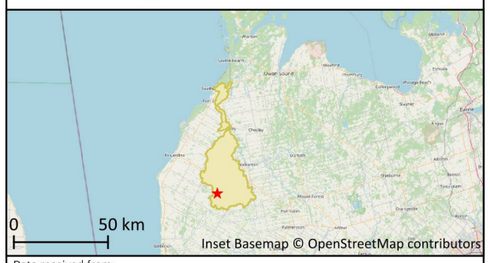
Features of Interest

- Potential Tier 2 Fish Survey Location

1:350

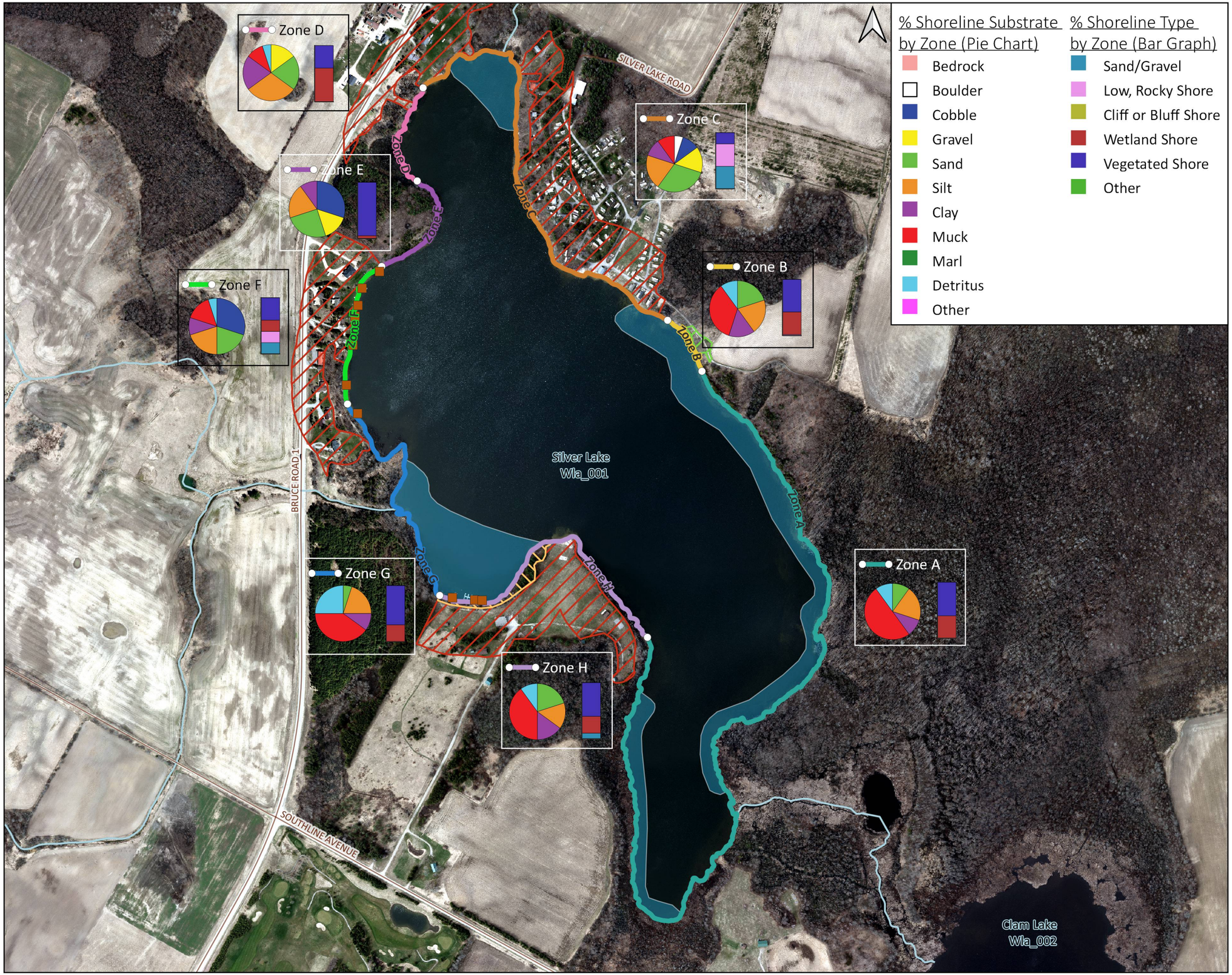
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ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
September 14, 2023	Map ID: NWMO_BIS_D181b	



NWMO Biodiversity Impact Studies

Habitat and Features - Silver Lake

Figure C-4

Local Road

Watercourse

Aquatic Vegetation and Features

Floating

Shoreline Features*

Buildings and Lawn

Lawn

Riparian Trees

Features of Interest

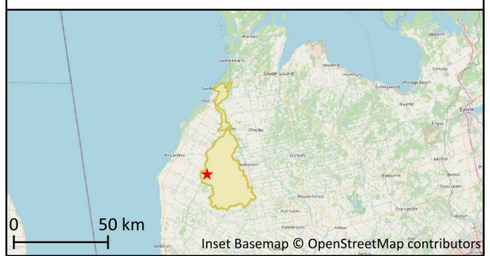
Dock

*Recorded within 100m from the shoreline

1:7,000

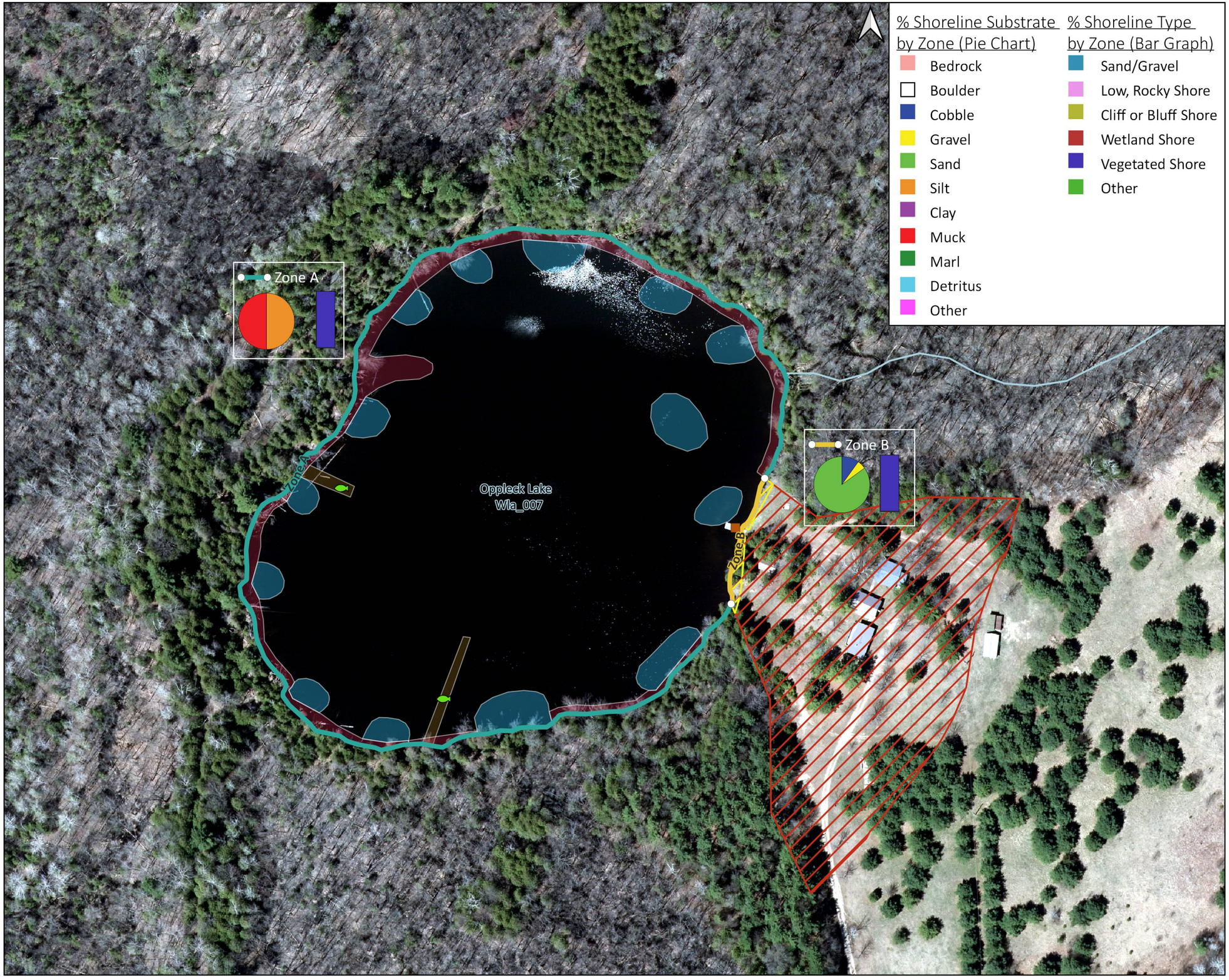
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ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
September 14, 2023	Map ID: NWMO_BIS_D181c	



NWMO Biodiversity Impact Studies

Habitat and Features - Oppleck Lake

Figure C-5

Watercourse

Aquatic Vegetation and Features
- Debris/Woody
- Floating
- Instream Log

Shoreline Features*
- Buildings and Lawn
- Stabalization

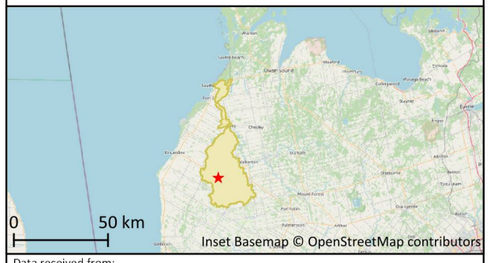
Features of Interest
- Dock
- Potential Tier 2 Fish Survey Location

*Recorded within 100m from the shoreline

1:1,500

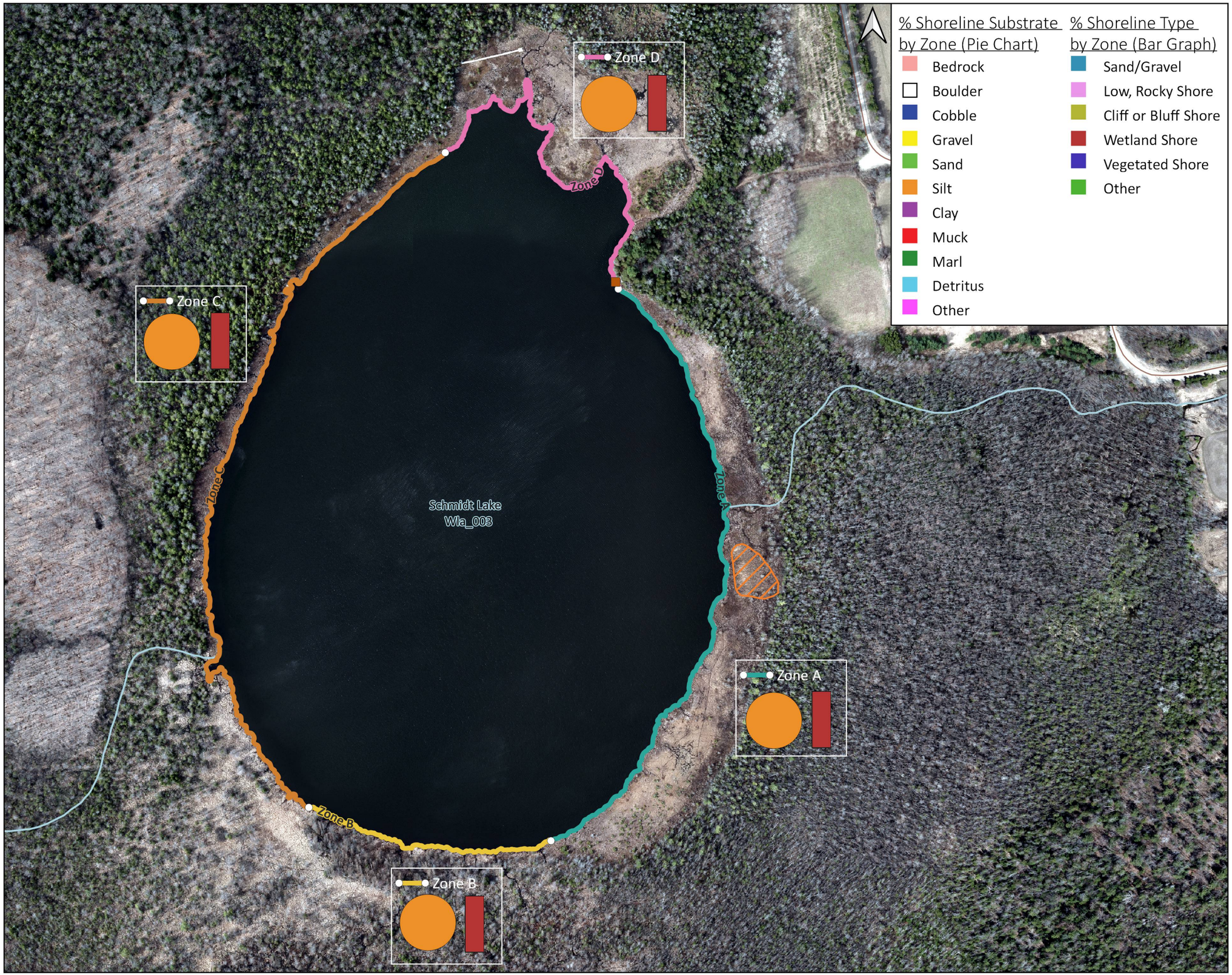
0 25 50 m

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
September 14, 2023	Map ID: NWMO_BIS_D181d	



NWMO Biodiversity Impact Studies

Habitat and Features - Schmidt Lake

Figure C-6

Local Road

Watercourse

Shoreline Features*

Cattails

Features of Interest

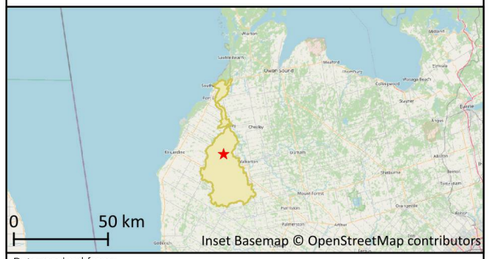
Dock

*Recorded within 100m from the shoreline

1:1,500

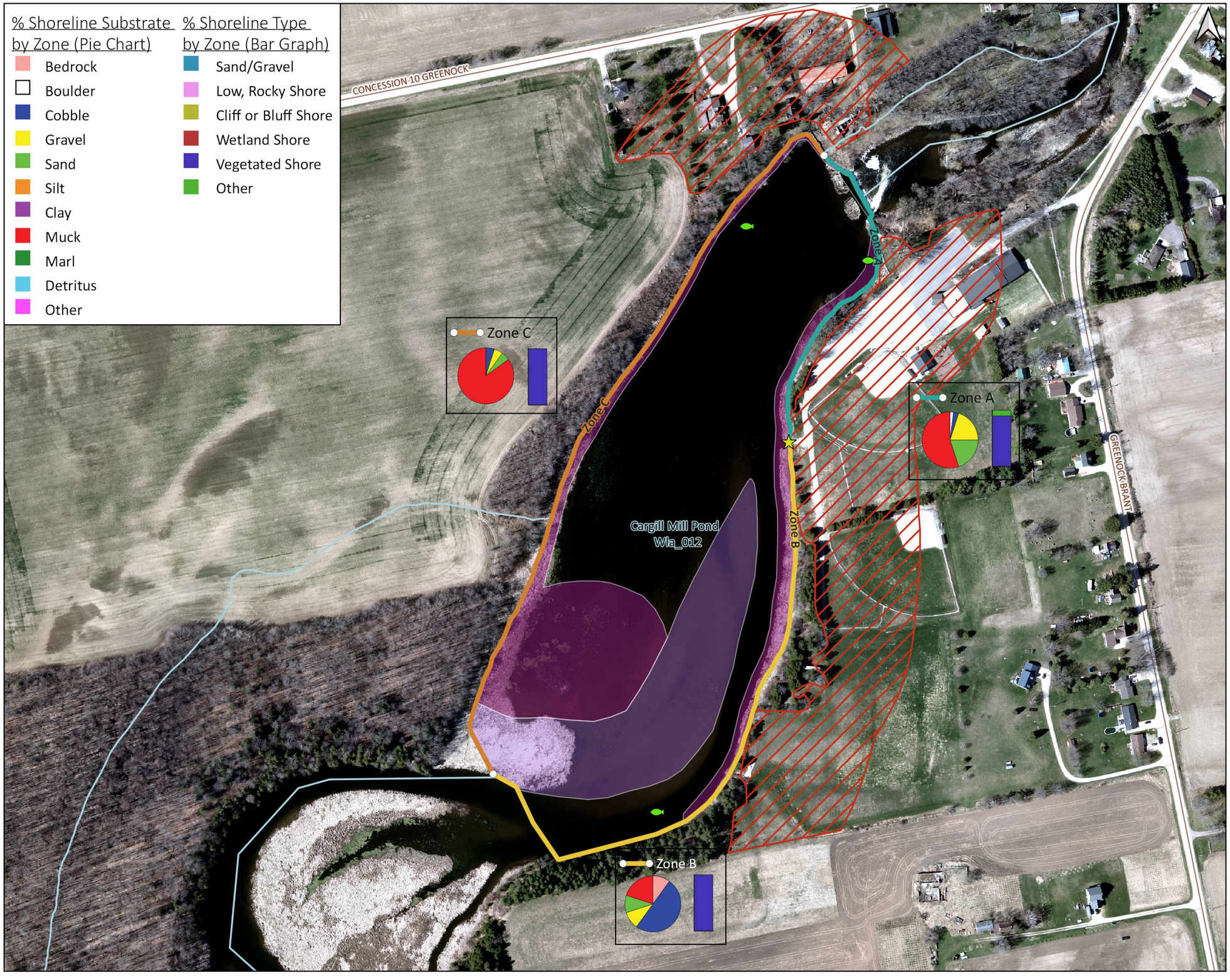
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ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
September 14, 2023	Map ID: NWMO_BIS_D181e	



NWMO Biodiversity Impact Studies

Habitat and Features - Cargill Mill Pond

Figure C-7

- Local Road
- Watercourse

Aquatic Vegetation and Features

- Dam
- Cattails
- Vegetated Bar

Shoreline Features*

- Buildings and Lawn

Features of Interest

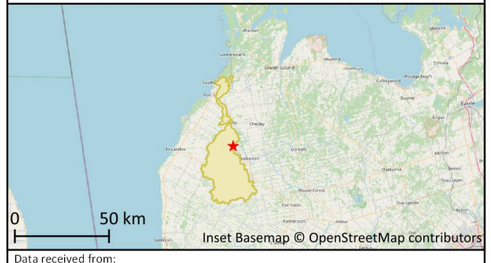
- Boat Launch
- Potential Tier 2 Fish Survey Location

*Recorded within 100m from the shoreline

1:3,000

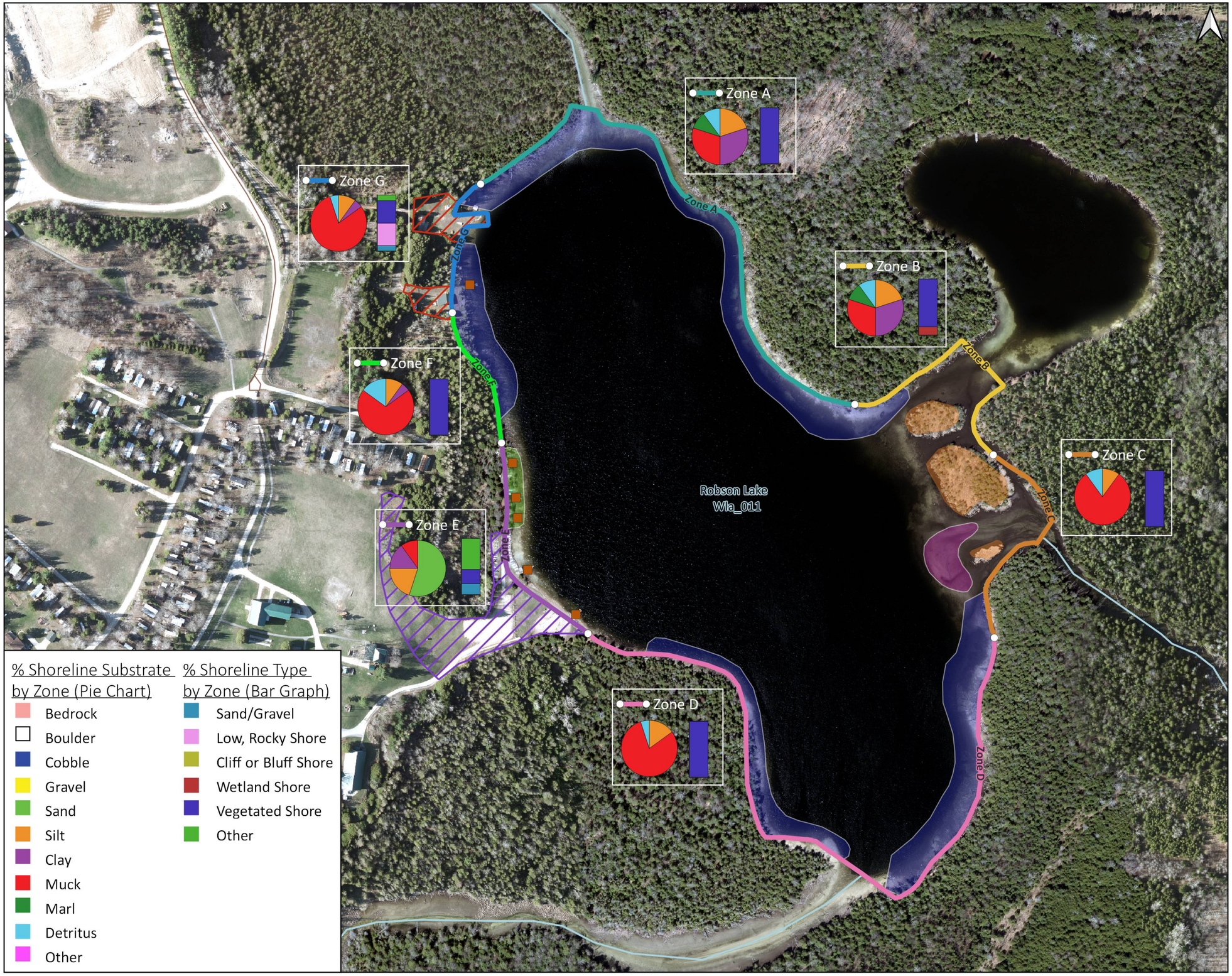
0 50 100 m

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
September 14, 2023	Map ID: NWMO_BIS_D181f	



% Shoreline Substrate by Zone (Pie Chart)

- Bedrock
- Boulder
- Cobble
- Gravel
- Sand
- Silt
- Clay
- Muck
- Marl
- Detritus
- Other

% Shoreline Type by Zone (Bar Graph)

- Sand/Gravel
- Low, Rocky Shore
- Cliff or Bluff Shore
- Wetland Shore
- Vegetated Shore
- Other

NWMO Biodiversity Impact Studies

Habitat and Features - Robson Lake

Figure C-8

- Local Road
- Watercourse

Aquatic Vegetation and Features

- Cattails
- Submerged Veg and Instream Logs
- Submerged Veg
- Island

Shoreline Feature*

- Buildings and Lawn
- Beach and Lawn

Features of Interest

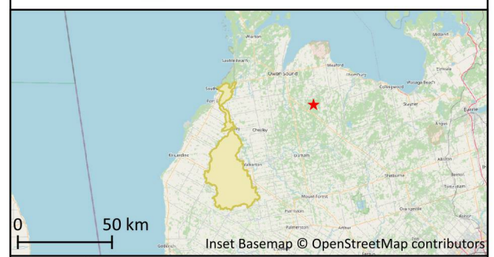
- Dock

*Recorded within 100m from the shoreline

1:3,000

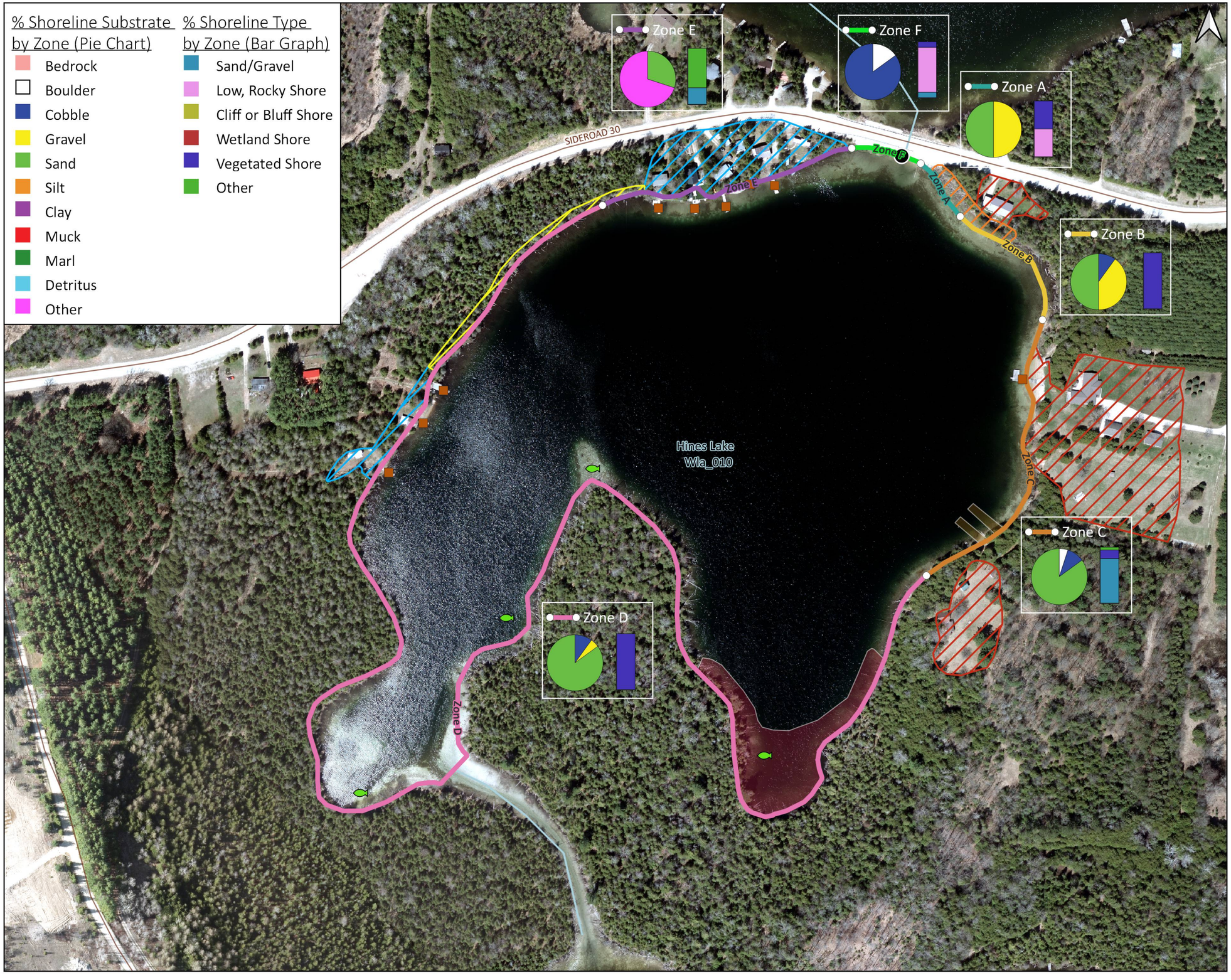
0 50 100 m

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
September 14, 2023	Map ID: NWMO_BIS_D181g	



NWMO Biodiversity Impact Studies

Habitat and Features - Hines Lake

Figure C-9

Local Road

Watercourse

Aquatic Vegetation and Features

- Debris/Woody
- Instream Log

Shoreline Cover

- Buildings and Lawn
- Buildings with Stabalization
- Cattails
- Stabalization

Features of Interest

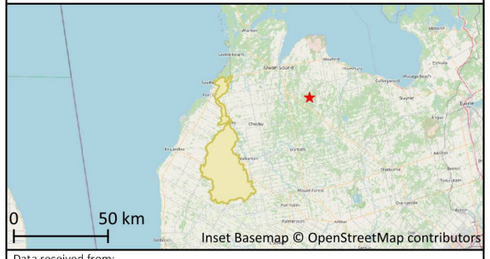
- Culvert
- Dock
- Potential Tier 2 Fish Survey Location

*Recorded within 100m from the shoreline

1:2,500

0 50 100 m

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: HB
September 14, 2023	Map ID: NWMO_BIS_D181h	

APPENDIX D – WETLAND SUMMARY OF HABITAT CHARACTERISTICS

Table D-1. Count of sites within each habitat categorical variable.

	AOI		North of the AOI	South of the AOI
	Marsh	Swamp	Swamp	Swamp
Percent Waterbody Shaded (AKA Riparian vegetation cover)				
N	3	2	3	2
None	0	0	0	0
Sparse (< 5 %)	0	0	0	0
Moderate (5 – 20 %)	1	1	0	0
Abundant (> 20 %)	2	1	3	2
Migratory Obstruction				
N	3	2	3	2
None	2	1	2	2
Seasonal	1	1	1	0
Permanent	0	0	0	0
Reach Type				
N	3	2	3	2
Isolated	1	1	1	2
Palustrine Intermittent Flow	2	1	0	0
Palustrine Permanent Flow	0	0	1	0
Riverine	0	0	1	0
Lacustrine at Rivermouth	0	0	0	0
Lacustrine Exposed to Lake	0	0	0	0
Riparian Stage				
N	3	2	2	2
Initial (< 5% total cover)	0	0	0	0
Shrub/herb (5 – 10% total cover)	0	0	0	0
Pole Sapling	0	0	0	0
Young Forest	1	0	1	0
Mature Forest	2	2	1	2

Notes:
Site IDs included in each wetland grouping in the AOI and LSA_{AQU} are provided in Table A-2.

Table D-2. Water chemistry characteristics of wetland sites in the AOI and LSA_{AQU}.

Study Area	**AOI**								**North of the AOI**				**South of the AOI**			
Wetland Type	**Marsh**				**Swamp**				**Swamp**				**Swamp**			
Collection Date Range	**July 22nd – Sept 29th, 2022**				**July 22nd – 25th, 2022**				**July 21st – Aug 29th, 2022**				**Aug 27th – Sept 3rd, 2022**			
Variable	**N**	**Min**	**Mean (± SE)**	**Max**	**N**	**Min**	**Mean (± SE)**	**Max**	**N**	**Min**	**Mean (± SE)**	**Max**	**N**	**Min**	**Mean (± SE)**	**Max**
Water Temperature (°C)	3	16.6	18.2 (0.9)	19.6	2	19.0	19.4 (0.4)	19.8	3	19.7	22.6 (2.5)	27.7	2	16.3	17.0 (0.7)	17.7
Water pH	3	7.4	7.6 (0.2)	8.0	2	7.6	7.6 (0.1)	7.7	3	7.3	7.6 (0.2)	7.9	2	6.4	6.6 (0.3)	6.9
Conductivity (µS /cm)	3	293.0	408.2 (61.2)	501.8	2	482.0	541.0 (59.0)	600.0	3	379.0	439.8 (36.8)	506.0	2	47.5	88.8 (41.2)	130.0
Turbidity (NTU)	3	2.4	6.5 (2.1)	8.6	2	0.3	2.1 (1.8)	3.9	3	1.0	3.3 (2.1)	7.4	2	1.5	2.0 (0.5)	2.5
Dissolved O_2 (mg/L)	3	0.5	2.9(2.1)	7.0	2	1.6	2.3 (0.7)	3.0	3	0.5	3.0 (2.4)	7.8	2	2.3	9.7 (7.3)	17.0
Dissolved O_2 (%)	3	5.3	30.8 (21.7)	74.0	2	17.9	27.0 (9.1)	36.0	3	5.0	37.3 (30.8)	99.0	2	18.0	22.5 (4.5)	27.0

Notes:
Site IDs included in each wetland grouping in the AOI and LSA_{AQU} are provided in **Table A-2.**

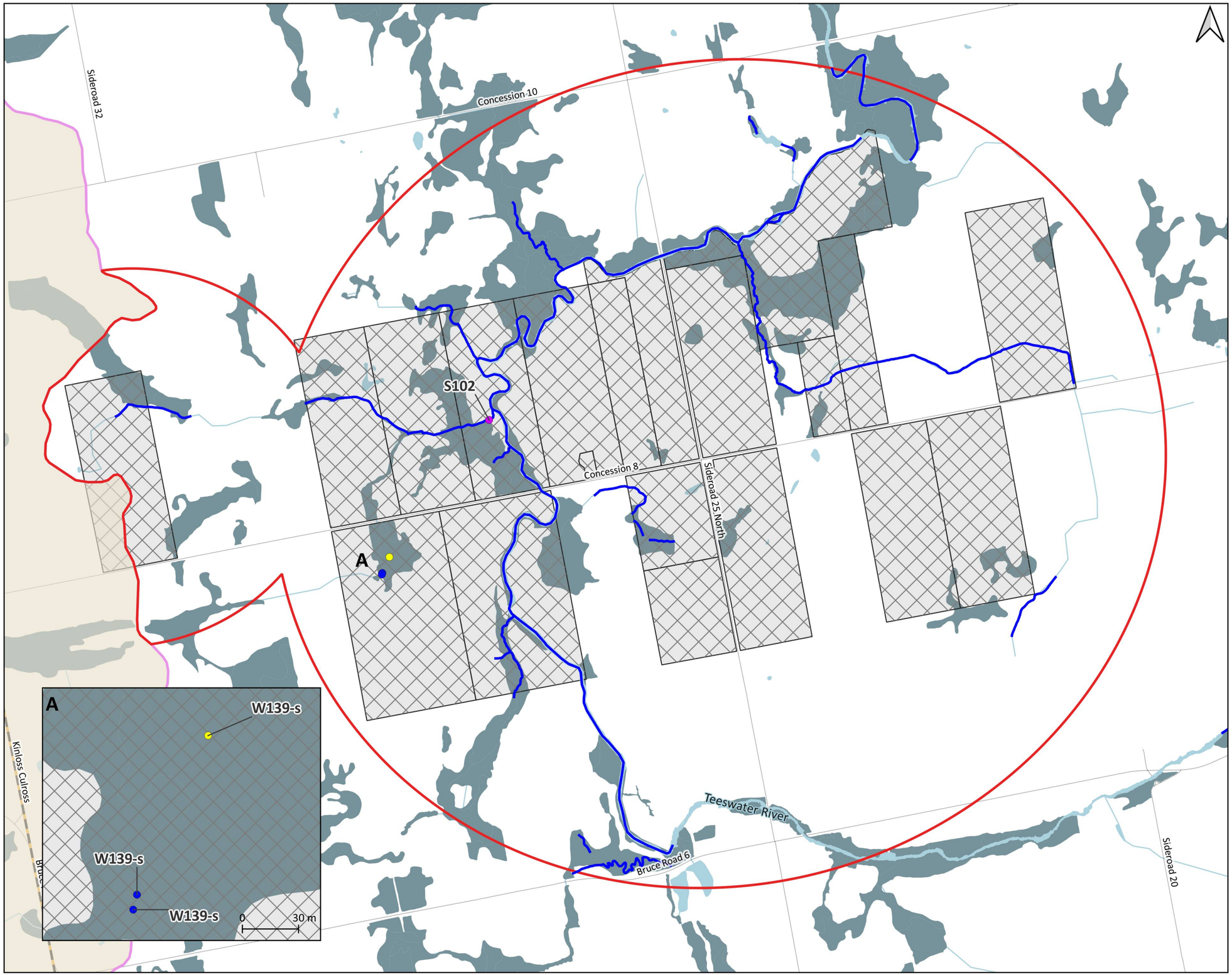
Table D-3. Habitat characteristics of habitat survey units in the AOI and LSA_{AQU}.

	AOI										North of the AOI					South of the AOI				
	Marsh					Swamp					Swamp					Swamp				
	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max
Substrate																				
Sand	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA
Loam	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA
Silt	2	10	35	35.4	60	0	NA	NA	NA	NA	1	60	60	NA	60	0	NA	NA	NA	NA
Clay	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA
Muck	0	NA	NA	NA	NA	1	5	5	NA	5	1	65	65	NA	65	1	40	40	NA	40
Detritus	2	90	95	7.1	100	2	95	97.5	3.5	100	3	35	58.3	36.2	100	2	50	55	7.1	60
Peat	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	1	50	50	NA	50
Other	1	40	40	NA	40	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA
If "Other" Substrate, List:	Vegetated Bottom					NA					NA					NA				
In-Water Cover																				
Small Woody Debris Overhanging	2	5	5	0	5	1	2	2	NA	2	2	5	7.5	3.5	10	1	80	80	NA	80
Small Woody Debris In Water	3	2	4	1.7	5	1	1	1	NA	1	3	1	10.3	12.9	25	2	2	11	12.7	20
Large Woody Debris Overhanging	2	5	7.5	3.5	10	1	20	20	NA	20	2	5	5	0	5	2	3	4	1.4	5
Large Woody Debris In Water	1	20	20	NA	20	2	5	15	14.1	25	3	1	5.3	4.5	10	2	5	5	0	5
Boulders	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA
Deep Pools	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA
Overhanging Vascular Macrophytes	2	2	31	41.0	60	1	35	35	NA	35	3	5	38.3	45.4	90	2	70	85	21.2	100
Vascular Macrophytes In Water	3	80	83.3	5.8	90	2	75	80	7.1	85	3	20	46.7	23.6	65	2	92	96	5.7	100
Organic Debris	2	10	55	63.6	100	2	35	62.5	38.9	90	3	10	40	52.0	100	1	100	100	NA	100
Other	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA
None	0	NA	NA	NA	NA	0	NA	NA	NA	NA	2	30	31.5	2.1	33	0	NA	NA	NA	NA
If "Other" Cover, List:																				

	AOI										North of the AOI					South of the AOI				
	Marsh					Swamp					Swamp					Swamp				
	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max	N	Min	Mean	SD	Max
Aquatic Habitat Vegetation																				
Submergent	2	8	9	1.4	10	1	10	10	NA	10	1	40	40	NA	40	0	NA	NA	NA	NA
Floating	2	5	7.5	3.5	10	1	50	50	NA	50	3	5	20	15	35	2	90	95	7.1	100
Emergent	3	65	72.3	7.5	80	2	35	50	21.2	65	2	20	20	0	20	1	2	2	NA	2

Note:
Site IDs included in each wetland grouping in the AOI and LSA_{AQU} are provided in **Table A-2.**

APPENDIX E – POTENTIALLY IMPORTANT FISH HABITAT



NWMO Biodiversity Impact Studies

AHM Mapping: Potentially Important Habitat - AOI

Figure E-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land
- Planned 2022 Field Location

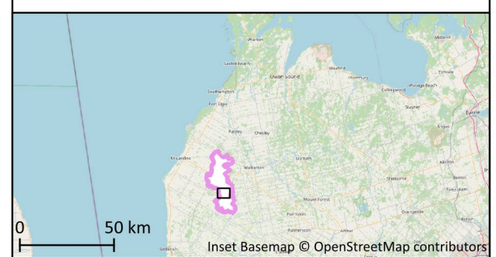
Potentially Important Habitat

- Groundwater Inflow [1]
- Seep [2]
- Spring and/or Seep [1]

1:20,000

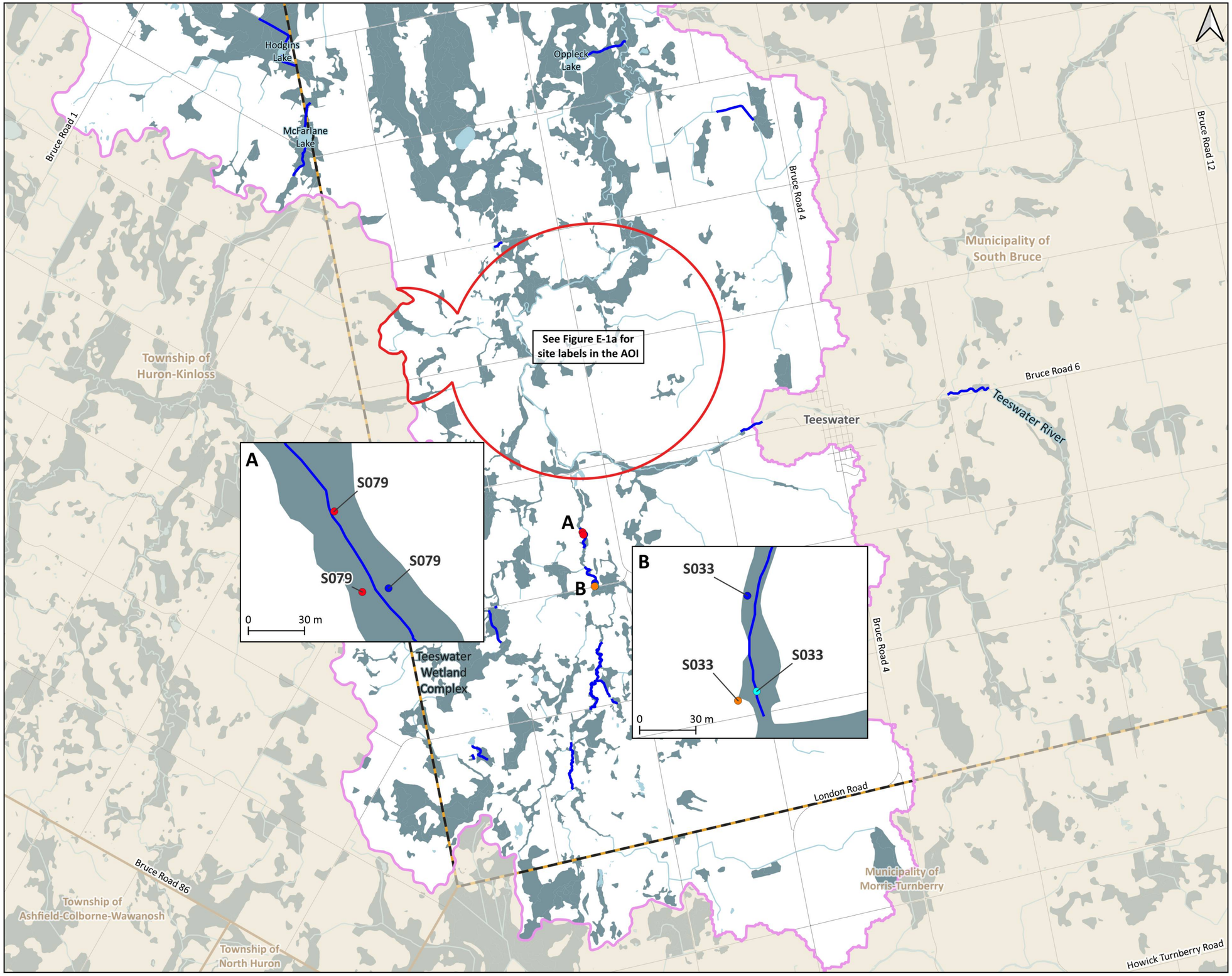
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A098a	



NWMO Biodiversity Impact Studies

AHM Mapping: Potentially Important Habitat - South LSA_{AQU}

Figure E-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- Planned 2022 Field Location

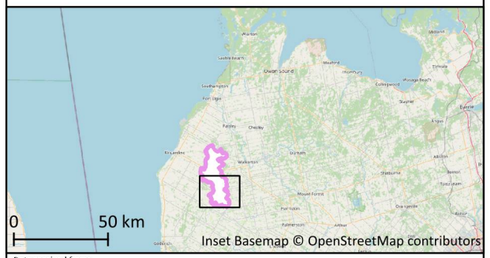
Potentially Important Habitat

- Inflow of Seep [1]
- Seep [2]
- Source of Seep [1]
- Spring [2]

1:65,000

0 1 2 km

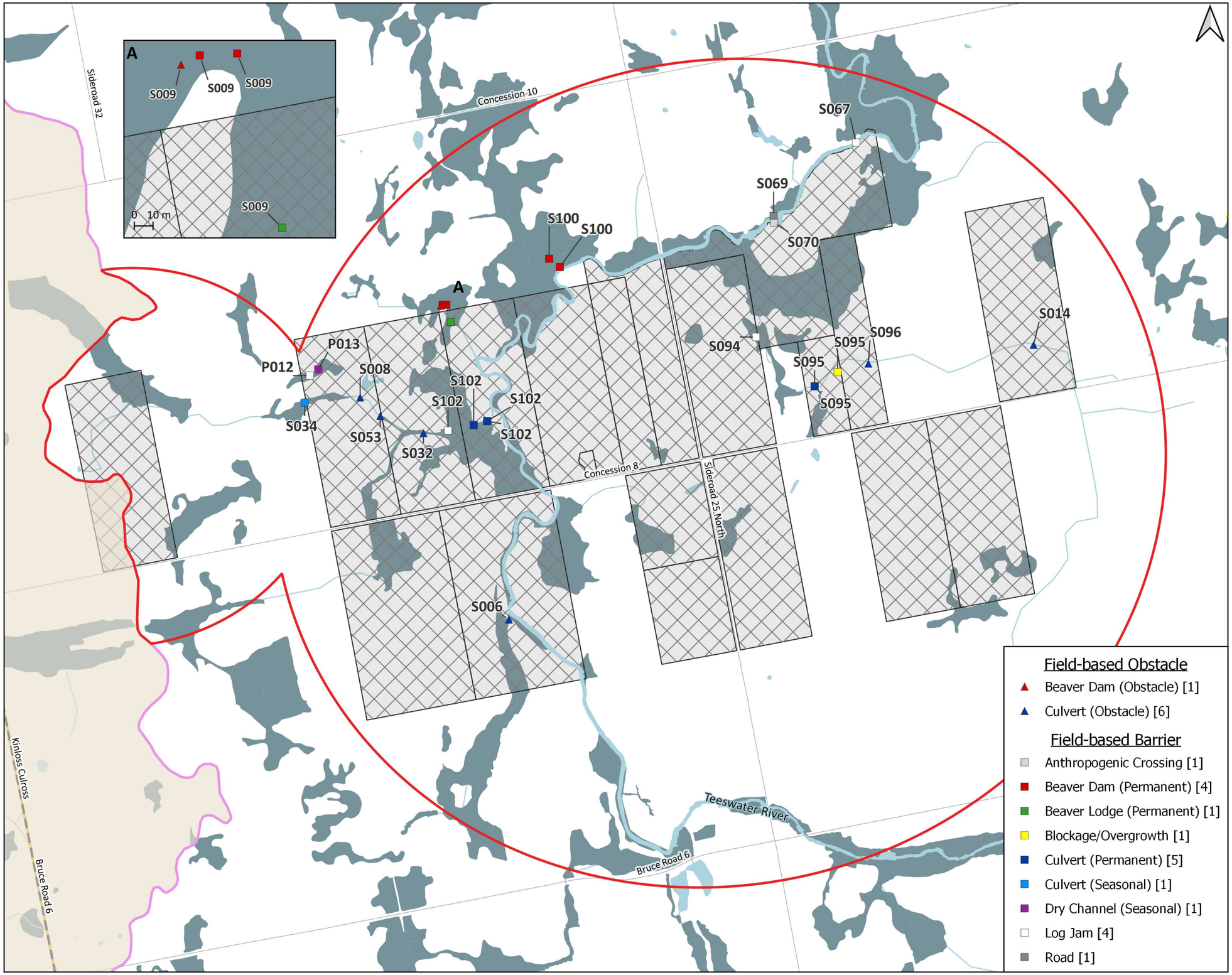
ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A098b	

APPENDIX F – BARRIERS TO FISH PASSAGE



Field-based Obstacle

- Beaver Dam (Obstacle) [1]
- Culvert (Obstacle) [6]

Field-based Barrier

- Anthropogenic Crossing [1]
- Beaver Dam (Permanent) [4]
- Beaver Lodge (Permanent) [1]
- Blockage/Overgrowth [1]
- Culvert (Permanent) [5]
- Culvert (Seasonal) [1]
- Dry Channel (Seasonal) [1]
- Log Jam [4]
- Road [1]

NWMO Biodiversity Impact Studies

AHM Mapping: Barriers & Obstacles - AOI

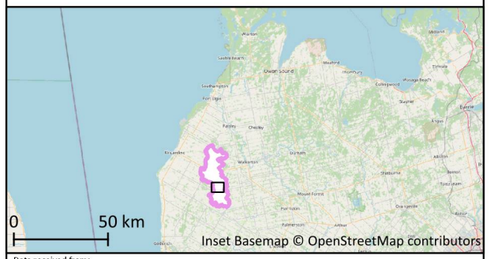
Figure F-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

1:20,000

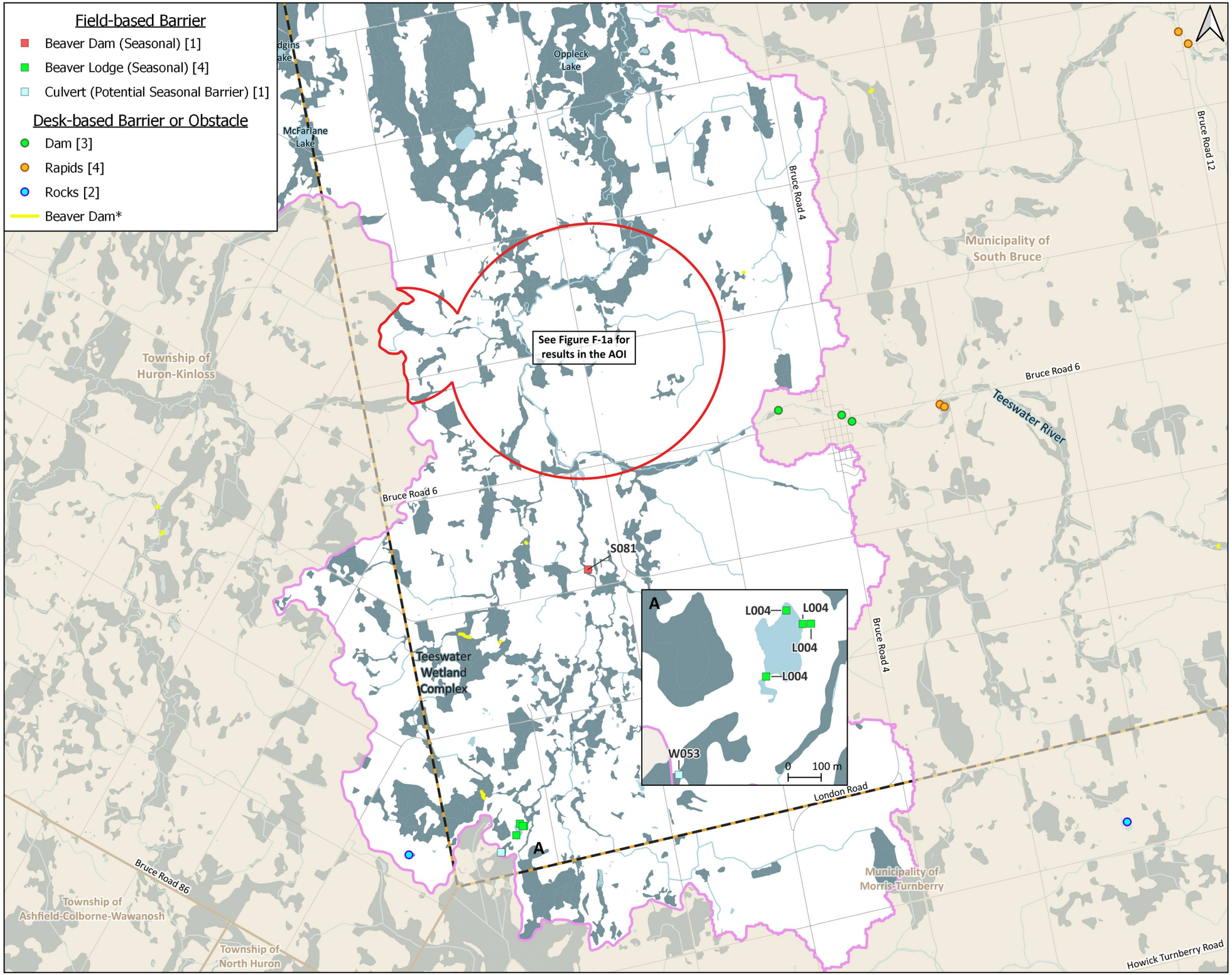
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A099a	



NWMO Biodiversity Impact Studies

AHM Mapping: Barriers & Obstacles - South LSA_{AQU}

Figure F-1b

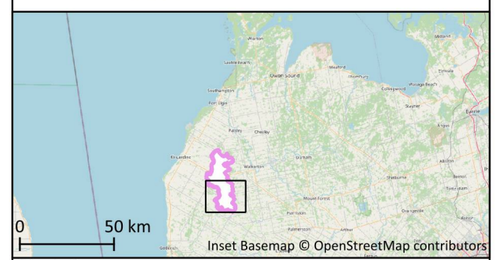
- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

*The Beaver Dam dataset is listed as deprecated and was last updated July 2008 with no updates to the dataset planned. These records have not been verified to ensure they are still present or active.

1:65,000

0 1 2 km

ZOETICA



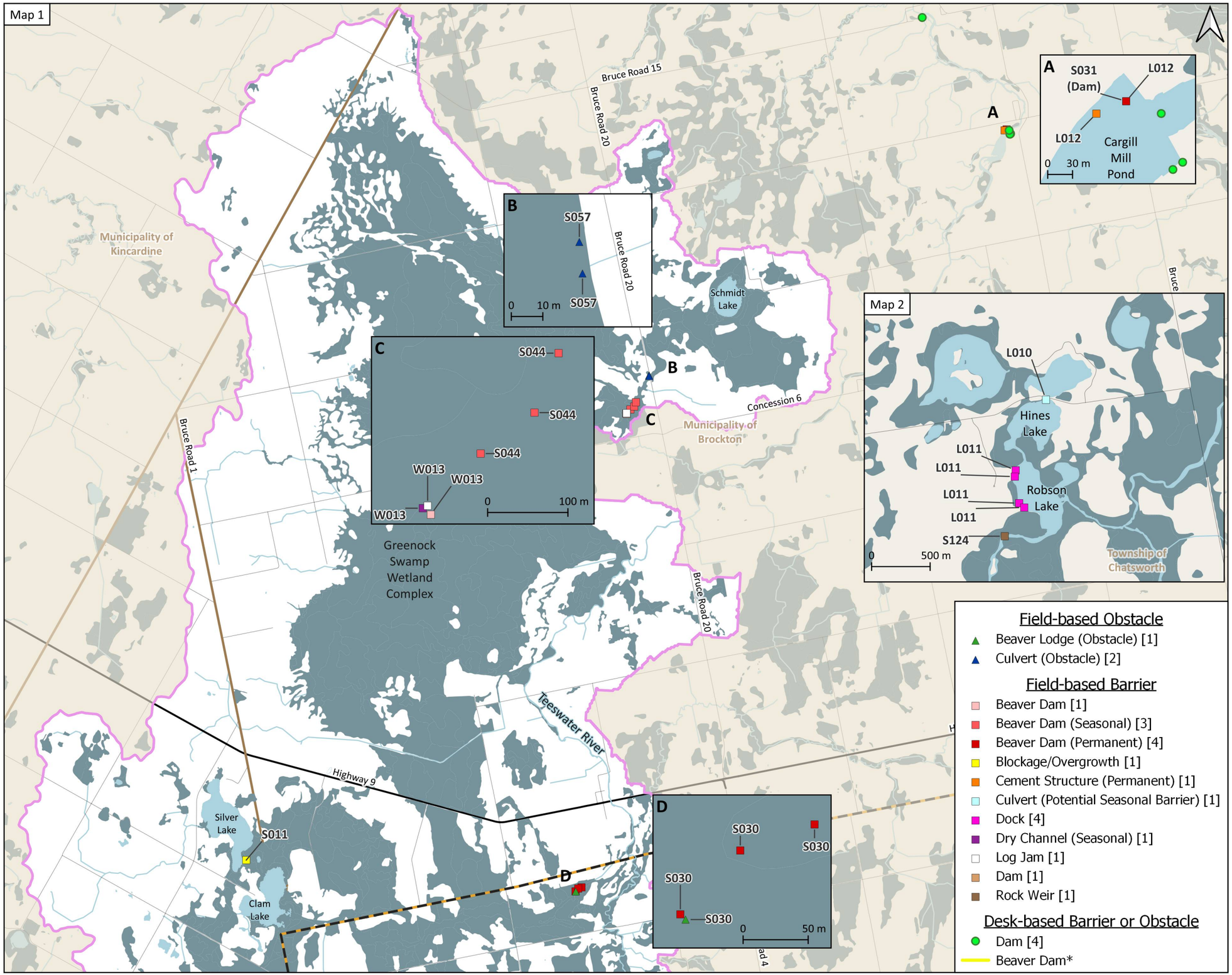
Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A099b	

NWMO Biodiversity Impact Studies

AHM Mapping: Barriers & Obstacles - North LSA_{AQU}

Figure F-1c



- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

Field-based Obstacle

- Beaver Lodge (Obstacle) [1]
- Culvert (Obstacle) [2]

Field-based Barrier

- Beaver Dam [1]
- Beaver Dam (Seasonal) [3]
- Beaver Dam (Permanent) [4]
- Blockage/Overgrowth [1]
- Cement Structure (Permanent) [1]
- Culvert (Potential Seasonal Barrier) [1]
- Dock [4]
- Dry Channel (Seasonal) [1]
- Log Jam [1]
- Dam [1]
- Rock Weir [1]

Desk-based Barrier or Obstacle

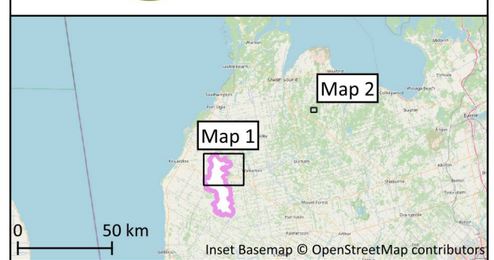
- Dam [4]
- Beaver Dam*

*The Beaver Dam dataset is listed as deprecated and was last updated July 2008 with no updates to the dataset planned. These records have not been verified to ensure they are still present or active.

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — Beaver Dams (MNRF); OHN Hydrographic Line (MNRF); OHN Hydrographic Point (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); 2022 SB AHM Watercourse Data Rev. B (NSC); 2022 SB AHM Wetland Data Rev. B (NSC); 2022 SB AHM Waterbody Data Rev. A (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A099c	

APPENDIX G – SUMMARIES OF VEGETATION RECORDED DURING AHM SURVEYS

G.1 Riparian Vegetation Summaries

Table G-1. Predominant riparian vegetation species documented during AHM surveys of waterbodies (see Table G-1b below for more species). An entry of '1' indicates the species was present at that site; blank cells indicate absence.

Station ID	Waterbody ID	Wet or Dry	Eastern White Cedar	American Elm	Eastern Hemlock	White Birch	White Spruce	Black Spruce	Tamarack	Silver Maple	Red Maple	Eastern White Pine	Norway Maple	Sugar Maple	Manitoba Maple	Maple sp.	Scot's Pine	Green Ash	Ash sp.	Cherry sp.	Poplar sp.	Red Oak	Common Buckthorn	Goldenrod sp.	Hemp Dogbane	Nodding Beggarticks	Rice Cutgrass	Calico Aster	Serviceberry sp.	Labrador tea	Leatherleaf	American Cranberry	Blueberry	Sedge sp.	Willow sp.	Rush sp.	Common Boneset	New England Aster	Heath Aster	Lance-leaved Self-heal	Woolgrass	Wood Nettle	Riverbank Grape	White Snakeroot
SB_L001	Wla_001	Wet																																1										
SB_L001	Wla_001	Wet																1		1									1															
SB_L001	Wla_001	Wet																1			1	1																						
SB_L001	Wla_001	Wet								1								1																1										
SB_L001	Wla_001	Wet	1															1					1						1															
SB_L001	Wla_001	Wet									1							1																										
SB_L001	Wla_001	Wet									1	1						1																1										
SB_L001	Wla_001	Wet									1	1					1	1																										
SB_L003	Wla_003	Wet																												1														
SB_L003	Wla_003	Wet							1	1																				1														
SB_L003	Wla_003	Wet							1																																			
SB_L003	Wla_003	Wet	1																																1									
SB_L004	Wla_004	Wet																					1										1	1										
SB_L004	Wla_004	Wet																					1	1	1	1	1							1									
SB_L004	Wla_004	Wet																					1	1				1						1										
SB_L004	Wla_004	Wet																					1										1											
SB_L005	Wla_005	Wet																					1											1										
SB_L005	Wla_005	Wet														1			1				1											1										
SB_L005	Wla_005	Wet														1			1				1											1										
SB_L006	Wla_006	Wet																																	1	1	1	1		1				
SB_L006	Wla_006	Wet																																			1	1	1					
SB_L006	Wla_006	Wet																						1		1								1	1	1				1			
SB_L006	Wla_006	Wet																						1	1	1								1	1								
SB_L007	Wla_007	Wet	1																																									
SB_L007	Wla_007	Wet	1							1	1	1																																
SB_L010	Wla_010	Wet																																										
SB_L010	Wla_010	Wet	1			1			1																																			
SB_L010	Wla_010	Wet	1																															1									
SB_L010	Wla_010	Wet	1					1																																			
SB_L010	Wla_010	Wet	1																																								
SB_L010	Wla_010	Wet																																									

Station ID	Waterbody ID	Wet or Dry	Eastern White Cedar	American Elm	Eastern Hemlock	White Birch	White Spruce	Black Spruce	Tamarack	Silver Maple	Red Maple	Eastern White Pine	Norway Maple	Sugar Maple	Manitoba Maple	Maple sp.	Scot's Pine	Green Ash	Ash sp.	Cherry sp.	Poplar sp.	Red Oak	Common Buckthorn	Goldenrod sp.	Hemp Dogbane	Nodding Beggarticks	Rice Cutgrass	Calico Aster	Serviceberry sp.	Labrador tea	Leatherleaf	American Cranberry	Blueberry	Sedge sp.	Willow sp.	Rush sp.	Common Boneset	New England Aster	Heath Aster	Lance-leaved Self-heal	Woolgrass	Wood Nettle	Riverbank Grape	White Snakeroot
SB_L011	Wla_011	Wet	1				1				1																																
SB_L011	Wla_011	Wet	1						1																								1										
SB_L011	Wla_011	Wet	1				1		1		1																						1										
SB_L011	Wla_011	Wet	1				1		1		1																						1										
SB_L011	Wla_011	Wet	1				1		1		1																						1										
SB_L011	Wla_011	Wet	1				1		1																								1										
SB_L011	Wla_011	Wet	1				1		1																																		
SB_L012	Wla_012	Wet										1	1																														
SB_L012	Wla_012	Wet										1	1				1																										
SB_L012	Wla_012	Wet												1	1																												
SB_P003	Wpo_003	Dry																																									
SB_P005	Wpo_005	Wet							1																					1	1	1	1	1									
SB_P007	Wpo_007	Wet																						1										1										
SB_P007	Wpo_007	Wet		1	1		1				1																																
SB_P008	Wpo_008	Wet																						1																				
SB_P009	Wpo_009	Wet																																		1							
SB_P010	Wpo_010	Wet																						1																				
SB_P010	Wpo_010	Wet							1															1																				
SB_P015	Wpo_015	Wet																						1																				
SB_P015	Wpo_015	Wet																																1									

Table G-1b. Additional predominant riparian vegetation species documented during AHM surveys of waterbodies. An entry of '1' indicates the species was present at that site; blank cells indicate absence.

Station ID	Waterbody ID	Wet or Dry	Chokecherry	Red-osier Dogwood	Raspberry	Sensitive Fern	Joe-Pye-weed	Bull Thistle	Canada Thistle	Variety of Cultivated Trees	Pasture (Grasses)	Maintained Lawn	Swamp Loosestrife	Common Milkweed	Swamp Milkweed	Pale Smartweed	Button Bush	Narrowleaf meadowsweet	Pickerelweed	Reed Canarygrass	Green Bulrush	Softstem Bulrush	Water Horehound	Broadleaf Arrowhead	Cattail sp.	Narrowleaf Cattail	Sweetgale	Bog Laurel	Broadleaf Cattail
SB_L001	Wla_001	Wet					1						1				1	1	1	1									1
SB_L001	Wla_001	Wet																											1
SB_L001	Wla_001	Wet										1																	
SB_L001	Wla_001	Wet											1				1	1											
SB_L001	Wla_001	Wet					1																						
SB_L001	Wla_001	Wet										1						1	1										1
SB_L001	Wla_001	Wet															1	1											
SB_L001	Wla_001	Wet											1				1												
SB_L003	Wla_003	Wet																		1					1		1	1	
SB_L003	Wla_003	Wet											1												1		1		
SB_L003	Wla_003	Wet					1						1												1		1		1
SB_L003	Wla_003	Wet											1														1	1	1
SB_L004	Wla_004	Wet					1								1					1									
SB_L004	Wla_004	Wet													1	1				1									
SB_L004	Wla_004	Wet						1							1					1									
SB_L004	Wla_004	Wet													1					1		1		1					
SB_L005	Wla_005	Wet																		1									
SB_L005	Wla_005	Wet																		1									
SB_L005	Wla_005	Wet	1	1	1	1																							
SB_L006	Wla_006	Wet									1																		
SB_L006	Wla_006	Wet						1	1		1																		
SB_L006	Wla_006	Wet									1									1	1								
SB_L006	Wla_006	Wet									1												1						
SB_L007	Wla_007	Wet										1																	
SB_L007	Wla_007	Wet																											
SB_L010	Wla_010	Wet																								1			
SB_L010	Wla_010	Wet																											
SB_L010	Wla_010	Wet																											
SB_L010	Wla_010	Wet																											

Station ID	Waterbody ID	Wet or Dry	Chokecherry	Red-osier Dogwood	Raspberry	Sensitive Fern	Joe-Pye-weed	Bull Thistle	Canada Thistle	Variety of Cultivated Trees	Pasture (Grasses)	Maintained Lawn	Swamp Loosestrife	Common Milkweed	Swamp Milkweed	Pale Smartweed	Button Bush	Narrowleaf meadowsweet	Pickerelweed	Reed Canarygrass	Green Bulrush	Softstem Bulrush	Water Horehound	Broadleaf Arrowhead	Cattail sp.	Narrowleaf Cattail	Sweetgale	Bog Laurel	Broadleaf Cattail
SB_L010	Wla_010	Wet										1																	
SB_L010	Wla_010	Wet										1																	
SB_L011	Wla_011	Wet																											
SB_L011	Wla_011	Wet																							1				
SB_L011	Wla_011	Wet																	1						1				
SB_L011	Wla_011	Wet																	1										
SB_L011	Wla_011	Wet																	1										
SB_L011	Wla_011	Wet																	1										
SB_L011	Wla_011	Wet																											
SB_L012	Wla_012	Wet								1		1																	
SB_L012	Wla_012	Wet								1		1														1			
SB_L012	Wla_012	Wet																											
SB_P003	Wpo_003	Dry																											
SB_P005	Wpo_005	Wet																											
SB_P007	Wpo_007	Wet												1											1				
SB_P007	Wpo_007	Wet				1																			1				
SB_P008	Wpo_008	Wet							1			1														1			
SB_P009	Wpo_009	Wet																	1							1			
SB_P010	Wpo_010	Wet												1					1										
SB_P010	Wpo_010	Wet																	1										
SB_P015	Wpo_015	Wet										1																	
SB_P015	Wpo_015	Wet																								1			

Table G-2. Predominant riparian vegetation species documented during AHM surveys of wetlands. An entry of '1' indicates the species was present at that site; blank cells indicate absence.

Station ID	Polygon ID	Wet or Dry	Reed Canarygrass	Norway Maple	Cattail sp.	Bittersweet Nightshade	Elderberry	Cherry sp.	Willow sp.	Royal Fern	Red osier Dogwood	Smooth Rose	Broadleaf cattail	Silver Maple	Buttonbush	Tall Meadowsweet	Tamarack	White Cedar	Green Ash	Swamp Milkweed	Sugar Maple	Red Maple	White Elm	Maple sp.	Basswood	Spotted Joe Pye-weed	Goldenrod Sp.	Wood Nettle	Stinging Nettle	Meadow-rue	Devil Beggartick	Nodding Beggartick	Fern Sp.	Christmas Fern	Senstive Fern	Ostrich Fern	Royal Fern	Wool Grass	Hop Sedge	Common ninebark	Cutgrass	Pale smartweed	Common Jewelweed
SB_P002	Wpo_002	Wet	1	1	1	1																																					
SB_P004	Wpo_004	Dry																																									
SB_P006	Wpo_006	Dry																																									
SB_P011	Wpo_011	Dry																																									
SB_P012	Wpo_012	Wet									1			1					1									1	1					1	1								
SB_P013	Wpo_013	Wet									1			1					1					1			1					1	1	1								
SB_P014	Wpo_014	Dry																																									
SB_P016	Wpo_016	Wet												1																													
SB_S113	100-16417-73068-01126-00000-00000-00000	Wet																			1																						
SB_W002	Whs_068	Dry																																									
SB_W003	Whs_088	Dry																																									
SB_W005	Whs_074	Dry																																									
SB_W006	Whs_087	Dry																																									
SB_W008	Whs_088	Dry																																									
SB_W009	Whs_236	Wet																				1						1																1
SB_W011	Whs_088	Dry																																									
SB_W013	Whs_132	Wet								1													1	1																				
SB_W017	Wms_053	Dry																																									
SB_W018	Wms_040	Dry																																									
SB_W023	Wms_040	Dry																																									
SB_W024	Wms_152	Dry																																									
SB_W025	Wss_050	Dry																																									
SB_W028	Wcs_058	Dry																																									
SB_W032	Whs_138	Dry																																									
SB_W033	Whs_282	Dry																																									
SB_W035	Whs_273	Dry																																									
SB_W037	Whs_0636	Dry																																									
SB_W038	Wma_132	Wet	1				1	1	1		1	1	1	1	1	1				1																							
SB_W041	Wms_040	Dry																																									

Station ID	Polygon ID	Wet or Dry	Reed Canarygrass	Norway Maple	Cattail sp.	Bittersweet Nightshade	Elderberry	Cherry sp.	Willow sp.	Royal Fern	Red osier Dogwood	Smooth Rose	Broadleaf cattail	Silver Maple	Buttonbush	Tall Meadowsweet	Tamarack	White Cedar	Green Ash	Swamp Milkweed	Sugar Maple	Red Maple	White Elm	Maple sp.	Basswood	Spotted Joe Pye-weed	Goldenrod Sp.	Wood Nettle	Stinging Nettle	Meadow-rue	Devil Beggartick	Nodding Beggartick	Fern Sp.	Christmas Fern	Senstive Fern	Ostrich Fern	Royal Fern	Wool Grass	Hop Sedge	Common ninebark	Cutgrass	Pale smartweed	Common Jewelweed
SB_W044	Wms_055	Dry																																									
SB_W045	Wms_057	Dry																																									
SB_W046	Wss_050	Dry																																									
SB_W051	Wcs_047	Dry																																									
SB_W053	Whs_159	Wet	1							1													1	1							1				1	1	1	1	1		1	1	
SB_W054	Whs_155	Dry																																									
SB_W055	Whs_165	Dry																																									
SB_W056	Whs_167	Dry																																									
SB_W057	Whs_158	Dry																																									
SB_W058	Whs_160	Dry																																									
SB_W059	Whs_166	Dry																																									
SB_W060	Whs_184	Dry																																									
SB_W062	Wma_010	Dry																																									
SB_W065	Wma_073	Dry																																									
SB_W066	Wma_004	Dry																																									
SB_W067	Wma_005	Dry																																									
SB_W068	Wma_068	Dry																																									
SB_W069	Wma_065	Dry														1	1									1	1					1											
SB_W071	Wms_096	Dry																																									
SB_W073	Wms_066	Dry																																									
SB_W075	Wms_103	Dry																																									
SB_W076	Wss_006	Dry																																									
SB_W112	Wss_005	Dry																																									
SB_W113	Whs_031	Dry																																									
SB_W114	Whs_188	Dry																																									
SB_W115	Whs_194	Dry																																									
SB_W116	Whs_026	Dry																																									
SB_W117	Whs_030	Dry																																									
SB_W118	Whs_200	Dry																																									
SB_W119	Whs_191	Dry																																									
SB_W120	Whs_028	Dry																																									
SB_W121	Whs_012	Dry																																									
SB_W122	Wms_044	Dry																																									

Station ID	Polygon ID	Wet or Dry	Reed Canarygrass	Norway Maple	Cattail sp.	Bittersweet Nightshade	Elderberry	Cherry sp.	Willow sp.	Royal Fern	Red osier Dogwood	Smooth Rose	Broadleaf cattail	Silver Maple	Buttonbush	Tall Meadowsweet	Tamarack	White Cedar	Green Ash	Swamp Milkweed	Sugar Maple	Red Maple	White Elm	Maple sp.	Basswood	Spotted Joe Pye-weed	Goldenrod Sp.	Wood Nettle	Stinging Nettle	Meadow-rue	Devil Beggartick	Nodding Beggartick	Fern Sp.	Christmas Fern	Senstive Fern	Ostrich Fern	Royal Fern	Wool Grass	Hop Sedge	Common ninebark	Cutgrass	Pale smartweed	Common Jewelweed
SB_W123	Wms_145	Dry																																									
SB_W124	Wms_131	Dry																																									
SB_W125	Wms_138	Dry																																									
SB_W126	Wms_132	Dry																																									
SB_W127	Wma_037	Dry																																									
SB_W128	Wma_032	Dry																																									
SB_W129	Wma_126	Dry																																									
SB_W130	Wma_042	Dry																																									
SB_W131	Wma_040	Dry																																									
SB_W132	Wma_051	Wet	1						1																		1					1						1		1			
SB_W133	Wma_045	Dry																																									
SB_W134	Wma_041	Dry																																									
SB_W135	Wma_039	Dry																																									
SB_W136	Wma_125	Dry																																									
SB_W137	Wss_020	Dry																																									
SB_W138	Wcs_015	Dry																																									
SB_W164	Wss_021	Dry																																									
SB_W165	Wcs_005	Dry																																									
SB_W166	Wcs_052	Dry																																									

G.2 Aquatic Vegetation Summaries

Table G-3. Predominant emergent vegetation in watercourses. An entry of '1' indicates the species was present at that site; blank cells indicate absence.

Station ID	Watercourse ID	Wet or Dry	Cutgrass	Reed canarygrass	Sedge	Spikerush	Wool-grass	Sweet flag	Horsetail	Blue flag	Softstem bulrush	Eastern bur-reed	Giant bur-reed	Cattail	Water-plantain	Pickerelweed	Arrowhead	Bur-reed Species	Common Speedwell	Invasive Common Reed	Water Speedwell	Watercress	Joe Pye	Terrestrial Grass sp.	Speedwell sp.
SB_S001	100-16417-40678-00000-00000-00000-00000	Dry																							
SB_S002	100-16417-00000-00000-00000-00000-00000	Wet		1																					
SB_S003	100-16417-00000-00000-00000-00000-00000	Wet																							
SB_S004	100-16417-00000-00000-00000-00000-00000	Wet									1						1								
SB_S006	100-16417-71148-00000-00000-00000-00000	Wet															1				1	1			
SB_S007	100-16417-00000-00000-00000-00000-00000	Wet															1				1	1			
SB_S008	100-16417-68907-00000-00000-00000-00000	Wet																							
SB_S009	100-16417-68907-00000-00000-00000-00000	Wet																							
SB_S010	100-16417-00000-00000-00000-00000-00000	Wet																							
SB_S011	100-16417-52545-00000-00000-00000-00000	Wet																							
SB_S012	100/16417-70213-00000-00000-00000-00000	Dry																							
SB_S013	100-16417-00000-00000-00000-00000-00000	Wet										1					1								
SB_S014	100-16417-66222-00000-00000-00000-00000	Wet																							
SB_S015	100-16417-00000-00000-00000-00000-00000	Wet		1													1				1				
SB_S016	100-16417-00000-00000-00000-00000-00000	Wet		1													1				1				
SB_S018	100-16417-73068-00000-00000-00000-00000	Wet		1													1								
SB_S019	100-16417-00000-00000-00000-00000-00001	Wet											1		1			1							
SB_S021	100-16417-40678-00000-00000-00000-00000	Dry																							
SB_S026	100-16417-52545-00000-00000-00000-00000	Wet																							
SB_S029	100-16417-73068-01126-00000-00000-00000	Wet		1																					
SB_S030	100-16417-52545-00000-00000-00000-00000	Wet																							
SB_S031	100-16417-00000-00000-00000-00000-00000	Wet																							
SB_S032	100-16417-69430-00000-00000-00000-00000	Wet							1										1			1			
SB_S033	100-16417-73068-00000-00000-00000-00000	Wet																			1				
SB_S034	100-16417-69430-00000-00000-00000-00000	Wet																						1	
SB_S035	100-16417-00000-00000-00000-00000-00000	Wet						1				1		1											
SB_S037	100-16417-40678-00000-00000-00000-00000	Wet		1																	1				
SB_S038	100-16417-00000-00000-00000-00000-00000	Wet															1								
SB_S039	100-16417-00000-00000-00000-00000-00000	Wet															1								
SB_S040	100-16417-00000-00000-00000-00000-00000	Wet															1								

Station ID	Watercourse ID	Wet or Dry	Cutgrass	Reed canarygrass	Sedge	Spikerush	Wool-grass	Sweet flag	Horsetail	Blue flag	Softstem bulrush	Eastern bur-reed	Giant bur-reed	Cattail	Water-plantain	Pickerelweed	Arrowhead	Bur-reed Species	Common Speedwell	Invasive Common Reed	Water Speedwell	Watercress	Joe Pye	Terrestrial Grass sp.	Speedwell sp.
SB_S042	100-16417-00000-00000-00000-00000-00000	Wet															1				1				
SB_S044	100-16417-40648-00000-00000-00000-00000	Wet																					1		1
SB_S045	100-16417-73068-00000-00000-00000-00000	Wet															1								
SB_S046	100-16417-00000-00000-00000-00000-00000	Wet																							
SB_S047	100-16417-73068-00000-00000-00000-00000	Wet	1	1													1								
SB_S048	100-16417-69702-00000-00000-00000-00000	Dry																							
SB_S049	100-16417-00000-00000-00000-00000-00000	Wet															1								
SB_S050	100-16417-67470-00000-00000-00000-00000	Wet			1						1														
SB_S051	100-16417-00000-00000-00000-00000-00000	Wet		1													1						1		
SB_S052	100-16417-52545-00000-00000-00000-00000	Wet											1				1								
SB_S053	100-16417-69430-00000-00000-00000-00000	Wet															1					1			
SB_S056	100-16417-00000-00000-00000-00000-00000	Wet									1	1					1								
SB_S057	100-16417-40678-00000-00000-00000-00000	Wet																							
SB_S058	100-16417-00000-00000-00000-00000-00000	Wet													1										
SB_S059	100-16417-00000-00000-00000-00000-00000	Wet																							
SB_S061	100-16417-00000-00000-00000-00000-00000	Wet																							
SB_S062	100-16417-00000-00000-00000-00000-00000	Wet																							
SB_S063	100-16417-00000-00000-00000-00000-00000	Wet																							
SB_S064	100-16417-00000-00000-00000-00000-00000	Wet																							
SB_S065	100-16417-00000-00000-00000-00000-00000	Wet																							
SB_S067	100-16417-00000-00000-00000-00000-00000	Wet								1															
SB_S068	100-16417-00000-00000-00000-00000-00000	Wet															1								
SB_S069	100-16417-00000-00000-00000-00000-00000	Dry																							
SB_S070	100-16417-00000-00000-00000-00000-00000	Wet		1							1						1								
SB_S071	100-16417-00000-00000-00000-00000-00000	Wet															1								
SB_S072	100-16417-00000-00000-00000-00000-00000	Wet									1	1					1								
SB_S073	100-16417-00000-00000-00000-00000-00000	Wet															1								
SB_S074	100-16417-00000-00000-00000-00000-00000	Wet															1								
SB_S075	100-16417-00000-00000-00000-00000-00000	Wet															1								
SB_S076	100-16417-00000-00000-00000-00000-00000	Wet				1											1								
SB_S077	100-16417-00000-00000-00000-00000-00000	Wet											1				1								
SB_S078	100-16417-00000-00000-00000-00000-00000	Wet				1											1								
SB_S079	100-16417-73068-00000-00000-00000-00000	Wet																							

Station ID	Watercourse ID	Wet or Dry	Cutgrass	Reed canarygrass	Sedge	Spikerush	Wool-grass	Sweet flag	Horsetail	Blue flag	Softstem bulrush	Eastern bur-reed	Giant bur-reed	Cattail	Water-plantain	Pickerelweed	Arrowhead	Bur-reed Species	Common Speedwell	Invasive Common Reed	Water Speedwell	Watercress	Joe Pye	Terrestrial Grass sp.	Speedwell sp.
SB_S080	100-16417-73068-00000-00000-00000-00000	Wet																							
SB_S081	100-16417-73068-00000-00000-00000-00000	Wet																			1				
SB_S089	100-16417-73068-00000-00000-00000-00000	Wet		1								1					1								
SB_S090	100-16417-73068-00000-00000-00000-00000	Wet		1													1								
SB_S093	100-16417-66222-00000-00000-00000-00000	Wet		1								1					1								
SB_S094	100-16417-66222-00000-00000-00000-00000	Wet		1								1					1								
SB_S095	100-16417-66222-00000-00000-00000-00000	Wet																							
SB_S096	100-16417-66222-00000-00000-00000-00000	Wet		1													1								
SB_S099	100-16417-66222-00000-00000-00000-00000	Wet																						1	1
SB_S100	100-16417-67470-00000-00000-00000-00000	Wet			1							1													
SB_S101	100-16417-68907-00000-00000-00000-00000	Wet		1					1																
SB_S102	100-16417-69430-00000-00000-00000-00000	Wet															1		1						
SB_S103	100-16417-69430-00000-00000-00000-00000	Wet							1																
SB_S104	100-16417-69430-00000-00000-00000-00000	Dry																							
SB_S105	100-16417-73068-01126-00000-00000-00000	Wet		1						1															
SB_S106	100-16417-70213-00000-00000-00000-00000	Dry																							
SB_S107	100-16417-71148-00000-00000-00000-00000	Dry																							
SB_S108	100-16417-71148-00000-00000-00000-00000	Wet															1								
SB_S109	100-16417-73068-01126-07098-00000-00000	Dry																							
SB_S110	100-16417-73068-01126-45969-00000-00000	Wet												1						1					
SB_S112	100-16417-73068-01126-47587-00000-00000	Dry																							
SB_S114	100-16417-73068-01126-96316-00000-00000	Dry																							
SB_S115	100-16417-52545-19950-87263-00000-00000	Dry																							
SB_S117	100-16417-65667-00000-00000-00000-00000	Dry																							
SB_S120	100-16417-5683700000-00000-00000-00000	Dry																							
SB_S121	100-16417-70213-00000-00000-00000-00000	Dry																							
SB_S124	100-87742-00000-00000-00000-00000-00000	Wet												1											
SB_S125	100-87742-63692-00000-00000-00000-00000	Wet			1	1					1														
SB_S126	100-16417-58230-00000-00000-00000-00000	Wet		1		1	1														1				
SB_W061	Wma_069	Wet												1				1							
SB_W064	Wma_060	Wet																							
SB_W139-s	Wcs_004	Wet																							

Table G-4. Predominant floating vegetation species in watercourses. An entry of '1' indicates the species was present at that site; blank cells indicate absence.

Station ID	Watercourse ID	Wet or Dry	Duckweed	Swamp milkweed	Marsh speedwell	Spatterdock	Water-lily	Common pondweed	Water Speedwell	Arrowhead	Swamp Loosestrife
SB_S001	100-16417-40678-00000-00000-00000-00000	Dry									
SB_S002	100-16417-00000-00000-00000-00000-00000	Wet		1					1		
SB_S003	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S004	100-16417-00000-00000-00000-00000-00000	Wet				1					
SB_S006	100-16417-71148-00000-00000-00000-00000	Wet									
SB_S007	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S008	100-16417-68907-00000-00000-00000-00000	Wet									
SB_S009	100-16417-68907-00000-00000-00000-00000	Wet	1			1					
SB_S010	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S011	100-16417-52545-00000-00000-00000-00000	Wet	1				1				1
SB_S012	100/16417-70213-00000-00000-00000-00000	Dry									
SB_S013	100-16417-00000-00000-00000-00000-00000	Wet				1		1			
SB_S014	100-16417-66222-00000-00000-00000-00000	Wet			1						
SB_S015	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S016	100-16417-00000-00000-00000-00000-00000	Wet			1					1	
SB_S018	100-16417-73068-00000-00000-00000-00000	Wet			1						
SB_S019	100-16417-00000-00000-00000-00000-00001	Wet	1				1				
SB_S021	100-16417-40678-00000-00000-00000-00000	Dry									
SB_S026	100-16417-52545-00000-00000-00000-00000	Wet	1								
SB_S029	100-16417-73068-01126-00000-00000-00000	Wet		1	1						
SB_S030	100-16417-52545-00000-00000-00000-00000	Wet									
SB_S031	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S032	100-16417-69430-00000-00000-00000-00000	Wet									
SB_S033	100-16417-73068-00000-00000-00000-00000	Wet									
SB_S034	100-16417-69430-00000-00000-00000-00000	Wet									
SB_S035	100-16417-00000-00000-00000-00000-00000	Wet					1				
SB_S037	100-16417-40678-00000-00000-00000-00000	Wet	1								
SB_S038	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S039	100-16417-00000-00000-00000-00000-00000	Wet				1					
SB_S040	100-16417-00000-00000-00000-00000-00000	Wet				1					
SB_S042	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S044	100-16417-40648-00000-00000-00000-00000	Wet									
SB_S045	100-16417-73068-00000-00000-00000-00000	Wet							1		
SB_S046	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S047	100-16417-73068-00000-00000-00000-00000	Wet		1					1		
SB_S048	100-16417-69702-00000-00000-00000-00000	Dry									
SB_S049	100-16417-00000-00000-00000-00000-00000	Wet			1						
SB_S050	100-16417-67470-00000-00000-00000-00000	Wet				1					

Station ID	Watercourse ID	Wet or Dry	Duckweed	Swamp milkweed	Marsh speedwell	Spatterdock	Water-lily	Common pondweed	Water Speedwell	Arrowhead	Swamp Loosestrife
SB_S051	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S052	100-16417-52545-00000-00000-00000-00000	Wet	1			1					
SB_S053	100-16417-69430-00000-00000-00000-00000	Wet									
SB_S056	100-16417-00000-00000-00000-00000-00000	Wet				1					
SB_S057	100-16417-40678-00000-00000-00000-00000	Wet									
SB_S058	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S059	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S061	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S062	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S063	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S064	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S065	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S067	100-16417-00000-00000-00000-00000-00000	Wet				1					
SB_S068	100-16417-00000-00000-00000-00000-00000	Wet							1		
SB_S069	100-16417-00000-00000-00000-00000-00000	Dry									
SB_S070	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S071	100-16417-00000-00000-00000-00000-00000	Wet				1					
SB_S072	100-16417-00000-00000-00000-00000-00000	Wet				1					
SB_S073	100-16417-00000-00000-00000-00000-00000	Wet				1					
SB_S074	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S075	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S076	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S077	100-16417-00000-00000-00000-00000-00000	Wet									
SB_S078	100-16417-00000-00000-00000-00000-00000	Wet			1						
SB_S079	100-16417-73068-00000-00000-00000-00000	Wet									
SB_S080	100-16417-73068-00000-00000-00000-00000	Wet									
SB_S081	100-16417-73068-00000-00000-00000-00000	Wet									
SB_S089	100-16417-73068-00000-00000-00000-00000	Wet							1		
SB_S090	100-16417-73068-00000-00000-00000-00000	Wet							1		
SB_S093	100-16417-66222-00000-00000-00000-00000	Wet							1		
SB_S094	100-16417-66222-00000-00000-00000-00000	Wet							1		
SB_S095	100-16417-66222-00000-00000-00000-00000	Wet							1		
SB_S096	100-16417-66222-00000-00000-00000-00000	Wet			1						
SB_S099	100-16417-66222-00000-00000-00000-00000	Wet									
SB_S100	100-16417-67470-00000-00000-00000-00000	Wet	1								
SB_S101	100-16417-68907-00000-00000-00000-00000	Wet	1								
SB_S102	100-16417-69430-00000-00000-00000-00000	Wet									
SB_S103	100-16417-69430-00000-00000-00000-00000	Wet			1						
SB_S104	100-16417-69430-00000-00000-00000-00000	Dry									

Station ID	Watercourse ID	Wet or Dry	Duckweed	Swamp milkweed	Marsh speedwell	Spatterdock	Water-lily	Common pondweed	Water Speedwell	Arrowhead	Swamp Loosestrife
SB_S105	100-16417-73068-01126-00000-00000-00000	Wet									
SB_S106	100-16417-70213-00000-00000-00000-00000	Dry									
SB_S107	100-16417-71148-00000-00000-00000-00000	Dry									
SB_S108	100-16417-71148-00000-00000-00000-00000	Wet			1						
SB_S109	100-16417-73068-01126-07098-00000-00000	Dry									
SB_S110	100-16417-73068-01126-45969-00000-00000	Wet									
SB_S112	100-16417-73068-01126-47587-00000-00000	Dry									
SB_S114	100-16417-73068-01126-96316-00000-00000	Dry									
SB_S115	100-16417-52545-19950-87263-00000-00000	Dry									
SB_S117	100-16417-65667-00000-00000-00000-00000	Dry									
SB_S120	100-16417-5683700000-00000-00000-00000	Dry									
SB_S121	100-16417-70213-00000-00000-00000-00000	Dry									
SB_S124	100-87742-00000-00000-00000-00000-00000	Wet					1				
SB_S125	100-87742-63692-00000-00000-00000-00000	Wet					1				
SB_S126	100-16417-58230-00000-00000-00000-00000	Wet									
SB_W061	Wma_069	Wet									
SB_W064	Wma_060	Wet									
SB_W139-s	Wcs_004	Wet									

Table G-5. Predominant submergent vegetation in watercourses. An entry of '1' indicates the species was present at that site; blank cells indicate absence.

Station ID	Watercourse ID	Wet or Dry	Waterweed	Water cress	Flatstem pondweed	Narrow bur-reed	Floating bur-reed	Tape-grass	Coontail	Water-milfoil	Naiad	Sago pondweed	Mare's-tail	Ribbonleaf pondweed	Northern pondweed	Largeleaf pondweed	Water Speedwell	Macroalgae SP.	Stonewort Sp.	Pondweed Spp. (Broad-Leaf)	Flat Leaved Pondweed	Common Speedwell
SB_S001	100-16417-40678-00000-00000-00000-00000	Dry																				
SB_S002	100-16417-00000-00000-00000-00000-00000	Wet		1																		
SB_S003	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S004	100-16417-00000-00000-00000-00000-00000	Wet														1						
SB_S006	100-16417-71148-00000-00000-00000-00000	Wet		1										1			1					
SB_S007	100-16417-00000-00000-00000-00000-00000	Wet						1						1						1		
SB_S008	100-16417-68907-00000-00000-00000-00000	Wet		1																		
SB_S009	100-16417-68907-00000-00000-00000-00000	Wet	1										1					1				
SB_S010	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S011	100-16417-52545-00000-00000-00000-00000	Wet							1		1								1			
SB_S012	100-16417-70213-00000-00000-00000-00000	Dry																				
SB_S013	100-16417-00000-00000-00000-00000-00000	Wet						1								1						
SB_S014	100-16417-66222-00000-00000-00000-00000	Wet		1																		
SB_S015	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S016	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S018	100-16417-73068-00000-00000-00000-00000	Wet		1		1																
SB_S019	100-16417-00000-00000-00000-00000-00001	Wet								1												
SB_S021	100-16417-40678-00000-00000-00000-00000	Dry																				
SB_S026	100-16417-52545-00000-00000-00000-00000	Wet																				
SB_S029	100-16417-73068-01126-00000-00000-00000	Wet													1							
SB_S030	100-16417-52545-00000-00000-00000-00000	Wet																				
SB_S031	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S032	100-16417-69430-00000-00000-00000-00000	Wet																				
SB_S033	100-16417-73068-00000-00000-00000-00000	Wet		1																		
SB_S034	100-16417-69430-00000-00000-00000-00000	Wet		1																		
SB_S035	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S037	100-16417-40678-00000-00000-00000-00000	Wet																				
SB_S038	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S039	100-16417-00000-00000-00000-00000-00000	Wet						1														
SB_S040	100-16417-00000-00000-00000-00000-00000	Wet						1														
SB_S042	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S044	100-16417-40648-00000-00000-00000-00000	Wet																				

Station ID	Watercourse ID	Wet or Dry	Waterweed	Water cress	Flatstem pondweed	Narrow bur-reed	Floating bur-reed	Tape-grass	Coontail	Water-milfoil	Naiad	Sago pondweed	Mare's-tail	Ribbonleaf pondweed	Northern pondweed	Largeleaf pondweed	Water Speedwell	Macroalgae SP.	Stonewort Sp.	Pondweed Spp. (Broad-Leaf)	Flat Leaved Pondweed	Common Speedwell
SB_S045	100-16417-73068-00000-00000-00000-00000	Wet		1																		
SB_S046	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S047	100-16417-73068-00000-00000-00000-00000	Wet		1			1			1												
SB_S048	100-16417-69702-00000-00000-00000-00000	Dry																				
SB_S049	100-16417-00000-00000-00000-00000-00000	Wet								1		1										
SB_S050	100-16417-67470-00000-00000-00000-00000	Wet		1																		
SB_S051	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S052	100-16417-52545-00000-00000-00000-00000	Wet			1				1													
SB_S053	100-16417-69430-00000-00000-00000-00000	Wet																				
SB_S056	100-16417-00000-00000-00000-00000-00000	Wet														1						
SB_S057	100-16417-40678-00000-00000-00000-00000	Wet																				
SB_S058	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S059	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S061	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S062	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S063	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S064	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S065	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S067	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S068	100-16417-00000-00000-00000-00000-00000	Wet														1						
SB_S069	100-16417-00000-00000-00000-00000-00000	Dry																				
SB_S070	100-16417-00000-00000-00000-00000-00000	Wet																1				
SB_S071	100-16417-00000-00000-00000-00000-00000	Wet														1						
SB_S072	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S073	100-16417-00000-00000-00000-00000-00000	Wet						1														
SB_S074	100-16417-00000-00000-00000-00000-00000	Wet						1										1				
SB_S075	100-16417-00000-00000-00000-00000-00000	Wet						1														
SB_S076	100-16417-00000-00000-00000-00000-00000	Wet																			1	1
SB_S077	100-16417-00000-00000-00000-00000-00000	Wet																				
SB_S078	100-16417-00000-00000-00000-00000-00000	Wet								1		1										
SB_S079	100-16417-73068-00000-00000-00000-00000	Wet		1				1														
SB_S080	100-16417-73068-00000-00000-00000-00000	Wet		1				1														
SB_S081	100-16417-73068-00000-00000-00000-00000	Wet		1				1												1		

Station ID	Watercourse ID	Wet or Dry	Waterweed	Water cress	Flatstem pondweed	Narrow bur-reed	Floating bur-reed	Tape-grass	Coontail	Water-milfoil	Naiad	Sago pondweed	Mare's-tail	Ribbonleaf pondweed	Northern pondweed	Largeleaf pondweed	Water Speedwell	Macroalgae SP.	Stonewort Sp.	Pondweed Spp. (Broad-Leaf)	Flat Leaved Pondweed	Common Speedwell
SB_S089	100-16417-73068-00000-00000-00000-00000	Wet		1			1															
SB_S090	100-16417-73068-00000-00000-00000-00000	Wet		1																		
SB_S093	100-16417-66222-00000-00000-00000-00000	Wet		1																		
SB_S094	100-16417-66222-00000-00000-00000-00000	Wet		1																		
SB_S095	100-16417-66222-00000-00000-00000-00000	Wet		1																		
SB_S096	100-16417-66222-00000-00000-00000-00000	Wet		1																		
SB_S099	100-16417-66222-00000-00000-00000-00000	Wet		1																		
SB_S100	100-16417-67470-00000-00000-00000-00000	Wet																				
SB_S101	100-16417-68907-00000-00000-00000-00000	Wet						1														
SB_S102	100-16417-69430-00000-00000-00000-00000	Wet																				
SB_S103	100-16417-69430-00000-00000-00000-00000	Wet		1																		
SB_S104	100-16417-69430-00000-00000-00000-00000	Dry																				
SB_S105	100-16417-73068-01126-00000-00000-00000	Wet																				
SB_S106	100-16417-70213-00000-00000-00000-00000	Dry																				
SB_S107	100-16417-71148-00000-00000-00000-00000	Dry																				
SB_S108	100-16417-71148-00000-00000-00000-00000	Wet		1													1					
SB_S109	100-16417-73068-01126-07098-00000-00000	Dry																				
SB_S110	100-16417-73068-01126-45969-00000-00000	Wet																				
SB_S112	100-16417-73068-01126-47587-00000-00000	Dry																				
SB_S114	100-16417-73068-01126-96316-00000-00000	Dry																				
SB_S115	100-16417-52545-19950-87263-00000-00000	Dry																				
SB_S117	100-16417-65667-00000-00000-00000-00000	Dry																				
SB_S120	100-16417-5683700000-00000-00000-00000	Dry																				
SB_S121	100-16417-70213-00000-00000-00000-00000	Dry																				
SB_S124	100-87742-00000-00000-00000-00000-00000	Wet								1									1	1		
SB_S125	100-87742-63692-00000-00000-00000-00000	Wet							1										1			
SB_S126	100-16417-58230-00000-00000-00000-00000	Wet																				
SB_W061	Wma_069	Wet		1																		
SB_W064	Wma_060	Wet		1				1														
SB_W139-s	Wcs_004	Wet		1																		

Table G-6. Predominant vegetation in waterbodies. An entry of '1' indicates the species was present at that site; blank cells indicate absence.

			Submergent																	Floating					Emergent												
Station ID	Polygon ID	Wet or Dry	Waterweed	Flatstem pondweed	Floating bur-reed	Tape-grass	Coontail	Water marigold	Water-milfoil	Fine leaved pondweed	Sago pondweed	Ribbonleaf pondweed	Water smartweed	Largleaf pondweed	Curly leaf pondweed	Clasping-leaf pondweed	Horned Pondweed	Pondweed sp.	Stonewort	Fanwort	Duckweed	Watershield	Spatterdock	Water-lily	Mild Waterpepper	Reed canarygrass	Sedge	Three-way sedge	Rush	Beak-rush	Wool-grass	Softstem bulrush	Cattail	Pickerelweed	Arrowhead	Bur-reed Sp.	Green Bulrush	White beak-rush
SB_L001	Wla_001	Wet	1	1			1	1						1							1		1	1					1					1	1		1	
SB_L003	Wla_003	Wet	1							1	1										1																	
SB_L004	Wla_004	Wet			1		1		1												1	1				1		1			1						
SB_L005	Wla_005	Wet					1		1		1		1								1											1	1			1		
SB_L006	Wla_006	Wet				1					1												1	1					1			1	1					
SB_L007	Wla_007	Wet												1			1						1															
SB_L010	Wla_010	Wet																	1	1				1			1					1					
SB_L011	Wla_011	Wet							1									1	1					1									1					
SB_L012	Wla_012	Wet	1						1						1									1	1								1	1		1		
SB_P003	Wpo_003	Dry																																				
SB_P005	Wpo_005	Wet							1			1																1		1							1
SB_P007	Wpo_007	Wet							1										1				1				1						1			1		
SB_P008	Wpo_008	Wet							1																								1					
SB_P009	Wpo_009	Wet							1												1												1					
SB_P010	Wpo_010	Wet							1							1					1												1		1			
SB_P015	Wpo_015	Wet							1																								1			1		

Table G-7. Predominant vegetation species in wetlands. An entry of '1' indicates the species was present at that site; blank cells indicate absence.

			Emergent									Floating					Submergent				
Station ID	Polygon ID	Wet or Dry	Reed canarygrass	Sedge	Wool-grass	Softstem bulrush	Cattail	Water arum	Spike Rush	Bittersweet Nightshade	Water Parsnip	Duckweed	Smartweed	Water-lily	Sphagnum moss	Moss Sp.	Tape-grass	Water-milfoil	Sago pondweed	Bladderwort	Water smartweed
SB_P002	Wpo_002	Wet	1				1			1							1				
SB_P004	Wpo_004	Dry																			
SB_P006	Wpo_006	Dry																			
SB_P011	Wpo_011	Dry																			
SB_P012	Wpo_012	Wet	1								1									1	1
SB_P013	Wpo_013	Wet	1								1	1									
SB_P014	Wpo_014	Dry																			
SB_P016	Wpo_016	Wet	1										1								
SB_S113	100-16417-73068-01126-00000-00000-00000	Wet		1								1			1	1					
SB_W002	Whs_068	Dry																			
SB_W003	Whs_088	Dry																			
SB_W005	Whs_074	Dry																			
SB_W006	Whs_087	Dry																			
SB_W008	Whs_088	Dry																			
SB_W009	Whs_236	Wet										1									
SB_W011	Whs_088	Dry																			
SB_W013	Whs_132	Wet						1				1									
SB_W017	Wms_053	Dry																			
SB_W018	Wms_040	Dry																			
SB_W023	Wms_040	Dry																			
SB_W024	Wms_152	Dry																			
SB_W025	Wss_050	Dry																			
SB_W028	Wcs_058	Dry																			
SB_W032	Whs_138	Dry																			
SB_W033	Whs_282	Dry																			
SB_W035	Whs_273	Dry																			
SB_W037	Whs_0636	Dry																			
SB_W038	Wma_132	Wet					1		1			1								1	
SB_W041	Wms_040	Dry																			
SB_W044	Wms_055	Dry																			
SB_W045	Wms_057	Dry																			
SB_W046	Wss_050	Dry																			
SB_W051	Wcs_047	Dry																			

			Emergent									Floating					Submergent				
Station ID	**Polygon ID**	**Wet or Dry**	**Reed canarygrass**	**Sedge**	**Wool-grass**	**Softstem bulrush**	**Cattail**	**Water arum**	**Spike Rush**	**Bittersweet Nightshade**	**Water Parsnip**	**Duckweed**	**Smartweed**	**Water-lily**	**Sphagnum moss**	**Moss Sp.**	**Tape-grass**	**Water-milfoil**	**Sago pondweed**	**Bladderwort**	**Water smartweed**
SB_W053	Whs_159	Wet										1									
SB_W054	Whs_155	Dry																			
SB_W055	Whs_165	Dry																			
SB_W056	Whs_167	Dry																			
SB_W057	Whs_158	Dry																			
SB_W058	Whs_160	Dry																			
SB_W059	Whs_166	Dry																			
SB_W060	Whs_184	Dry																			
SB_W062	Wma_010	Dry																			
SB_W065	Wma_073	Dry																			
SB_W066	Wma_004	Dry																			
SB_W067	Wma_005	Dry																			
SB_W068	Wma_068	Dry																			
SB_W069	Wma_065	Dry		1	1		1														
SB_W071	Wms_096	Dry																			
SB_W073	Wms_066	Dry																			
SB_W075	Wms_103	Dry																			
SB_W076	Wss_006	Dry																			
SB_W112	Wss_005	Dry																			
SB_W113	Whs_031	Dry																			
SB_W114	Whs_188	Dry																			
SB_W115	Whs_194	Dry																			
SB_W116	Whs_026	Dry																			
SB_W117	Whs_030	Dry																			
SB_W118	Whs_200	Dry																			
SB_W119	Whs_191	Dry																			
SB_W120	Whs_028	Dry																			
SB_W121	Whs_012	Dry																			
SB_W122	Wms_044	Dry																			
SB_W123	Wms_145	Dry																			
SB_W124	Wms_131	Dry																			
SB_W125	Wms_138	Dry																			
SB_W126	Wms_132	Dry																			
SB_W127	Wma_037	Dry																			

			Emergent									Floating					Submergent				
Station ID	**Polygon ID**	**Wet or Dry**	**Reed canarygrass**	**Sedge**	**Wool-grass**	**Softstem bulrush**	**Cattail**	**Water arum**	**Spike Rush**	**Bittersweet Nightshade**	**Water Parsnip**	**Duckweed**	**Smartweed**	**Water-lily**	**Sphagnum moss**	**Moss Sp.**	**Tape-grass**	**Water-milfoil**	**Sago pondweed**	**Bladderwort**	**Water smartweed**
SB_W128	Wma_032	Dry																			
SB_W129	Wma_126	Dry																			
SB_W130	Wma_042	Dry																			
SB_W131	Wma_040	Dry																			
SB_W132	Wma_051	Wet	1	1		1								1				1	1		
SB_W133	Wma_045	Dry																			
SB_W134	Wma_041	Dry																			
SB_W135	Wma_039	Dry																			
SB_W136	Wma_125	Dry																			
SB_W137	Wss_020	Dry																			
SB_W138	Wcs_015	Dry																			
SB_W164	Wss_021	Dry																			
SB_W165	Wcs_005	Dry																			
SB_W166	Wcs_052	Dry																			

APPENDIX H – SPECIES LIST

Table H-1. Common and scientific names for species mentioned in this report. Species names follow the NHIC's Ontario species lists (current to March 1, 2023).

Common Name	Scientific Name
Fish	
Brook trout	*Salvelinus fontinalis*
Lake trout	*Salvelinus namaycush*
Largemouth bass	*Micropterus salmoides*
Northern pike	*Esox lucius*
Pugnose shiner	*Notropis anogenus*
Pumpkinseed	*Lepomis gibbosus*
Smallmouth bass	*Micropterus dolomieu*
Sunfish	*Lepomis* sp.
Yellow perch	*Perca flavescens*
Invertebrates	
Rainbow mussel	*Villosa iris*
Mammals	
Beaver	*Castor canadensis*
Vegetation	
American / White Elm	*Ulmus americana*
American Cranberry	*Viburnum trilobum*
Arrowhead	*Sagittaria* sp.
Ash sp.	*Fraxinus sp.*
Basswood	*Tilia americana*
Beak-rush	*Rhynchospora sp.*
Bittersweet Nightshade	*Solanum dulcamara*
Black Spruce	*Picea mariana*
Bladderwort	*Utricularia sp.*
Blue flag	*Iris versicolor*
Blueberry	*Vaccinium* sp.
Bog Laurel	*Kalmia polifolia*
Broadleaf Arrowhead	*Sagittaria latifolia*
Broadleaf Cattail	*Typha latifolia*
Bull Thistle	*Cirsium vulgare*
Bur-reed	*Sparganium sp.*
Buttonbush	*Cephalanthus occidentalis*
Calico Aster	*Symphyotrichum lateriflorum*
Canada Thistle	*Cirsium arvense*
Cattail sp.	*Typha* sp.
Cherry sp.	*Prunus* sp.
Chokecherry	*Prunus virginiana*
Christmas Fern	*Polystichum acrostichoides*

Common Name	**Scientific Name**
Clasping-leaf pondweed	*Potamogeton richardsonii*
Common /European Buckthorn	*Rhamnus cathartica*
Common Boneset	*Eupatorium perfoliatum*
Common Jewelweed	*Impatiens capensis*
Common Milkweed	*Asclepias syriaca*
Common ninebark	*Physocarpus opulifolius*
Common pondweed	*Potamogeton natans*
Common Speedwell	*Veronica officinalis*
Coontail	*Ceratophyllum sp.*
Curly leaf pondweed	*Potamogeton crispus*
Cutgrass	*Leersia sp.*
Cutgrass	*Leersia oryzoides*
Devil Beggartick	*Bidens frondosa*
Duckweed	Lemna sp.
Eastern bur-reed	*Sparganium americanum*
Eastern Hemlock	*Tsuga canadensis*
Eastern White Cedar	*Thuja occidentalis*
Eastern White Pine	*Pinus strobus*
Elderberry	*Sambucus sp.*
Fanwort	*Cabomba caroliniana*
Fine leaved pondweed	*Stuckenia filiformis*
Flat Leaved Pondweed	*Potamogeton compressus*
Flatstem pondweed	*Potamogeton zosteriformis*
Floating bur-reed	*Sparganium fluctuans*
Giant bur-reed	*Sparganium eurycarpum*
Goldenrod sp.	*Solidago* sp.
Green Ash	*Fraxinus pennsylvanica*
Green Bulrush	*Scirpus atrovirens*
Heath Aster	*Symphyotrichum ericoides*
Hemp Dogbane	*Apocynum cannabinum*
Hop Sedge	*Carex lupulina*
Horned Pondweed	*Zannichellia palustris*
Horsetail	*Equisetum sp.*
Invasive Common Reed	*Phragmites australis* ssp. *australis*
Joe Pye	*Eutrochium sp.*
Joe-Pye-weed	*Eutrochium fistulosum*
Labrador tea	*Rhododendron* sp.
Lance-leaved Self-heal	*Prunella vulgaris*
Largeleaf pondweed	*Potamogeton amplifolius*
Leatherleaf	*Chamaedaphne calyculata*
Manitoba Maple	*Acer negundo*

Common Name	**Scientific Name**
Maple sp.	*Acer* sp.
Mare's-tail	*Hippurus vulgaris*
Marsh speedwell	*Veronica scutellata*
Meadow-rue	*Thalictrum* sp.
Mild Waterpepper	*Persicaria hydropiperoides*
Naiad	*Najas sp.*
Narrow bur-reed	*Sparganium angustifolium*
Narrowleaf Cattail	*Typha angustifolia*
Narrowleaf meadowsweet	*Spiraea alba*
New England Aster	*Symphyotrichum novae-angliae*
Nodding Beggarticks	*Bidens cernua*
Northern pondweed	*Potamogeton alpinus*
Norway Maple	*Acer platanoides*
Ostrich Fern	*Matteucia struthiopteris*
Pale Smartweed	P*ersicaria lapathifolia*
Pickerelweed	P*ontederia cordata*
Pondweed sp.	*Potamageton* sp.
Poplar sp.	*Populus* sp.
Raspberry	*Rubus* sp.
Red Maple	*Acer rubrum*
Red Oak	*Quercus rubra*
Red-osier Dogwood	*Cornus sericea*
Reed Canarygrass	*Phalaris arundinacea*
Ribbonleaf pondweed	*Potamogeton epihydrus*
Rice Cutgrass	*Leersia oryzoides*
Riverbank Grape	*Vitis riparia*
Royal Fern	*Osmunda regalis*
Rush sp.	*Juncus* sp.
Sago pondweed	*Potamogeton pectinatus*
Scot's Pine	*Pinus sylvestris*
Sedge sp.	*Carex* sp.
Sensitive Fern	*Onoclea sensibilis*
Serviceberry sp.	*Amelanchier* sp.
Silver Maple	*Acer saccharinum*
Smartweed	*Polygonum* sp.
Smooth Rose	*Rosa blanda*
Softstem Bulrush	*Schoenoplectus tabernaemontani*
Torrey's bulrush	*Schoenoplectus torreyi*
Spatterdock	*Nuphar sp.*
Speedwell	*Veronica* sp.
Sphagnum moss	*Sphagnum* sp.

Common Name	**Scientific Name**
Creeping spikerush	*Eleocharis palustris*
Spikerush	*Eleocharis sp.*
Spotted Joe Pye-weed	*Eutrochium maculatum*
Stinging Nettle	*Urtica dioica*
Stonewort	*Charales sp.*
Sugar Maple	*Acer saccharum*
Swamp Loosestrife	*Decodon verticillatus*
Swamp Milkweed	*Asclepias incarnata*
Sweet flag	*Acorus* sp.
Sweetgale	*Myrica gale*
Tall Meadowsweet	*Spiraea sp.*
Tamarack	*Larix laricina*
Tape-grass	*Vallisneria americana*
Three-way sedge	*Dulichium arundinaceum*
Water arum	*Calla palustris*
Water Horehound	*Lycopus americanus*
Water marigold	*Megalodonta beckii*
Water Parsnip	*Sium suave*
Water smartweed	P*olygonum amphibium*
Water Speedwell	*Veronica anagallis-aquatica*
Watercress	*Nasturtium* sp.
Water-lily	*Nymphaea sp.*
Water-milfoil	*Myriophyllum sp.*
Water-plantain	*Alisma plantago-aquatica*
Watershield	*Brasenia schreberi*
Waterweed	*Elodea sp.*
White beak-rush	R*hynchospora alba*
White Birch	*Betula papyrifera*
White Snakeroot	*Ageratina altissima*
White Spruce	*Picea glauca*
Willow sp.	*Salix* sp.
Wood Nettle	*Laportea canadensis*
Woolgrass	*Scirpus cyperinus*



Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: ENVIRONMENTAL DNA 2023 BASELINE REPORT

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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GLOSSARY AND ABBREVIATIONS

AOI	Area of Interest
Barcode	A short, variable DNA region, flanked by conserved DNA regions for primer design, useful for differentiating taxa
Barcode gap	In eDNA metabarcoding, a gene region amplified by a primer that has less within-species variation than between-species variation is said to have a barcode gap. Barcode gaps can also be assessed at higher taxonomic levels, such as genus or family. There is increased confidence in a detection of taxa with a barcode gap than taxa without a barcode gap.
Biodiversity value	The biotic environmental components that will be considered for study within the Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components.
BIS	Biodiversity Impact Studies
BLAST	Basic Local Assignment Search Tool; a program that compares nucleotide or protein sequences to sequence databases and calculates statistics on the results
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DNA	Deoxyribonucleic Acid
eDNA	Environmental DNA; extra-organismal genetic material that has been expelled into the environment, such as skin, feces, gametes, hair, and other cells.
GRTS	Generalized Random Tessellation Stratified
Habitat grouping	The type of watercourse, waterbody, or wetland to be sampled. There are eight habitat groupings proposed for initial eDNA studies: 1. Watercourses: a. rivers/streams 2. Waterbodies: a. lakes/ponds ≤ 1 ha, b. lakes/ponds > 1 ha 3. Wetlands: a. marshes, b. conifer swamps, c. mixedwood swamps, d. hardwood swamps, e. shrub swamps Habitat groupings were determined through desk-based analysis of remotely sensed habitat data; however, these classifications should be verified by the field contractor on the ground. Wetland habitat groupings also include land access considerations at the time of writing (September 2023). If access to other aquatic habitat areas is provided at a later date, sampling that habitat type may occur in a subsequent field campaign.

IUCN	International Union for the Conservation of Nature
LSA	Local Study Area LSA_{AQU} = Aquatic Local Study Area
NWMO	Nuclear Waste Management Organization
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose Traditional Territories include the Project location.
RSA	Regional Study Area RSA_{AQU} = Aquatic Regional Study Area
SAR	Species at Risk
SARA	Federal *Species at Risk Act*
SARO	Species at Risk in Ontario
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SOP	Standard Operating Procedure
The Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines

1.0 BACKGROUND

Environmental DNA (eDNA) refers to extra-organismal genetic material that has been expelled into the environment, such as skin, feces, gametes, hair, and other cells (Stewart 2019). Instead of collecting samples directly from the organism, eDNA can be collected from the surrounding environment, such as water or soil, to assess habitat occupancy. eDNA detections can indicate that a species has been recently present in the general area (though see Section 5.1 for further discussion of limitations). Compared to traditional surveys, eDNA methods are non-invasive, highly sensitive and accurate for many species, generally more cost-effective for taxa that are otherwise difficult to detect, have a low risk of pathogen transfer between sites, and typically do not require permits. Furthermore, eDNA metabarcoding uses high-throughput sequencing to enable the rapid detection of multiple species at the same time, and both samples and data can be archived for retroactive analysis in the future[1].

Despite some limitations (see Section 5.1.3 of Zoetica™'s *Best Practices and Preferred Approach (BPPA) Report* for more details (Zoetica 2021)), eDNA metabarcoding is an exciting and promising new tool for biodiversity baseline data collection and monitoring studies. This technique is a powerful first-pass methodology to detect species (e.g., cryptic species that would require more effort for an initial detection using traditional methods), which can help design Tier 2 studies to focus on collecting key data on abundance and relative abundance values for focal species.

1.1 Objectives

The primary data objectives of the aquatic eDNA metabarcoding studies for the Biodiversity Impact Studies (BIS) at the Saugeen Ojibway Nation (SON)- South Bruce siting area are to:

1. Provide community-level species composition data that can indicate areas that may host more or fewer species and that contribute relatively more or less to the overall genetic diversity of the Area of Interest (AOI) and aquatic local study area (LSA_{AQU});
2. Locate cryptic species that are difficult to detect using traditional methods, some of which may be species-at-risk and/or important to stakeholders and rights-holders; and
3. Characterize the presence and distribution of biodiversity values within the AOI and LSA_{AQU} under current conditions that may inform subsequent, targeted studies to measure population abundance and relative abundance.

Appendix E, Chapter 1 of the 2023 SON-South Bruce BIS Baseline Report begins to fulfil the requirements of the Tailored Impact Statement Guidelines (TISG) Template[2] (see Appendix C in Zoetica's BPPA Report (Zoetica 2021)).

Collecting community-level species composition data (Objective 1) at baseline will serve several purposes. Understanding overall biodiversity in the area, including species of interest (e.g., at-risk, rare, culturally important), will help inform early site selection of the Project, mitigation, and design, and will help inform further baseline studies. Community-level biodiversity baseline data will also help make predictions about the effects of the Project and can help determine if the Project had an effect (during post-construction monitoring) on the presence and distribution of a species and/or genetic diversity. For example, these

[1] In all sections of this 2023 BIS Baseline Report, where eDNA studies and results are noted, they refer to the use of eDNA in combination with metabarcoding for multi-species identification.
[2] Please see Chapter 1 for the limitations of and planned updates to the TISG Template (IAAC 2023).

baseline data could show that a species was likely not present to begin with or that a range shift (natural or perhaps climate change-induced) has occurred.

1.2 Best Practices

Since eDNA survey methods are relatively new and continually being optimized (especially eDNA collection with metabarcoding laboratory analysis), there are currently no formally accepted standard methods. However, cohesive Canadian and international guidelines are emerging for designing, conducting, analyzing, reporting, and interpreting eDNA studies, including metabarcoding (Goldberg et al. 2016, Hobbs et al. 2017, Helbing and Hobbs 2019, The eDNA Society 2019, Abbott et al. 2021). Recent research studies have also included good practice recommendations and proposed standard protocols for field sampling (e.g., water collection, eDNA capture), laboratory methods (e.g., eDNA extraction, genetic marker selection), and bioinformatic data processing for eDNA metabarcoding (Deiner et al. 2017, Dickie et al. 2018, Zinger et al. 2019, Morey et al. 2020, Mychek-Londer et al. 2020, Shu et al. 2020).

Best practices are discussed in further detail in Section 2.4 of Zoetica's *Baseline Program Design Report* (BPD) (Zoetica 2022a) and Section 5.1.3 of the BPPA Report (Zoetica 2021).

2.0 STUDY AREAS

In 2022, aquatic eDNA metabarcoding studies were focused within the AOI and the LSA_{AQU}, and within select areas outside of the LSA_{AQU} (see Section 3.0, Chapter 1 for study area delineations). Outside of the LSA_{AQU}, sites within and outside of the RSA_{AQU} were included to capture appropriate control sites and areas known to support critical habitats for Species at Risk (SAR)[3]. Within the AOI, the goal of the eDNA metabarcoding study is to survey all waterbodies, watercourses, and wetlands that the Project may directly impact. However, as the final Project location has not yet been determined, the sampling design during the first field campaign consisted of reduced effort distributed over the entire AOI. Additional surveying can be undertaken once more information about the Project is known (including location, components, activities, and the extent of potential impacts) and based on results from the initial eDNA metabarcoding studies. Data objectives for eDNA collection within the AOI are primarily driven by the potential Project footprint and associated infrastructure that could directly impact these habitats and the biodiversity values that depend on them to fulfill their life history requisites, such as fish, herpetofauna, and SAR. Data objectives within the LSA_{AQU} are primarily driven by potential Project interactions and localized cumulative effects on aquatic and semi-aquatic biodiversity values (e.g., effects on surface water quality and hydrology, resulting in direct and indirect habitat loss, mortality, and impacts to movement).

[3] For the purposes of the 2023 Baseline Report, conservation statuses described in text for at-risk species refer to their Species at Risk in Ontario (SARO) listings unless otherwise indicated. Conservation statuses are from the NHIC's Ontario species list, current to March 1, 2023, and updated for any discrepancies with provincial and federal SAR listings up to August 15, 2023. As such, species and status listings may differ from those presented in Zoetica's 2021 BPPA Report (Zoetica 2021).

3.0 METHODS

3.1 Survey Locations

For initial eDNA metabarcoding studies, Zoetica first categorized aquatic habitat types into the following habitat groupings that are thought to likely host different species assemblages:

- Watercourses: streams and rivers
- Waterbodies: lakes and ponds ≤1 ha; lakes and ponds >1 ha
- Wetlands: marshes, conifer swamps, mixedwood swamps, hardwood swamps, and shrub swamps

Wetland sample sites were identified using Generalized Random Tessellation Stratified (GRTS) design (the GRTS study design is further described in Section 4.3.1 in the BPPA Report (Zoetica 2021)). For further details regarding sample allocation, habitat groupings, and sampling implementation, see Zoetica's *Standard Operating Procedure* (SOP) *for Aquatic eDNA Field Sampling* (Aquatic eDNA SOP) (Zoetica 2022b) and Section 2.4 of the BPD Report (Zoetica 2022a). See also Appendix A, Chapter 1 for data quality scoring.

Logistical difficulties, including expected sampling areas being devoid of water and limited permission to access private land, prevented sampling at some of the planned survey locations. The actual sampling allocation by site and season is skewed towards watercourses (**Table 3-1**). In one or more seasons, field crews sampled a total of 41 sites in the AOI, 50 sites in the LSA_{AQU}, and six sites outside of the LSA_{AQU}, within and outside of the RSA_{AQU}. Field crews visited but were unable to sample 71 sites. Overall, the results from 609 samples were verified and included in eDNA summaries.

Table 3-1. eDNA metabarcoding sampling locations by site type, study area, and season. Letter in the parentheses indicates the standard prefix identifying the habitat grouping in eDNA metabarcoding results.

Habitat Grouping	AOI	Outside the AOI
Summer		
Watercourses (S)	29	18
Waterbodies (all)	1	6
Lake (> 1 ha; L)	0	2
Pond (≤ 1 ha; P)	1	4
Wetlands (all)	8	7
Marsh	3	1
Swamp	5	6
Total	38	31
Fall		
Watercourses (S)	30	29
Waterbodies (all)	2	14
Lake (> 1 ha; L)	1	9
Pond (≤ 1 ha; P)	1	5
Wetlands (all)	3	11
Marsh	2	3
Swamp	1	8
Total	35	54

3.2 Field Sampling

3.2.1 Survey Timing and Environmental Conditions

Initial eDNA metabarcoding field campaigns for the BIS baseline program were conducted in the summer and fall of 2022. Environmental factors can affect eDNA persistence and degradation; as such, field crews recorded environmental conditions at each sampling location to enable appropriate data interpretation and transparent reporting (see Section 6.5.2 in the Aquatic eDNA SOP (Zoetica 2022b)). These factors may be evaluated in statistical models after at least three years of data collection.

Field surveys in the SON-South Bruce siting area were limited to watercourses, waterbodies and wetlands that were accessible on public lands, Nuclear Waste Management Organization (NWMO)-owned/optioned lands, and private lands where owners had granted permission to survey. As a result, many reaches within the AOI and the LSA_{AQU} south of the AOI could not be surveyed as they were on private lands where permission was not granted. In addition to access, the summer of 2022 was an exceptionally dry season in the SON-South Bruce region, and many sites visited for eDNA sampling did not contain enough water to sample. As a result of accessibility and dry conditions, field crews were unable to sample over 78% of wetlands that they attempted to access for eDNA sampling (**Table J-1**).

3.2.2 Survey Crew

Field teams from North/South Consultants completed the 2022 eDNA field sampling campaigns, with support from the Saugeen Valley Conservation Authority. A field technician from Dr. Robert Hanner's research laboratory at the University of Guelph trained field staff in aquatic eDNA sample collection, filtration, storage, and transport. Zoetica provided instruction on GRTS sampling and contingency planning. Contracted field staff consisted of skilled wildlife and fisheries field personnel who could identify suitable microhabitats for sampling. Field staff were also familiar with wetland classification according to the Ontario Wetland Evaluation System (MNRF 2014) and could accurately identify wetland types on the ground.

3.2.3 eDNA Sample Collection and Data Recording

Field staff collected and recorded eDNA data following the Aquatic eDNA SOP developed by Zoetica (Zoetica 2022b) following *in situ* training provided by the Hanner Laboratory (University of Guelph). Field staff recorded data on a digital field form created by NWMO contractors based on paper forms included within the BPD Report (Zoetica 2022a). Field contractors provided environmental condition data outputs to Zoetica following field contractor quality plans. Field data, once quality checked by the field data collection contractor, were provided to Zoetica for data analysis and interpretation. Data reviewed by Zoetica were assumed to be cleaned following a quality assurance / quality control procedure undertaken by the field data collection contractor and error-free.

3.3 Laboratory Analyses

Metabarcoding refers to the amplification of a DNA molecular region common to many species that allows for simultaneous identification of many taxa from a single sample via a high-throughput sequencing platform (Cristescu 2014, Deiner et al. 2017). Prior to eDNA metabarcoding laboratory analysis, Zoetica provided a preliminary list of species of interest to the Hanner Laboratory for a barcode gap analysis (Appendix A). This list included species from both siting areas under consideration for the Project (see

Section 1.0, Chapter 1). A barcode gap analysis examines the regions amplified by the three primers used in laboratory analysis to determine if the species in question can be differentiated by the primer in question (Meyer and Paulay 2005). Detection of a species with a barcode gap is therefore more reliable than detection of a species without a barcode gap or a species for which a barcode gap has not been assessed.

Members of Dr. Hanner's laboratory at the University of Guelph performed DNA extraction, amplification, and sequencing. The lab processed samples for three molecular markers, COI-Vert, COI-Invert, and 12S-MiFish. Using these three primers allows for a broader range of possible detections across the animal kingdom and more reliable detections. The laboratory also filtered and trimmed the sequencing results, checked for errors, and merged results based on protocols developed by the Hanner laboratory. A Basic Local Assignment Search Tool (BLAST) search on the final sequences produced 250 BLAST results that were then used to assess a final taxonomic assignment for each sample sequence. To increase confidence in results, the laboratory reduced eDNA metabarcoding results to identifications with a minimum of 95% identity and 95% coverage[4]. The laboratory reported identifications to the genus or species level, which Zoetica used in most of the following summaries. eDNA taxa identification data, once quality checked by the Hanner Laboratory, were provided to Zoetica for data analysis and interpretation. Data reviewed by Zoetica were assumed to be cleaned following a quality assurance / quality control procedure undertaken by the Hanner Laboratory and error-free.

Zoetica received eDNA metabarcoding results from the Hanner Laboratory as numbers of sequence reads for each taxa detected in samples collected at each site. The number of sequence reads does not indicate the presence of multiple individuals of a species; therefore the sample results were combined and the resulting number of sequence reads was reduced to a binary result, with "1" indicating that the taxa was detected at the given site during the stated season, and "0" indicating that the taxa was not detected at the given site during the stated season. A "0" indicates that the species was not detected at the site; however, it does not mean that the species is necessarily absent. These binary detection/non-detection data were used to create the tables included in Appendices C-G.

Zoetica compared the eDNA metabarcoding species detections to a list of species of conservation concern for Ontario maintained by the Natural Heritage Information Centre, which includes information on species at risk in Ontario (SARO) and species listed under the federal *Species at Risk Act* (*SARA*) among other sources (see Appendix D and Section 3.1 in the BPPA Report (Zoetica 2021) for a comprehensive list of SAR, including at-risk species, and the methods used to compile this list). Zoetica also compared the eDNA metabarcoding species detections to a list of invasive and potentially invasive species, which includes species regulated under the Ontario *Invasive Species Act*, species listed as pests by the Canadian Food Inspection Agency, and other sources. Zoetica compared eDNA metabarcoding results to a curated list of species and taxa at higher levels of identification that may be or are of interest to rights-holders and stakeholders, as well as species of potential socio-economic importance. Due to the large number of invertebrate detections, identifications to the species level were used to create a refined list of all detected invertebrate families.

[4] Percent identity is the percentage of the DNA bases in the sample that are identical to the reference genome (the sample in the database), relative to the alignment length (Fassler and Cooper 2011). Percent coverage is the percentage of the sample length that aligns with the database record relative to the alignment length (NIH n.d.).

Zoetica's evaluation of vertebrate species detections included geographic screening to determine if the detected species' known or expected range included the SON-South Bruce siting area. Species identified as out-of-range were submitted to the Hanner lab for further investigation, including analysis for a barcode gap.

A list of the vertebrate species detected with eDNA metabarcoding, including scientific and common names, is included in Appendix C for mammals, Appendix D for amphibians, Appendix E for birds, and Appendix F for fish. Scientific names for invertebrate species are listed in Appendix G. As common names of invertebrates are not included in the tables in Appendix G, the scientific name of invertebrate species is included following usage of its common name in Sections 4.2.5 and 4.2.6. For any other vertebrate species mentioned in the text that was not detected with eDNA metabarcoding as part of the current study, the scientific name follows the first mention of its common name.

3.4 Statistical Analyses

Of the 609 samples included in data summaries, 548 included measurements of at least one site environmental covariate. Field crews reported several reasons why environmental data may not have been collected at a site, including water too shallow for the water quality meter, malfunctions of devices such as the turbidity meter, and duckweed too thick for accurate measurements. For the first year of data collection, Zoetica calculated the minimum, mean, standard deviation, and maximum values for parameters related to the sample collection, such as air and water temperature, water pH, and turbidity (**Table J-2**). Statistical analyses on the eDNA metabarcoding results, including measures of occupancy and regression regarding covariates associated with detections, can occur after a minimum of three years of data collection and will be reported in future iterations of the BIS Baseline Report. R code is available upon request.

4.0 RESULTS

eDNA metabarcoding indicated the presence of 1009 taxa, including 642 unique species identifications and 294 identifications to genus. Of the 294 taxa detected to the genus level, 139 genera did not correspond to an identification at the species level (Appendix B). The remaining 73 detections were only to the family level. Lists of species[5] detected by study area, habitat grouping, and season are included in taxa-specific appendices: mammals in Appendix C, amphibians in Appendix D, birds in Appendix E, fish in Appendix F, and invertebrates in Appendix G.

4.1 Species Composition and Richness Patterns

Due to small and unevenly distributed sample sizes (e.g., more stream samples than all other habitat groupings, higher availability of accessible sites in the fall), overall counts of taxa detected in different habitat groupings and seasons may not be reliably compared (**Table 3-1**). Generally speaking, eDNA metabarcoding identified more species in the fall than the summer and more species in watercourses compared to other habitat groupings (**Table 4-1**). However, no amphibian species were detected in watercourses in the summer. Although more samples were collected in the fall compared to the summer, the higher number of species detections in the fall applies to habitat types where sampling effort was similar between the seasons – samples from wetlands collected in the summer resulted in fewer overall species detections (15 sites, 96 species) compared to wetland samples collected in the fall (14 sites, 197 species). A table of counts of species detected with eDNA metabarcoding by taxa group, site, and season is included in Appendix K.

Table 4-1. Number of unique species detected with eDNA metabarcoding by taxa type, season, and habitat grouping. Counts include all detections to species, before geographic curation and further investigations by the Hanner Lab.

Habitat Grouping	Total Species	Amphibian Species	Bird Species	Fish Species	Mammal Species	Invertebrate Species
Summer						
Watercourses	306	0	14	24	8	260
Waterbodies (all)	72	2	4	12	3	51
Lakes	33	1	1	11	2	18
Ponds	53	1	3	6	3	40
Wetlands (all)	96	2	6	10	5	73
Marshes	52	2	5	10	4	31
Swamps	67	1	4	4	3	55
Fall						
Watercourses	427	3	15	26	12	371
Waterbodies (all)	164	1	4	25	7	127
Lakes	120	1	4	25	7	83
Ponds	75	1	2	5	3	64

[5] While all eDNA species detections are reported in this chapter, detections are only reported within the BV-specific study areas in Chapters 1–9.

Habitat Grouping	Total Species	Amphibian Species	Bird Species	Fish Species	Mammal Species	Invertebrate Species
Wetlands (all)	197	1	9	7	8	172
Marshes	112	1	1	5	5	100
Swamps	122	1	9	5	7	100

4.1.1 Overall Detections – Summer

To begin to understand the distribution of species across sampling locations within the AOI and outside of the AOI, Zoetica looked at numbers of detected species of different taxa across sampled sites. First, Zoetica compared species numbers detected in summer sampling. For mammals, in the summer a watercourse site in the eastern AOI had the largest number of species (five; **Figure C-1**). Zoetica detected four unique mammal species at three other watercourse sites in the AOI, along a line roughly northeast-southwest. Outside of the AOI, the site with the most mammal species detections (four) was a watercourse site to the north of the AOI. Of the six sites with detections of amphibian species, three were inside the AOI: one marsh site in the northwestern AOI where two species were detected (**Figure D-1**), one swamp in the northeastern AOI with one species detection, and one marsh site in the central AOI with one species detection. A lake site in the northeastern portion of the LSA_{AQU} and two pond sites south of the AOI each had one amphibian species detection.

For birds, in the summer a watercourse site north of the AOI had the largest number of species (four; **Figure E-1**). Zoetica detected three unique bird species at two other sites in the AOI, one at a watercourse site in the east-central portion of the AOI and the other in a swamp in the south-central area of the AOI. A watercourse site in the west-central AOI had the largest number of unique fish species (10; **Figure F-1**). Four other watercourse sites in the AOI along a line roughly south-southwest to north-northeast each had eDNA metabarcoding detections of nine unique fish species. Two sites in the northern LSA_{AQU} also had detections of nine fish species. Zoetica detected the highest number of unique invertebrate species (56) at a watercourse site in the east central AOI (**Figure G-1**). Of the eleven sites with the most invertebrate species detections (38-56), ten were watercourse sites in the north and central portions of the AOI, along a line roughly west-southwest to east-northeast. Outside the AOI, the site with the largest number of unique invertebrate species (39) was a watercourse site along the northeastern LSA_{AQU}.

4.1.2 Overall Detections – Fall

In the fall, the two sites with the most detections of mammal species (six each) were a watercourse site in the east-central section of the AOI and a watercourse in the northeastern LSA_{AQU} (**Figure C-2**). Five other sites – one in the eastern AOI, three in the LSA_{AQU} north of the AOI, and one south of the AOI in the LSA_{AQU} – each had five mammal species detections in the fall. Four sites in the AOI and 13 sites in the LSA_{AQU} each had one amphibian detection in the fall (**Figure D-2**). The four AOI sites with amphibian detections in the fall were in the western, northeastern, and central portions of the AOI. For bird species, a watercourse site in the west central AOI had the most detections of unique species in the fall (five; **Figure E-2**). Zoetica detected four unique bird species in the fall at two other sites in the central and east sections of the AOI. A watercourse site northeast of the LSA_{AQU}, outside of the RSA_{AQU}, had the most detections of unique fish species (13; **Figure F-2**). Inside the AOI, four sites in the north-central and west-central AOI each had nine unique fish species detections in the fall. Zoetica recorded the largest number of unique invertebrate taxa (58 species) at a watercourse site north of the AOI in the northeastern LSA_{AQU} (**Figure G-2**). In the AOI, the

site with the largest number of unique invertebrate taxa (52 species) was in the northeast quadrant of the AOI.

4.1.3 Combined Detections – Both Seasons

In the summer, a site in the west-central AOI recorded the largest number of unique vertebrate species (15; **Figure H-1**), contrasting with the site with the most invertebrate species detections (56), which was in the northeastern quadrant of the AOI (**Figure G-1**). The site with the second-most vertebrate species detections (14) was in the eastern AOI. Six sites, including three in the northeastern LSA_{AQU} and three in the AOI, recorded 13 vertebrate species in the summer.

In the fall, a watercourse site northeast of the LSA_{AQU}, outside of the RSA_{AQU}, had the most vertebrate species detections (18; **Figure H-2**). Four sites in the LSA_{AQU} north of the AOI had detections of 16 or 17 unique vertebrate species. In the AOI, the sites with the most unique vertebrate species detections (15) were watercourses in the northwestern AOI. A watercourse site in the northeastern LSA_{AQU} had the most invertebrate species detections in the fall (58; **Figure G-2**).

4.1.4 Species of Conservation Concern

eDNA metabarcoding technology indicated the presence of two vertebrate and three invertebrate species of conservation concern (**Table 4-2**). Approximate locations[6] of detections of species of conservation concern are depicted in **Figure I-1**. Digger crayfish and juniper seed moth (both provincially rare) were each detected in more than one grid square, while wood thrush, monarch, and pugnose shiner (all SAR) were detected in one grid square each (**Figure I-1**).

eDNA metabarcoding indicated the presence of three SAR: wood thrush, pugnose shiner, and monarch. In the summer, eDNA metabarcoding indicated the presence of monarch in one grid square in the LSA_{AQU} (**Figure I-1**). In the fall, wood thrush was detected in one grid square in the AOI and pugnose shiner was detected in one grid square in the LSA_{AQU} (**Figure I-1**). The Committee on the Status of Endangered Wildlife In Canada (COSEWIC) has designated both wood thrush and pugnose shiner as Threatened (COSEWIC 2012, 2013) and monarch as Endangered (COSEWIC 2016). The Species at Risk in Ontario (SARO) database lists wood thrush and monarch as species of Special Concern (COSSARO 2013a, 2020) and pugnose shiner as Threatened (COSSARO 2013b). Wood thrush has a NatureServe conservation status of S4B in Ontario, indicating that the breeding population is apparently secure, but possible causes for concern exist (NatureServe n.d.). A NatureServe conservation rank of S2 indicates that the pugnose shiner is at high risk of extirpation in Ontario (NatureServe n.d.). A NatureServe conservation status of S2N, S4B indicates that the non-breeding monarch population in Ontario is imperiled or at high risk of extirpation, while the breeding population is apparently secure, but causes for concern exist (NatureServe n.d.).

In the fall, eDNA metabarcoding indicated the presence of two provincially rare invertebrate species, juniper seed month and digger crayfish (**Figure I-1**). Juniper seed moth was detected in two grid squares in the AOI, and digger crayfish was detected in three grid squares – one in the AOI and two in the LSA_{AQU} (**Figure I-1**). Juniper seed moth and digger crayfish are not SARA- or SARO-listed species, but in Ontario both species have a NatureServe conservation status of S3, indicating that each species is vulnerable and at moderate risk of extirpation (NatureServe n.d.).

[6] Due to the sensitivity of at-risk and rare species, exact locations of detections are not shown on maps nor included in the Appendices.

Table 4-2. Summary of species of conservation concern detected using eDNA metabarcoding sampling in 2022.

Common Name	Scientific Name	NatureServe Conservation Rank in Ontario	COSEWIC Designation	SARO Classification	Season of Detection	Habitat Grouping
Pugnose Shiner	*Notropis anogenus*	S2	Threatened	Threatened	Fall	Lake
Monarch	*Danaus plexippus*	S2N, S4B	Endangered	Special Concern	Summer	Stream
Wood Thrush	*Hylocichla mustelina*	S4B	Threatened	Special Concern	Fall	Stream
Juniper Seed Moth	*Argyresthia alternatella*	S3	N/A	N/A	Fall	Stream
Digger Crayfish	*Fallicambarus fodiens*	S3	N/A	N/A	Fall	Stream Swamp

The Hanner Lab performed additional investigations into the detections of S2 species: monarch and pugnose shiner (**Table 4-3**). Additional analysis indicated that there is a barcode gap for pugnose shiner, but there is overlap between pugnose shiner and another native fish in the same genus, the sand shiner (*Notropis stramineus*). Therefore, this detection should be followed-up by field investigations to verify the presence of pugnose shiner. For monarch, the evidence is mixed, indicating that the data available may not be sufficient to determine if a barcode gap exists. In addition, there is a species in the same genus, the soldier or tropical queen (*Danaus eresimus*) that overlaps with the monarch. However, the typical range of the soldier includes the Caribbean, Central America, and the southern United States, although a verified observation of soldier occurred in Ontario in 2002 (Lotts and Naberhaus 2021). As a result, this detection may be monarch rather than the soldier, but uncertainty exists. Due to the inconclusive results, further field investigations should occur to verify this detection.

Table 4-3. Results of further analysis by the Hanner Lab for selected species at risk detected in 2022.

Common Name	Species	Class	Primer	Summary
Pugnose Shiner	*Notropis anogenus*	Actinopteri	Vert	There are three record matches for two occurrences, with an average of just over 100 reads per occurrence. The initial results had 100% coverage and 99.5% identity. The results of the Hanner Lab barcode gap analysis indicated that there does appear to be a barcode gap for the species, but the species *Notropis stramineus* does overlap. As such, this identification may be either species, and given the small available *Notropis* dataset, this would most reliably be placed at a genus level identification.
Monarch	*Danaus plexippus*	Insecta	Invert	With 30 record matches, a single ASV and only a single occurrence, with only 54 reads, this result does not have strong support. The Hanner lab conducted a DNA barcode gap assessment and detected a gap. However, this gap has a poorly supported bootstrap value and the taxa does overlap with *Danaus eresimus*. As such, this identification may be either species, and given the small available *Danaus* dataset, this would most reliably be placed at a genus level identification.

4.1.5 Species of Interest to Stakeholders and Rights-holders, and species of Potential Socio-Economic Importance

During engagement activities in 2020, groups of taxa were mentioned as being of importance, such as migratory birds, herpetofauna, and fish communities (see Appendix B of the BPPA for more information; Zoetica 2021). Stakeholders and rights-holders also identified invasive species as being of interest; these are discussed in Section 4.1.6. At this time, specific taxa of interest to stakeholders, rights-holders, and taxa of potential socio-economic importance have not been identified for the SON-South Bruce siting area. Specific species of interest may be identified from ongoing and future engagement activities and will be discussed in future iterations of the BIS Baseline Report.

4.1.6 Invasive and Potentially Invasive Species

eDNA metabarcoding suggests the presence of one potentially invasive vertebrate species and five invertebrate invasive species (**Table 4-4**). eDNA metabarcoding results detected pig across all site types and both seasons. Detection of pig DNA may indicate the presence of domestic pigs or invasive wild pigs, also known as feral hogs; therefore, Zoetica refers to these detections as a potentially invasive species. All invertebrate species indicated as potentially invasive were checked against the Global Invasive Species Database, maintained by the Invasive Species Specialist Group of the International Union for the Conservation of Nature (IUCN, http://www.iucngisd.org/gisd/). Locations of detections of invertebrate invasive species are depicted in **Figure I-2**. Inside the AOI, summer invertebrate invasive species detections included rusty crayfish, red earthworm, and spongy moth (also known as LDD moth), and fall detections included rusty crayfish, common earthworm, and red earthworm (**Figure I-2**). Red earthworm, an invasive earthworm commonly used as bait, was the most frequently detected invasive or potentially invasive invertebrate species (11 sites). Red earthworm was detected in two streams in the AOI in both the summer and fall seasons and at seven sites in the LSA_{AQU} – one stream site in the summer and five streams and a pond in the fall (**Figure I-2**). The spongy moth, a destructive pest of hardwood trees (Global Invasive Species Database 2022), was detected at a watercourse sampling site in the east-central portion of the AOI (site S096, **Figure I-2**). The Hanner lab found evidence of a barcode gap for rusty crayfish for at least one primer used in this study (**Table A-1**). Based on the available data, there is no barcode gap for octagonal tail-worm, red earthworm, or spongy moth (**Table A-2**).

Table 4-4. 2022 detections of invasive and potentially invasive species.

Common Name	Scientific Name	Number of Sites with Detections	Summer Detection Locations (count)	Fall Detection Locations (count)
Octagonal tail-worm	*Dendrobaena octaedra*	2	--	LSA_{AQU} (2): Swamp (2)
Rusty Crayfish	*Faxonius rusticus*	4	AOI (1): Stream (1) LSA_{AQU} (2): Stream (2)	AOI (1): Stream (1)
Common Earthworm	*Lumbricus terrestris*	6	--	AOI (4): Stream (4) LSA_{AQU} (2): Stream (1) Swamp (1)

Common Name	Scientific Name	Number of Sites with Detections	Summer Detection Locations (count)	Fall Detection Locations (count)
Red Earthworm	*Lumbricus rubellus*	11	AOI (2): Stream (2) LSA_{AQU} (1): Stream (1)	AOI (2): Stream (2) LSA_{AQU} (6): Pond (1) Stream (5)
Spongy (LDD) Moth	*Lymantria dispar*	1	AOI (1): Stream (1)	--
Pig	*Sus scrofa*	28	AOI (7): Stream (7) LSA_{AQU} (5): Lake (2) Pond (2) Stream (1)	AOI (7): Stream (6) Swamp (1) LSA_{AQU} (18): Lake (7) Pond (2) Stream (9)
Notes: See Appendix A for information regarding barcode gap analyses.				

4.2 Presence and Distribution of Biodiversity Values

As only one summer and one fall season of data have been collected, data cannot be used to determine species absence from a site. However, even if absence cannot be confirmed, eDNA metabarcoding detections indicate presence. Presence and distribution can be more fully assessed after at least three years of eDNA sampling. General, overall richness patterns for broad taxa groups are included in Section 4.1.

4.2.1 Geographic Curation

Zoetica reviewed the known ranges of vertebrates detected to species with eDNA metabarcoding and found 12 species not expected to occur in Ontario (**Table 4-5**). Of the out-of-range taxa, there were five birds, four fish, one amphibian, and two mammals. Several of the exotic species detected but not known to exist in Ontario belong to the same genera as native species, and so could indicate presence of the native species instead. For example, the detected wedge-tailed eagle is in the same genus as golden eagle (*Aquila chrysaetos*), a native bird species, so may indicate the presence of golden eagle instead. The detected Gulf coast waterdog is in the same genus as the native species common mudpuppy (*Necturus maculosus*), so may indicate the presence of common mudpuppy instead.

The Hanner Lab investigated the out-of-range taxa for identification data available in public databases, the quality of those data, the quality of the eDNA metabarcoding result, considered the geographic range of the identified species and known relatives, and performed barcode gap analyses, if possible. The Hanner lab thus recommended removing five taxa from the results due to insufficient data and / or borderline results. The Hanner Lab also determined that the remaining seven out-of-range species should only be identified to the genus level due to limitations as outlined in **Table 4-5**.

Table 4-5. eDNA metabarcoding detections of vertebrate species determined to be out of their known range, and results of further analysis by the Hanner Lab.

Common Name	Species	Class	Range	Notes	RESULT
Tricolored Blackbird	*Agelaius tricolor*	Aves	Pacific Coast, Baja peninsula (Mexico) to Oregon (U.S.)	Not enough data to support this identification. With only a single molecular match and a sequence coverage just above our 95% threshold, combined with the geographic curation, this taxonomic assignment is not reliable. As such, this taxonomic assignment should be moved up to genus and would then most likely represent a red winged blackbird (*Agelaius phoeniceus*).	Genus–- Not enough data, borderline results
Wedge-tailed Eagle	*Aquila audax*	Aves	Australia	Each match for this taxa matched to only a single record from the MetaWorks database, which is most likely an incorrectly named record. This taxonomic assignment can be moved up to genus and then would most likely represent an endemic bird such as the Golden Eagle (*Aquila chrysaetos).*	Genus–- not enough data
Barnacle Goose	*Branta leucopsis*	Aves	North Atlantic, Greenland and eastward	With very little genetic variation between the taxa of this genus (< 1 %) and with few records for three of the four taxa with available data, this result should be rolled back to genus. In addition, the *B. leucopsis* results have a lower identity nearer the 95% threshold. This result may represent an endemic species, Canada goose (*Branta canadensis*) or cackling goose (*Branta hutchinsii*).	Genus–- no barcode, borderline results
Golden Jackal	*Canis aureus*	Mammalia	SE Europe—SE Asia	While the barcode gap did show a gap for this species (and several others in the *Canis* genus), the quality of these analyses is poor. For example, the *Canis aureus* identification is based on only three records, each of which has the same haplotype (single unique sequence). Also, *C. adustus* had no barcode gap with *C. aureus* noted as one of the overlapping records. There is also known hybridization within the genus. Thus, records with taxa outside of the expected range should be set to the genus *Canis*. This result may represent endemic species such as coyote (*Canis latrans*) or domestic dog (*Canis lupus familiaris*).	Genus–- species overlap and known hybridization
Forbes's Blackbird	*Curaeus forbesi*	Aves	South America, non-migratory	Not enough data to support this identification. Each of the 3 sequence matches for these taxa were based on a single match. Furthermore, the sequence coverage was just above the 95% threshold indicating that there were	Remove—not enough data, borderline results

Common Name	Species	Class	Range	Notes	RESULT
				more than 10 different nucleotides. As such, this taxonomic assignment should be removed from the analysis.	
Glassy Darter	*Etheostoma vitreum*	Actinopterygii	Southern U.S.	While many of the species in this genus do have a barcode gap for the amplified region, this Darter did not have a barcode gap. It overlaps with other records in the genus and as such the taxonomy should be moved up to genus. Therefore, any of the *Etheostoma* fish could be represented by this result. Endemic species that could be indicated by this result include rainbow darter (*Etheostoma caeruleum*), greenside darter (*Etheostoma blennioides*), or least darter (*Etheostoma microperca*).	Genus–- no barcode
Lined Chub	*Hybopsis lineapunctata*	Actinopterygii	Southeastern U.S.	There is only a single record match and a single unique sequence recovered, it has a relatively low sequence identity (with just over 95%). Furthermore, there are very few reads reported with only two reads in a single sample. This result is suspect and should be removed.	Remove–- borderline results
Tepui Vireo	*Hylophilus sclateri*	Aves	South America	While this taxon does have a barcode gap when compared to three other taxa in the genus (where data are available), the bootstrap resampling support for this gap is weak. There are few data representing the taxa, and each of the BLAST results also had weak support (both identity and coverage near the 95% threshold). This, in combination with the geographic curation, indicates that this taxonomic assignment should be removed from the data set.	Remove–- not enough data, borderline results
Blacktail Redhorse	*Moxostoma poecilurum*	Actinopterygii	Southern U.S.	Although this species did display a barcode with the available sequence data, there are many closely related and overlapping taxa in this genus. The BLAST results were on the lower end of the 95% threshold cutoff. Thus, along with the taxonomic curation, it is likely that this record represents a sister species in the genus. As such this record should be moved up to genus. This detection may represent several endemic species such as river redhorse (*Moxostoma carinatum*) or silver redhorse (*Moxostoma anisurum*).	Genus–- species overlap, borderline results
Gulf Coast Waterdog	*Necturus beyeri*	Amphibia	Southeastern U.S.	This taxonomic assignment was based on 12S molecular data. After alignment and cleaning, there were no records available to assess the barcode gap for this taxon for the MiFish amplified region.	Remove–- not enough data

Common Name	Species	Class	Range	Notes	RESULT
				Furthermore, with only a single match and an out-of-range taxonomic curation, this taxonomic assignment can be removed.	
Mule Deer	*Odocoileus hemionus*	Mammalia	Western North America	With 10 records, a single occurrence, and 18 reads in the sample, this is a weak positive. With the available data there is no DNA barcode gap for the region amplified. This record could only be reliably called the genus *Odocoileus.* This detection may represent the endemic species white-tailed deer (*Odocoileus virginianus*).	Genus–- no barcode
Sardines / Japanese Pilchard	*Sardinops melanostictus*	Actinopteri	Marine	The *Sardinops* genus contains only one species (although two names still exist in the databases). As such, there is not enough data to evaluate a barcode gap for species level identifications. This, combined with the geographic curation and the poorer quality identity, indicates that this result should be removed from the analysis.	Remove–- not enough data

4.2.2 Mammals

Following geographic curation, Zoetica detected eleven species of mammals through eDNA metabarcoding in the summer and fall of 2022 (**Table 4-6**, Appendix C). Detected semi-aquatic mammals include muskrat (118 sites) and beaver (34 sites), which were both detected across the LSA_{AQU} and AOI in both seasons and also at sites in the RSA_{AQU} and at reference sites in the fall. North American river otter was detected at four stream sites in the LSA_{AQU} in the fall. Of the ten detected mammalian wildlife species, muskrat detections were the most numerous (118 sites), followed by raccoon (36 sites). Mammal detections to the genus level included the genus *Odocoileus*, which includes white-tailed deer (*Odocoileus virginianus*), and *Canis*, which includes coyotes (*Canis latrans*) and domestic dogs (*Canis lupus familiaris*; Appendix B).

Of the mammal species detected, barcode gaps exist for beaver and meadow vole (Appendix A, **Table A-1**). Beaver has a barcode gap for all three primers used in this study. There was insufficient data to evaluate the presence of a barcode gap for northern short-tailed shrew, muskrat, red squirrel, and North American river otter. In addition to mammalian wildlife, the most frequent detections of other mammal species included human (55 sites) and pig (37 sites).

Table 4-6. Mammal species detected with eDNA samples collected in 2022.

Common Name	Scientific Name
Small Terrestrial Mammals	
Northern Short-tailed Shrew	*Blarina brevicauda*
Meadow Vole	*Microtus pennsylvanicus*
Raccoon	*Procyon lotor*

Common Name	Scientific Name
Red Squirrel	*Tamiasciurus hudsonicus*
Semi-Aquatic Mammals	
Beaver	*Castor canadensis*
Star-Nosed Mole	*Condylura cristata*
North American River Otter	*Lontra canadensis*
Muskrat	*Ondatra zibethicus*
Other	
Human	*Homo sapiens*
Brown Rat	*Rattus norvegicus*
Pig	*Sus scrofa*
Notes: See Appendix A for information regarding barcode gap analyses.	

4.2.3 Amphibians and Reptiles

Following geographic curation, eDNA metabarcoding detected four amphibian species – three salamanders and one frog (**Table 4-7**, Appendix D). No reptile species were detected. Both Eastern newt and wood frog were detected in the AOI. Eastern newt was the most commonly detected amphibian species (15 sites) across the AOI and LSA_{AQU}, in both seasons and all habitat types.

Wood frog has a barcode gap on all three primers used in this study (Appendix A, **Table A-1**). At this time, there is insufficient data to evaluate the presence of a barcode gap with the primers used for eastern newt and red-backed salamander. In addition, the detected genus *Lithobates*, which includes species such as wood frog and mink frog, also has a barcode gap.

Table 4-7. Amphibian species detected with eDNA samples collected in 2022.

Common Name	Scientific Name
Four-toed Salamander	*Hemidactylium scutatum*
Wood Frog	*Lithobates sylvaticus*
Eastern Newt	*Notophthalmus viridescens*
Eastern Red-backed Salamander	*Plethodon cinereus*
Notes: See Appendix A for information regarding barcode gap analyses.	

4.2.4 Birds

Following geographic curation, eDNA metabarcoding surveys in 2022 detected 21 species of birds, including upland breeding birds such as red-winged blackbird (three sites) and waterbirds such as wood duck (29 sites; **Table 4-8**, Appendix E). American robin (48 sites) and wood duck (32 sites) were the most frequently detected bird species. The Teeswater River system was mentioned during engagement as a potentially important migratory bird staging area (Zoetica 2021), and detections of waterbirds such as wood duck, mallard, and hooded merganser support this assessment. Other waterbirds were detected at the genus level, such as the genus *Branta*, which includes Canada goose (*Branta canadensis*), and the

genus *Ardea*, which includes great blue heron (*Ardea herodias;* Appendix B). The genus *Meleagris* was also detected, which includes wild turkey (*Meleagris gallopavo;* Appendix B).

A barcode gap exists on at least one primer used in the study for brown creeper, wood duck, and red-breasted nuthatch (**Table A-1**). The Hanner lab assessed hooded merganser for barcode gaps, but there was insufficient data to assess the presence of a barcode gap for the primers used in this study. At this time, mallard does not have barcode gaps for primers used in this study.

Table 4-8. Bird species detected with eDNA samples collected in 2022.

Common Name	Scientific Name
Upland Breeding Birds	
Red-Winged Blackbird	*Agelaius phoeniceus*
Hermit Thrush	*Catharus guttatus*
Swainson's Thrush	*Catharus ustulatus*
Brown Creeper	*Certhia americana*
Blue Jay	*Cyanocitta cristata*
Wood Thrush	*Hylocichla mustelina*
Savannah Sparrow	*Passerculus sandwichensis*
Indigo Bunting	*Passerina cyanea*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Ruby Crowned Kinglet	*Regulus calendula*
Golden Crowned Kinglet	*Regulus satrapa*
Eastern Phoebe	*Sayornis phoebe*
Red-Breasted Nuthatch	*Sitta canadensis*
White-Breasted Nuthatch	*Sitta carolinensis*
Tree Swallow	*Tachycineta bicolor*
American Robin	*Turdus migratorius*
Waterbirds	
Wood Duck	*Aix sponsa*
Mallard	*Anas platyrhynchos*
Hooded Merganser	*Lophodytes cucullatus*
Virginia Rail	*Rallus limicola*
Other	
Muscovy Duck	*Cairina moschata*

Notes:
See Appendix A for information regarding barcode gap analyses.

4.2.5 Fish, Crayfish, and Mussels

Following geographic curation, eDNA metabarcoding analysis indicated the presence of 31 fish species across the AOI, LSA_{AQU}, RSA_{AQU}, and at reference sites outside of the RSA_{AQU} (**Table 4-9**, Appendix F). Central mudminnow was the most frequently detected species (154 sites), followed by creek chub (134 sites). Zoetica detected the presence of several sportfish, including sunfishes such as smallmouth bass (44 sites) and largemouth bass (2 sites). eDNA metabarcoding also indicated the presence of the genus *Esox*, which includes the species northern pike (*Esox lucius;* Appendix B).

It was noted during engagement that local people harvest crayfish in the Teeswater River (Zoetica 2021). In addition to the previously discussed rusty crayfish (Section 4.1.6) and digger crayfish (Section 4.1.4), eDNA metabarcoding indicated the presence of three native crayfish species: big water crayfish (*Cambarus robustus*), northern clearwater crayfish (*Orconectes propinquus*) and calico crayfish (*Orconectes immunis*; Appendix G). One bivalve species, creek heelsplitter (*Lasmigona compressa)*, was detected at one site in the AOI in the fall (Section 4.2.6, Appendix G). Other primary and secondary producers are included in Section 4.2.6.

Of the fish species detected, white sucker and blacknose shiner have barcode gaps on at least one of the primers used in this study.

Table 4-9. Fish, crayfish, and mussel species detected with eDNA samples collected in 2022.

Common Name	Scientific Name
Atherinopsidae – Neotropical silversides	
Brook Silverside	*Labidesthes sicculus*
Catostomidae – Suckers	
White Sucker	*Catostomus commersonii*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Centrarchidae – Sunfishes	
Rock Bass	*Ambloplites rupestris*
Pumpkinseed	*Lepomis gibbosus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Largemouth Bass	*Micropterus salmoides*
Gasterosteidae – Sticklebacks	
Brook Stickleback	*Culaea inconstans*
Ictaluridae – Catfishes	
Yellow Bullhead	*Ameiurus natalis*
Tadpole madtom	*Noturus gyrinus*
Leuciscidae – Minnows	
Northern Redbelly Dace	*Chrosomus eos*
Finescale Dace	*Chrosomus neogaeus*
Common Shiner	*Luxilus cornutus*
Hornyhead Chub	*Nocomis biguttatus*
River Chub	*Nocomis micropogon*
Golden Shiner	*Notemigonus crysoleucas*
Pugnose Shiner	*Notropis anogenus*
Blacknose Shiner	*Notropis heterolepis*
Fathead Minnow	*Pimephales promelas*
Eastern Blacknose Dace	*Rhinichthys atratulus*
Creek Chub	*Semotilus atromaculatus*
Percidae – Perches and Darters	

Common Name	Scientific Name
Rainbow Darter	*Etheostoma caeruleum*
Iowa Darter	*Etheostoma exile*
Fantail Darter	*Etheostoma flabellare*
Blackside Darter	*Percina maculata*
Salmonidae – Salmon and Trout	
Brook Trout	*Salvelinus fontinalis*
Umbridae – Mudminnows	
Central Mudminnow	*Umbra limi*
Other Fish	
Banded Killifish	*Fundulus diaphanus*
Cambaridae – Freshwater Crayfish	
Big Water Crayfish	*Cambarus robustus*
Digger Crayfish	*Fallicambarus fodiens*
Rusty Crayfish	*Faxonius rusticus*
Calico Crayfish	*Orconectes immunis*
Northern Clearwater Crayfish	*Orconectes propinquus*
Unionidae – Freshwater Mussels	
Creek Heelsplitter	*Lasmigona compressa*
Notes: See Appendix A for information regarding barcode gap analyses.	

4.2.6 Invertebrates

eDNA metabarcoding analysis in 2022 indicated 563 non-vertebrate species, including 510 insects and one diatom (class Bacillariophyceae; **Table 4-10**, Appendix G). eDNA metabarcoding detected 126 insect families and 22 non-insect families. The most detected invertebrate species (77 sites) was *Thienemanniella xena*, a midge in the Chironomidae family. Invertebrate detections included three species of conservation concern (Section 4.1.4) and five invasive species (Section 4.1.6). Rusty crayfish, an invertebrate invasive species, has a barcode gap and was detected with the Invert primer (Appendix A, **Table A-1**). In addition, eDNA metabarcoding results indicated the presence of a native earthworm species (*Sparganophilus tamesis*) in the AOI, LSA_{AQU}, RSA_{AQU}, and outside of the RSA_{AQU} (26 sites). During engagement, concerns were raised by stakeholders regarding ticks due to certain species being a vector for Lyme disease (Zoetica 2021). The rabbit tick (*Haemaphysalis leporispalustris*) was detected with eDNA, however it is not known to transmit diseases to humans (Government of Ontario 2023).

Table 4-10. Invertebrate families detected with eDNA samples in 2022, organized by class.

Arachnida				
Ixodidae	Phalangiidae			
Bacillariophyceae[1]				
Sellaphoraceae				
Bivalvia				
Unionidae[2]				
Branchiopoda				

Bosminidae	Chydoridae	Daphniidae	Eurycercidae	Sididae
Clitellata				
Enchytraeidae	Glossiphoniidae	Lumbricidae	Lumbriculidae	Naididae
Sparganophilidae				
Collembola				
Isotomidae	Katiannidae			
Eurotatoria				
Synchaetidae				
Gastropoda				
Amnicolidae				
Insecta				
Acroceridae	Agromyzidae	Anthicidae	Anthomyiidae	Anthomyzidae
Argyresthiidae	Asilidae	Baetidae	Belostomatidae	Bibionidae
Caeciliusidae	Caenidae	Calliphoridae	Capniidae	Carabidae
Cerambycidae	Ceratopogonidae	Chaoboridae	Chironomidae	Chloropidae
Chrysomelidae	Chrysopidae	Cicadellidae	Cleridae	Coniopterygidae
Corixidae	Corydalidae	Crambidae	Culicidae	Curculionidae
Dermestidae	Dolichopodidae	Drosophilidae	Dryomyzidae	Dytiscidae
Ectopsocidae	Elateridae	Elmidae	Empididae	Ephemeridae
Ephydridae	Erebidae	Erotylidae	Fanniidae	Forficulidae
Geometridae	Goeridae	Gryllidae	Gyrinidae	Haliplidae
Heleomyzidae	Hemerobiidae	Heptageniidae	Hesperiidae	Hydrophilidae
Hydroptilidae	Isonychiidae	Lampyridae	Lauxaniidae	Lepidopsocidae
Lepidostomatidae	Leptophlebiidae	Leuctridae	Limnephilidae	Limoniidae
Melandryidae	Membracidae	Meropeidae	Muscidae	Mycetophilidae
Nemouridae	Nepidae	Nitidulidae	Noteridae	Notonectidae
Nymphalidae	Pediciidae	Pentatomidae	Perlodidae	Phalacridae
Philopotamidae	Phoridae	Phryganeidae	Pipunculidae	Platypezidae
Platystomatidae	Pleidae	Polleniidae	Psephenidae	Psocidae
Psychodidae	Ptilodactylidae	Ptychopteridae	Rhagionidae	Rhaphidophoridae
Rhopalidae	Sarcophagidae	Scarabaeidae	Scathophagidae	Sciomyzidae
Scirtidae	Sepsidae	Sialidae	Simuliidae	Sisyridae
Sphaeroceridae	Staphylinidae	Stenopsocidae	Stratiomyidae	Syrphidae
Tabanidae	Tachinidae	Taeniopterygidae	Tenthredinidae	Tephritidae
Tipulidae	Tortricidae	Uenoidae	Corylophidae	Ephemerellidae
Glyphipterigidae	Lasiocampidae	Periscelididae	Tenebrionidae	Trichoceridae
Malacostraca				
Cambaridae[3]	Hyalellidae			
Ostracoda				
Cyprididae				

Notes:

1. Phylum: Bacillariophyta
2. Scientific name: *Lasmigona compressa*; Common name: Creek heelsplitter
3. Freshwater crayfish family; includes rusty crayfish (Section 4.1.6), digger crayfish (Section 4.1.4), big water crayfish, northern clearwater crayfish, and calico crayfish (Section 4.2.5).

5.0 DISCUSSION

To our knowledge, this eDNA project represents the densest spatial application of eDNA metabarcoding in North America and highlights a successful collaboration between industry, consulting, and academic institutions. eDNA metabarcoding during the summer and fall of 2022 indicated the presence of over 500 taxa, including five species of conservation concern (Section 4.1.4; **Figure I-1**) and six invasive or potentially invasive species (Section 4.1.6; **Figure I-2**). These findings show promise that the eDNA metabarcoding program is achieving the objectives of obtaining preliminary community composition data, locating potentially present cryptic species, identifying the distribution of biodiversity values, and providing baseline data (Section 1.1). As the summer and fall of 2022 results provide only two seasons of data within the first cycle of data collection, data cannot be used to draw conclusions about the true absence of a species; however, the species detected suggest a diverse vertebrate and invertebrate community.

Overall, the data suggested that a rich array of species use habitats that interface with aquatic habitats. Early eDNA metabarcoding data indicated potential areas of the AOI and outside of the AOI that support a higher species richness. Generally, a higher vertebrate species richness was detected across the AOI from the southwest to the northeast, and into the eastern LSA_{AQU} north of the AOI (**Figure H-1**, **Figure H-2**). This information will be useful for planning future sampling efforts and may help to inform siting of the Project to avoid species-rich areas. eDNA metabarcoding shows promise, with repeated seasonal sampling, of revealing seasonal habitat use patterns that help maintain high levels of biodiversity. For example, with repeated sampling, a pattern of higher species richness of fish in specific habitat types in the fall may suggest seasonal habitat refugia of particular importance for maintaining biodiversity. This will inform the Project about maintaining those diverse habitats and connections between them for seasonal use.

eDNA metabarcoding detected several cryptic taxa that are difficult to detect via other means. These data potentially revealed species of conservation concern including pugnose shiner, wood thrush, monarch, digger crayfish, and juniper seed moth (Section 4.1.4; **Figure I-1**) and raised the possibility of invasive species in the area (Section 4.1.6; **Figure I-2**), including three earthworms, spongy moth, rusty crayfish, and feral pig. Additional work should be undertaken to verify these results (e.g., QT PCR; Section 5.2). Overall, eDNA metabarcoding provides the start of a baseline list of present species, which can be verified, expanded, and used over the long term, with repeated sampling, to determine changes in species presence.

5.1 Current Limitations

eDNA metabarcoding is a promising emerging technology but is limited in several ways. First, the primers used may not amplify some taxa that are present in the system (Collins et al. 2019). If the DNA of a species does not amplify with the primers used, then it cannot be detected even if it is present. For example, the endangered species rainbow mussel is known to exist within the Teeswater River system (DFO 2018), but the primers used in this study did not detect it. This lack of amplification could affect entire taxa groups, possibly explaining the few amphibian detections in the eDNA results. Second, a species may not have a barcode gap for the primers used in this study, which adds uncertainty to any identifications of that species' presence from eDNA BLAST results (Pawlowski et al. 2018). However, publicly available data may not be sufficient to assess if a barcode gap exists (Ruppert et al. 2019). These issues are known as taxonomic blind spots that decrease with time as more species are sequenced and actively researched.

Other reasons that species may be present and not detected is because of eDNA degradation, a low DNA shedding rate, and distance from the organism to the sampling location (Helbing and Hobbs 2019). eDNA did not indicate the presence of pugnose shiner in Cargill Mill Pond (Section 4.1.4; **Figure I-1**), which is known to contain pugnose shiner critical habitat (COSEWIC 2013). The reasons for not detecting pugnose shiner in Cargill Mill Pond may be due to harsh conditions at the sampling locations leading to degradation of eDNA, the pugnose shiner having a naturally low DNA shedding rate, or the selected sampling locations may have been very far from where pugnose shiner occurs in the pond. Because of the discrepancy in detections and known presence, the detection of pugnose shiner in the LSA_{AQU} and the failure to detect pugnose shiner in Cargill Mill Pond warrants further investigation.

Another limitation of only two seasons of data collection, each with a single round of sampling effort, is that trends cannot yet be established or predicted. While patterns of detections were consistent between taxa groups and seasons (Section 4.1), species' ecological requirements often vary with the time of year. Further sampling will reveal if seasonal trends exist for a given taxa group or if detection patterns shift among seasons and years. In addition, covariates other than aquatic habitat type may reveal finer-scale habitat associations and requirements.

It is important to consider that eDNA detection of a species does not necessarily mean that the species was in the immediate vicinity of the sampling location, nor that the species was recently present. Similarly, it is not possible to ascertain details about the source of the DNA, such as the number of individuals, age, sex, type of cells, or if the source was alive when shedding DNA. For example, eDNA metabarcoding detection of a fish could mean that the fish was in a body of water where it was detected, or that a predator consumed that fish species elsewhere and excreted fish DNA into the body of water where eDNA sampling was conducted (Merkes et al. 2014, Guilfoyle and Schultz 2017). The DNA may also have been transported to the sampling location by the interconnections of the surface water system. The persistence, transport, and settling of eDNA affect species detections and are active areas of research. DNA behaves like fine particulate matter in water channels, meaning that downstream detections of eDNA are dependent on local hydraulic characteristics such as the depth of the water column and flow velocity (Pont et al. 2018). During the summer and fall of 2022, samples taken from streams or river sites detected the greatest number of unique species for most taxa groups (**Table 4-1**). This result may be due to the larger sample size within streams compared to sites in other aquatic habitat types (**Table 3-1**), or it may be due to the larger effective sampling area of watercourses due to the transport of DNA over longer distances compared to waterbodies and wetlands which typically have lower flow (Deiner et al. 2016). A modelling study suggests that eDNA of a fish species in a large volume river could be detected 130 km downstream from its expected source, but eDNA detection distances for watercourses with substantially less flow, such as those expected in the sampled areas of the AOI, LSA_{AQU}, and outside of the LSA_{AQU}, are orders of magnitude less (Pont et al. 2018). Understanding the effective sampling area differences between aquatic habitat types will be crucial for interpreting future analyses.

5.2 Ongoing Investigations

Barcode gaps may be required to reliably differentiate detections of closely related species. In addition, detections of unexpected species (such as those far outside their known range) could be explained by barcode gaps (Section 4.2.1). In the eDNA metabarcoding results, there are several examples where barcode gap analysis does or could clarify unexpected results. For example, eDNA metabarcoding suggests the presence of two nuthatch species in the same genus, red-breasted nuthatch and white-breasted

nuthatch (**Table 4-8**, Appendix E). Red-breasted nuthatch has barcode gaps on two of the three primers used in this study, and its presence was indicated by the Vert primer, on which it has a barcode gap (**Table A-1**). Therefore, there is increased confidence in the detection of red-breasted nuthatch. In turn, even though white-breasted nuthatch has not been assessed for barcode gaps, the detection of white-breasted nuthatch is less likely to be a misattributed detection of red-breasted nuthatch, so there is increased confidence in the detection of white-breasted nuthatch result as well.

Unexpected vertebrate species detections included humans, domestic species (Section 4.2.2), marine species, and species outside of their known ranges (Section 4.2.1). It is possible that these detections are the result of taxonomic blind spots, or that identification is biased because the unexpected species has more publicly available data than related native species. Other than barcode gap analyses, closer scrutiny of the results, such as if livestock detections occurred close to farms, may indicate why unexpected detections occurred.

In 2022, Zoetica supplied a preliminary list of detections warranting closer scrutiny to the Hanner lab for further investigation (**Table A-2**). Several of the unexpected taxa, including invasive invertebrate species red earthworm and spongy moth (Section 4.1.6) and livestock (genera *Bos, Sus, Ovis,* and *Gallus*, Section 4.2.2), showed poor evidence of barcode gaps, suggesting that eDNA metabarcoding detections of these species may not be reliable. However, the lack of a barcode gap or sufficient evidence for a barcode gap also does not automatically mean that the detection is incorrect; thus, investigation of these taxa is ongoing. Other than barcode gaps, possible explanations for detections of livestock and humans could indicate human dwellings and farms in the sampled area, interconnected via watercourses, waterbodies, and wetlands. For marine fish species commonly found in human or domestic animal diets, such as sardines, wastewater may hold enough remnant DNA from the fish, which can be detected with eDNA metabarcoding if wastewater mixes with surface water (Merkes et al. 2014). The analysis of eDNA detections is ongoing at the time of writing this 2023 BIS Baseline Report (September 2023), and further results with be discussed in future iterations of the report.

5.3 Future Directions

eDNA metabarcoding is an evolving tool to identify community composition, especially for cryptic species, and to determine where future studies should occur. Because of the uncertainty of certain eDNA metabarcoding results and current limitations in methods, detections of species of interest should be followed up by barcode gap analyses and/or traditional sampling to confirm their presence. Targeted eDNA sampling for species such as pugnose shiner and rainbow mussel may also occur to verify the presence of these species. Future reporting will include analysis of sampling covariates such as pH to determine if environmental variables are affecting eDNA results. Results included in this current version of the eDNA Appendix E, Chapter 1 of the BIS Baseline Report, will be reassessed with future data, and future analyses will include any advancements to laboratory and bioinformatics procedures. Therefore, the list of detected taxa will be enhanced as methods evolve and available data improves, refining detections and confidence in results. Continuation of the eDNA program will increase confidence in species presence, allow for identification of biodiversity hotspots, aid in identifying locations for Tier 2 studies (Section 1.1), help to inform site selection, and contribute baseline data to help determine if the Project could affect biodiversity.

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APPENDIX A – BARCODE GAP ANALYSES

Table A-1. Species assessed for a barcode gap in 2022, prior to data collection.

Common Name	Scientific Name	Taxa Type	Number of Markers - Genus	Number of Markers - Species	Barcode Gap – MiFish Marker[1]	Barcode Gap – Invert Marker[1]	Barcode Gap – Vert Marker[1]	Number of Markers with Barcode Gap
Moose	*Alces americanus*	Mammal	3	NA	NA	NO	YES	1
Northern Short-tailed Shrew	*Blarina brevicauda*	Mammal	1	1	NA	NA	NA	0
Gray Wolf	*Canis lupus*	Mammal	2	2	YES	YES	YES	3
Beaver	*Castor canadensis*	Mammal	1	2	YES	YES	YES	3
Porcupine	*Erethizon dorsatum*	Mammal	NA	NA	NA	NA	NA	0
Northern Flying Squirrel	*Glaucomys sabrinus*	Mammal	1	NA	NA	YES	YES	2
Wolverine	*Gulo gulo*	Mammal	NA	NA	NA	NA	NA	0
Silver-haired Bat	*Lasionycteris noctivagans*	Mammal	NA	NA	NA	NA	NA	0
Eastern Red Bat	*Lasiurus borealis*	Mammal	NA	NA	YES	YES	YES	3
Hoary Bat	*Lasiurus cinereus*	Mammal	NA	NA	NA	NA	NA	0
Snowshoe Hare	*Lepus americanus*	Mammal	1	1	YES	NA	NA	1
River Otter	*Lontra canadensis*	Mammal	NA	NA	NA	NA	NA	0
Canada Lynx	*Lynx canadensis*	Mammal	1	NA	NA	NA	NA	0
American Marten	*Martes americana*	Mammal	NA	NA	NA	NA	NA	0
Rock Vole	*Microtus chrotorrhinus*	Mammal	1	1	NA	NA	NA	0
Meadow Vole	*Microtus pennsylvanicus*	Mammal	1	1	NA	YES	YES	2
House Mouse	*Mus musculus*	Mammal	3	3	NO	NO	NO	0
Southern Red-backed Vole	*Myodes gapperi*	Mammal	NA	NA	NA	NO	NO	0
Little Brown Myotis	*Myotis lucifugus*	Mammal	NA	NA	NA	YES	NO	1
Northern Myotis	*Myotis septentrionalis*	Mammal	NA	NA	NA	YES	YES	2
Woodland Jumping Mouse	*Napaeozapus insignis*	Mammal	NA	NA	NA	NA	NA	0
Mink	*Neovison vison*	Mammal	NA	NA	NA	NA	NA	0
White-tailed Deer	*Odocoileus virginianus*	Mammal	NA	NA	NA	NA	NA	0
Muskrat	*Ondatra zibethicus*	Mammal	3	3	NA	NA	NA	0
Fisher	*Pekania pennanti*	Mammal	NA	NA	NA	NA	NA	0
Deer Mouse	*Peromyscus maniculatus*	Mammal	NA	NA	NA	NO	NO	0
Eastern Heather Vole	*Phenacomys ungava*	Mammal	NA	NA	NA	YES	YES	2
Cougar	*Puma concolor couguar*	Mammal	NA	NA	NA	NA	NA	0
Woodland Caribou	*Rangifer tarandus*	Mammal	NA	NA	NA	NA	NA	0
Arctic Shrew	*Sorex arcticus*	Mammal	1	1	NA	NO	NO	0
Masked Shrew	*Sorex cinereus*	Mammal	1	1	NA	NO	NO	0
American Pygmy Shrew	*Sorex hoyi*	Mammal	1	NA	NA	YES	YES	2
Red Squirrel	*Tamiasciurus hudsonicus*	Mammal	1	1	NA	NA	NA	0
American Badger	*Taxidea taxus*	Mammal	NA	NA	NA	NA	NA	0
Gray Fox	*Urocyon cinereoargenteus*	Mammal	NA	NA	NA	NA	NA	0
Black Bear	*Ursus americanus*	Mammal	NA	NA	NA	NA	NA	0
Meadow Jumping Mouse	*Zapus hudsonius*	Mammal	1	1	NA	YES	YES	2
Blue-spotted Salamander	*Ambystoma laterale*	Amphibian or Reptile	NA	NA	NA	NA	NA	0
Snapping Turtle	*Chelydra serpentina*	Amphibian or Reptile	NA	NA	NA	NA	NA	0
Western Painted Turtle	*Chrysemys picta*	Amphibian or Reptile	NA	NA	NA	NA	NA	0
Gray Treefrog	*Hyla versicolor*	Amphibian or Reptile	NA	NA	NA	NA	NA	0
Mink Frog	*Lithobates septentrionalis*	Amphibian or Reptile	1	NA	NO	YES	YES	2
Wood Frog	*Lithobates sylvaticus*	Amphibian or Reptile	1	1	YES	YES	YES	3
Eastern Newt	*Notophthalmus viridescens*	Amphibian or Reptile	1	1	NA	NA	NA	0

Common Name	Scientific Name	Taxa Type	Number of Markers - Genus	Number of Markers - Species	Barcode Gap – MiFish Marker[1]	Barcode Gap – Invert Marker[1]	Barcode Gap – Vert Marker[1]	Number of Markers with Barcode Gap
Eastern Red-backed Salamander	*Plethodon cinereus*	Amphibian or Reptile	1	1	NA	NA	NA	0
Spring Peeper	*Pseudacris crucifer*	Amphibian or Reptile	NA	NA	NA	YES	YES	2
Boreal Chorus Frog	*Pseudacris maculata*	Amphibian or Reptile	NA	NA	NA	YES	YES	2
Red-sided Gartersnake	*Thamnophis sirtalis*	Amphibian or Reptile	NA	NA	NA	NO	YES	1
Eastern Gartersnake	*Thamnophis sirtalis*	Amphibian or Reptile	NA	NA	NA	NO	YES	1
Northern Goshawk	*Accipiter gentilis*	Bird	NA	NA	NA	NO	YES	1
Northern Saw-whet Owl	*Aegolius acadicus*	Bird	NA	NA	NA	YES	YES	2
Boreal Owl	*Aegolius funereus*	Bird	NA	NA	NA	YES	YES	2
Wood Duck	*Aix sponsa*	Bird	1	1	NA	YES	YES	2
Mallard	*Anas platyrhynchos*	Bird	2	NA	NO	NO	NO	0
American Black Duck	*Anas rubripes*	Bird	2	NA	NA	NO	NO	0
Eastern Whip-poor-will	*Antrostomus vociferus*	Bird	NA	NA	NA	NA	NA	0
Golden Eagle	*Aquila chrysaetos*	Bird	NA	NA	NA	YES	YES	2
Great Blue Heron	*Ardea herodias*	Bird	1	NA	NA	YES	YES	2
Short-eared Owl	*Asio flammeus*	Bird	NA	NA	NA	YES	YES	2
Long-eared Owl	*Asio otus*	Bird	NA	NA	NA	YES	YES	2
Ruffed Grouse	*Bonasa umbellus*	Bird	1	1	NA	NA	NA	0
Canada Goose	*Branta canadensis*	Bird	1	1	NA	NO	YES	1
Snowy Owl	*Bubo scandiacus*	Bird	NA	NA	NA	YES	YES	2
Great Horned Owl	*Bubo virginianus*	Bird	NA	NA	NO	YES	YES	2
Red-shouldered Hawk	*Buteo lineatus*	Bird	NA	NA	YES	YES	YES	3
Canada Warbler	*Cardellina canadensis*	Bird	NA	NA	NA	YES	YES	2
Brown Creeper	*Certhia americana*	Bird	NA	NA	NA	YES	YES	2
Chimney Swift	*Chaetura pelagica*	Bird	NA	NA	NA	YES	YES	2
Black Tern	*Chlidonias niger*	Bird	NA	NA	NA	YES	YES	2
Common Nighthawk	*Chordeiles minor*	Bird	NA	NA	NA	NA	NA	0
Evening Grosbeak	*Coccothraustes vespertinus*	Bird	NA	NA	NA	NA	NA	0
Olive-sided Flycatcher	*Contopus cooperi*	Bird	NA	NA	NA	NA	NA	0
Eastern Wood-Pewee	*Contopus virens*	Bird	NA	NA	NA	NA	NA	0
Yellow Rail	*Coturnicops noveboracensis*	Bird	NA	NA	NA	NA	NA	0
Bobolink	*Dolichonyx oryzivorus*	Bird	NA	NA	NA	NA	NA	0
Pileated Woodpecker	*Dryocopus pileatus*	Bird	NA	NA	NA	YES	YES	2
Alder Flycatcher	*Empidonax alnorum*	Bird	NA	NA	NA	NO	NO	0
Least Flycatcher	*Empidonax minimus*	Bird	NA	NA	NA	YES	YES	2
Rusty Blackbird	*Euphagus carolinus*	Bird	NA	NA	NA	NA	NA	0
Spruce Grouse	*Falcipennis canadensis*	Bird	NA	NA	YES	NA	NA	1
Peregrine Falcon *anatum/tundrius*	*Falco anatum*	Bird	NA	NA	NA	NA	NA	0
Peregrine Falcon *anatum/tundrius*	*Falco peregrinus*	Bird	NA	NA	NA	NO	YES	1
Peregrine Falcon *anatum/tundrius*	*Falco tundrius*	Bird	NA	NA	NA	NA	NA	0
Common Yellowthroat	*Geothlypis trichas*	Bird	NA	NA	NA	NA	NA	0
Bald Eagle	*Haliaeetus leucocephalus*	Bird	NA	NA	NA	YES	YES	2
Barn Swallow	*Hirundo rustica*	Bird	NA	NA	NA	NO	NO	0
Least Bittern	*Ixobrychus exilis*	Bird	NA	NA	NA	YES	YES	2
Short-billed Dowitcher	*Limnodromus griseus*	Bird	NA	NA	NA	YES	YES	2

Common Name	Scientific Name	Taxa Type	Number of Markers - Genus	Number of Markers - Species	Barcode Gap – MiFish Marker[1]	Barcode Gap – Invert Marker[1]	Barcode Gap – Vert Marker[1]	Number of Markers with Barcode Gap
Hooded Merganser	*Lophodytes cucullatus*	Bird	1	1	NA	NA	NA	0
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Bird	NA	NA	NA	NA	NA	0
Common Merganser	*Mergus merganser*	Bird	NA	NA	NA	YES	YES	2
Red-breasted Merganser	*Mergus serrator*	Bird	NA	NA	NA	YES	YES	2
Black-and-white Warbler	*Mniotilta varia*	Bird	NA	NA	NA	NA	NA	0
American White Pelican	*Pelecanus erythrorhynchos*	Bird	NA	NA	NA	YES	YES	2
Horned Grebe	*Podiceps auritus*	Bird	NA	NA	NA	YES	YES	2
Red-necked Grebe	*Podiceps grisegena*	Bird	NA	NA	NA	YES	YES	2
Eared Grebe	*Podiceps nigricollis*	Bird	NA	NA	NA	YES	YES	2
Pied-billed Grebe	*Podilymbus podiceps*	Bird	NA	NA	NA	NA	NA	0
Bank Swallow	*Riparia riparia*	Bird	NA	NA	NA	NA	NA	0
Ovenbird	*Seiurus aurocapilla*	Bird	NA	NA	NA	NA	NA	0
Bay-breasted Warbler	*Setophaga castanea*	Bird	NA	NA	NA	YES	YES	2
Blackburnian Warbler	*Setophaga fusca*	Bird	NA	NA	NA	YES	YES	2
Chestnut-sided Warbler	*Setophaga pensylvanica*	Bird	NA	NA	NA	YES	YES	2
Red-breasted Nuthatch	*Sitta canadensis*	Bird	NA	NA	NA	YES	YES	2
Northern Shoveler	*Spatula clypeata*	Bird	NA	NA	NA	YES	YES	2
Great Gray Owl	*Strix nebulosa*	Bird	NA	NA	NA	YES	YES	2
Barred Owl	*Strix varia*	Bird	NA	NA	NA	NO	NO	0
Lesser Yellowlegs	*Tringa flavipes*	Bird	NA	NA	NA	YES	YES	2
Winter Wren	*Troglodytes hiemalis*	Bird	1	NA	NA	NO	NO	0
Greater Prairie-Chicken	*Tympanuchus cupido*	Bird	NA	NA	NA	NA	NA	0
Sharp-tailed Grouse	*Tympanuchus phasianellus*	Bird	NA	NA	YES	NA	NA	1
Red-eyed Vireo	*Vireo olivasceus*	Bird	1	NA	NA	NA	NA	0
Harris's Sparrow	*Zonotrichia querula*	Bird	1	NA	NA	YES	YES	2
Lake Sturgeon	*Acipenser fulvescens*	Fish	NA	NA	NA	NA	NA	0
Goldfish	*Carassius auratus*	Fish	NA	NA	NO	NO	NO	0
Prussian carp	*Carassius gibelio*	Fish	NA	NA	NA	NO	NO	0
White Sucker	*Catostomus commersonii*	Fish	2	2	NA	YES	YES	2
Northern Snakehead	*Channa argus*	Fish	NA	NA	YES	YES	YES	3
Cisco (Lake Herring)	*Coregonus artedi*	Fish	1	NA	NO	NO	NO	0
Lake Whitefish	*Coregonus clupeaformis*	Fish	1	NA	NA	NO	NO	0
Shortjaw Cisco	*Coregonus zenithicus*	Fish	1	NA	NO	NA	NA	0
Grass Carp	*Ctenopharyngodon idella*	Fish	NA	NA	NA	NA	NA	0
Northern Pike	*Esox lucius*	Fish	2	2	YES	NO	NO	1
Eurasian Ruffe	*Gymnocephalus cernua*	Fish	NA	NA	NA	NA	NA	0
Brassy Minnow	*Hybognathus hankinsoni*	Fish	NA	NA	NA	YES	YES	2
Silver Carp	*Hypopthalmichthys molitrix*	Fish	NA	NA	NA	NA	NA	0
Bighead Carp	*Hypopthalmichthys nobilis*	Fish	NA	NA	NA	NA	NA	0
Silver Lamprey	*Ichthyomyzon unicuspis*	Fish	NA	NA	NA	NO	NO	0
Silver Chub	*Macrhybopsis storeriana*	Fish	NA	NA	YES	YES	YES	3
Black Carp	*Mylopharyngodon piceus*	Fish	NA	NA	NA	NA	NA	0
Round Goby	*Neogobius melanostomus*	Fish	NA	NA	NA	YES	YES	2
Blacknose Shiner	*Notropis heterolepis*	Fish	2	1	NA	YES	YES	2
Spottail Shiner	*Notropis hudsonius*	Fish	2	2	YES	YES	YES	3

Common Name	Scientific Name	Taxa Type	Number of Markers - Genus	Number of Markers - Species	Barcode Gap – MiFish Marker[1]	Barcode Gap – Invert Marker[1]	Barcode Gap – Vert Marker[1]	Number of Markers with Barcode Gap
Rainbow Smelt	*Osmerus mordax*	Fish	NA	NA	YES	YES	YES	3
Sea Lamprey	*Petromyzon marinus*	Fish	NA	NA	NA	NA	NA	0
Tubenose Goby	*Proterorhinus semilunaris*	Fish	NA	NA	NA	NO	NO	0
Stone Moroko	*Pseudorasbora parva*	Fish	NA	NA	YES	NA	NA	1
Longnose Dace	*Rhinichthys cataractae*	Fish	1	NA	NA	NO	YES	1
Lake Trout	*Salvelinus namaycush*	Fish	1	NA	NO	YES	NO	1
Zander	*Sander lucioperca*	Fish	3	NA	YES	YES	YES	3
Rudd	*Scardinius erythrophthalmus*	Fish	NA	NA	NO	NO	YES	1
Wels Catfish	*Silurus glanis*	Fish	NA	NA	NA	YES	YES	2
Walleye	*Stizostedion vitreum*	Fish	NA	NA	NA	NA	NA	0
Tench	*Tinca tinca*	Fish	NA	NA	NA	NA	NA	0
Spiny Waterflea	*Bythotrephes longimanus*	Invertebrate	NA	NA	NA	NO	NO	0
Fishhook Waterflea	*Cercopagis pengoi*	Invertebrate	NA	NA	NA	NA	NA	0
Common Yabby (Crayfish)	*Cherax destructor*	Invertebrate	NA	NA	NA	NA	NA	0
Chinese Mysterysnail	*Cipangopaludina chinensis*	Invertebrate	NA	NA	NA	NO	NO	0
Asian Clam	*Corbicula fluminea*	Invertebrate	NA	NA	NA	YES	YES	2
Killer Shrimp	*Dikerogammarus villosus*	Invertebrate	NA	NA	NA	YES	YES	2
Quagga Mussel	*Dreissena bugensis*	Invertebrate	NA	NA	NA	NA	NA	0
Zebra Mussel	*Dreissena polymorpha*	Invertebrate	NA	NA	NA	YES	YES	2
Chinese Mitten Crab	*Eriocheir sinensis*	Invertebrate	NA	NA	NO	YES	YES	2
Rusty Crayfish	*Faxonius rusticus*	Invertebrate	NA	NA	NA	YES	YES	2
Bloody Red Shrimp	*Hemimysis anomala*	Invertebrate	NA	NA	NA	NA	NA	0
Golden Mussel	*Limnoperna fortunei*	Invertebrate	NA	NA	NA	YES	YES	2
Channeled Apple Snail	*Pomacea canaliculata*	Invertebrate	NA	NA	NA	NO	NO	0
New Zealand Mud Snail	*Potamopyrgus antipodarum*	Invertebrate	NA	NA	NA	YES	YES	2
Red swamp Crayfish	*Procambarus clarkii*	Invertebrate	NA	NA	YES	YES	NO	2
Marmorkrebs (Marbled Crayfish)	*Procambarus virginalis*	Invertebrate	NA	NA	NA	NO	NO	0
Banded Mysterysnail	*Viviparus georgianus*	Invertebrate	NA	NA	NA	NA	NA	0

Notes:
This list includes species from both siting areas under consideration for the Project (see Section 1.0, Chapter 1).

1. Barcode gap results are reported in three possible outcomes: *NA* is due to insufficient data to evaluate the presence of a barcode gap; *Yes* indicates the presence of a barcode gap given the available data; *No* is the absence of a barcode gap given the available data.

Table A-2. Barcode gaps for unexpected species detected with eDNA samples collected in 2021-2022.

Common Name	Scientific Name	Taxa Type	Native Range	12S	COI-Vert	COI-Invert	Notes
Varied Thrush	*Ixoreus naevius*	Bird	North America[1]	NA	NA		Insufficient Data
American Eel	*Anguilla rostrata*	Fish	North America[1]	NA		Yes	Data available for 17 species in the Genus, 0 with insufficient data, 5 with no barcode gap, the remaining 12 have gaps. This species does have a barcode gap.
Atlantic Herring	*Clupea harengus*	Fish	Marine	NA	No		Data for only two species both marine. This needs to be assessed at a higher taxonomic level.
Escolar	*Lepidocybium flavobrunneum*	Fish	Marine	NA	NA		Insufficient Data
Atlantic Mackerel	*Scomber scombrus*	Fish	Marine	NA	Yes		Data available for 4 species in the Genus, 0 with insufficient data, 3 with no barcode gap, the remaining 1 has a gap and is the target species.
European Chub	*Squalius cephalus*	Fish	Europe	NA	No		Data available for 28 species in the Genus, 8 with insufficient data, 10 with no barcode gap, the remaining 10 have a gap. This species does not have a barcode gap.
Fall Fish	*Semotilus corporalis*	Fish	North America[1]	Yes	Yes		COI - Data available for 3 species in the Genus, 1 with insufficient data, 0 with no barcode gap, the remaining 2 have a gap. This species does have a barcode gap. 12S - Data for two species available, and both have gaps.
PumpkinSeed	*Lepomis gibbosus*	Fish	North America[2]	NA	Yes		Data for 9 species, and all species have barcode gaps.
Bluegill	*Lepomis macrochirus*	Fish	North America[2]	NA	Yes		Data for 9 species, and all species have barcode gaps.
Permanent Marsh Mosquito	*Anopheles walker*	Invertebrate	North America	NA		No	
Spongy Moth (LDD Moth)	*Lymantria dispar*	Invertebrate	Invasive[1]			No	Data available for 51 species in the Genus, 15 with insufficient data, 14 with no barcode gap, the remaining 22 have gaps. This species does not have a barcode gap.
Red Earthworm	*Lumbricus rubellus*	Invertebrate	Invasive			No	Data available for 9 species in the Genus, 2 with insufficient data, 3 with no barcode gap, the remaining 4 have gaps. This species does not have a barcode gap.
Octagonal tail-worm	*Dendrobaena octaedra*	Invertebrate	Invasive			No	Data available for 15 species in the Genus, 7 with insufficient data, 6 with no barcode gap, the remaining 2 have gaps. This species does not have a barcode gap.

Notes:
In most cases, invertebrates were assessed for a barcode gap on the COI-Invert primer only, and vertebrates were assessed for a barcode gap on 12-S (MiFish) and the COI_Vert primers.
Barcode gap results are reported in three possible outcomes: *NA* is due to insufficient data to evaluate the presence of a barcode gap; *Yes* is the presence of a barcode gap given the available data; *No* is the absence of a barcode gap given the available data; blank is the marker was not assessed for a barcode gap for the species in question.

1. Detection is outside of the species' known range.
2. Pumpkinseed and bluegill are included to determine if barcode gaps can differentiate them.

APPENDIX B – DETECTIONS TO THE GENUS LEVEL

Table B-1. 2022 eDNA detections with genera as the final result.

Genera	Order
Mammals	
Not Detected at Species Level	
Bos	Artiodactyla
Ovis	Artiodactyla
Odocoileus	Artiodactyla
Equus	Perissodactyla
Canis	Carnivora
Amphibians	
Detected at Species Level	
Lithobates	Anura
Birds	
Not Detected at Species Level	
Anser	Anseriformes
Aquila	Accipitriformes
Ardea	Pelecaniformes
Branta	Anseriformes
Butorides	Pelecaniformes
Columba	Columbiformes
Corvus	Passeriformes
Eremophila	Passeriformes
Gallus	Galliformes
Hirundo	Passeriformes
Junco	Passeriformes
Meleagris	Galliformes
Melospiza	Passeriformes
Passer	Passeriformes
Phalacrocorax	Pelecaniformes
Sturnus	Passeriformes
Troglodytes	Passeriformes
Zonotrichia	Passeriformes
Detected at Species Level	
Agelaius	Passeriformes
Turdus	Passeriformes
Fish	
Not Detected at Species Level	
Clupea	Clupeiformes
Cottus	Perciformes
Esox	Esociformes
Pomoxis	Centrarchiformes
Detected at Species Level	
Catostomus	Cypriniformes
Chrosomus	Cypriniformes
Etheostoma	Perciformes
Lepomis	Centrarchiformes
Micropterus	Centrarchiformes
Moxostoma	Cypriniformes
Nocomis	Cypriniformes
Percina	Perciformes
Rhinichthys	Cypriniformes
Salvelinus	Salmoniformes
Umbra	Esociformes
Invertebrates	

Genera	Order
Not Detected at Species Level	
Acalymma	Coleoptera
Acricotopus	Diptera
Acylomus	Coleoptera
Alluaudomyia	Diptera
Anisodactylus	Coleoptera
Apallates	Diptera
Aphodius	Coleoptera
Apocephalus	Diptera
Atarba	Diptera
Axarus	Diptera
Bezzia	Diptera
Bourletiella	Symphypleona
Brachydeutera	Diptera
Buenoa	Hemiptera
Carpelimus	Coleoptera
Chelifera	Diptera
Chlaenius	Coleoptera
Chrysoperla	Neuroptera
Chrysotus	Diptera
Clinohelea	Diptera
Clinotanypus	Diptera
Condylostylus	Diptera
Coniopteryx	Neuroptera
Cordyla	Diptera
Cuterebra	Diptera
Cymbiodyta	Coleoptera
Cypria	Podocopida
Delia	Diptera
Diamesa	Diptera
Dicerca	Coleoptera
Dicranophragma	Diptera
Dictya	Diptera
Digrammia	Lepidoptera
Dilophus	Diptera
Dixella	Diptera
Donacaula	Lepidoptera
Einfeldia	Diptera
Epicauta	Coleoptera
Epicypta	Diptera
Epuraea	Coleoptera
Eristalinus	Diptera
Erythridula	Hemiptera
Forcipomyia	Diptera
Geranomyia	Diptera
Gomphus	Odonata
Gonomyia	Diptera
Graphomya	Diptera
Heleniella	Diptera
Helina	Diptera
Helobdella	Rhynchobdellida
Hemerobius	Neuroptera
Hydrodroma	Trombidiformes
Hypena	Lepidoptera
Hypnoidus	Coleoptera

Genera	Order
Kellicottia	Ploima
Krenopelopia	Diptera
Kurzia	Diplostraca
Laphria	Diptera
Lethocerus	Hemiptera
Leucrocuta	Ephemeroptera
Limnophila	Diptera
Linopodes	Trombidiformes
Lonchoptera	Diptera
Lucilia	Dipetra
Lygus	Hemiptera
Macronychia	Diptera
Medetera	Diptera
Melanostoma	Diptera
Melanotus	Coleoptera
Monohelea	Diptera
Nebrioporus	Coleoptera
Nemotelus	Diptera
Neoscutopterus	Coleoptera
Neozavrelia	Diptera
Oberea	Coleoptera
Ochthera	Diptera
Oscinella	Diptera
Palpomyia	Diptera
Parakiefferiella	Diptera
Paraleuctra	Plecoptera
Parametriocnemus	Diptera
Paratendipes	Diptera
Paratrichocladius	Diptera
Perlesta	Plecoptera
Phaenopsectra	Diptera
Phora	Diptera
Photuris	Coleoptera
Phragmatobia	Lepidoptera
Phyllobrotica	Coleoptera
Phytobia	Diptera
Platynota	Lepidoptera
Platypalpus	Diptera
Platypeza	Diptera
Poecilolycia	Diptera
Polytrichophora	Diptera
Psectrotanypus	Diptera
Pseudosmittia	Diptera
Psyche	Lepidoptera
Rachispoda	Diptera
Ravinia	Diptera
Rhagoletis	Diptera
Rheotanytarsus	Diptera
Rhipidia	Diptera
Roederiodes	Diptera
Scaphoideus	Hemiptera
Scaphytopius	Hemiptera
Scolytus	Coleoptera
Stenolophus	Coleoptera
Stictochironomus	Diptera

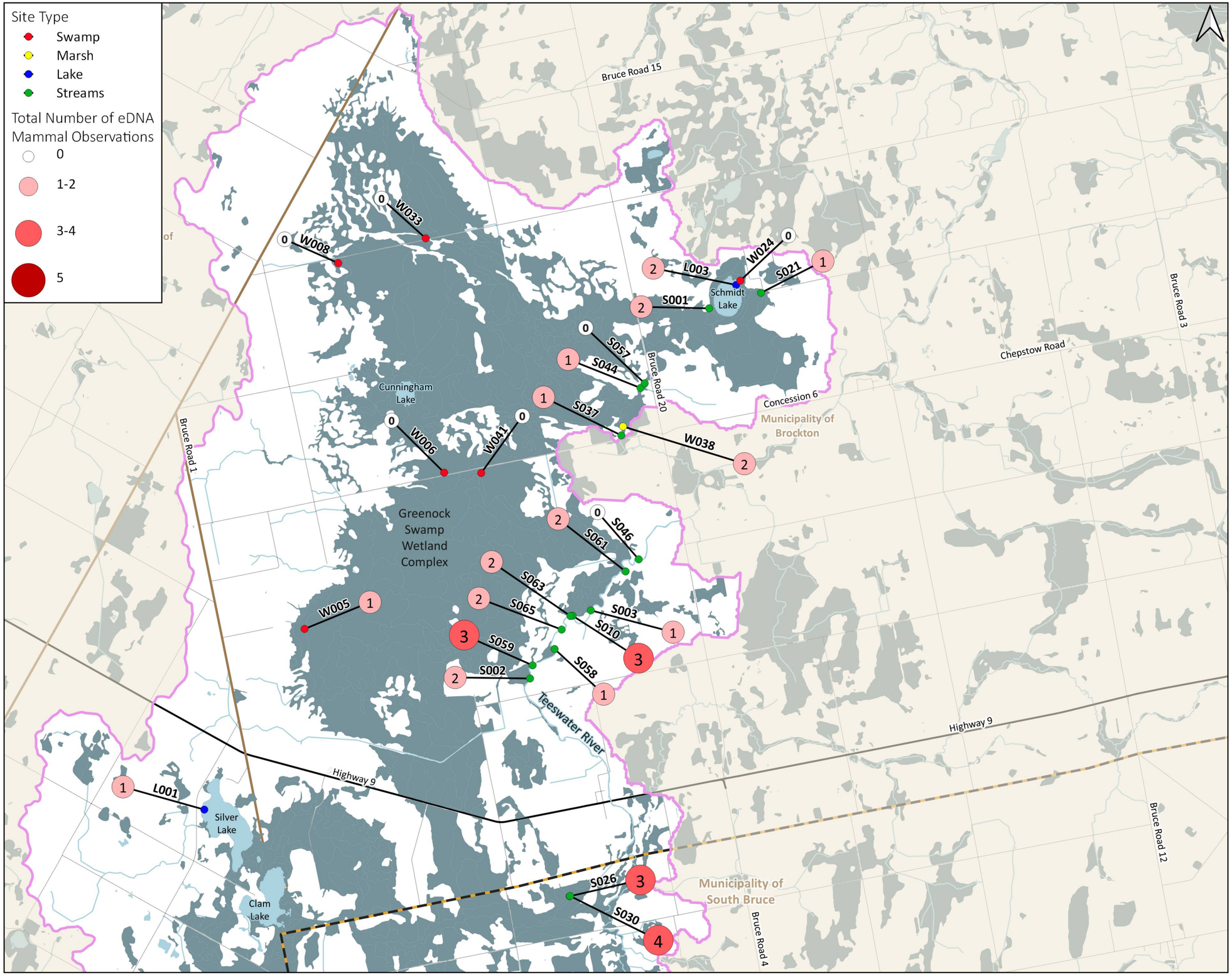
Genera	Order
Sublettea	Diptera
Sympetrum	Odonata
Tetartopeus	Coleoptera
Thienemannimyia	Diptera
Thulinius	Parachela
Triaenodes	Trichoptera
Tribelos	Diptera
Trichocorixa	Hemiptera
Tricholochmaea	Coleoptera
Trirhabda	Coleoptera
Trissopelopia	Diptera
Xylotopus	Diptera
Zaphne	Diptera
Zeiraphera	Lepidoptera
Detected at Species Level	
Ablabesmyia	Diptera
Acilius	Coleoptera
Agabus	Coleoptera
Allocapnia	Plecoptera
Allodia	Diptera
Alona	Diplostraca
Amara	Coleopetra
Amphinemura	Plecoptera
Anopheles	Diptera
Antocha	Diptera
Aporrectodea	Crassiclitellata
Argyrotaenia	Lepidoptera
Athous	Coleoptera
Atrichopogon	Diptera
Baetis	Ephemeroptera
Bibio	Diptera
Boettcheria	Diptera
Cambarus	Decapoda
Ceriodaphnia	Diplostraca
Chalcosyrphus	Diptera
Chaoborus	Diptera
Chauliodes	Megaloptera
Chironomus	Diptera
Chlorops	Diptera
Chrysopilus	Diptera
Chrysops	Diptera
Cladotanytarsus	Diptera
Coenosia	Diptera
Contacyphon	Coleoptera
Corynoneura	Diptera
Cricotopus	Diptera
Culex	Diptera
Culicoides	Diptera
Daphnia	Diplostraca
Dasyhelea	Diptera
Dendrobaena	Crassiclitellata
Diaphanosoma	Diplostraca
Dicranomyia	Diptera
Dicranota	Diptera
Dicrotendipes	Diptera

Genera	Order
Dolerus	Hymenoptera
Dolichopus	Diptera
Drosophila	Diptera
Dytiscus	Coleoptera
Ellychnia	Coleoptera
Eristalis	Diptera
Eukiefferiella	Diptera
Euschistus	Hemiptera
Exechia	Diptera
Fridericia	Enchytraeida
Glyptotendipes	Diptera
Gymnometriocnemus	Diptera
Gyrinus	Coleoptera
Haliplus	Coleoptera
Helophilus	Diptera
Hemerodromia	Diptera
Hesperophylax	Trichoptera
Hyalella	Amphipoda
Hybomitra	Diptera
Lepidostoma	Trichoptera
Leptophlebia	Ephemeroptera
Limnephilus	Trichoptera
Limnophyes	Diptera
Liodessus	Coleoptera
Lispe	Dipetra
Longitarsus	Coleoptera
Lumbriculus	Lumbriculida
Lumbricus	Crassiclitellata
Megaselia	Diptera
Metriocnemus	Diptera
Micropsectra	Diptera
Microtendipes	Diptera
Molophilus	Diptera
Myllaena	Coleoptera
Nais	Haplotaxida
Nemotaulius	Trichoptera
Neoplea	Hemiptera
Neoporus	Coleoptera
Notonecta	Hemiptera
Octolasion	Crassiclitellata
Olibrus	Coleoptera
Optioservus	Coleoptera
Orconectes	Decapoda
Orthocladius	Diptera
Paracapnia	Plecoptera
Parachironomus	Diptera
Paraphaenocladius	Diptera
Paratanytarsus	Diptera
Parydra	Diptera
Pherbellia	Diptera
Philonthus	Coleoptera
Phytomyza	Diptera
Pipunculus	Diptera
Platycheirus	Diptera
Pollenia	Diptera

Genera	Order
Polypedilum	Diptera
Procladius	Diptera
Procloeon	Ephemeroptera
Psectrocladius	Diptera
Psychoda	Diptera
Psylliodes	Coleoptera
Pterostichus	Coleoptera
Ptilodactyla	Coleoptera
Pycnopsyche	Trichoptera
Pyropyga	Coleoptera
Rhantus	Coleoptera
Rheocricotopus	Diptera
Scaptomyza	Diptera
Sepedon	Diptera
Sialis	Megaloptera
Simocephalus	Diplostraca
Simulium	Diptera
Smittia	Diptera
Stempellinella	Diptera
Stenelmis	Coleoptera
Stilobezzia	Diptera
Stratiomys	Diptera
Syrphus	Diptera
Tabanus	Diptera
Tachinus	Coleoptera
Taeniopteryx	Plecoptera
Tanytarsus	Diptera
Telamona	Hemiptera
Tetanocera	Diptera
Thienemanniella	Diptera
Tipula	Diptera
Trichadenotecnum	Psocoptera
Trichocera	Diptera
Tricyphona	Diptera
Tvetenia	Diptera
Valenzuela	Psocoptera

APPENDIX C – MAMMAL SPECIES DETECTIONS BY SEASON, HABITAT GROUPING, AND STUDY AREA

C.1 Summer



NWMO Biodiversity Impact Studies

eDNA Summer Results (Mammal) - North LSA_{AQU}

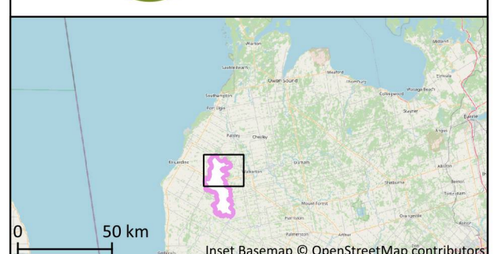
Figure C-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

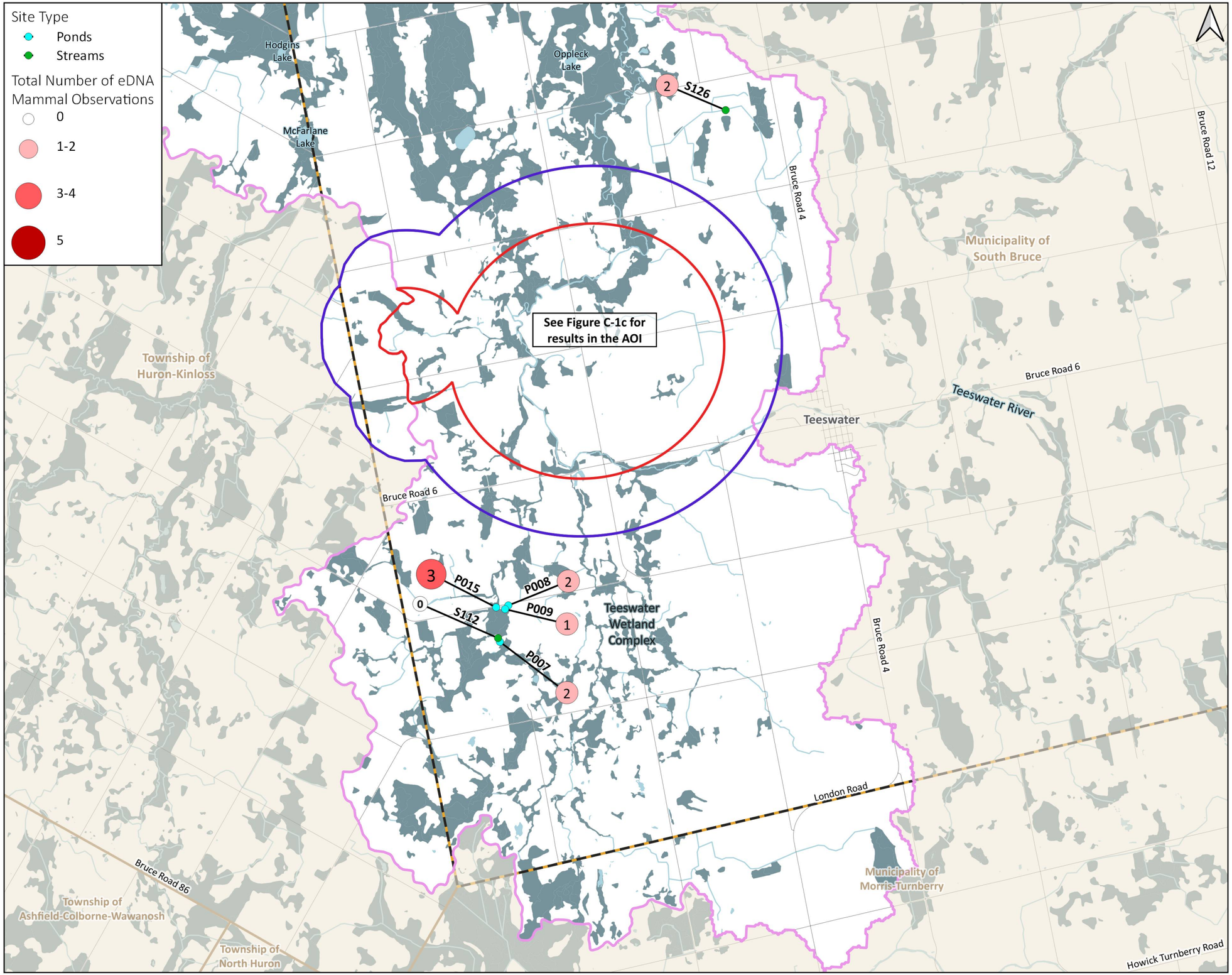
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ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A105a	



NWMO Biodiversity Impact Studies

eDNA Summer Results (Mammal) - South LSA_{AQU}

Figure C-1b

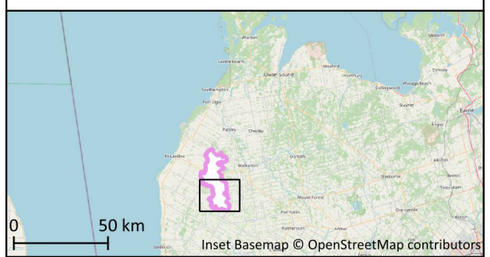
- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A105b	

Site Type
- Ponds
- Swamp
- Marsh
- Streams

Total Number of eDNA Mammal Observations
- 0
- 1-2
- 3-4
- 5

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Bruce Road 6
Kinloss Culross
Teeswater River

NWMO Biodiversity Impact Studies

eDNA Summer Results (Mammal) - AOI

Figure C-1c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A105c	

C.1.1 Watercourses

Table C-1. Summer 2022 detections of mammal species in watercourses in the AOI.

	Star-nosed Mole (*Condylura cristata*)	Human (*Homo sapiens*)	Muskrat (*Ondatra zibethicus*)	Raccoon (*Procyon lotor*)	Pig (*Sus scrofa*)	Northern Short-tailed Shrew (*Blarina brevicauda*)	Meadow Vole (*Microtus pennsylvanicus*)
S006	0	0	1	0	0	0	0
S009	0	0	1	0	0	0	0
S013	0	0	1	0	0	0	0
S014	0	1	1	0	0	0	1
S016	0	0	1	0	0	0	0
S029	0	0	1	1	1	0	0
S034	0	0	0	0	1	0	1
S038	0	0	1	1	0	0	0
S040	0	0	1	1	0	0	0
S042	0	0	1	0	0	0	0
S051	0	0	1	0	0	0	0
S056	0	0	1	0	0	0	0
S067	0	0	1	0	0	0	0
S072	0	1	1	0	1	0	0
S073	0	1	1	0	0	0	0
S074	0	0	1	0	0	0	0
S075	0	0	1	0	0	0	0
S076	0	0	1	1	1	1	0
S077	0	0	1	0	0	0	0
S093	0	0	1	0	1	0	0
S094	0	1	1	1	0	1	0
S095	1	0	1	1	0	0	1
S096	1	0	1	1	1	0	1
S100	0	1	1	0	1	0	0
Total	*2*	*5*	*23*	*7*	*7*	*2*	*4*

Table C-2. Summer 2022 detections of mammal species in watercourses outside of the AOI.

	Beaver (*Castor canadensis*)	Human (*Homo sapiens*)	Muskrat (*Ondatra zibethicus*)	Raccoon (*Procyon lotor*)	Pig (*Sus scrofa*)
S001	0	0	1	1	0
S002	1	0	1	0	0
S003	0	0	1	0	0
S010	1	1	1	0	0
S021	0	0	1	0	0
S026	0	1	1	1	0
S030	1	1	1	1	0
S037	0	0	1	0	0
S044	0	0	1	0	0
S058	0	0	1	0	0
S059	1	0	1	1	0
S061	1	0	1	0	0
S063	0	0	1	0	1
S065	0	0	1	1	0
S126	0	1	1	0	0
Total	*5*	*4*	*15*	*5*	*1*

C.1.2 Waterbodies

Table C-3. Summer 2022 detections of mammal species in waterbodies.

	Human (*Homo sapiens*)	**Muskrat (*Ondatra zibethicus*)**	**Pig (*Sus scrofa*)**
AOI			
P010	0	1	0
Total	*0*	*1*	*0*
Outside of the AOI			
L001	0	0	1
L003	0	1	1
P007	1	1	0
P008	0	1	1
P009	0	1	0
P015	1	1	1
Total	*2*	*5*	*4*

C.1.3 Wetlands

Table C-4. Summer 2022 detections of mammal species in wetlands.

	Star-nosed Mole (*Condylura cristata*)	**Human (*Homo sapiens*)**	**Muskrat (*Ondatra zibethicus*)**	**Raccoon (*Procyon lotor*)**	**Meadow Vole (*Microtus pennsylvanicus*)**
AOI					
P012 swamp	0	1	0	0	0
P013 marsh	0	1	0	0	0
P016 swamp	0	1	0	1	0
W127 marsh	0	0	1	1	1
W139 swamp	1	1	0	0	0
Total	*1*	*4*	*1*	*2*	*1*
Outside of the AOI					
W005 swamp	0	1	0	0	0
W038 marsh	0	1	1	0	0
Total	*0*	*2*	*1*	*0*	*0*

C.2 Fall

NWMO Biodiversity Impact Studies

eDNA Fall Results (Mammal) - North LSA_{AQU}

Figure C-2a

Site Type
- Swamp
- Lake
- Stream

Total Number of eDNA Mammal Observations
- 0
- 1-2
- 3-4
- 5-6

Map 1

Area of Interest (AOI)
Local Study Area (LSA_{TER})
Local Study Area (LSA_{AQU})
Lake
Wetland
Watercourse
Highway
Local Road
South Bruce Boundary
Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

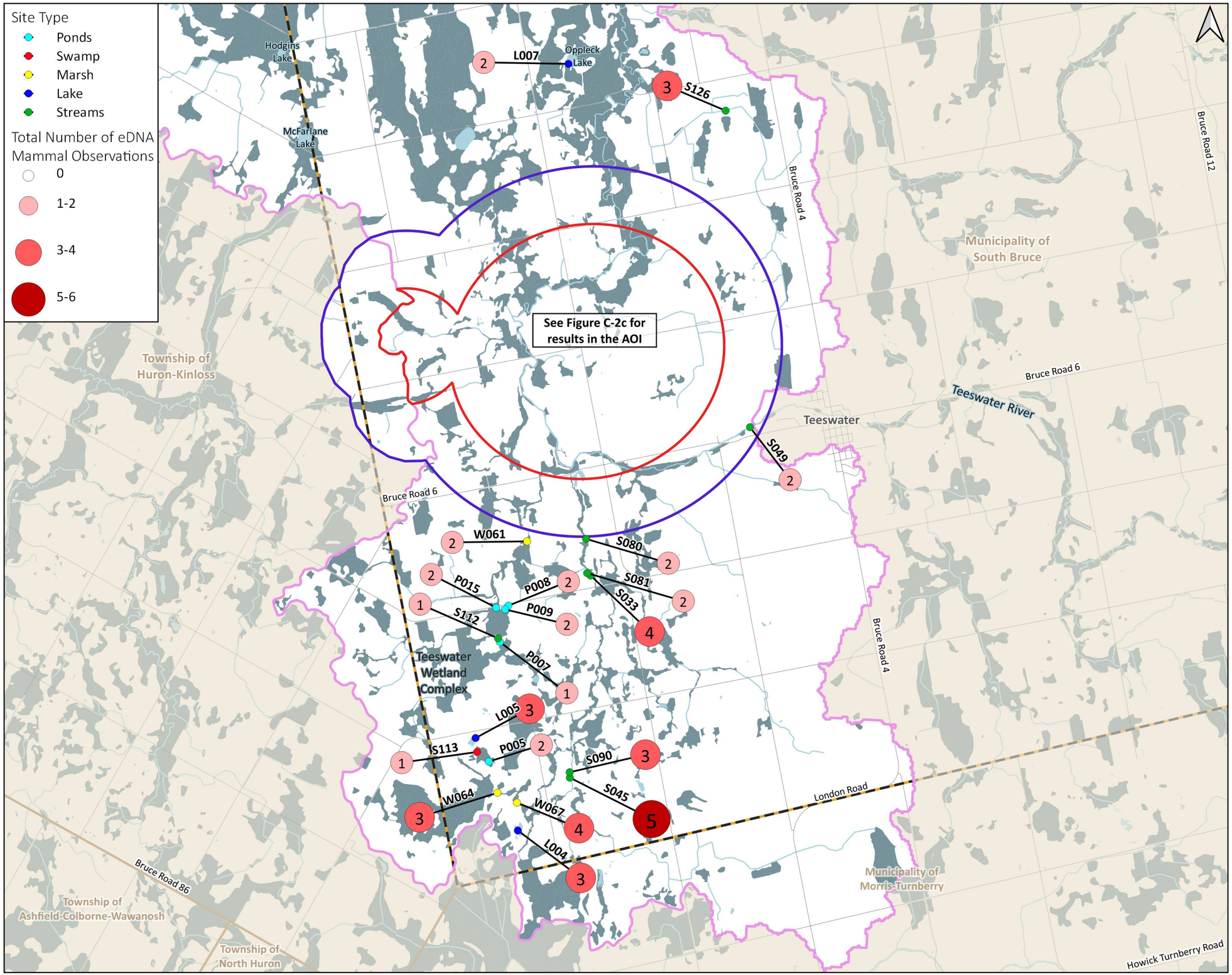
1:65,000
0 1 2 km

ZOETICA

Map 2
0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A110a	



NWMO Biodiversity Impact Studies

eDNA Fall Results (Mammal) - South LSA_{AQU}

Figure C-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A110b	

Site Type
- Ponds
- Swamp
- Marsh
- Lake
- Streams

Total Number of eDNA Mammal Observations
- 0
- 1-2
- 3-4
- 5-6

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Kinloss Culross
Bruce Road 6
Teeswater River
W132
L006
W127
W139
P010
S100
S072
S013
S067
S056
S040
S093
S094
S096
S014
S009
S016
S073
S074
S101
S042
S075
S034
S102
S015
S051
S095
S022
S077
S076
S006
S108
S038
S029
S099

NWMO Biodiversity Impact Studies

eDNA Fall Results (Mammal) - AOI

Figure C-2c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A110c	

C.2.1 Watercourses

Table C-5. Fall 2022 detections of mammal species in watercourses in the AOI.

	Beaver (*Castor canadensis*)	Human (*Homo sapiens*)	Muskrat (*Ondatra zibethicus*)	Raccoon (*Procyon lotor*)	Pig (*Sus scrofa*)	Northern Short-tailed Shrew (*Blarina brevicauda*)	Meadow Vole (*Microtus pennsylvanicus*)
S006	0	0	1	0	0	0	0
S009	1	0	1	0	0	0	0
S013	0	0	1	0	0	0	0
S014	0	1	1	1	0	0	0
S015	1	0	1	1	0	0	0
S016	0	1	1	0	0	0	0
S022	0	1	1	0	0	0	0
S029	1	1	1	0	0	0	0
S034	0	0	0	1	1	0	0
S038	0	0	1	0	0	0	0
S040	0	1	1	0	0	0	0
S042	0	0	1	1	0	0	0
S051	0	0	1	0	0	1	0
S056	0	0	1	0	0	0	0
S067	0	0	1	0	0	0	0
S072	0	0	1	0	0	0	0
S073	0	1	1	0	0	0	0
S074	0	1	1	0	1	0	0
S075	1	1	1	1	0	0	0
S076	0	0	1	0	0	0	0
S077	0	1	1	0	1	1	0
S093	1	1	1	0	1	0	0
S094	1	0	1	1	1	0	1
S095	0	1	1	1	0	1	0
S096	0	1	1	0	0	1	1
S099	0	0	0	1	1	0	0
S100	0	0	1	0	0	0	0
S101	1	0	1	0	0	0	0
S102	0	0	1	0	0	0	0
Total	*7*	*12*	*27*	*8*	*6*	*4*	*2*

Table C-6. Fall 2022 detections of mammal species in watercourses outside of the AOI.

	Beaver (*Castor canadensis*)	Star-nosed Mole (*Condylura cristata*)	Human (*Homo sapiens*)	Muskrat (*Ondatra zibethicus*)	Raccoon (*Procyon lotor*)	Pig (*Sus scrofa*)	Red Squirrel (*Tamiasciurus hudsonicus*)	North American River Otter (*Lontra canadensis*)	Meadow Vole (*Microtus pennsylvanicus*)	Brown Rat (*Rattus norvegicus*)
S001	0	0	1	1	0	1	0	0	0	0
S002	1	0	0	1	0	1	0	0	0	0
S003	1	0	1	1	1	0	0	1	0	0
S010	0	0	0	1	1	0	0	0	0	0
S011	1	1	0	1	0	1	0	1	0	0
S019[1]	1	0	1	1	0	0	0	0	0	1
S021	0	0	1	1	0	1	0	0	1	0
S026	0	1	0	1	1	0	0	0	1	0
S030	1	0	0	1	1	1	0	0	0	0
S031[1]	1	0	0	1	1	0	1	0	0	0
S033	1	0	0	1	1	0	0	0	1	0
S037	0	0	0	1	0	0	0	0	1	0
S044	0	0	0	1	0	1	0	0	0	0
S045	1	0	1	1	0	1	0	1	0	0
S046	1	0	1	1	1	1	0	1	0	0
S049	0	0	1	1	0	0	0	0	0	0
S055	1	0	1	1	0	0	0	0	0	0
S057	0	0	1	0	0	0	0	0	0	0
S058	1	1	1	1	0	1	0	0	0	0
S059	1	0	0	1	0	0	0	0	0	0
S061	1	0	0	1	0	0	0	0	0	0
S063	1	0	0	1	1	0	0	0	0	0
S065	0	0	0	1	0	0	0	0	0	0
S080	1	0	0	1	0	0	0	0	0	0
S081	1	0	0	1	0	0	0	0	0	0
S090	1	0	1	1	0	0	0	0	0	0
S112	0	0	1	0	0	0	0	0	0	0
S124[2]	0	0	1	1	0	0	0	0	0	0
S126	1	0	0	1	0	0	0	0	1	0
Total	*18*	*3*	*13*	*27*	*8*	*9*	*1*	*4*	*5*	*1*

Notes:
1. S019 and S031 are in the RSA_{AQU}.
2. S124 is outside of the RSA_{AQU}.

C.2.2 Waterbodies

Table C-7. Fall 2022 detections of mammal species in waterbodies.

	Beaver (*Castor canadensis*)	Human (*Homo sapiens*)	Muskrat (*Ondatra zibethicus*)	Raccoon (*Procyon lotor*)	Pig (*Sus scrofa*)	Meadow Vole (*Microtus pennsylvanicus*)	Brown Rat (*Rattus norvegicus*)
AOI							
P010	0	0	1	0	0	0	0
Total	*0*	*0*	*1*	*0*	*0*	*0*	*0*
Outside of the AOI							
L001	0	1	1	0	1	0	0
L002	1	1	1	0	1	0	0
L003	0	0	1	0	0	0	0
L004	1	0	1	0	1	0	0
L005	0	0	1	0	1	1	0
L007	0	1	0	0	1	0	0
L010[1]	0	0	0	0	1	0	0
L011[1]	0	0	1	1	0	0	0
L012[2]	1	0	1	0	1	0	1
P005	0	1	0	0	1	0	0
P007	0	0	1	0	0	0	0
P008	0	1	1	0	0	0	0
P009	0	1	1	0	0	0	0
P015	0	0	1	0	1	0	0
Total	*3*	*6*	*11*	*1*	*9*	*1*	*1*

Notes:
1. L010 and L011 are outside of the RSA_{AQU}.
2. L012 is in the RSA_{AQU}.

C.2.3 Wetlands

Table C-8. Fall 2022 detections of mammal species in wetlands.

	Beaver *(Castor canadensis)*	Star-nosed Mole (*Condylura cristata*)	Human (*Homo sapiens*)	Muskrat (*Ondatra zibethicus*)	Raccoon (*Procyon lotor*)	Pig (*Sus scrofa*)
AOI						
W139 swamp	0	1	1	0	0	1
Total	*0*	*1*	*1*	*0*	*0*	*1*
Outside of the AOI						
S113 swamp	0	0	0	0	1	0
W005 swamp	0	0	1	0	1	0
W006 swamp	0	0	0	1	1	0
W008 swamp	0	0	1	0	0	0
W009 swamp	0	1	1	1	0	0
W018 swamp	0	1	1	0	0	1
W033 swamp	1	0	0	1	0	1
W061 marsh	0	0	0	1	1	0
W064 marsh	0	0	1	1	0	0
W067 marsh	0	1	1	1	1	0
Total	*1*	*3*	*6*	*6*	*5*	*2*

APPENDIX D – AMPHIBIAN SPECIES DETECTIONS BY SEASON, HABITAT GROUPING, AND STUDY AREA

Site Type
- Swamp
- Marsh
- Lake
- Streams

Total Number of eDNA Amphibian Observations
- 0
- 1
- 2

Greenock Swamp Wetland Complex
Cunningham Lake
Schmidt Lake
Silver Lake
Clam Lake
Teeswater River
Municipality of Brockton
Municipality of South Bruce
Concession 6
Chepstow Road
Bruce Road 15
Bruce Road 1
Bruce Road 20
Bruce Road 3
Bruce Road 12
Bruce Road 4
Highway 9

NWMO Biodiversity Impact Studies

eDNA Summer Results (Amphibians) - North LSA_{AQU}

Figure D-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

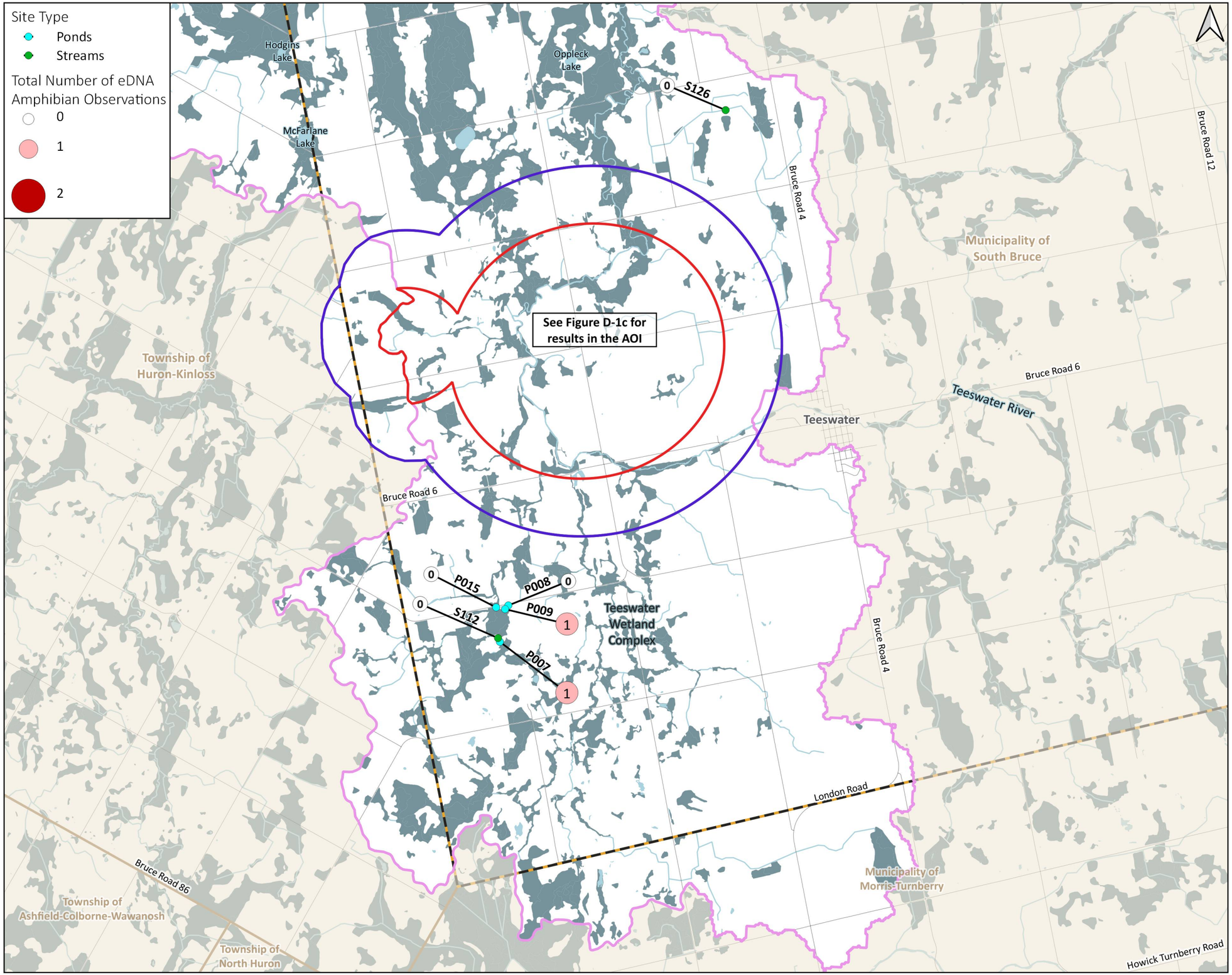
1:65,000
0 1 2 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A107a	



NWMO Biodiversity Impact Studies

eDNA Summer Results (Amphibians) - South LSA_{AQU}

Figure D-1b

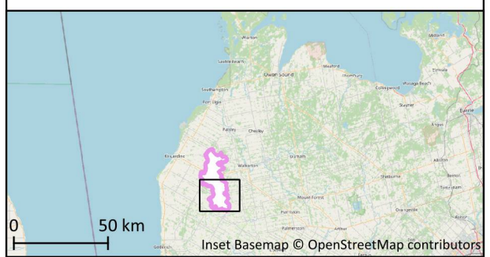
- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A107b	

Site Type
- Ponds
- Swamp
- Marsh
- Streams

Total Number of eDNA Amphibian Observations
- 0
- 1
- 2

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Bruce Road 6
Kinloss Culross
Teeswater River

0 S056 0 S067 0 S040 0
0 S100 0 S072 0 S013 0 S093 0
0 S009 2 P013 P012 1 S016 0 S073 0 S074 0 S094 0 S096 0 S014 0
0 S101 0 S042 0 S075 0
0 S034 0 S102 0 S015 0 S095 0 W124 0
0 S051 0 P002 1 W127
0 W139 0 S077 S076 0 W113 P016 0 S099 0
0 S006
0 S108
S038 0
0 P010 S029 0

NWMO Biodiversity Impact Studies

eDNA Summer Results (Amphibians) - AOI

Figure D-1c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A107c	

Site Type
- Swamp
- Lake
- Stream

Total Number of eDNA Amphibian Observations
- 0
- 1

Map 1

Bruce Road 15
Municipality of Kincardine
Greenock Swamp Wetland Complex
Cunningham Lake
Schmidt Lake
Cargill Mill Pond
Bruce Road 20
Concession 6
Municipality of Brockton
Chepstow Road
Bruce Road 3
Bruce Road 1
Teeswater River
Highway 9
Silver Lake
Clam Lake
Municipality of South Bruce
Bruce Road 12
Bruce Road 4

W033 W008 W006 W041 W005 W018 W009
S057 S044 S037 S046 S061 S063 S065 S003 S010 S059 S058 S002 S055 S026 S030
L003 S021 S001 L012 S031 S019
L001 S011 L002

Map 2

Hines Lake
Clarke's Lake
Robson Lake
Township of Chatsworth
L010 L011 S124

NWMO Biodiversity Impact Studies

eDNA Fall Results (Amphibians) - North LSA_{AQU}

Figure D-2a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

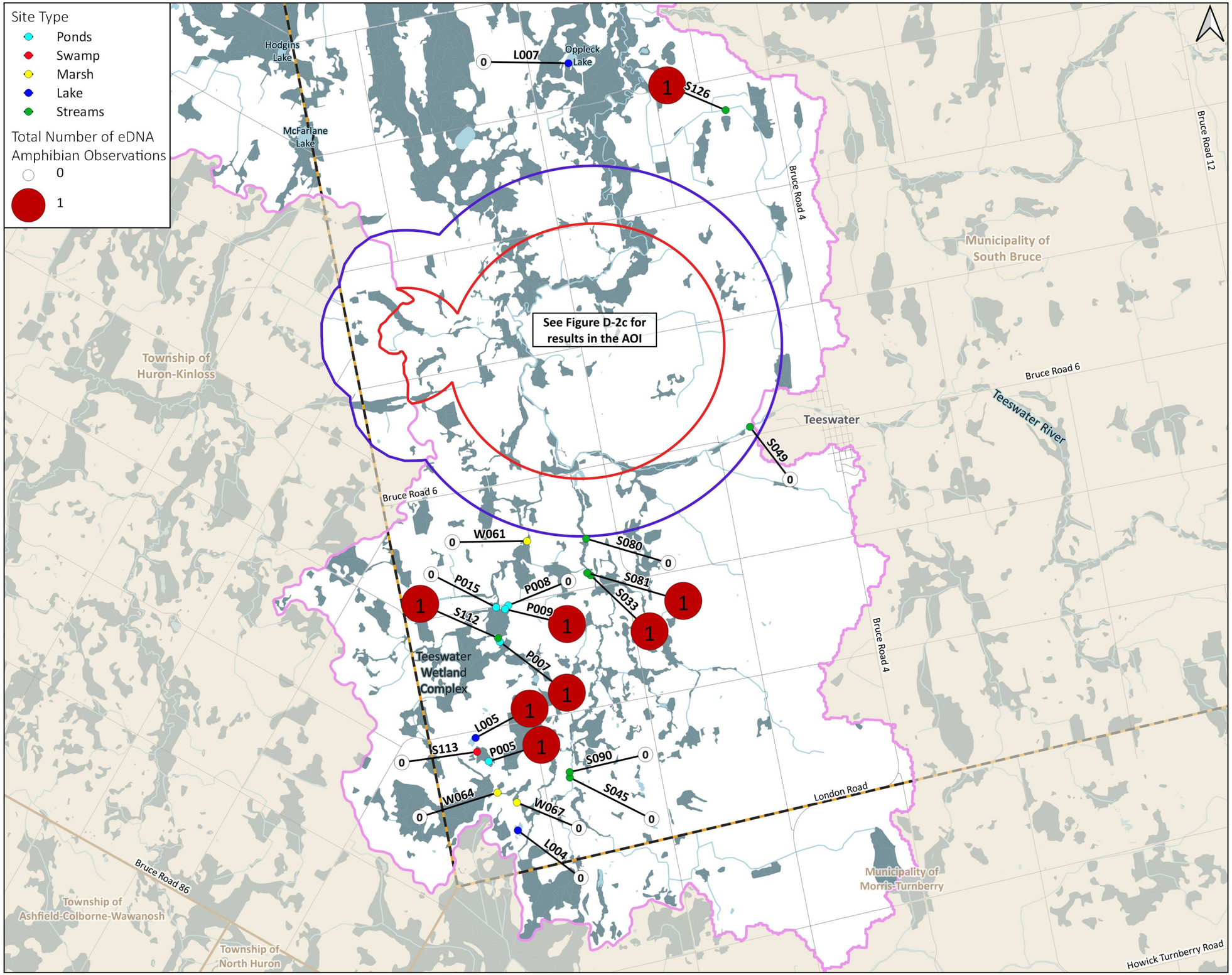
1:65,000
0 1 2 km

ZOETICA

Map 2
Map 1
0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A111a	



NWMO Biodiversity Impact Studies

eDNA Fall Results (Amphibians) - South LSA_{AQU}

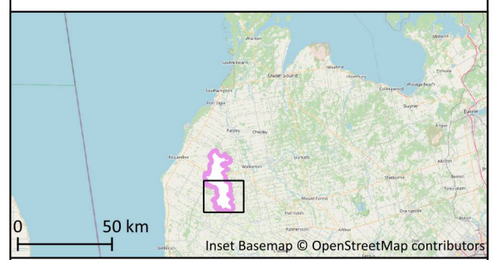
Figure D-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A111b	

NWMO Biodiversity Impact Studies

eDNA Fall Results (Amphibians) - AOI

Figure D-2c

Site Type
- Ponds
- Swamp
- Marsh
- Lake
- Streams

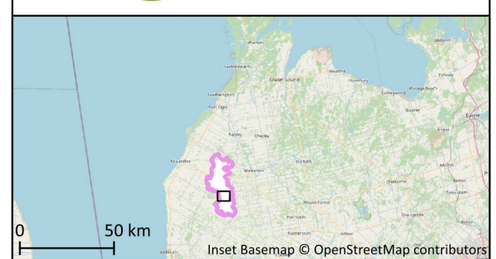
Total Number of eDNA Amphibian Observations
- 0
- 1

Area of Interest (AOI)
Local Study Area (LSA_{TER})
Local Study Area (LSA_{AQU})
Lake
Wetland
Watercourse
Highway
Local Road
South Bruce Boundary
Municipal Boundary
NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A111c	

Table D-1. 2022 detections of amphibian species.

	Four-toed Salamander (*Hemidactylium scutatum*)	Eastern Newt (*Notophthalmus viridescens*)	Wood Frog (*Lithobates sylvaticus*)	Red-backed Salamander (*Plethodon cinereus*)
SUMMER				
AOI - Wetlands				
P012 swamp	0	1	0	0
P013 marsh	0	1	1	0
W127 marsh	0	1	0	0
Total	*0*	*3*	*1*	*0*
Outside of the AOI - Waterbodies				
L003	1	0	0	0
P007	0	1	0	0
P009	0	1	0	0
Total	*1*	*2*	*0*	*0*
FALL				
AOI - Waterbodies				
L006	0	1	0	0
Total	*0*	*1*	*0*	*0*
AOI - Wetlands				
W127 marsh	0	1	0	0
W132 marsh	0	1	0	0
W139 swamp	0	1	0	0
Total	*0*	*3*	*0*	*0*
Outside of the AOI - Watercourses				
S010	0	0	0	1
S026	0	1	0	0
S030	0	0	0	1
S033	0	0	0	1
S058	0	0	0	0
S063	0	0	0	0
S081	0	0	0	1
S112	0	1	0	0
S126	0	0	0	1
Total	*0*	*2*	*0*	*5*
Outside of the AOI - Waterbodies				
L005	0	1	0	0
P005	0	1	0	0
P007	0	1	0	0
P009	0	1	0	0
Total	*0*	*4*	*0*	*0*

APPENDIX E – BIRD SPECIES DETECTIONS BY SEASON, HABITAT GROUPING, AND STUDY AREA

E.1 Summer

Site Type
- Swamp
- Marsh
- Lake
- Streams

Total Number of eDNA Bird Observations
- 0
- 1
- 2
- 3-4

Bruce Road 15
Bruce Road 3
Chepstow Road
Bruce Road 20
Concession 6
Municipality of Brockton
Bruce Road 1
Cunningham Lake
Greenock Swamp Wetland Complex
Schmidt Lake
Teeswater River
Highway 9
Silver Lake
Clam Lake
Municipality of South Bruce
Bruce Road 12
Bruce Road 4

W033 0
W008 0
W024 0
L003 1
S021 1
S001 1
S057 0
S044 4
S037 1
W038 2
W006 0
W041 0
S046 0
S061 2
S063 2
S065 1
S003 1
S010 2
S059 1
S058 0
S002 2
W005 0
L001 0
S026 2
S030 0

NWMO Biodiversity Impact Studies

eDNA Summer Results (Bird) - North LSA_{AQU}

Figure E-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

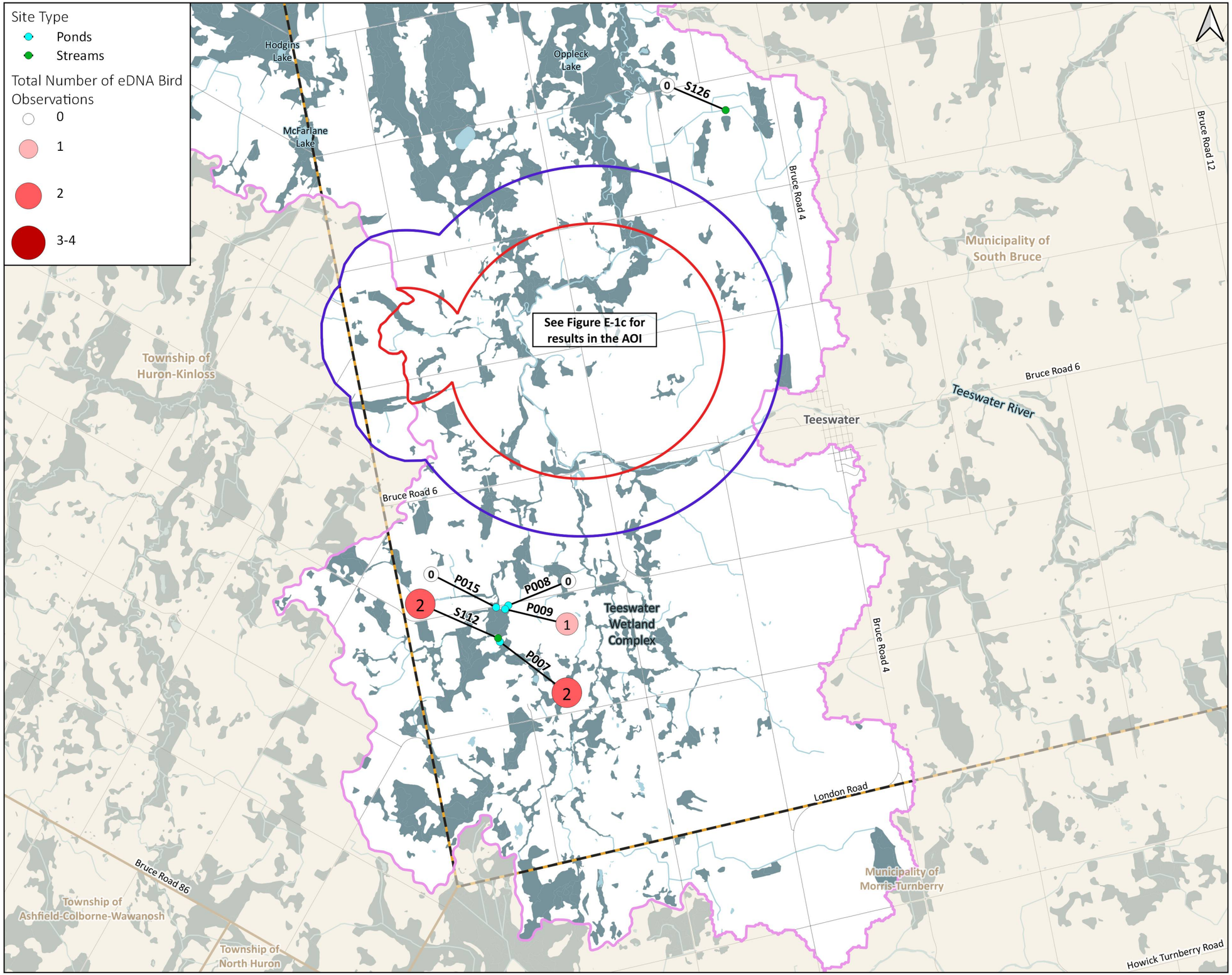
1:65,000
0 1 2 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A106a	



NWMO Biodiversity Impact Studies

eDNA Summer Results (Bird) - South LSA_{AQU}

Figure E-1b

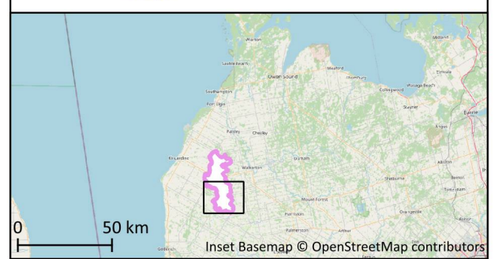
- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A106b	

NWMO Biodiversity Impact Studies

eDNA Summer Results (Bird) - AOI

Figure E-1c

Site Type
- Ponds
- Swamp
- Marsh
- Streams

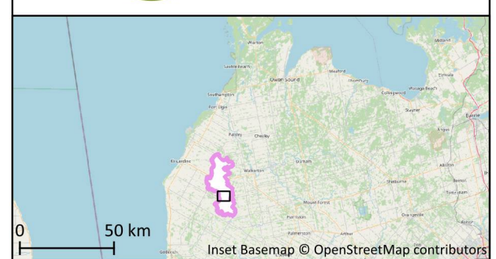
Total Number of eDNA Bird Observations
- 0
- 1
- 2
- 3-4

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A106c	

E.1.1 Watercourses

Table E-1. Summer 2022 detections of bird species in watercourses in the AOI.

	Red-winged Blackbird (*Agelaius phoeniceus*)	**Wood Duck (*Aix sponsa*)**	**Hooded Merganser (*Lophodytes cucullatus*)**	**Savannah Sparrow (*Passerculus sandwichensis*)**	**Rose-breasted Grosbeak (*Pheucticus ludovicianus*)**	**Tree Swallow (*Tachycineta bicolor*)**	**American Robin (*Turdus migratorius*)**
S009	0	1	0	0	0	0	0
S013	0	1	0	0	0	0	0
S014	0	0	0	1	0	0	1
S015	0	0	0	0	0	0	0
S016	0	1	0	0	0	0	0
S029	0	0	0	0	1	0	0
S034	0	0	0	0	1	0	0
S038	0	1	1	0	0	0	0
S040	0	0	1	0	0	0	0
S051	0	0	0	0	0	0	1
S056	0	0	0	0	0	1	1
S067	0	0	0	0	0	1	1
S072	0	0	1	0	0	0	0
S073	0	1	0	0	0	0	0
S076	0	0	0	0	0	0	0
S093	0	1	0	0	0	0	1
S094	0	0	0	0	0	0	1
S095	0	1	0	0	0	0	1
S096	1	0	0	0	0	0	1
S099	0	0	0	0	0	0	0
S100	0	1	0	0	0	0	1
S101	0	0	0	0	0	0	0
S102	0	0	0	0	0	0	1
Total	*1*	*8*	*3*	*1*	*2*	*2*	*10*

Table E-2. Summer 2022 detections of bird species in watercourses outside of the AOI.

	Red-winged Blackbird (*Agelaius phoeniceus*)	**Wood Duck (*Aix sponsa*)**	**Blue Jay (*Cyanocitta cristata*)**	**Hooded Merganser (*Lophodytes cucullatus*)**	**Rose-breasted Grosbeak (*Pheucticus ludovicianus*)**	**Virginia Rail (*Rallus limicola*)**	**Red-breasted Nuthatch (*Sitta canadensis*)**	**American Robin (*Turdus migratorius*)**
S001	0	0	0	0	0	1	0	0
S002	0	0	0	1	0	0	0	0
S003	0	0	0	1	0	0	0	0
S010	1	0	0	0	0	0	0	0
S021	0	1	0	0	0	0	0	0
S026	0	1	0	0	0	0	0	0
S037	0	0	0	0	0	0	0	1
S044	0	1	0	0	1	0	0	1
S059	0	0	1	0	0	0	0	0
S061	0	1	0	0	0	0	0	0
S063	0	1	0	1	0	0	0	0
S065	0	1	0	0	0	0	0	0
S112	0	0	1	0	0	0	1	0
Total	*1*	*6*	*2*	*3*	*1*	*1*	*1*	*2*

E.1.2 Waterbodies

Table E-3. Summer 2022 detections of bird species in waterbodies.

	Red-winged Blackbird (*Agelaius phoeniceus*)	**Wood Duck (*Aix sponsa*)**	**Rose-breasted Grosbeak (*Pheucticus ludovicianus*)**
Outside of the AOI			
L003	0	0	1
P007	0	1	0
P009	1	0	0
Total	1	1	1
Notes: No bird detections in waterbodies in the AOI in the Summer.			

E.1.3 Wetlands

Table E-4. Summer 2022 detections of bird species in wetlands.

	Wood Duck (*Aix sponsa*)	**Blue Jay (*Cyanocitta cristata*)**	**Eastern Phoebe (*Sayornis phoebe*)**	**American Robin (*Turdus migratorius*)**
AOI				
P002 marsh	0	0	1	1
P012 swamp	1	0	0	0
P016 swamp	1	1	0	0
W113 swamp	1	0	0	0
W124 swamp	0	0	0	0
W127 marsh	1	0	0	0
W139 swamp	0	1	0	0
Total	*4*	*2*	*1*	*1*
Outside of the AOI				
W038 marsh	1	0	0	0
Total	*1*	*0*	*0*	*0*

E.2 Fall

NWMO Biodiversity Impact Studies

eDNA Fall Results (Bird) - North LSA_{AQU}

Figure E-2a

Site Type
- Swamp
- Lake
- Stream

Total Number of eDNA Bird Observations
- 0
- 1
- 2-3
- 4-5

Map 1

Area of Interest (AOI)
Local Study Area (LSA_{TER})
Local Study Area (LSA_{AQU})
Lake
Wetland
Watercourse
Highway
Local Road
South Bruce Boundary
Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA

Map 2
Map 1
0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A113a	

NWMO Biodiversity Impact Studies

eDNA Fall Results (Bird) - South LSA_{AQU}

Figure E-2b

Site Type
- Ponds
- Swamp
- Marsh
- Lake
- Streams

Total Number of eDNA Bird Observations
- 0
- 1
- 2-3
- 4-5

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A113b	

NWMO Biodiversity Impact Studies

eDNA Fall Results (Bird) - AOI

Figure E-2c

Site Type
- Ponds
- Swamp
- Marsh
- Lake
- Streams

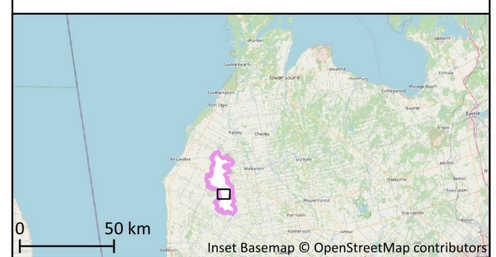
Total Number of eDNA Bird Observations
- 0
- 1
- 2-3
- 4-5

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A113c	

E.2.1 Watercourses

Table E-5. Fall 2022 detections of bird species in watercourses in the AOI.

	Wood Duck (*Aix sponsa*)	**Mallard (*Anas platyrhynchos*)**	**Hermit Thrush (*Catharus guttatus*)**	**Blue Jay (*Cyanocitta cristata*)**	**Indigo Bunting (*Passerina cyanea*)**	**Ruby-crowned Kinglet (*Regulus calendula*)**	**Golden-crowned Kinglet (*Regulus satrapa*)**	**American Robin (*Turdus migratorius*)**
S006	0	0	0	0	0	0	0	1
S009	1	0	0	0	0	0	0	0
S014	0	0	0	0	0	0	0	1
S015	1	0	0	0	0	0	1	1
S016	0	1	0	0	0	1	0	0
S022	0	0	0	0	0	0	0	1
S034	0	0	0	1	0	0	0	1
S038	0	0	0	0	0	0	0	1
S042	1	0	0	0	0	0	0	0
S051	0	0	0	0	0	0	0	0
S073	0	0	0	0	0	0	0	1
S074	0	0	0	0	0	0	0	1
S075	0	0	0	0	0	0	0	1
S076	0	0	0	0	0	0	0	1
S077	0	0	0	0	0	0	0	1
S093	0	0	1	0	0	0	0	1
S094	0	0	0	0	0	0	0	1
S095	0	0	1	1	0	0	1	1
S096	0	0	0	0	0	0	0	1
S099	0	0	0	0	1	1	0	1
S100	1	0	0	0	0	0	0	0
S108	0	0	0	1	0	0	0	1
Total	*4*	*1*	*2*	*3*	*1*	*2*	*2*	*17*

Table E-6. Fall 2022 detections of bird species in watercourses outside of the AOI.

	Wood Duck (*Aix sponsa*)	Mallard (*Anas platyrhynchos*)	Muscovy Duck (*Cairina moschata*)	Blue Jay (*Cyanocitta cristata*)	Indigo Bunting (*Passerina cyanea*)	Golden crowned Kinglet (*Regulus satrapa*)	White-breasted Nuthatch (*Sitta carolinensis*)	American Robin (*Turdus migratorius*)
S001	0	1	0	0	0	0	0	0
S003	0	0	0	1	0	1	0	0
S010	1	0	0	0	0	1	0	0
S019[1]	0	0	0	0	0	0	0	1
S021	1	0	0	0	0	0	0	0
S031[1]	0	0	0	0	0	0	0	1
S033	0	0	0	0	0	0	0	0
S037	1	0	1	0	0	0	0	0
S045	0	0	0	0	0	0	0	1
S046	1	0	0	0	0	0	1	1
S049	0	0	0	0	0	0	0	1
S061	0	0	0	1	0	0	0	1
S063	0	0	0	0	0	0	0	1
S080	0	0	0	0	0	0	0	1
S081	0	0	0	0	0	0	0	1
S126	0	0	0	0	1	0	0	1
Total	*4*	*1*	*1*	*2*	*1*	*2*	*1*	*10*

Note:
1. S019 and S031 are in the RSA_{AQU}.

E.2.2 Waterbodies

Table E-7. Fall 2022 detections of bird species in waterbodies.

	Wood Duck (*Aix sponsa*)	**American Robin (*Turdus migratorius*)**
Outside of the AOI		
L001	1	0
L004	0	1
L005	0	1
L012[1]	0	1
P005	1	0
Total	*2*	*3*

Notes:
1. L012 is in the RSA_{AQU}.

No bird detections in waterbodies in the AOI in the Fall.

E.2.3 Wetlands

Table E-8. Fall 2022 detections of bird species in wetlands.

	Wood Duck (*Aix sponsa*)	**Hermit Thrush (*Catharus guttatus*)**	**Swainson's Thrush (*Catharus ustulatus*)**	**Brown Creeper (*Certhia americana*)**	**Ruby-crowned Kinglet (*Regulus calendula*)**	**Golden-crowned Kinglet (*Regulus satrapa*)**	**American Robin (*Turdus migratorius*)**
AOI							
W139 swamp	0	1	0	0	0	0	1
Total	*0*	*1*	*0*	*0*	*0*	*0*	*1*
Outside of the AOI							
S113 swamp	0	0	0	0	0	0	1
W005 swamp	0	0	0	0	1	1	0
W008 swamp	0	0	0	0	0	1	1
W009 swamp	0	0	0	1	0	0	0
W018 swamp	0	0	1	0	0	0	0
W033 swamp	1	1	0	0	0	0	1
W041 swamp	0	0	0	0	0	0	1
W061 marsh	1	0	0	0	0	0	0
Total	*2*	*1*	*1*	*1*	*1*	*2*	*4*

APPENDIX F – FISH SPECIES DETECTIONS BY SEASON, HABITAT GROUPING, AND STUDY AREA

F.1 Summer

Site Type
- Swamp
- Marsh
- Lake
- Streams

Total Number of eDNA Fish Observations
- 0-2
- 3-5
- 6-8
- 9-10

Bruce Road 15
Bruce Road 3
Chepstow Road
Bruce Road 20
Concession 6
Municipality of Brockton
Bruce Road 1
Cunningham Lake
Schmidt Lake
Greenock Swamp Wetland Complex
Teeswater River
Highway 9
Silver Lake
Clam Lake
Municipality of South Bruce
Bruce Road 12
Bruce Road 4

W033 1
W008 1
L003 8
W024 3
S021 6
S001 6
S057 5
S044 7
S037 8
W006 1
W041 1
W038 9
S046 2
S061 8
S063 7
S065 7
S003 4
S010 8
S059 4
S002 9
S058 5
L001 5
S026 6
S030 4
W005 1

NWMO Biodiversity Impact Studies

eDNA Summer Results (Fish) - North LSA_{AQU}

Figure F-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

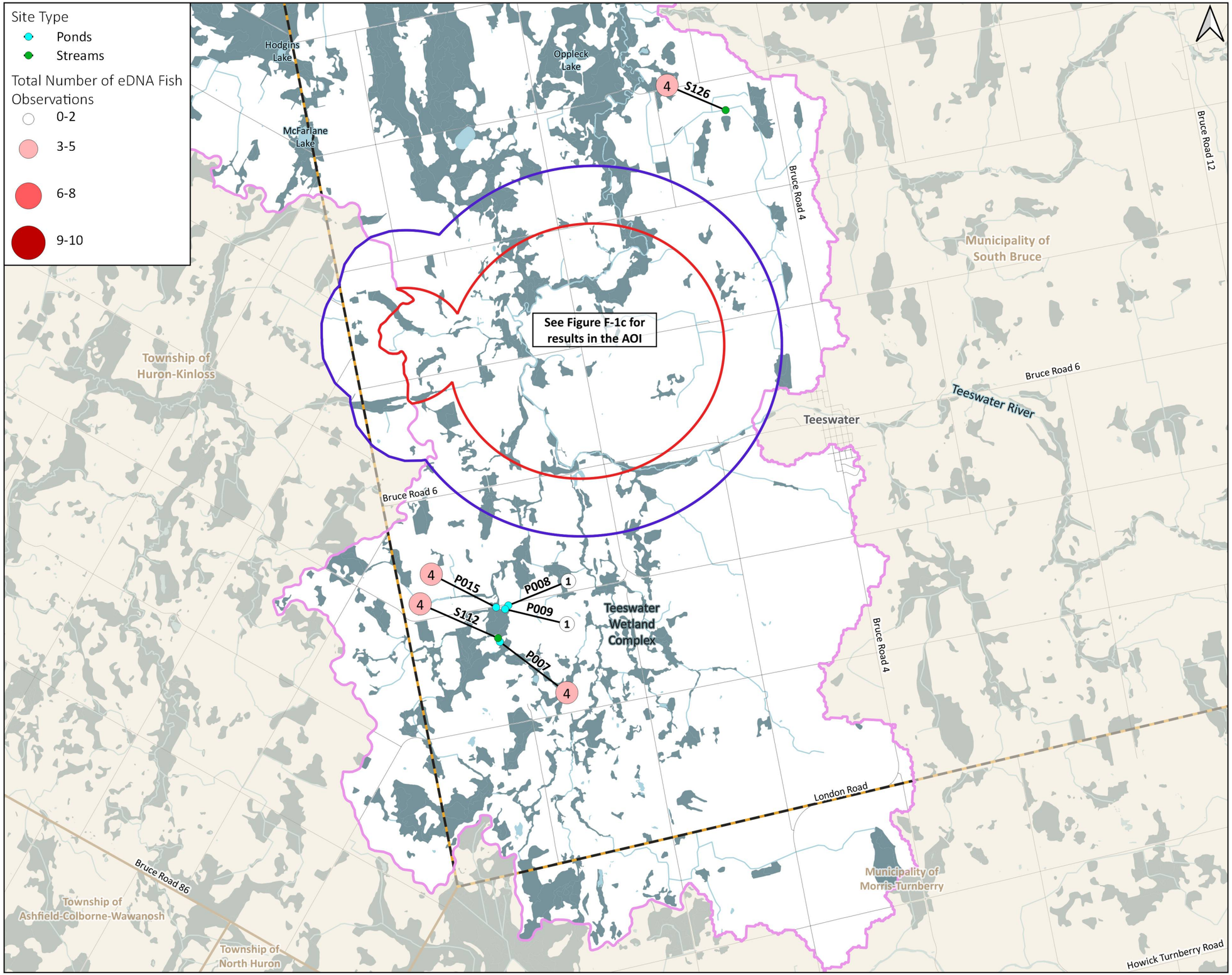
1:65,000
0 1 2 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A104a	



NWMO Biodiversity Impact Studies

eDNA Summer Results (Fish) - South LSA_{AQU}

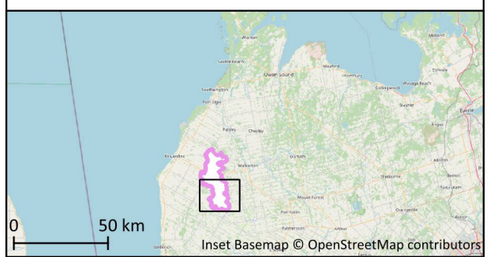
Figure F-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A104b	

Site Type
- Ponds
- Swamp
- Marsh
- Streams

Total Number of eDNA Fish Observations
- 0-2
- 3-5
- 6-8
- 9-10

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Kinloss Culross
Bruce Road 6
Teeswater River

NWMO Biodiversity Impact Studies

eDNA Summer Results (Fish) - AOI

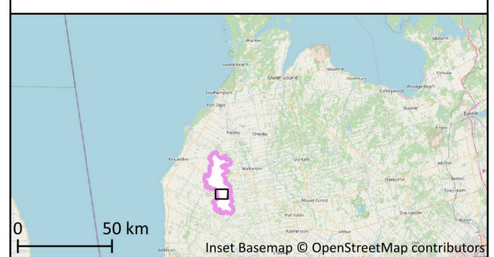
Figure F-1c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A104c	

F.1.1 Watercourses

Table F-1. Summer 2022 detections of fish species in watercourses in the AOI.

	Rock Bass (*Ambloplites rupestris*)	Northern Redbelly Dace (*Chrosomus eos*)	Brook Stickleback (*Culaea inconstans*)	Longear sunfish (*Lepomis megalotis*)	Shorthead Redhorse (*Moxostoma macrolepidotum*)	Hornyhead chub (*Nocomis biguttatus*)	Creek chub (*Semotilus atromaculatus*)	Central Mudminnow (*Umbra limi*)	White Sucker (*Catostomus commersonii*)	Finescale Dace (*Chrosomus neogaeus*)	Rainbow Darter (*Etheostoma caeruleum*)	Bluegill (*Lepomis macrochirus*)	Common Shiner (*Luxilus cornutus*)	Smallmouth Bass (*Micropterus dolomieu*)	Golden Shiner (*Notemigonus crysoleucas*)	Blacknose Shiner (*Notropis heterolepis*)	Blackside Darter (*Percina maculata*)	Fathead Minnow (*Pimephales promelas*)	Eastern Blacknose Dace (*Rhinichthys atratulus*)	Brook Trout (*Salvelinus fontinalis*)
S006	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
S009	0	1	1	0	0	0	1	1	0	1	0	0	0	0	1	1	0	1	0	0
S013	1	1	0	0	1	1	1	1	0	0	1	0	0	1	0	0	1	0	0	0
S014	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
S015	1	1	0	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0	0	0
S016	1	1	0	0	0	1	1	1	0	0	1	0	1	1	0	0	1	0	0	0
S029	0	0	0	0	0	1	1	1	0	0	1	0	0	1	0	1	1	1	0	0
S034	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
S038	0	1	0	0	0	1	1	1	1	0	1	1	0	1	0	0	1	0	0	0
S040	1	1	0	0	0	1	1	1	0	0	1	0	0	1	0	0	1	1	0	0
S042	1	0	0	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0	0	0
S051	0	0	0	0	0	1	1	1	0	0	1	0	0	1	0	0	1	0	0	0
S056	0	1	0	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0	0	0
S067	1	0	0	0	0	1	1	1	0	0	1	0	0	1	0	0	1	0	0	0
S072	1	1	0	0	0	1	1	1	0	0	1	0	0	1	0	0	1	0	0	0

	Rock Bass (*Ambloplites rupestris*)	Northern Redbelly Dace (*Chrosomus eos*)	Brook Stickleback (*Culaea inconstans*)	Longear sunfish (*Lepomis megalotis*)	Shorthead Redhorse (*Moxostoma macrolepidotum*)	Hornyhead chub (*Nocomis biguttatus*)	Creek chub (*Semotilus atromaculatus*)	Central Mudminnow (*Umbra limi*)	White Sucker (*Catostomus commersonii*)	Finescale Dace (*Chrosomus neogaeus*)	Rainbow Darter (*Etheostoma caeruleum*)	Bluegill (*Lepomis macrochirus*)	Common Shiner (*Luxilus cornutus*)	Smallmouth Bass (*Micropterus dolomieu*)	Golden Shiner (*Notemigonus crysoleucas*)	Blacknose Shiner (*Notropis heterolepis*)	Blackside Darter (*Percina maculata*)	Fathead Minnow (*Pimephales promelas*)	Eastern Blacknose Dace (*Rhinichthys atratulus*)	Brook Trout (*Salvelinus fontinalis*)
S073	0	1	0	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0	0	0
S074	0	1	0	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0
S075	0	1	0	0	0	1	1	1	0	0	1	0	0	1	0	0	0	1	0	0
S076	1	1	0	0	0	1	1	1	0	0	1	1	0	1	0	0	1	0	0	0
S077	0	1	0	1	0	1	1	1	0	0	1	0	0	1	0	0	0	0	0	0
S093	0	1	0	0	0	0	1	1	0	0	1	0	0	0	0	0	1	0	0	0
S094	0	1	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0
S095	0	1	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0	1	1	1
S096	0	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0
S099	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
S100	0	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	1	0	0
S101	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
S102	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
S108	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Total	*8*	*23*	*2*	*2*	*1*	*15*	*28*	*29*	*1*	*3*	*19*	*2*	*1*	*15*	*1*	*2*	*10*	*6*	*1*	*1*

Table F-2. Summer 2022 detections of fish species in watercourses outside of the AOI.

	Rock Bass (*Ambloplites rupestris*)	Northern Redbelly Dace (*Chrosomus eos*)	Brook Stickleback (*Culaea inconstans*)	Iowa Darter (*Etheostoma exile*)	Hornyhead chub (*Nocomis biguttatus*)	Creek Chub (*Semotilus atromaculatus*)	Central Mudminnow (*Umbra limi*)	Finescale Dace (*Chrosomus neogaeus*)	Rainbow Darter (*Etheostoma caeruleum*)	Pumpkinseed (*Lepomis gibbosus*)	Smallmouth Bass (*Micropterus dolomieu*)	Golden Shiner (*Notemigonus crysoleucas*)	Blacknose Shiner (*Notropis heterolepis*)	Blackside Darter (*Percina maculata*)	Fathead Minnow (*Pimephales promelas*)
S001	0	0	0	1	0	0	1	1	0	1	0	0	1	0	1
S002	1	0	0	0	1	1	1	0	1	0	1	0	1	1	1
S003	0	1	0	0	0	1	1	0	1	0	0	0	0	0	0
S010	1	0	1	0	1	1	1	0	1	0	0	0	1	1	0
S021	0	1	1	0	0	0	1	1	0	0	0	0	1	0	1
S026	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0
S030	1	0	0	0	0	1	1	0	0	1	0	0	0	0	0
S037	0	1	1	0	0	1	1	1	0	0	0	1	1	0	1
S044	0	1	1	0	0	1	1	1	0	0	0	0	1	0	1
S046	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
S057	0	1	0	1	0	1	1	1	0	0	0	0	0	0	0
S058	0	0	0	0	1	1	1	0	1	0	0	0	0	1	0
S059	0	0	0	0	0	1	1	0	1	0	1	0	0	0	0
S061	0	0	0	0	1	1	1	0	1	0	1	0	0	1	1
S063	1	0	0	0	1	1	1	0	1	0	1	0	0	1	0
S065	1	1	0	0	1	1	1	0	1	0	0	0	0	1	0
S112	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1
S126	0	1	0	0	0	1	1	0	1	0	0	0	0	0	0
Total	*5*	*8*	*4*	*2*	*7*	*16*	*18*	*6*	*9*	*3*	*4*	*1*	*6*	*6*	*7*

F.1.2 Waterbodies

Table F-3. Summer 2022 detections of fish species in waterbodies.

	Northern Redbelly Dace (*Chrosomus eos*)	**Brook Stickleback (*Culaea inconstans*)**	**Iowa Darter (*Etheostoma exile*)**	**Tadpole Madtom (*Noturus gyrinus*)**	**Creek Chub (*Semotilus atromaculatus*)**	**Central Mudminnow (*Umbra limi*)**	**Finescale Dace (*Chrosomus neogaeus*)**	**Brook Silverside (*Labidesthes sicculus*)**	**Pumpkinseed (*Lepomis gibbosus*)**	**Bluegill (*Lepomis macrochirus*)**	**Blacknose Shiner (*Notropis heterolepis*)**	**Fathead Minnow (*Pimephales promelas*)**
AOI												
P010	1	1	0	0	1	1	0	0	1	0	0	1
Total	*1*	*1*	*0*	*0*	*1*	*1*	*0*	*0*	*1*	*0*	*0*	*1*
Outside of the AOI												
L001	0	0	1	1	0	0	0	1	1	1	0	0
L003	1	0	1	0	1	1	1	0	1	0	1	1
P007	1	0	0	0	1	1	0	0	0	0	0	1
P008	0	0	0	0	0	1	0	0	0	0	0	0
P009	0	0	0	0	0	1	0	0	0	0	0	0
P015	1	0	0	0	1	1	0	0	0	0	0	1
Total	*3*	*0*	*2*	*1*	*3*	*5*	*1*	*1*	*2*	*1*	*1*	*3*

F.1.3 Wetlands

Table F-4. Summer 2022 detections of fish species in wetlands.

	Northern Redbelly Dace (*Chrosomus eos*)	Brook Stickleback (*Culaea inconstans*)	Iowa Darter (*Etheostoma exile*)	Creek Chub (*Semotilus atromaculatus*)	Central Mudminnow (*Umbra limi*)	Finescale Dace (*Chrosomus neogaeus*)	Pumpkinseed (*Lepomis gibbosus*)	Golden Shiner (*Notemigonus crysoleucas*)	Blacknose Shiner (*Notropis heterolepis*)	Fathead Minnow (*Pimephales promelas*)
AOI										
P002 marsh	0	0	0	0	1	0	0	0	0	0
P016 swamp	0	1	0	1	1	0	0	0	0	0
W113 swamp	0	1	0	0	1	0	0	0	0	0
W124 swamp	0	0	0	1	1	0	0	0	0	0
W127 marsh	0	1	0	0	1	0	0	0	0	0
W139 swamp	0	0	0	1	1	0	0	0	0	0
Total	*0*	*3*	*0*	*3*	*6*	*0*	*0*	*0*	*0*	*0*
Outside of the AOI										
W005 swamp	0	0	0	0	1	0	0	0	0	0
W006 swamp	0	0	0	0	1	0	0	0	0	0
W008 swamp	0	0	0	0	1	0	0	0	0	0
W024 swamp	0	1	1	0	1	0	0	0	0	0
W033 swamp	0	0	0	0	1	0	0	0	0	0
W038 marsh	1	0	1	1	1	1	1	1	1	1
W041 swamp	0	0	0	0	1	0	0	0	0	0
Total	*1*	*1*	*2*	*1*	*7*	*1*	*1*	*1*	*1*	*1*

F.2 Fall

NWMO Biodiversity Impact Studies

Total Fall Results (Fish) - North LSA_{AQU}

Figure F-2a

Site Type
- Swamp
- Lake
- Stream

Total Number of eDNA Fish Observations
- 1-3
- 4-6
- 7-9
- 10-13

Map 1

Map 2

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA

0 50 km

Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A109a	

NWMO Biodiversity Impact Studies

Total Fall Results (Fish) - South LSA_{AQU}

Figure F-2b

Site Type
- Ponds
- Swamp
- Marsh
- Lake
- Streams

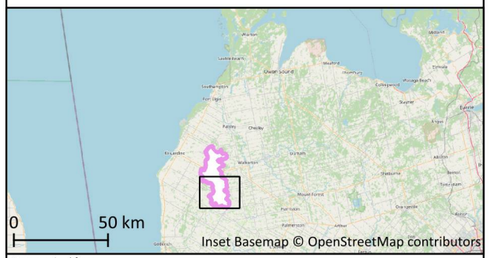
Total Number of eDNA Fish Observations
- 1-3
- 4-6
- 7-9
- 10-13

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A109b	

NWMO Biodiversity Impact Studies

Total Fall Results (Fish) - AOI

Figure F-2c

Site Type
- Ponds
- Swamp
- Marsh
- Lake
- Streams

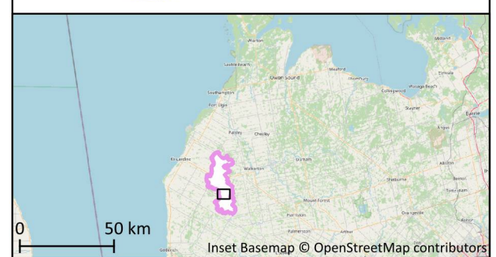
Total Number of eDNA Fish Observations
- 1-3
- 4-6
- 7-9
- 10-13

Area of Interest (AOI)
Local Study Area (LSA_{TER})
Local Study Area (LSA_{AQU})
Lake
Wetland
Watercourse
Highway
Local Road
South Bruce Boundary
Municipal Boundary
NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A109c	

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Bruce Road 6
Kinloss Culross
Teeswater River
W132
L006
S056
S067
S040
S100
S072
S013
S093
S009
S073
S074
S016
S101
S075
S042
S094
S096
S014
S034
S102
S015
S095
S022
S051
W127
S077
S076
W139
S006
S108
S038
P010
S029
S099

F.2.1 Watercourses

Table F-5. Fall 2022 detections of fish species in watercourses in the AOI.

	Northern Redbelly Dace (*Chrosomus eos*)	**Longear sunfish (*Lepomis megalotis*)**	**Hornyhead chub (*Nocomis biguttatus*)**	**Creek chub (*Semotilus atromaculatus*)**	**Central Mudminnow (*Umbra limi*)**	**White Sucker (*Catostomus commersonii*)**	**Finescale Dace (*Chrosomus neogaeus*)**	**Rainbow Darter (*Etheostoma caeruleum*)**	**Smallmouth Bass (*Micropterus dolomieu*)**	**Blacknose Shiner (*Notropis heterolepis*)**	**Blackside Darter (*Percina maculata*)**	**Fathead Minnow (*Pimephales promelas*)**	**Eastern Blacknose Dace (*Rhinichthys atratulus*)**
S006	1	0	0	1	1	0	0	0	0	0	0	0	0
S009	1	0	0	1	1	0	1	0	0	0	0	1	0
S013	1	0	1	1	1	0	0	1	1	1	0	0	0
S014	1	0	0	1	1	0	1	0	0	0	0	0	0
S015	0	0	1	1	1	0	0	1	1	0	1	1	0
S016	1	0	1	1	1	0	0	1	1	0	1	1	0
S022	1	0	0	1	1	0	0	0	0	0	0	0	0
S029	1	0	0	1	1	0	0	1	0	0	0	0	0
S034	0	0	0	1	1	0	0	0	0	0	0	0	1
S038	1	0	1	1	1	0	0	1	1	0	0	0	0
S040	1	0	1	1	1	0	0	1	0	0	1	1	0
S042	1	1	1	1	1	0	0	1	1	0	1	1	0
S051	1	0	1	1	1	0	0	1	1	0	1	1	0
S056	0	0	1	1	1	0	0	1	1	0	0	0	0
S067	1	0	1	1	1	0	0	1	1	0	0	0	0

	Northern Redbelly Dace (*Chrosomus eos*)	Longear sunfish (*Lepomis megalotis*)	Hornyhead chub (*Nocomis biguttatus*)	Creek chub (*Semotilus atromaculatus*)	Central Mudminnow (*Umbra limi*)	White Sucker (*Catostomus commersonii*)	Finescale Dace (*Chrosomus neogaeus*)	Rainbow Darter (*Etheostoma caeruleum*)	Smallmouth Bass (*Micropterus dolomieu*)	Blacknose Shiner (*Notropis heterolepis*)	Blackside Darter (*Percina maculata*)	Fathead Minnow (*Pimephales promelas*)	Eastern Blacknose Dace (*Rhinichthys atratulus*)
S072	1	0	1	1	1	0	1	1	1	0	1	1	0
S073	1	0	1	1	1	0	0	1	1	0	1	0	0
S074	1	0	1	1	1	0	0	1	1	0	1	1	0
S075	1	1	1	1	1	0	0	1	1	0	1	1	0
S076	1	0	1	1	1	1	0	1	1	0	1	1	0
S077	1	1	1	1	1	0	0	1	1	0	1	0	0
S093	1	0	0	1	1	0	0	1	0	0	0	0	0
S094	1	0	0	1	1	0	0	1	0	0	0	0	0
S095	1	0	0	1	1	0	0	0	0	0	0	0	0
S096	1	0	0	1	1	0	0	0	0	0	0	0	0
S099	1	0	0	1	1	0	0	0	0	0	0	1	0
S100	1	0	0	1	1	0	1	0	0	0	0	1	0
S101	1	0	0	1	1	0	1	1	0	0	0	1	0
S102	1	0	0	1	1	0	1	0	0	0	0	0	0
S108	0	0	0	1	1	0	0	0	0	0	0	0	0
Total	*26*	*3*	*15*	*30*	*30*	*1*	*6*	*19*	*14*	*1*	*11*	*13*	*1*

Table F-6. Fall 2022 detections of fish species in watercourses outside of the AOI.

	Rock Bass (*Ambloplites rupestris*)	Northern Redbelly Dace (*Chrosomus eos*)	Iowa Darter (*Etheostoma exile*)	Fantail Darter (*Etheostoma flabellare*)	Longear Sunfish (*Lepomis megalotis*)	Hornyhead Chub (*Nocomis biguttatus*)	River Chub (*Nocomis micropogon*)	Tadpole Madtom (*Noturus gyrinus*)	Creek Chub (*Semotilus atromaculatus*)	Central Mudminnow (*Umbra limi*)	Yellow Bullhead (*Ameiurus natalis*)	White Sucker (*Catostomus commersonii*)	Finescale Dace (*Chrosomus neogaeus*)	Rainbow Darter (*Etheostoma caeruleum*)	Brook Silverside (*Labidesthes sicculus*)	Pumpkinseed (*Lepomis gibbosus*)	Bluegill (*Lepomis macrochirus*)	Smallmouth Bass (*Micropterus dolomieu*)	Largemouth Bass (*Micropterus salmoides*)	Golden Shiner (*Notemigonus crysoleucas*)	Blacknose Shiner (*Notropis heterolepis*)	Blackside Darter (*Percina maculata*)	Fathead Minnow (*Pimephales promelas*)
S001	0	1	1	0	0	0	0	0	1	1	0	0	1	0	0	1	0	0	0	0	1	0	1
S002	0	1	0	0	0	1	0	0	1	1	0	1	0	1	0	0	0	1	0	1	0	1	0
S003	0	1	0	1	0	1	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	1	0
S010	0	0	1	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1
S011	0	0	1	0	0	0	1	1	1	1	0	0	0	0	1	0	1	0	1	0	0	0	0
S019[1]	0	0	0	1	1	0	1	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	1
S021	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	1	0	1
S026	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
S030	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0
S031[1]	1	1	0	1	1	0	1	0	1	1	1	0	1	1	0	0	0	1	0	0	0	0	1
S033	0	1	1	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1	0
S037	0	1	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1
S044	0	1	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0
S045	0	1	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1
S046	1	0	0	0	0	1	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	1	1
S049	0	1	0	0	1	1	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	1
S055	0	1	0	1	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
S057	0	1	1	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0
S058	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
S059	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1	0
S061	0	0	0	0	0	1	1	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0
S063	1	1	0	1	0	1	0	0	1	1	0	0	1	1	0	0	0	1	0	0	0	1	0
S065	0	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
S080	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0

	Rock Bass (*Ambloplites rupestris*)	Northern Redbelly Dace (*Chrosomus eos*)	Iowa Darter (*Etheostoma exile*)	Fantail Darter (*Etheostoma flabellare*)	Longear Sunfish (*Lepomis megalotis*)	Hornyhead Chub (*Nocomis biguttatus*)	River Chub (*Nocomis micropogon*)	Tadpole Madtom (*Noturus gyrinus*)	Creek Chub (*Semotilus atromaculatus*)	Central Mudminnow (*Umbra limi*)	Yellow Bullhead (*Ameiurus natalis*)	White Sucker (*Catostomus commersonii*)	Finescale Dace (*Chrosomus neogaeus*)	Rainbow Darter (*Etheostoma caeruleum*)	Brook Silverside (*Labidesthes sicculus*)	Pumpkinseed (*Lepomis gibbosus*)	Bluegill (*Lepomis macrochirus*)	Smallmouth Bass (*Micropterus dolomieu*)	Largemouth Bass (*Micropterus salmoides*)	Golden Shiner (*Notemigonus crysoleucas*)	Blacknose Shiner (*Notropis heterolepis*)	Blackside Darter (*Percina maculata*)	Fathead Minnow (*Pimephales promelas*)
S081	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
S090	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
S112	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
S124[2]	0	0	0	0	1	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0
S126	0	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1
Total	*3*	*19*	*7*	*5*	*4*	*10*	*4*	*1*	*27*	*29*	*3*	*1*	*8*	*17*	*1*	*3*	*2*	*9*	*1*	*1*	*3*	*6*	*11*

Notes:
1. S019 and S031 are in the RSA_{AQU}.
2. S124 is outside of the RSA_{AQU}.

F.2.2 Waterbodies

Table F-7. Fall 2022 detections of fish species in waterbodies in the AOI.

	Northern Redbelly Dace (*Chrosomus eos*)	Creek chub (*Semotilus atromaculatus)*	Central Mudminnow (*Umbra limi*)	Fathead Minnow (*Pimephales promelas*)
L006	1	1	1	0
P010	1	1	1	1
Total	*2*	*2*	*2*	*1*

Table F-8. Fall 2022 detections of fish species in waterbodies outside of the AOI.

	Rock Bass (*Ambloplites rupestris*)	Northern Redbelly Dace (*Chrosomus eos*)	Brook Stickleback (*Culaea inconstans*)	Iowa Darter (*Etheostoma exile*)	Banded Killifish (*Fundulus diaphanus*)	Longear sunfish (*Lepomis megalotis*)	Hornyhead chub (*Nocomis biguttatus*)	River Chub (*Nocomis micropogon*)	Tadpole Madtom (*Noturus gyrinus*)	Creek Chub (*Semotilus atromaculatus*)	Central Mudminnow (*Umbra limi*)	Yellow Bullhead (*Ameiurus natalis*)	Finescale Dace (*Chrosomus neogaeus*)	Rainbow Darter (*Etheostoma caeruleum*)	Green Sunfish (*Lepomis cyanellus*)	Pumpkinseed (*Lepomis gibbosus*)	Bluegill (*Lepomis macrochirus*)	Smallmouth Bass (*Micropterus dolomieu*)	Largemouth Bass (*Micropterus salmoides*)	Golden Shiner (*Notemigonus crysoleucas*)	Blacknose Shiner (*Notropis heterolepis*)	Blackside Darter (*Percina maculata*)	Fathead Minnow (*Pimephales promelas*)
L001	1	0	0	1	0	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0
L002	1	0	0	1	0	1	0	0	1	1	1	1	0	0	0	1	1	0	1	0	0	0	0
L003	0	1	0	1	0	0	0	0	0	1	1	0	1	0	0	1	0	0	0	0	1	0	1
L004	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1
L005	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
L007	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	0	1
L010[1]	0	1	0	1	1	1	1	1	0	1	1	0	0	0	1	0	0	1	0	0	0	0	0
L011[1]	0	0	0	1	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
L012[2]	0	0	0	0	0	1	0	0	1	1	1	1	0	1	0	0	0	1	0	0	0	1	0
P005	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
P007	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
P008	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
P009	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
P015	0	1	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1
Total	*2*	*7*	*1*	*6*	*1*	*4*	*2*	*1*	*3*	*12*	*13*	*2*	*2*	*1*	*1*	*3*	*2*	*2*	*1*	*1*	*2*	*1*	*5*

Notes:
1. L010 and L011 are outside of the RSA_{AQU}.
2. L012 is in the RSA_{AQU}.

F.2.3 Wetlands

Table F-9. Fall 2022 detections of fish species in wetlands in the AOI.

	Northern Redbelly Dace (*Chrosomus eos*)	Creek Chub (*Semotilus atromaculatus*)	Central Mudminnow (*Umbra limi*)
AOI			
W127 marsh	0	1	0
W132 marsh	1	0	1
W139 swamp	1	1	1
Total	*2*	*2*	*2*

Table F-10. Fall 2022 detections of fish species in wetlands outside of the AOI.

	Northern Redbelly Dace (*Chrosomus eos*)	Iowa Darter (*Etheostoma exile*)	Creek Chub (*Semotilus atromaculatus*)	Central Mudminnow (*Umbra limi*)	Finescale Dace (*Chrosomus neogaeus*)	Rainbow Darter (*Etheostoma caeruleum*)	Fathead Minnow (*Pimephales promelas*)
S113 swamp	0	0	1	1	0	0	0
W005 swamp	0	0	1	1	1	0	0
W006 swamp	1	1	1	1	0	0	0
W008 swamp	0	0	1	1	0	0	0
W009 swamp	0	0	1	1	0	0	0
W018 swamp	0	0	0	1	1	0	0
W033 swamp	1	0	1	1	1	0	0
W041 swamp	0	0	0	1	0	0	0
W061 marsh	1	0	1	1	0	1	0
W064 marsh	1	0	1	1	0	0	0
W067 marsh	1	0	1	1	0	0	1
Total	*5*	*1*	*9*	*11*	*3*	*1*	*1*

APPENDIX G – INVERTEBRATE SPECIES DETECTIONS BY SEASON, HABITAT GROUPING, AND STUDY AREA

G.1 Summer

Site Type
- Swamp
- Marsh
- Lake
- Streams

Total Number of eDNA Invertebrate Observations
- 0-13
- 14-28
- 29-43
- 44-58

Bruce Road 15
Bruce Road 3
Chepstow Road
Bruce Road 20
Concession 6
Municipality of Brockton
Bruce Road 1
Cunningham Lake
Schmidt Lake
Greenock Swamp Wetland Complex
Teeswater River
Highway 9
Silver Lake
Clam Lake
Municipality of South Bruce
Bruce Road 12
Bruce Road 4

W033 6
W008 3
W024 7
L003 9
S021 12
S001 10
S057 14
S044 7
S037 12
W038 10
W006 0
W041 4
S046 13
S061 27
S063 39
S065 18
S003 33
S010 15
S059 19
S058 31
S002 26
W005 12
L001 11
S026 15
S030 17

NWMO Biodiversity Impact Studies

eDNA Summer Results (Invertebrate) - North LSA_{AQU}

Figure G-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A108a	

Site Type
- Ponds
- Streams

Total Number of eDNA Invertebrate Observations
- 0-13
- 14-28
- 29-43
- 44-58

Hodgins Lake
McFarlane Lake
Oppleck Lake
13 S126
Bruce Road 4
Bruce Road 12
Municipality of South Bruce
See Figure G-1c for results in the AOI
Township of Huron-Kinloss
Bruce Road 6
Teeswater River
Teeswater
13 P015 P008 14
9 S112 P009 18
P007 6
Teeswater Wetland Complex
Bruce Road 4
London Road
Bruce Road 86
Township of Ashfield-Colborne-Wawanosh
Township of North Huron
Municipality of Morris-Turnberry
Howick Turnberry Road

NWMO Biodiversity Impact Studies

eDNA Summer Results (Invertebrate) - South LSA_{AQU}

Figure G-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA

0 50 km

Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A108b	

Site Type
- Ponds
- Swamp
- Marsh
- Streams

Total Number of eDNA Invertebrate Observations
- 0-13
- 14-28
- 29-43
- 44-58

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Bruce Road 6
Kinloss Culross
Teeswater River

NWMO Biodiversity Impact Studies

eDNA Summer Results (Invertebrate) - AOI

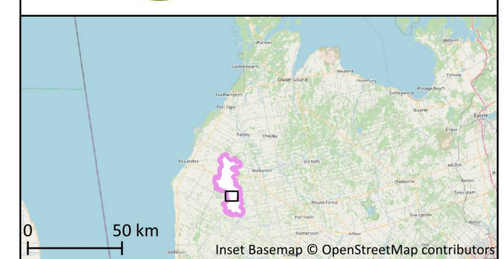
Figure G-1c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A108c	

G.1.1 Watercourses

Table G-1. Summer 2022 detections of invertebrate species in watercourses in the AOI.

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Phylum: Annelida																														
Class: Clitellata																														
Order: Crassiclitellata																														
Lumbricidae	*Lumbricus rubellus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Order: Enchytraeida																														
Enchytraeidae	*Fridericia ratzeli*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Order: Haplotaxida																														
Naididae	*Aulodrilus pluriseta*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1
Naididae	*Branchiura sowerbyi*	0	0	1	0	1	1	1	0	1	0	1	1	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Naididae	*Ilyodrilus templetoni*	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Nais bretscheri*	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Naididae	*Nais communis*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Nais stolci*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Naididae	*Potamothrix bavaricus*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Lumbriculida																														
Sparganophilidae	*Sparganophilus tamesis*	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Rhynchobdellida																														
Glossiphoniidae	*Placobdella parasitica*	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Arthropoda																														
Class: Branchiopoda																														
Order: Diplostraca																														
Chydoridae	*Alona circumfimbriata*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Daphniidae	*Ceriodaphnia dubia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Daphniidae	*Simocephalus serrulatus*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Class: Insecta																														
Order: Coleoptera																														
Carabidae	*Loricera pilicornis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Carabidae	*Pterostichus melanarius*	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysomelidae	*Dibolia chelones*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Chrysomelidae	*Psylliodes picinus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0
Cleridae	*Cymatodera bicolor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Cleridae	*Isohydnocera curtipennis*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Curculionidae	*Sciaphilus asperatus*	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	1	1	1	0	0	0	1	0
Dytiscidae	*Dytiscus fasciventris*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0
Dytiscidae	*Hygrotus impressopunctatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Dytiscidae	*Ilybiosoma seriatum*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	1
Dytiscidae	*Laccophilus maculosus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Dytiscidae	*Liodessus affinis*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dytiscidae	*Neoporus clypealis*	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	0	0	1	1	0
Dytiscidae	*Neoporus undulatus*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dytiscidae	*Platambus semivittatus*	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Elateridae	*Dalopius pallidus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elateridae	*Hemicrepidius brevicollis*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Elateridae	*Hemicrepidius hemipodus*	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Elmidae	*Dubiraphia vittata*	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	1	1	1	0	0	0	0	0
Elmidae	*Optioservus fastiditus*	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Elmidae	*Stenelmis quadrimaculata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Gyrinidae	*Dineutus hornii*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haliplidae	*Haliplus immaculicollis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Haliplidae	*Peltodytes tortulosus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	*Hydrobius fuscipes*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	*Tropisternus mixtus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Hydrophilidae	*Tropisternus natator*	0	0	1	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0
Lampyridae	*Pyropyga decipiens*	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	1	0
Lampyridae	*Pyropyga nigricans*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Psephenidae	*Psephenus herricki*	0	0	0	0	1	0	1	0	0	0	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Scarabaeidae	*Amphimallon majale*	0	0	1	0	1	1	0	0	1	1	1	0	1	1	1	0	1	0	0	0	1	1	1	1	0	0	0	1	0
Scirtidae	*Contacyphon obscurus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Staphylinidae	*Lathrobium othioides*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Staphylinidae	*Philonthus carbonarius*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staphylinidae	*Philonthus flavibasis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Staphylinidae	*Philonthus longicornis*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Diptera																														
Agromyzidae	*Cerodontha incisa*	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agromyzidae	*Cerodontha longipennis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Agromyzidae	*Cerodontha muscina*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Agromyzidae	*Liriomyza brassicae*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Agromyzidae	*Nemorimyza posticata*	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Agromyzidae	*Phytomyza crassiseta*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
Anthomyzidae	*Stiphrosoma balteatum*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asilidae	*Machimus notatus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Calliphoridae	*Phormia regina*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Ceratopogonidae	*Atrichopogon fusculus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	*Culicoides haematopotus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Ceratopogonidae	*Dasyhelea turficola*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Chaoboridae	*Chaoborus albipes*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaoboridae	*Chaoborus punctipennis*	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Ablabesmyia annulata*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Brillia flavifrons*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0
Chironomidae	*Chironomus acidophilus*	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Chironomus bifurcatus*	0	1	0	0	0	1	1	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
Chironomidae	*Chironomus maturus*	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	1	0
Chironomidae	*Chironomus melanescens*	0	0	0	1	1	1	0	0	0	1	1	0	0	0	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Chironomidae	*Cladopelma edwardsi*	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cladotanytarsus atridorsum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Conchapelopia telema*	0	0	0	1	1	1	0	1	0	0	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	0	0	1	0
Chironomidae	*Corynoneura arctica*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Corynoneura scutellata*	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1
Chironomidae	*Cricotopus annulator*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus bicinctus*	0	0	1	0	1	1	0	0	0	1	0	1	0	1	1	0	1	1	1	0	0	1	0	0	0	1	0	1	0
Chironomidae	*Cricotopus sylvestris*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus tremulus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus triannulatus*	0	0	1	1	0	1	1	0	1	0	0	1	1	1	0	1	0	0	1	1	1	0	1	1	0	0	0	0	0
Chironomidae	*Cricotopus trifascia*	0	0	0	0	1	0	0	0	0	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus tristis*	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Chironomidae	*Cryptochironomus digitatus*	0	1	0	1	1	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0
Chironomidae	*Dicrotendipes modestus*	0	1	1	0	1	0	1	0	1	1	1	1	1	0	1	1	1	0	1	1	0	0	0	0	0	1	0	1	0
Chironomidae	*Dicrotendipes tritomus*	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Eukiefferiella claripennis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	1	1	1
Chironomidae	*Glyptotendipes meridionalis*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Heterotrissocladius changi*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Chironomidae	*Hydrobaenus johannseni*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Lauterborniella agrayloides*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Metriocnemus albolineatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Chironomidae	*Micropsectra nigripila*	1	1	1	0	1	1	0	0	0	1	1	0	1	1	0	0	1	0	1	1	1	1	0	1	0	0	1	1	0
Chironomidae	*Micropsectra polita*	1	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1
Chironomidae	*Micropsectra subletteorum*	1	1	0	1	1	1	0	0	0	1	1	0	1	1	1	1	0	1	0	0	0	0	1	1	0	0	1	0	1
Chironomidae	*Micropsectra xantha*	1	0	0	1	1	1	0	1	0	0	0	0	0	0	0	1	1	0	1	0	1	1	1	1	0	0	0	1	1
Chironomidae	*Microtendipes pedellus*	0	0	1	1	1	1	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0
Chironomidae	*Monopelopia tenuicalcar*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Nilotanypus fimbriatus*	0	0	0	0	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	1	0	0	1	0	0
Chironomidae	*Orthocladius carlatus*	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Orthocladius oliveri*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Orthocladius smolandicus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Pagastia orthogonia*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Parachironomus frequens*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Paralauterborniella nigrohalteralis*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Polypedilum aviceps*	1	0	0	0	1	0	1	1	0	0	0	1	1	1	0	0	1	1	1	1	1	1	1	1	0	0	1	0	1
Chironomidae	*Polypedilum convictum*	0	0	0	0	0	1	0	0	1	1	1	0	1	1	0	0	0	1	1	1	0	1	1	0	0	1	1	1	0
Chironomidae	*Potthastia gaedii*	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Procladius denticulatus*	0	0	1	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Prodiamesa olivacea*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0
Chironomidae	*Rheocricotopus robacki*	0	0	1	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Chironomidae	*Stempellinella fimbriata*	0	0	0	0	1	1	1	0	0	1	0	1	0	0	1	0	1	0	0	1	1	1	0	0	0	0	0	0	0
Chironomidae	*Tanypus neopunctipennis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Chironomidae	*Tanypus stellatus*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Tanytarsus glabrescens*	0	1	0	0	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	0	0
Chironomidae	*Tanytarsus guerlus*	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Tanytarsus wirthi*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Thienemanniella xena*	0	0	1	1	1	1	0	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0
Chironomidae	*Tvetenia paucunca*	1	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0	1
Chironomidae	*Xenochironomus xenolabis*	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0
Chloropidae	*Malloewia nigripalpis*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloropidae	*Rhopalopterum soror*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Empididae	*Clinocera binotata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Empididae	*Neoplasta scapularis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Ephydridae	*Hydrellia albilabris*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Ephydridae	*Hydrellia notata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	1
Ephydridae	*Notiphila olivacea*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ephydridae	*Notiphila scalaris*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Ephydridae	*Parydra quadrituberculata*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	*Scatella stagnalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Lauxaniidae	*Minettia lyraformis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Limoniidae	*Antocha saxicola*	0	0	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	1	0
Limoniidae	*Hexatoma spinosa*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Pseudolimnophila luteipennis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Muscidae	*Coenosia tigrina*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
Muscidae	*Gymnodia delecta*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pediciidae	*Dicranota guerini*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	1
Phoridae	*Diplonevra nitidula*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Phoridae	*Phalacrotophora longifrons*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pipunculidae	*Dorylomorpha atramontensis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Platystomatidae	*Rivellia steyskali*	1	0	1	1	1	0	0	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	1	0	1	1
Polleniidae	*Pollenia pediculata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
Psychodidae	*Psychoda alternata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Psychodidae	*Psychoda phalaenoides*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Ptychopteridae	*Ptychoptera quadrifasciata*	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	0	0	1	0	1
Rhagionidae	*Rhagio vertebratus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Sarcophagidae	*Boettcheria latisterna*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Sciomyzidae	*Elgiva solicita*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sciomyzidae	*Sepedon armipes*	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sciomyzidae	*Sepedon fuscipennis*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sepsidae	*Themira putris*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Simuliidae	*Simulium tuberosum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Simuliidae	*Simulium verecundum*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0
Simuliidae	*Simulium vittatum*	1	0	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	0	0
Sphaeroceridae	*Leptocera erythrocera*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Syrphidae	*Allograpta obliqua*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Syrphidae	*Eristalis flavipes*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Syrphidae	*Eristalis transversa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Syrphidae	*Lejops chrysostomus*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syrphidae	*Platycheirus quadratus*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syrphidae	*Syrphus rectus*	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Syrphidae	*Toxomerus marginatus*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1
Tabanidae	*Chrysops ater*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0
Tabanidae	*Chrysops sackeni*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	*Tabanus aegrotus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Tipulidae	*Nephrotoma cornicina*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Tipulidae	*Tipula abdominalis*	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Tipulidae	*Tipula mallochi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Order: Ephemeroptera																														
Baetidae	*Baetis brunneicolor*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae	*Baetis rusticans*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae	*Baetis tricaudatus*	1	0	1	1	0	1	1	1	0	0	1	1	0	0	0	0	1	1	0	0	1	1	1	1	0	0	0	1	1
Baetidae	*Procloeon rubropictum*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeridae	*Hexagenia atrocaudata*	0	0	1	0	1	1	1	0	0	1	1	1	0	1	1	1	0	0	1	1	0	0	0	0	0	1	0	0	0
Ephemeridae	*Hexagenia limbata*	0	0	1	0	1	1	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Heptageniidae	*Stenacron interpunctatum*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isonychiidae	*Isonychia bicolor*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Order: Hemiptera																														
Cicadellidae	*Erythroneura bakeri*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Corixidae	*Palmacorixa buenoi*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Notonectidae	*Notonecta lunata*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentatomidae	*Euschistus variolarius*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Pleidae	*Neoplea striola*	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Hymenoptera																														
Tenthredinidae	*Dolerus apricus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tenthredinidae	*Macrophya flavolineata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Order: Lepidoptera																														
Argyresthiidae	*Argyresthia canadensis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Erebidae	*Apantesis phalerata*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erebidae	*Lascoria ambigualis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Erebidae	*Lymantria dispar*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Erebidae	*Macrochilo absorptalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Tortricidae	*Cochylis temerana*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Tortricidae	*Gypsonoma salicicolana*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Order: Mecoptera																														
Meropeidae	*Merope tuber*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Megaloptera																														

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Corydalidae	*Chauliodes rastricornis*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Corydalidae	*Nigronia serricornis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Sialidae	*Sialis joppa*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Sialidae	*Sialis vagans*	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sialidae	*Sialis velata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Order: Neuroptera																														
Coniopterygidae	*Conwentzia pineticola*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemerobiidae	*Micromus posticus*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	1	0	0	1	0	0
Hemerobiidae	*Micromus subanticus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Sisyridae	*Climacia areolaris*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Order: Plecoptera																														
Capniidae	*Paracapnia angulata*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leuctridae	*Leuctra rickeri*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemouridae	*Amphinemura delosa*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Perlodidae	*Isoperla nana*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0
Taeniopterygidae	*Strophopteryx fasciata*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taeniopterygidae	*Taeniopteryx nivalis*	0	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Order: Psocoptera																														
Psocidae	*Trichadenotecnum majus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Order: Trichoptera																														
Hydroptilidae	*Hydroptila consimilis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Hydroptilidae	*Hydroptila jackmanni*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostomatidae	*Lepidostoma griseum*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Limnephilidae	*Frenesia difficilis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Limnephilidae	*Ironoquia punctatissima*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Limnephilidae	*Limnephilus canadensis*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Limnephilidae	*Platycentropus radiatus*	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	1	1	0	0	1	0	0
Limnephilidae	*Psychoglypha subborealis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Limnephilidae	*Pycnopsyche subfasciata*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philopotamidae	*Dolophilodes distinctus*	1	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	1	1	1	1	0	0	0	0	1	0
Class: Malacostraca																														
Order: Amphipoda																														
Hyalellidae	*Hyalella azteca*	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Order: Decapoda																														
Cambaridae	*Faxonius rusticus*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Class: Ostracoda																														
Order: Podocopida																														
Cyprididae	*Cypridopsis vidua*	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Bacillariophyta																														
Class: Bacillariophyceae																														
Order: Naviculales																														
Sellaphoraceae	*Sellaphora pupula*	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Table G-2. Summer 2022 detections of invertebrate species in watercourses outside of the AOI.

Family	Scientific Name	S001	S002	S003	S010	S021	S026	S030	S037	S044	S046	S057	S058	S059	S061	S063	S065	S112	S126
Phylum: Annelida																			
Class: Clitellata																			
Order: Crassiclitellata																			
Lumbricidae	*Lumbricus rubellus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Haplotaxida																			
Naididae	*Aulodrilus pluriseta*	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Branchiura sowerbyi*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Naididae	*Ilyodrilus templetoni*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Naididae	*Nais stolci*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Order: Lumbriculida																			
Sparganophilidae	*Sparganophilus tamesis*	0	1	1	0	0	1	1	0	0	0	0	1	1	1	1	0	0	0
Order: Rhynchobdellida																			
Glossiphoniidae	*Placobdella parasitica*	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0
Phylum: Arthropoda																			
Class: Arachnida																			
Order: Opiliones																			
Phalangiidae	*Phalangium opilio*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Class: Collembola																			
Order: Symphypleona																			
Katiannidae	*Sminthurinus elegans*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Class: Insecta																			
Order: Coleoptera																			
Carabidae	*Pterostichus corvinus*	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
Carabidae	*Pterostichus melanarius*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Cerambycidae	*Orthosoma brunneum*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Curculionidae	*Sciaphilus asperatus*	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Dermestidae	*Attagenus brunneus*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Dytiscidae	*Ilybiosoma seriatum*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Dytiscidae	*Laccophilus maculosus*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Dytiscidae	*Neoporus clypealis*	0	0	1	0	0	0	1	0	0	0	1	1	0	0	1	1	0	0
Dytiscidae	*Neoporus undulatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Dytiscidae	*Platambus semivittatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Elmidae	*Dubiraphia vittata*	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0
Erotylidae	*Ischyrus quadripunctatus*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Gyrinidae	*Dineutus hornii*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haliplidae	*Haliplus immaculicollis*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	*Hydrobius fuscipes*	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Hydrophilidae	*Paracymus tarsalis*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Lampyridae	*Ellychnia corrusca*	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Lampyridae	*Pyropyga decipiens*	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Melandryidae	*Symphora rugosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Psephenidae	*Psephenus herricki*	0	1	1	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0
Scarabaeidae	*Amphimallon majale*	0	1	1	1	0	0	0	0	0	0	0	1	0	1	1	1	0	1
Scarabaeidae	*Serica intermixta*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scirtidae	*Contacyphon obscurellus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Scirtidae	*Prionocyphon limbatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Scirtidae	*Scirtes tibialis*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Staphylinidae	*Dinothenarus badipes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Staphylinidae	*Hemiquedius ferox*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Order: Diptera																			
Agromyzidae	*Nemorimyza posticata*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	*Atrichopogon fusculus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	*Culicoides biguttatus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S001	S002	S003	S010	S021	S026	S030	S037	S044	S046	S057	S058	S059	S061	S063	S065	S112	S126
Chironomidae	*Brillia flavifrons*	0	1	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Chironomus acidophilus*	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Chironomus bifurcatus*	0	1	1	0	1	0	1	1	0	0	0	1	1	1	1	0	0	0
Chironomidae	*Chironomus lugubris*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Chironomus maturus*	0	0	0	0	1	0	0	1	0	1	1	0	0	0	0	0	0	0
Chironomidae	*Chironomus melanescens*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Conchapelopia telema*	0	0	1	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1
Chironomidae	*Corynoneura scutellata*	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus bicinctus*	0	1	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1
Chironomidae	*Cricotopus triannulatus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Cricotopus trifascia*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus tristis*	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0
Chironomidae	*Cryptochironomus digitatus*	0	0	0	0	1	1	1	0	1	0	1	0	0	0	0	0	0	1
Chironomidae	*Dicrotendipes modestus*	0	0	0	0	1	0	1	1	1	0	1	0	0	0	1	0	0	0
Chironomidae	*Dicrotendipes tritomus*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Eukiefferiella claripennis*	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1
Chironomidae	*Hydrobaenus johannseni*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Micropsectra nigripila*	1	1	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0
Chironomidae	*Micropsectra polita*	0	1	0	0	0	0	1	1	0	1	0	0	1	0	1	0	1	0
Chironomidae	*Micropsectra subletteorum*	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Chironomidae	*Micropsectra xantha*	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0
Chironomidae	*Microtendipes pedellus*	0	0	0	1	0	0	0	0	0	1	0	1	1	1	1	1	0	1
Chironomidae	*Nilotanypus fimbriatus*	0	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0
Chironomidae	*Orthocladius carlatus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Orthocladius oliveri*	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0
Chironomidae	*Pagastia orthogonia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Paralauterborniella nigrohalteralis*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Chironomidae	*Polypedilum aviceps*	0	0	1	0	0	0	0	0	0	1	1	1	1	0	1	0	1	1
Chironomidae	*Polypedilum convictum*	0	1	1	1	0	1	1	0	0	1	0	1	0	1	1	1	0	1
Chironomidae	*Procladius denticulatus*	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0
Chironomidae	*Rheocricotopus robacki*	0	1	1	0	0	0	0	0	0	1	0	1	1	1	1	1	0	0
Chironomidae	*Stempellinella fimbriata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Synorthocladius semivirens*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Tanytarsus glabrescens*	0	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	0	0
Chironomidae	*Tanytarsus guerlus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Tanytarsus mendax*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Thienemanniella xena*	0	1	1	1	0	1	1	0	1	0	1	1	1	1	1	0	0	0
Chironomidae	*Tvetenia paucunca*	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1
Chironomidae	*Xenochironomus xenolabis*	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Dolichopodidae	*Pelastoneurus vagans*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Empididae	*Hemerodromia melanosoma*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ephydridae	*Nostima picta*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	*Scatella tenuicosta*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Antocha saxicola*	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1
Limoniidae	*Discobola annulata*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Pseudolimnophila luteipennis*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Muscidae	*Hebecnema nigra*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Muscidae	*Lispe albitarsis*	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Platystomatidae	*Rivellia steyskali*	0	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0
Polleniidae	*Pollenia griseotomentosa*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polleniidae	*Pollenia pediculata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Ptychopteridae	*Ptychoptera quadrifasciata*	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Sciomyzidae	*Pherbellia parallela*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Simuliidae	*Simulium decorum*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Simuliidae	*Simulium tuberosum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Family	Scientific Name	S001	S002	S003	S010	S021	S026	S030	S037	S044	S046	S057	S058	S059	S061	S063	S065	S112	S126
Simuliidae	*Simulium verecundum*	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Simuliidae	*Simulium vittatum*	0	0	1	0	0	0	0	0	1	1	0	1	0	1	0	1	0	0
Sphaeroceridae	*Leptocera erythrocera*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stratiomyidae	*Sargus cuprarius*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Syrphidae	*Syrphus rectus*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Tabanidae	*Chrysops sackeni*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipulidae	*Tipula abdominalis*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Ephemeroptera																			
Baetidae	*Baetis tricaudatus*	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1
Ephemeridae	*Hexagenia atrocaudata*	0	1	1	1	0	0	0	0	0	1	0	1	0	1	1	1	0	0
Leptophlebiidae	*Leptophlebia nebulosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Order: Hemiptera																			
Nepidae	*Nepa apiculata*	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Notonectidae	*Notonecta irrorata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Pentatomidae	*Amaurochrous cinctipes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Pentatomidae	*Euschistus ictericus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Pleidae	*Neoplea striola*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Order: Megaloptera																			
Corydalidae	*Chauliodes rastricornis*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Corydalidae	*Nigronia serricornis*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Sialidae	*Sialis vagans*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Order: Neuroptera																			
Hemerobiidae	*Micromus posticus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Sisyridae	*Climacia areolaris*	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Plecoptera																			
Capniidae	*Allocapnia vivipara*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Taeniopterygidae	*Taeniopteryx nivalis*	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0
Order: Psocoptera																			
Psocidae	*Trichadenotecnum majus*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenopsocidae	*Graphopsocus cruciatus*	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Order: Trichoptera																			
Lepidostomatidae	*Lepidostoma griseum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Limnephilidae	*Platycentropus radiatus*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Limnephilidae	*Pycnopsyche guttifera*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnephilidae	*Pycnopsyche subfasciata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Philopotamidae	*Dolophilodes distinctus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Uenoidae	*Neophylax oligius*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Class: Malacostraca																			
Order: Amphipoda																			
Hyalellidae	*Hyalella azteca*	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Order: Decapoda																			
Cambaridae	*Faxonius rusticus*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

G.1.2 Waterbodies

Table G-3. Summer 2022 detections of invertebrate species in waterbodies in the AOI.

Family	Scientific Name	P010
Phylum: Annelida		
Class: Clitellata		
Order: Haplotaxida		
Naididae	*Potamothrix bavaricus*	1
Phylum: Arthropoda		
Class: Insecta		
Order: Coleoptera		
Haliplidae	*Peltodytes tortulosus*	1
Hydrophilidae	*Tropisternus mixtus*	1
Order: Diptera		
Chaoboridae	*Chaoborus punctipennis*	1
Chironomidae	*Chironomus maturus*	1
Chironomidae	*Chironomus staegeri*	1
Chironomidae	*Dicrotendipes tritomus*	1
Ephydridae	*Hydrellia tenebricosa*	1
Class: Ostracoda		
Order: Podocopida		
Cyprididae	*Cypridopsis vidua*	1

Table G-4. Summer 2022 detections of invertebrate species in waterbodies outside of the AOI.

Family	Scientific Name	L001	L003	P007	P008	P009	P015
Phylum: Annelida							
Class: Clitellata							
Order: Haplotaxida							
Naididae	*Nais communis*	0	0	0	0	1	0
Phylum: Arthropoda							
Class: Branchiopoda							
Order: Diplostraca							
Sididae	*Diaphanosoma brachyurum*	1	0	0	0	0	0
Class: Collembola							
Order: Symphypleona							
Katiannidae	*Sminthurinus elegans*	1	0	0	0	0	0
Class: Insecta							
Order: Coleoptera							
Dytiscidae	*Agabus anthracinus*	0	1	0	0	0	0
Dytiscidae	*Hydroporus dentellus*	0	1	0	0	0	0
Gyrinidae	*Dineutus hornii*	0	1	1	0	0	0
Haliplidae	*Haliplus immaculicollis*	0	0	0	0	1	1
Hydrophilidae	*Hydrobius fuscipes*	0	0	0	1	1	0
Hydrophilidae	*Hydrochara obtusata*	0	0	0	1	0	0
Hydrophilidae	*Tropisternus mixtus*	0	0	1	0	1	0
Phalacridae	*Olibrus semistriatus*	0	0	0	0	0	1
Scirtidae	*Scirtes tibialis*	0	1	0	0	1	0
Order: Diptera							
Chaoboridae	*Chaoborus punctipennis*	1	0	1	0	0	1
Chironomidae	*Chironomus acidophilus*	0	0	0	0	1	0
Chironomidae	*Chironomus atrella*	0	0	0	1	1	1
Chironomidae	*Chironomus bifurcatus*	0	0	0	0	0	1
Chironomidae	*Chironomus dilutus*	0	0	0	1	0	0
Chironomidae	*Chironomus maturus*	0	0	0	1	0	0
Chironomidae	*Corynoneura scutellata*	0	0	0	1	0	1
Chironomidae	*Cricotopus intersectus*	0	1	0	0	0	0
Chironomidae	*Cricotopus sylvestris*	1	0	0	0	0	0
Chironomidae	*Dicrotendipes modestus*	0	0	0	0	1	0
Chironomidae	*Dicrotendipes tritomus*	1	0	0	1	1	1
Chironomidae	*Lauterborniella agrayloides*	1	0	0	0	0	0
Chironomidae	*Micropsectra nigripila*	0	1	0	0	1	1
Chironomidae	*Monopelopia tenuicalcar*	0	1	0	0	0	0
Chironomidae	*Orthocladius smolandicus*	0	0	0	1	1	1
Chironomidae	*Parachironomus tenuicaudatus*	1	1	0	0	1	0
Chironomidae	*Paratanytarsus laccophilus*	0	0	0	0	0	1
Chironomidae	*Procladius denticulatus*	0	0	1	0	0	0
Chironomidae	*Psectrocladius obvius*	0	0	0	0	1	0
Chironomidae	*Psectrocladius sordidellus*	0	0	0	0	1	0
Chironomidae	*Tanytarsus mendax*	0	0	1	0	1	1
Chironomidae	*Tanytarsus recurvatus*	0	0	0	1	0	0
Chironomidae	*Tanytarsus usmaensis*	0	0	0	0	0	1
Culicidae	*Anopheles punctipennis*	0	0	0	0	0	1
Culicidae	*Ochlerotatus thibaulti*	0	0	0	1	0	0
Ephydridae	*Notiphila olivacea*	0	0	0	1	0	0
Sarcophagidae	*Sarcophaga albiceps*	1	0	0	0	0	0
Simuliidae	*Simulium vittatum*	1	0	0	0	0	0
Syrphidae	*Eristalis flavipes*	0	0	0	0	1	0
Order: Ephemeroptera							
Caenidae	*Caenis diminuta*	0	0	1	0	0	0
Ephemeridae	*Hexagenia atrocaudata*	1	0	0	0	0	0
Order: Hemiptera							
Belostomatidae	*Belostoma flumineum*	0	0	0	1	0	0
Notonectidae	*Notonecta undulata*	0	0	0	0	1	0
Pleidae	*Neoplea striola*	0	0	0	1	1	0
Class: Ostracoda							
Order: Podocopida							
Cyprididae	*Cypridopsis vidua*	1	1	0	1	0	0

G.1.3 Wetlands

Table G-5. Summer 2022 detections of invertebrate species in wetlands in the AOI.

Family	Scientific Name	P002 marsh	P012 swamp	P013 marsh	P016 swamp	W113 swamp	W124 swamp	W127 marsh	W139 swamp
Phylum: Annelida									
Class: Clitellata									
Order: Haplotaxida									
Naididae	*Ilyodrilus templetoni*	0	0	0	0	0	0	1	0
Naididae	*Slavina appendiculata*	0	0	0	0	0	0	1	0
Phylum: Arthropoda									
Class: Insecta									
Order: Coleoptera									
Carabidae	*Pterostichus melanarius*	0	0	0	1	0	0	0	0
Curculionidae	*Barypeithes pellucidus*	0	0	0	0	0	0	0	1
Curculionidae	*Sciaphilus asperatus*	0	0	0	0	0	0	0	1
Dytiscidae	*Ilybiosoma seriatum*	0	0	0	0	0	0	0	1
Dytiscidae	*Neoporus undulatus*	0	0	0	0	0	0	1	0
Haliplidae	*Haliplus immaculicollis*	0	0	0	0	0	0	1	0
Hydrophilidae	*Berosus sayi*	0	0	0	0	1	0	0	0
Hydrophilidae	*Coelostoma orbiculare*	0	0	0	0	0	0	1	0
Hydrophilidae	*Hydrochara obtusata*	0	0	0	0	0	0	1	0
Scarabaeidae	*Amphimallon majale*	1	0	0	0	0	0	0	1
Scirtidae	*Scirtes tibialis*	0	0	0	0	0	0	1	0
Order: Diptera									
Bibionidae	*Bibio xanthopus*	0	0	0	1	0	0	0	0
Ceratopogonidae	*Culicoides mulrennani*	0	0	0	0	0	0	1	0
Chaoboridae	*Chaoborus albipes*	1	1	0	1	0	0	0	0
Chaoboridae	*Chaoborus punctipennis*	0	0	0	1	0	0	0	0
Chironomidae	*Chironomus acidophilus*	1	0	0	1	1	1	0	0
Chironomidae	*Chironomus bifurcatus*	1	1	0	1	1	1	1	0
Chironomidae	*Chironomus maturus*	1	0	0	1	1	1	1	0
Chironomidae	*Corynoneura scutellata*	1	1	0	1	1	1	0	0
Chironomidae	*Gymnometriocnemus brumalis*	0	0	0	0	0	0	0	1
Chironomidae	*Metriocnemus albolineatus*	0	0	0	0	0	0	0	1
Chironomidae	*Micropsectra nigripila*	0	0	1	0	0	1	1	0
Chironomidae	*Micropsectra subletteorum*	0	0	0	0	0	0	0	1
Chironomidae	*Micropsectra xantha*	0	0	0	0	0	0	0	1
Chironomidae	*Parachironomus tenuicaudatus*	0	1	1	0	0	0	0	0
Chironomidae	*Polypedilum convictum*	0	0	0	0	0	0	0	1
Chironomidae	*Procladius denticulatus*	0	0	0	1	0	0	0	0
Chironomidae	*Prodiamesa olivacea*	0	0	0	0	0	0	0	1
Chironomidae	*Tvetenia paucunca*	0	0	0	0	0	0	0	1
Culicidae	*Culex territans*	0	1	0	0	0	0	0	0
Drosophilidae	*Scaptomyza flava*	0	0	0	0	0	1	0	0
Ephydridae	*Hydrellia albilabris*	0	0	0	0	0	0	1	0
Ephydridae	*Hydrellia notata*	0	0	0	1	0	0	0	0
Limoniidae	*Erioptera septemtrionis*	0	0	0	0	0	0	1	0
Pediciidae	*Pedicia goldsworthyi*	0	0	0	0	0	0	0	1
Platystomatidae	*Rivellia steyskali*	0	0	0	1	1	0	1	1
Sciomyzidae	*Elgiva solicita*	0	0	0	0	0	0	1	0
Sciomyzidae	*Sepedon fuscipennis*	0	0	0	1	0	0	0	0
Sphaeroceridae	*Pullimosina pullula*	0	0	0	0	0	0	1	0
Syrphidae	*Allograpta obliqua*	0	0	0	0	0	1	0	0
Tipulidae	*Nephrotoma cornicina*	0	0	0	1	0	0	0	0
Tipulidae	*Tipula mallochi*	0	0	1	0	0	0	0	0
Tipulidae	*Tipula tephrocephala*	0	0	0	0	0	0	0	1
Order: Hemiptera									
Notonectidae	*Notonecta irrorata*	1	0	0	0	0	0	0	0
Order: Lepidoptera									
Tortricidae	*Choristoneura fumiferana*	0	0	0	0	0	0	0	1
Order: Megaloptera									
Corydalidae	*Chauliodes rastricornis*	0	1	0	0	0	0	0	0
Order: Neuroptera									
Hemerobiidae	*Sympherobius amiculus*	0	0	0	0	0	0	0	1
Order: Plecoptera									
Perlodidae	*Isoperla nana*	0	0	0	0	0	0	0	1
Class: Ostracoda									
Order: Podocopida									
Cypridae	*Cypridopsis vidua*	1	0	0	0	0	0	0	0

Table G-6. Summer 2022 detections of invertebrate species in wetlands outside of the AOI.

Family	Scientific Name	W005 swamp	W008 swamp	W024 swamp	W033 swamp	W038 marsh	W041 swamp
Phylum: Annelida							
Class: Clitellata							
Order: Haplotaxida							
Naididae	*Nais communis*	0	0	0	0	1	0
Naididae	*Slavina appendiculata*	0	0	0	0	1	0
Phylum: Arthropoda							
Class: Branchiopoda							
Order: Diplostraca							
Daphniidae	*Simocephalus serrulatus*	0	0	0	0	1	0

Family	Scientific Name	W005 swamp	W008 swamp	W024 swamp	W033 swamp	W038 marsh	W041 swamp
Class: Insecta							
Order: Coleoptera							
Dytiscidae	*Clemnius laccophilinus*	0	0	1	0	0	0
Dytiscidae	*Neoporus undulatus*	0	0	1	0	0	0
Noteridae	*Hydrocanthus iricolor*	0	0	0	0	1	0
Scirtidae	*Contacyphon obscurus*	1	0	0	1	0	0
Scirtidae	*Scirtes tibialis*	0	0	0	0	1	0
Staphylinidae	*Hemiquedius ferox*	1	0	0	0	0	0
Order: Diptera							
Chaoboridae	*Chaoborus punctipennis*	0	0	0	0	1	0
Chironomidae	*Chironomus acidophilus*	1	1	0	1	0	0
Chironomidae	*Chironomus maturus*	1	1	0	0	0	1
Chironomidae	*Cricotopus bicinctus*	1	0	0	0	0	0
Chironomidae	*Dicrotendipes tritomus*	0	0	0	0	1	0
Chironomidae	*Micropsectra nigripila*	0	0	1	1	0	0
Chironomidae	*Micropsectra recurvata*	0	0	1	0	0	0
Chironomidae	*Micropsectra subletteorum*	0	0	1	0	0	0
Chironomidae	*Orthocladius smolandicus*	0	0	0	0	0	1
Chironomidae	*Parachironomus tenuicaudatus*	0	0	0	0	1	0
Chironomidae	*Tanytarsus mendax*	0	0	0	0	1	0
Culicidae	*Culex territans*	0	0	0	0	0	1
Ephydridae	*Hydrellia albilabris*	0	0	1	0	0	0
Fanniidae	*Fannia latifrons*	1	0	0	0	0	0
Limoniidae	*Ormosia affinis*	1	0	0	0	0	0
Limoniidae	*Pseudolimnophila luteipennis*	0	0	0	1	0	0
Muscidae	*Pentacricia aldrichii*	1	0	0	1	0	0
Ptychopteridae	*Ptychoptera quadrifasciata*	0	0	1	0	0	0
Sciomyzidae	*Atrichomelina pubera*	0	0	0	1	0	0
Tipulidae	*Tipula sayi*	1	0	0	0	0	0
Order: Neuroptera							
Hemerobiidae	*Micromus posticus*	1	0	0	0	0	0
Order: Psocoptera							
Lepidopsocidae	*Echmepteryx hageni*	1	0	0	0	0	0
Order: Trichoptera							
Limnephilidae	*Platycentropus radiatus*	0	0	0	0	0	1
Class: Ostracoda							
Order: Podocopida							
Cyprididae	*Cypridopsis vidua*	1	1	0	0	0	0
Phylum: Rotifera							
Class: Eurotatoria							
Order: Ploima							
Synchaetidae	*Polyarthra vulgaris*	0	0	0	0	1	0

G.2 Fall

Site Type
- Swamp
- Lake
- Stream

Total Number of eDNA Invertebrate Observations
- 3-13
- 14-28
- 29-43
- 44-58

Map 1

Bruce Road 15
Bruce Road 1
Bruce Road 20
Bruce Road 3
Bruce Road 12
Bruce Road 4
Chepstow Road
Concession 6
Highway 9
Greenock Swamp Wetland Complex
Cunningham Lake
Schmidt Lake
Cargill Mill Pond
Hines Lake
Clarke's Lake
Robson Lake
Silver Lake
Clam Lake
Teeswater River
Municipality of Brockton
Municipality of South Bruce
Township of Chatsworth

Map 2

NWMO Biodiversity Impact Studies

eDNA Fall Results (Invertebrate) - North LSA_{AQU}

Figure G-2a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

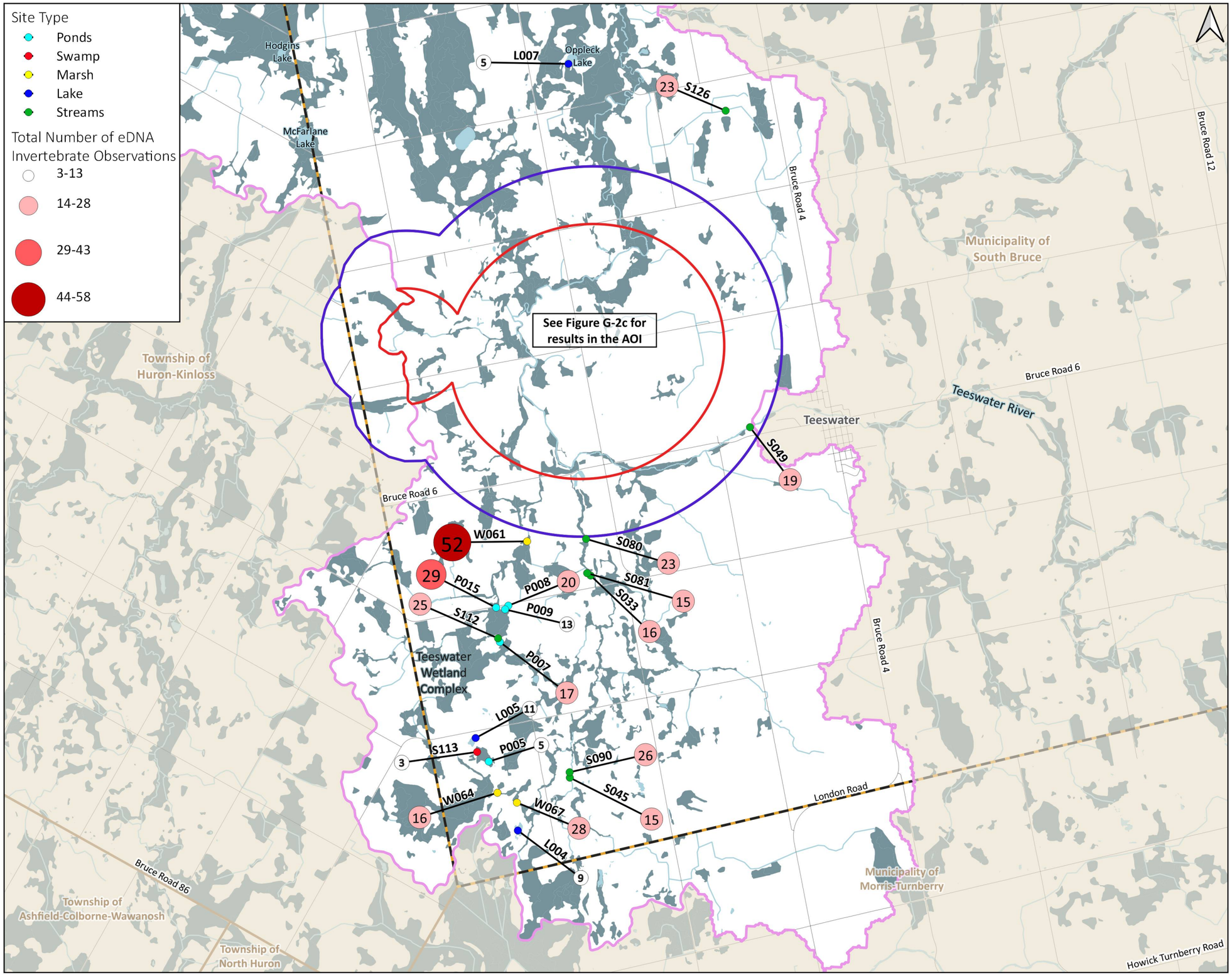
Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A112a	

NWMO Biodiversity Impact Studies

eDNA Fall Results (Invertebrate) - South LSA_{AQU}

Figure G-2b



Area of Interest (AOI)
Local Study Area (LSA_{TER})
Local Study Area (LSA_{AQU})
Lake
Wetland
Watercourse
Highway
Local Road
South Bruce Boundary
Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A112b	

Site Type
- Ponds
- Swamp
- Marsh
- Lake
- Streams

Total Number of eDNA Invertebrate Observations
- 3-13
- 14-28
- 29-43
- 44-58

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Kinloss Culross
Bruce Road 6
Teeswater River

28 W132 18 S056 22 S067 S040 28
9 L006
28 S100 32 S072 20 S013 30 S093 52 S094 23 S096 20 S014
14 S009 S073 34 S074 29 S016 24 S101 32 S042 38 S075 37 S034 11 S102 20 S015 26 S095 26 S022 36
S051 27
34 S077 S076 26 11 W139
18 S006 11 S108
S038 9
10 P010 S029 9
W127 7
S099 12

NWMO Biodiversity Impact Studies

eDNA Fall Results (Invertebrate) - AOI

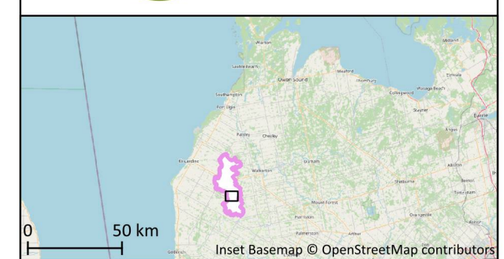
Figure G-2c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A112c	

G.2.1 Watercourses

Table G-7. Fall 2022 detections of invertebrate species in watercourses in the AOI.

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S022	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Phylum: Annelida																															
Class: Clitellata																															
Order: Crassiclitellata																															
Lumbricidae	*Lumbricus rubellus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
Lumbricidae	*Lumbricus terrestris*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0
Lumbricidae	*Octolasion tyrtaeum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Order: Enchytraeida																															
Enchytraeidae	*Henlea perpusilla*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Haplotaxida																															
Naididae	*Aulodrilus pluriseta*	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	1	0	1	1	0	1
Naididae	*Branchiura sowerbyi*	0	0	1	0	0	1	0	1	0	1	1	1	1	0	1	1	1	0	1	1	1	0	0	0	0	0	1	0	0	0
Naididae	*Chaetogaster diastrophus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Naididae	*Ilyodrilus templetoni*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0
Naididae	*Limnodrilus hoffmeisteri*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Nais bretscheri*	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Nais communis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Naididae	*Nais stolci*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Naididae	*Rhyacodrilus falciformis*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	0
Naididae	*Tubifex tubifex*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Order: Lumbriculida																															
Sparganophilidae	*Sparganophilus tamesis*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Phylum: Arthropoda																															
Class: Arachnida																															
Order: Opiliones																															
Phalangiidae	*Lophopilio palpinalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Phalangiidae	*Oligolophus tridens*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
Phalangiidae	*Phalangium opilio*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Class: Branchiopoda																															
Order: Diplostraca																															
Chydoridae	*Alona circumfimbriata*	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daphniidae	*Simocephalus serrulatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Class: Collembola																															
Order: Entomobryomorpha																															
Isotomidae	*Folsomia candida*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Symphypleona																															
Katiannidae	*Sminthurinus elegans*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Class: Insecta																															
Order: Coleoptera																															
Anthicidae	*Notoxus desertus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Carabidae	*Agonum thoreyi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S022	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Carabidae	*Bembidion transparens*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carabidae	*Clivina fossor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Carabidae	*Patrobus longicornis*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Carabidae	*Pterostichus corvinus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chrysomelidae	*Epitrix cucumeris*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cleridae	*Enoclerus nigripes*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Curculionidae	*Sciaphilus asperatus*	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	0	0	1	0	0	1	0
Dytiscidae	*Hydroporus niger*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Dytiscidae	*Ilybiosoma seriatum*	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Dytiscidae	*Ilybius biguttulus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Dytiscidae	*Laccophilus maculosus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Dytiscidae	*Neoporus clypealis*	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Dytiscidae	*Platambus semivittatus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Dytiscidae	*Rhantus sinuatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Elateridae	*Agriotes mancus*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elmidae	*Dubiraphia vittata*	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elmidae	*Optioservus fastiditus*	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Elmidae	*Stenelmis quadrimaculata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Erotylidae	*Acropteroxys gracilis*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gyrinidae	*Gyrinus sayi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haliplidae	*Haliplus immaculicollis*	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Haliplidae	*Peltodytes tortulosus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Hydrophilidae	*Coelostoma orbiculare*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Lampyridae	*Ellychnia corrusca*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0
Lampyridae	*Lucidota atra*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Phalacridae	*Olibrus semistriatus*	0	0	0	1	1	0	0	1	0	1	0	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0	0	0	0
Psephenidae	*Psephenus herricki*	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0
Ptilodactylidae	*Ptilodactyla carinata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Scarabaeidae	*Melinopterus prodromus*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Scarabaeidae	*Phyllophaga anxia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Scirtidae	*Exneria ruficollis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Scirtidae	*Prionocyphon limbatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Staphylinidae	*Erichsonius nanus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staphylinidae	*Gyrophaena insolens*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staphylinidae	*Meronera venustula*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staphylinidae	*Nehemitropia lividipennis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Staphylinidae	*Rugilus angustatus*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staphylinidae	*Tachinus limbatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Staphylinidae	*Xantholinus linearis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Order: Dermaptera																															
Forficulidae	*Forficula auricularia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Order: Diptera																															

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S022	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Acroceridae	*Actina viridis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agromyzidae	*Agromyza pseudoreptans*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agromyzidae	*Cerodontha angulata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Agromyzidae	*Cerodontha muscina*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Agromyzidae	*Nemorimyza posticata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Agromyzidae	*Ophiomyia quinta*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agromyzidae	*Phytomyza solidaginophaga*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	*Culicoides stellifer*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Chaoboridae	*Chaoborus punctipennis*	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Ablabesmyia americana*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Ablabesmyia annulata*	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Brillia flavifrons*	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Chironomidae	*Chironomus acidophilus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Chironomus maturus*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Chironomidae	*Chironomus melanescens*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Chironomidae	*Conchapelopia telema*	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Corynoneura scutellata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Cricotopus annulator*	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus bicinctus*	0	0	1	0	0	1	0	0	0	1	1	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus lebetis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Cricotopus tremulus*	0	0	0	0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	1	0	1	0	0	1	0	0	0	0	0	0
Chironomidae	*Cricotopus triannulatus*	0	0	1	0	1	1	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus trifascia*	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus tristis*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0
Chironomidae	*Cryptochironomus digitatus*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Dicrotendipes modestus*	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	0	1	0	1	0	0	0	1	0	0	0
Chironomidae	*Dicrotendipes tritomus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Eukiefferiella claripennis*	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Chironomidae	*Eukiefferiella endobryonia*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Heterotrissocladius changi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Chironomidae	*Hydrobaenus johannseni*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Chironomidae	*Kiefferulus tainanus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Limnophyes natalensis*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1
Chironomidae	*Micropsectra nigripila*	1	1	1	0	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	0	0	1	1	1	1	1	1	1	1	0
Chironomidae	*Micropsectra polita*	1	1	0	0	0	1	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Micropsectra subletteorum*	1	0	1	0	1	1	0	0	0	0	1	1	1	1	0	0	1	1	1	0	1	1	1	0	0	0	0	1	1	0
Chironomidae	*Micropsectra xantha*	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1
Chironomidae	*Microtendipes pedellus*	0	0	1	0	1	0	0	0	0	0	1	1	1	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Nanocladius anderseni*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Nilotanypus fimbriatus*	0	0	1	0	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Orthocladius carlatus*	0	0	0	0	1	1	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Orthocladius dorenus*	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S022	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Chironomidae	*Orthocladius oliveri*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Pagastia orthogonia*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	0
Chironomidae	*Paraphaenocladius impensus*	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0
Chironomidae	*Parochlus kiefferi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Polypedilum aviceps*	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0
Chironomidae	*Polypedilum convictum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	0	1	0	0
Chironomidae	*Potthastia gaedii*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Procladius denticulatus*	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Prodiamesa olivacea*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Chironomidae	*Stempellinella fimbriata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Tanytarsus glabrescens*	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0
Chironomidae	*Tanytarsus guerlus*	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Tanytarsus mendax*	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	1	0	1	1	0	0
Chironomidae	*Thienemanniella xena*	1	0	1	1	1	0	1	1	1	0	1	1	1	0	1	1	0	1	1	1	1	1	1	1	0	0	1	1	1	1
Chironomidae	*Tvetenia paucunca*	1	1	1	1	0	1	1	1	0	1	1	1	0	0	0	0	1	1	0	1	1	1	1	1	0	0	0	1	1	1
Chironomidae	*Xenochironomus xenolabis*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloropidae	*Malloewia abdominalis*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Culicidae	*Anopheles punctipennis*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosophilidae	*Chymomyza amoena*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Drosophilidae	*Drosophila suzukii*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Drosophilidae	*Drosophila tripunctata*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosophilidae	*Scaptomyza flava*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Dryomyzidae	*Dryomyza anilis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Ephydridae	*Hydrellia albilabris*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Ephydridae	*Hydrellia notata*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0
Ephydridae	*Scatella stagnalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Fanniidae	*Fannia sociella*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lauxaniidae	*Homoneura incerta*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Limoniidae	*Antocha saxicola*	0	0	0	1	0	1	1	0	0	1	0	0	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Limoniidae	*Dicranomyia halterella*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Limoniidae	*Epiphragma fasciapenne*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Euphylidorea luteola*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Limoniidae	*Hexatoma spinosa*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Muscidae	*Coenosia tigrina*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Muscidae	*Hebecnema nigra*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Pediciidae	*Dicranota guerini*	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Pediciidae	*Tricyphona inconstans*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Phoridae	*Megaselia arcticae*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Pipunculidae	*Eudorylas minor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Platystomatidae	*Rivellia steyskali*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Polleniidae	*Pollenia labialis*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Psychodidae	*Psychoda phalaenoides*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S022	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Ptychopteridae	*Bittacomorpha clavipes*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Ptychopteridae	*Ptychoptera quadrifasciata*	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	0
Scathophagidae	*Scathophaga furcata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Sciomyzidae	*Atrichomelina pubera*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Sciomyzidae	*Elgiva solicita*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Sciomyzidae	*Sepedon armipes*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Sciomyzidae	*Tetanocera vicina*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Simuliidae	*Simulium tuberosum*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Simuliidae	*Simulium venustum*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simuliidae	*Simulium vittatum*	0	0	0	0	1	1	0	0	0	0	1	1	1	1	0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0
Stratiomyidae	*Caloparyphus tetraspilus*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syrphidae	*Eristalis flavipes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Syrphidae	*Lejops chrysostomus*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	*Chrysops ater*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0
Tabanidae	*Chrysops dawsoni*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Tachinidae	*Ptilodexia conjuncta*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Tephritidae	*Euaresta bella*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Tipulidae	*Tipula abdominalis*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	0	0	0	1	0
Tipulidae	*Tipula concava*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Tipulidae	*Tipula oropezoides*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipulidae	*Tipula sayi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Tipulidae	*Tipula tephrocephala*	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Tipulidae	*Tipula tricolor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Trichoceridae	*Trichocera bimacula*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Ephemeroptera																															
Baetidae	*Baetis brunneicolor*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae	*Baetis intercalaris*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Baetidae	*Baetis tricaudatus*	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Baetidae	*Procloeon rubropictum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Baetidae	*Procloeon viridoculare*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caenidae	*Caenis latipennis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeridae	*Hexagenia atrocaudata*	0	0	1	0	1	1	0	0	0	0	1	1	1	1	1	0	1	0	1	1	1	0	0	0	0	0	1	0	1	0
Ephemeridae	*Hexagenia limbata*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Isonychiidae	*Isonychia bicolor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Leptophlebiidae	*Leptophlebia cupida*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Leptophlebiidae	*Paraleptophlebia adoptiva*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Order: Hemiptera																															
Belostomatidae	*Belostoma flumineum*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cicadellidae	*Erasmoneura vulnerata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Cicadellidae	*Erythroneura elegans*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Cicadellidae	*Erythroneura tricincta*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corixidae	*Hesperocorixa atopodonta*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S022	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Corixidae	*Palmacorixa buenoi*	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Nepidae	*Nepa apiculata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Notonectidae	*Notonecta irrorata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Pentatomidae	*Acrosternum hilare*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Pentatomidae	*Amaurochrous cinctipes*	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Pentatomidae	*Euschistus variolarius*	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0
Pleidae	*Neoplea striola*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Rhopalidae	*Harmostes reflexulus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Order: Lepidoptera																															
Argyresthiidae	*Argyresthia thuiella*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erebidae	*Halysidota tessellaris*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erebidae	*Hyphantria cunea*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erebidae	*Lascoria ambigualis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Erebidae	*Pyrrharctia isabella*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Glyphipterigidae	*Diploschizia impigritella*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lasiocampidae	*Malacosoma disstria*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Mecoptera																															
Meropeidae	*Merope tuber*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Order: Megaloptera																															
Corydalidae	*Chauliodes rastricornis*	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Corydalidae	*Nigronia serricornis*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
Sialidae	*Sialis joppa*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Sialidae	*Sialis vagans*	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Sialidae	*Sialis velata*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Neuroptera																															
Hemerobiidae	*Micromus posticus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Order: Orthoptera																															
Rhaphidophoridae	*Ceuthophilus guttulosus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Plecoptera																															
Capniidae	*Allocapnia recta*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capniidae	*Allocapnia vivipara*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Capniidae	*Paracapnia angulata*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemouridae	*Amphinemura delosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Perlodidae	*Isoperla nana*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	0	0	0	0	0
Taeniopterygidae	*Taeniopteryx nivalis*	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	1	1	0	0	1	0	1	0	0	0	0	0
Order: Psocoptera																															
Caeciliusidae	*Valenzuela flavidus*	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Ectopsocidae	*Ectopsocus meridionalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Lepidopsocidae	*Echmepteryx hageni*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Psocidae	*Trichadenotecnum majus*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Stenopsocidae	*Graphopsocus cruciatus*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Order: Trichoptera																															

Family	Scientific Name	S006	S009	S013	S014	S015	S016	S022	S029	S034	S038	S040	S042	S051	S056	S067	S072	S073	S074	S075	S076	S077	S093	S094	S095	S096	S099	S100	S101	S102	S108
Goeridae	*Goera stylata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Lepidostomatidae	*Lepidostoma bryanti*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Lepidostomatidae	*Lepidostoma vernale*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Limnephilidae	*Hesperophylax consimilis*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnephilidae	*Ironoquia punctatissima*	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Limnephilidae	*Platycentropus radiatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0
Limnephilidae	*Psychoglypha subborealis*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnephilidae	*Pycnopsyche guttifera*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Limnephilidae	*Pycnopsyche lepida*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Limnephilidae	*Pycnopsyche subfasciata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Philopotamidae	*Dolophilodes distinctus*	1	0	0	0	1	0	1	0	1	0	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	0	0	0	1	1
Phryganeidae	*Agrypnia vestita*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Class: Malacostraca																															
Order: Amphipoda																															
Hyalellidae	*Hyalella azteca*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Order: Decapoda																															
Cambaridae	*Faxonius rusticus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Class: Ostracoda																															
Order: Podocopida																															
Cyprididae	*Cypridopsis vidua*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca																															
Class: Bivalvia																															
Order: Unionida																															
Unionidae	*Lasmigona compressa*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table G-8. Fall 2022 detections of invertebrate species in watercourses outside of the AOI.

Family	Scientific Name	S001	S002	S003	S010	S011	S019[1]	S021	S026	S030	S031[1]	S033	S037	S044	S045	S046	S049	S055	S057	S058	S059	S061	S063	S065	S080	S081	S090	S112	S124[2]	S126
Phylum: Annelida																														
Class: Clitellata																														
Order: Crassiclitellata																														
Lumbricidae	*Aporrectodea limicola*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lumbricidae	*Lumbricus rubellus*	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0
Lumbricidae	*Lumbricus terrestris*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lumbricidae	*Octolasion tyrtaeum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Order: Enchytraeida																														
Enchytraeidae	*Cernosvitoviella minor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Enchytraeidae	*Fridericia ratzeli*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Enchytraeidae	*Globulidrilus riparius*	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeidae	*Henlea perpusilla*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Order: Haplotaxida																														
Naididae	*Aulodrilus pluriseta*	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1
Naididae	*Branchiura sowerbyi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	1	0	0	0	0	0	0	0
Naididae	*Dero vaga*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Ilyodrilus templetoni*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Nais bretscheri*	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Nais communis*	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Nais stolci*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0
Naididae	*Ophidonais serpentina*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Slavina appendiculata*	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naididae	*Vejdovskyella intermedia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Order: Lumbriculida																														
Lumbriculidae	*Lumbriculus variegatus*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Sparganophilidae	*Sparganophilus tamesis*	0	0	0	0	0	1	0	1	1	1	0	0	0	0	1	0	1	0	1	1	1	0	1	0	0	0	0	0	0
Order: Rhynchobdellida																														
Glossiphoniidae	*Placobdella parasitica*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Arthropoda																														
Class: Arachnida																														
Order: Ixodida																														
Ixodidae	*Haemaphysalis leporispalustris*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Class: Branchiopoda																														
Order: Diplostraca																														
Chydoridae	*Alona circumfimbriata*	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Daphniidae	*Ceriodaphnia dubia*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daphniidae	*Daphnia dentifera*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daphniidae	*Simocephalus serrulatus*	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eurycercidae	*Eurycercus longirostris*	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sididae	*Diaphanosoma brachyurum*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Class: Collembola																														

Family	Scientific Name	S001	S002	S003	S010	S011	S019[1]	S021	S026	S030	S031[1]	S033	S037	S044	S045	S046	S049	S055	S057	S058	S059	S061	S063	S065	S080	S081	S090	S112	S124[2]	S126
Order: Entomobryomorpha																														
Isotomidae	*Folsomia candida*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Class: Insecta																														
Order: Coleoptera																														
Anthicidae	*Anthicus cervinus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Anthicidae	*Notoxus desertus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Anthicidae	*Omonadus floralis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Carabidae	*Agonum gratiosum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Carabidae	*Amara apricaria*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Carabidae	*Amara lunicollis*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carabidae	*Platynus cincticollis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Carabidae	*Platynus decentis*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carabidae	*Pterostichus corvinus*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Carabidae	*Pterostichus melanarius*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Chrysomelidae	*Epitrix cucumeris*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chrysomelidae	*Psylliodes picinus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Curculionidae	*Listronotus humilis*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Curculionidae	*Sciaphilus asperatus*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Dytiscidae	*Ilybiosoma seriatum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Dytiscidae	*Ilybius biguttulus*	1	0	0	0	0	1	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Dytiscidae	*Laccophilus maculosus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Dytiscidae	*Neoporus clypealis*	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	1
Dytiscidae	*Neoporus undulatus*	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elateridae	*Athous rufifrons*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Elmidae	*Dubiraphia vittata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Elmidae	*Macronychus glabratus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Elmidae	*Optioservus fastiditus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Erotylidae	*Megalodacne fasciata*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
Gyrinidae	*Dineutus hornii*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Haliplidae	*Haliplus immaculicollis*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Hydrophilidae	*Enochrus ochraceus*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrophilidae	*Tropisternus natator*	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lampyridae	*Ellychnia corrusca*	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Lampyridae	*Pyropyga decipiens*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melandryidae	*Orchesia castanea*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitidulidae	*Carpophilus lugubris*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Noteridae	*Hydrocanthus iricolor*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phalacridae	*Olibrus semistriatus*	0	0	0	0	0	0	0	1	1	1	1	0	1	0	1	0	0	0	1	0	1	1	0	1	1	1	0	0	1
Psephenidae	*Psephenus herricki*	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	1	0	0	0	1	0	0	0	0	0
Scarabaeidae	*Amphimallon majale*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Scarabaeidae	*Melinopterus prodromus*	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
Scirtidae	*Contacyphon fuscescens*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S001	S002	S003	S010	S011	S019[1]	S021	S026	S030	S031[1]	S033	S037	S044	S045	S046	S049	S055	S057	S058	S059	S061	S063	S065	S080	S081	S090	S112	S124[2]	S126
Scirtidae	*Contacyphon obscurellus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Scirtidae	*Contacyphon obscurus*	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Scirtidae	*Exneria ruficollis*	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Scirtidae	*Prionocyphon limbatus*	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0
Scirtidae	*Scirtes tibialis*	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Staphylinidae	*Gyrohypnus fracticornis*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staphylinidae	*Nehemitropia lividipennis*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staphylinidae	*Olophrum obtectum*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staphylinidae	*Platydracus cinnamopterus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Staphylinidae	*Tasgius melanarius*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Dermaptera																														
Forficulidae	*Forficula auricularia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Diptera																														
Agromyzidae	*Agromyza pseudoreptans*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Agromyzidae	*Nemorimyza posticata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Agromyzidae	*Phytomyza loewii*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Agromyzidae	*Phytomyza nemopanthi*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthomyiidae	*Hydrophoria lancifer*	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthomyzidae	*Anthomyza variegata*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	*Culicoides haematopotus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	*Culicoides mulrennani*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Ceratopogonidae	*Culicoides stellifer*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	*Dasyhelea turficola*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	*Stilobezzia antennalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Chaoboridae	*Chaoborus albipes*	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0
Chaoboridae	*Chaoborus punctipennis*	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Chironomidae	*Ablabesmyia annulata*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Chironomidae	*Brillia flavifrons*	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Chironomidae	*Chironomus acidophilus*	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Chironomus bifurcatus*	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0
Chironomidae	*Chironomus dilutus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Chironomidae	*Chironomus maturus*	0	1	1	0	1	0	1	0	1	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Chironomus melanescens*	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	1	0	1	0	1	0	0	0
Chironomidae	*Conchapelopia telema*	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Chironomidae	*Corynoneura scutellata*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus annulator*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1
Chironomidae	*Cricotopus bicinctus*	0	1	1	1	0	0	0	1	0	0	0	0	0	0	1	0	1	0	1	1	1	0	1	0	0	1	0	0	0
Chironomidae	*Cricotopus lebetis*	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Chironomidae	*Cricotopus sylvestris*	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus tremulus*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus triannulatus*	0	1	0	0	0	1	0	0	0	1	1	0	0	0	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus trifascia*	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S001	S002	S003	S010	S011	S019[1]	S021	S026	S030	S031[1]	S033	S037	S044	S045	S046	S049	S055	S057	S058	S059	S061	S063	S065	S080	S081	S090	S112	S124[2]	S126
Chironomidae	*Cricotopus tristis*	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	1	1	0	0	1	1	1	0	0	1	0	0	0	0
Chironomidae	*Cricotopus vierriensis*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cryptochironomus digitatus*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Chironomidae	*Dicrotendipes modestus*	0	0	0	0	0	0	0	1	1	0	1	0	1	0	0	1	0	1	1	1	0	0	0	1	0	0	0	0	0
Chironomidae	*Dicrotendipes tritomus*	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	1	0
Chironomidae	*Eukiefferiella claripennis*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Eukiefferiella endobryonia*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Lauterborniella agrayloides*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Limnophyes natalensis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Chironomidae	*Metriocnemus albolineatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Micropsectra nigripila*	1	0	1	1	1	1	1	0	1	1	0	0	1	0	1	0	0	1	0	1	0	0	1	1	0	0	1	0	1
Chironomidae	*Micropsectra polita*	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Micropsectra subletteorum*	0	0	0	0	0	1	0	1	0	1	0	0	0	0	1	0	0	0	1	1	0	1	1	0	0	0	0	0	0
Chironomidae	*Micropsectra xantha*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Chironomidae	*Microtendipes pedellus*	0	1	1	0	0	1	0	0	0	0	1	0	0	1	1	1	1	0	1	1	1	0	0	0	1	1	0	0	1
Chironomidae	*Nanocladius anderseni*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Nilotanypus fimbriatus*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
Chironomidae	*Orthocladius carlatus*	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0
Chironomidae	*Orthocladius dorenus*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Orthocladius oliveri*	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Pagastia orthogonia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Chironomidae	*Parachironomus tenuicaudatus*	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Paralauterborniella nigrohalteralis*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0
Chironomidae	*Paraphaenocladius impensus*	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Parochlus kiefferi*	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Chironomidae	*Polypedilum aviceps*	0	0	0	0	0	1	0	0	0	1	1	0	0	1	1	0	1	1	0	1	0	0	0	1	0	0	0	0	1
Chironomidae	*Polypedilum convictum*	0	1	0	0	0	1	0	1	1	1	0	0	0	0	1	0	0	1	1	1	1	1	0	1	0	0	0	0	1
Chironomidae	*Procladius denticulatus*	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Chironomidae	*Psectrocladius obvius*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Psectrocladius sordidellus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Chironomidae	*Rheocricotopus robacki*	0	1	1	0	0	0	0	0	0	1	1	1	0	0	1	1	1	0	1	1	1	0	1	0	0	1	0	0	0
Chironomidae	*Smittia edwardsi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Stempellinella fimbriata*	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	0	0	0
Chironomidae	*Tanytarsus glabrescens*	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Chironomidae	*Tanytarsus mendax*	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0
Chironomidae	*Tanytarsus wirthi*	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Thienemanniella xena*	0	0	1	1	0	1	0	0	1	1	1	0	1	1	1	1	1	0	1	1	1	0	0	1	1	1	0	0	0
Chironomidae	*Tvetenia paucunca*	0	1	1	1	0	1	0	0	0	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	1
Chloropidae	*Chlorops cinerapennis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Culicidae	*Anopheles punctipennis*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Culicidae	*Uranotaenia sapphirina*	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dolichopodidae	*Achradocera arcuata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

Family	Scientific Name	S001	S002	S003	S010	S011	S019[1]	S021	S026	S030	S031[1]	S033	S037	S044	S045	S046	S049	S055	S057	S058	S059	S061	S063	S065	S080	S081	S090	S112	S124[2]	S126
Dolichopodidae	*Dolichopus albiciliatus*	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosophilidae	*Drosophila tripunctata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosophilidae	*Scaptomyza montana*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dryomyzidae	*Dryomyza anilis*	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	*Hydrellia albilabris*	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	*Hydrellia notata*	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Ephydridae	*Ilythea spilota*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0
Ephydridae	*Notiphila adusta*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	*Notiphila pulchra*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	*Scatella tenuicosta*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	*Setacera micans*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Limoniidae	*Antocha saxicola*	0	1	1	0	0	1	0	0	0	1	1	0	0	0	1	1	1	0	1	0	1	0	1	0	1	1	0	0	1
Limoniidae	*Dicranomyia frontalis*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Discobola annulata*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Epiphragma fasciapenne*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Erioptera caliptera*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Limoniidae	*Euphylidorea luteola*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Helius flavipes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Limoniidae	*Hexatoma spinosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Limoniidae	*Metalimnobia immatura*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Limoniidae	*Neolimnophila placida*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Ormosia affinis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0
Limoniidae	*Pilaria quadrata*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Pseudolimnophila luteipennis*	1	0	0	1	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Limoniidae	*Symplecta cana*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Muscidae	*Lispe albitarsis*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Muscidae	*Stomoxys calcitrans*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mycetophilidae	*Allodia angulata*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mycetophilidae	*Allodia rindeni*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Pediciidae	*Dicranota guerini*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Pipunculidae	*Pipunculus horvathi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Platypezidae	*Calotarsa pallipes*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Platystomatidae	*Rivellia steyskali*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polleniidae	*Pollenia griseotomentosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Polleniidae	*Pollenia labialis*	0	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0
Psychodidae	*Psychoda phalaenoides*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ptychopteridae	*Bittacomorpha clavipes*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Ptychopteridae	*Ptychoptera quadrifasciata*	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Sarcophagidae	*Boettcheria latisterna*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Sciomyzidae	*Atrichomelina pubera*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sciomyzidae	*Sepedon armipes*	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sciomyzidae	*Tetanocera annae*	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S001	S002	S003	S010	S011	S019[1]	S021	S026	S030	S031[1]	S033	S037	S044	S045	S046	S049	S055	S057	S058	S059	S061	S063	S065	S080	S081	S090	S112	S124[2]	S126
Sciomyzidae	*Tetanocera vicina*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
Simuliidae	*Simulium decorum*	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0
Simuliidae	*Simulium tuberosum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Simuliidae	*Simulium verecundum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
Simuliidae	*Simulium vittatum*	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Sphaeroceridae	*Leptocera erythrocera*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeroceridae	*Pullimosina pullula*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Stratiomyidae	*Stratiomys normula*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Syrphidae	*Chalcosyrphus nemorum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Syrphidae	*Eristalis flavipes*	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syrphidae	*Helophilus fasciatus*	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
Syrphidae	*Lejops chrysostomus*	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Syrphidae	*Syrphus rectus*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	*Chrysops dawsoni*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Tabanidae	*Chrysops indus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	*Chrysops sackeni*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Tabanidae	*Chrysops vittatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	*Tabanus similis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Tipulidae	*Tipula abdominalis*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0	0	1	1	1	0	0	0
Tipulidae	*Tipula concava*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipulidae	*Tipula dejecta*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Tipulidae	*Tipula hermannia*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipulidae	*Tipula oropezoides*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Tipulidae	*Tipula sayi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Tipulidae	*Tipula tephrocephala*	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Tipulidae	*Tipula tricolor*	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Order: Ephemeroptera																														
Baetidae	*Baetis rusticans*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae	*Baetis tricaudatus*	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	1	1	0	1	0
Baetidae	*Procloeon rubropictum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae	*Procloeon viridoculare*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ephemeridae	*Hexagenia atrocaudata*	0	1	1	1	0	1	0	0	0	1	0	0	0	0	1	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0
Ephemeridae	*Hexagenia limbata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Heptageniidae	*Maccaffertium exiguum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Heptageniidae	*Maccaffertium vicarium*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isonychiidae	*Isonychia bicolor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptophlebiidae	*Leptophlebia cupida*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Leptophlebiidae	*Paraleptophlebia adoptiva*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Order: Hemiptera																														
Belostomatidae	*Belostoma flumineum*	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
Cicadellidae	*Erasmoneura vulnerata*	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cicadellidae	*Erythroneura tricincta*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S001	S002	S003	S010	S011	S019[1]	S021	S026	S030	S031[1]	S033	S037	S044	S045	S046	S049	S055	S057	S058	S059	S061	S063	S065	S080	S081	S090	S112	S124[2]	S126
Cicadellidae	*Typhlocyba hockingensis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Corixidae	*Palmacorixa buenoi*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
Membracidae	*Glossonotus univittatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Membracidae	*Telamona tristis*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nepidae	*Nepa apiculata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0
Pentatomidae	*Banasa calva*	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0
Pentatomidae	*Euschistus variolarius*	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleidae	*Neoplea striola*	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Lepidoptera																														
Erebidae	*Pyrrharctia isabella*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glyphipterigidae	*Diploschizia impigritella*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Hesperiidae	*Ancyloxypha numitor*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Order: Megaloptera																														
Corydalidae	*Chauliodes rastricornis*	1	1	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Sialidae	*Sialis joppa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1
Sialidae	*Sialis vagans*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0
Order: Neuroptera																														
Chrysopidae	*Chrysopa oculata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Coniopterygidae	*Conwentzia pineticola*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Hemerobiidae	*Micromus posticus*	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Sisyridae	*Climacia areolaris*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Order: Plecoptera																														
Capniidae	*Allocapnia vivipara*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Nemouridae	*Amphinemura delosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Nemouridae	*Soyedina vallicularia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Perlodidae	*Isoperla nana*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taeniopterygidae	*Taeniopteryx nivalis*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	1	1	1	0	0	1	0	1	0	0	0
Order: Psocoptera																														
Caeciliusidae	*Valenzuela flavidus*	0	1	1	1	1	1	1	1	0	0	0	1	1	0	1	0	1	0	1	1	0	0	1	0	0	0	1	0	0
Ectopsocidae	*Ectopsocus meridionalis*	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Lepidopsocidae	*Echmepteryx hageni*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Psocidae	*Trichadenotecnum majus*	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	1	0	0
Psocidae	*Trichadenotecnum slossonae*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Stenopsocidae	*Graphopsocus cruciatus*	1	0	0	0	0	1	1	1	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Order: Trichoptera																														
Goeridae	*Goera stylata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Lepidostomatidae	*Lepidostoma vernale*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Limnephilidae	*Ironoquia punctatissima*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
Limnephilidae	*Limnephilus indivisus*	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Limnephilidae	*Limnephilus submonilifer*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Limnephilidae	*Nemotaulius hostilis*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnephilidae	*Platycentropus radiatus*	1	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	S001	S002	S003	S010	S011	S019[1]	S021	S026	S030	S031[1]	S033	S037	S044	S045	S046	S049	S055	S057	S058	S059	S061	S063	S065	S080	S081	S090	S112	S124[2]	S126
Limnephilidae	*Pycnopsyche guttifera*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnephilidae	*Pycnopsyche subfasciata*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Philopotamidae	*Dolophilodes distinctus*	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0
Phryganeidae	*Agrypnia vestita*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uenoidae	*Neophylax oligius*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Class: Malacostraca																														
Order: Amphipoda																														
Hyalellidae	*Hyalella azteca*	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0
Order: Decapoda																														
Cambaridae	*Cambarus robustus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Cambaridae	*Orconectes immunis*	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cambaridae	*Orconectes propinquus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Class: Ostracoda																														
Order: Podocopida																														
Cyprididae	*Cypridopsis vidua*	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Phylum: Mollusca																														
Class: Gastropoda																														
Order: Littorinimorpha																														
Amnicolidae	*Amnicola limosus*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes:
1. S019 and S031 are in the RSA_{AQU}.
2. S124 is outside of the RSA_{AQU}.

G.2.2 Waterbodies

Table G-9. Fall 2022 detections of invertebrate species in waterbodies in the AOI.

Family	Scientific Name	L006	P010
Phylum: Arthropoda			
Class: Branchiopoda			
Order: Diplostraca			
Eurycercidae	*Eurycercus longirostris*	1	0
Class: Insecta			
Order: Coleoptera			
Dytiscidae	*Hydrovatus pustulatus*	1	0
Haliplidae	*Haliplus leechi*	0	1
Phalacridae	*Olibrus semistriatus*	0	1
Scirtidae	*Scirtes tibialis*	1	0
Order: Diptera			
Bibionidae	*Bibio xanthopus*	1	0
Chironomidae	*Chironomus bifurcatus*	0	1
Chironomidae	*Corynoneura arctica*	1	0
Chironomidae	*Corynoneura scutellata*	1	0
Chironomidae	*Cryptochironomus digitatus*	1	0
Chironomidae	*Dicrotendipes tritomus*	0	1
Chironomidae	*Micropsectra subletteorum*	1	0
Chironomidae	*Tanytarsus glabrescens*	0	1
Chironomidae	*Tanytarsus mendax*	1	1
Dolichopodidae	*Pelastoneurus vagans*	0	1
Polleniidae	*Pollenia labialis*	0	1
Syrphidae	*Tropidia quadrata*	0	1
Tabanidae	*Chrysops indus*	0	1

Table G-10. Fall 2022 detections of invertebrate species in waterbodies outside of the AOI.

Family	Scientific Name	L001	L002	L003	L004	L005	L007	L010[1]	L011[1]	L012[1]	P005	P007	P008	P009	P015
Phylum: Annelida															
Class: Clitellata															
Order: Crassiclitellata															
Lumbricidae	*Lumbricus rubellus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Order: Haplotaxida															
Naididae	*Aulodrilus pluriseta*	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Naididae	*Chaetogaster diastrophus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Naididae	*Dero vaga*	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Naididae	*Ilyodrilus templetoni*	0	1	0	0	0	0	0	0	1	0	0	0	0	0
Naididae	*Nais bretscheri*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Naididae	*Nais communis*	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Naididae	*Rhyacodrilus falciformis*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Naididae	*Slavina appendiculata*	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Order: Lumbriculida															
Sparganophilidae	*Sparganophilus tamesis*	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Phylum: Arthropoda															
Class: Branchiopoda															
Order: Diplostraca															
Bosminidae	*Bosmina longirostris*	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Chydoridae	*Alona circumfimbriata*	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chydoridae	*Graptoleberis testudinaria*	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Daphniidae	*Ceriodaphnia dubia*	1	1	0	0	0	1	0	0	0	0	0	0	0	0
Daphniidae	*Daphnia dentifera*	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Daphniidae	*Daphnia mendotae*	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Daphniidae	*Simocephalus serrulatus*	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Eurycercidae	*Eurycercus longirostris*	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Sididae	*Diaphanosoma brachyurum*	1	1	0	0	0	1	0	0	0	0	0	0	0	0
Class: Insecta															
Order: Coleoptera															
Carabidae	*Clivina fossor*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Carabidae	*Pterostichus corvinus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Curculionidae	*Sciaphilus asperatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Dytiscidae	*Acilius confusus*	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Dytiscidae	*Hygrotus nubilus*	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Dytiscidae	*Ilybius biguttulus*	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Dytiscidae	*Ilybius oblitus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Dytiscidae	*Laccophilus maculosus*	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Dytiscidae	*Neoporus undulatus*	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Elateridae	*Hemicrepidius memnonius*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Elmidae	*Optioservus fastiditus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Gyrinidae	*Dineutus hornii*	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Family	Scientific Name	L001	L002	L003	L004	L005	L007	L010[1]	L011[1]	L012[1]	P005	P007	P008	P009	P015
Haliplidae	*Haliplus immaculicollis*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Haliplidae	*Haliplus leechi*	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Hydrophilidae	*Tropisternus mixtus*	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Phalacridae	*Olibrus semistriatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Psephenidae	*Psephenus herricki*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Scirtidae	*Contacyphon obscurus*	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Scirtidae	*Prionocyphon limbatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Scirtidae	*Scirtes tibialis*	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Staphylinidae	*Nehemitropia lividipennis*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Order: Diptera															
Agromyzidae	*Agromyza pseudoreptans*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Agromyzidae	*Cerodontha longipennis*	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Chaoboridae	*Chaoborus albipes*	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Chaoboridae	*Chaoborus punctipennis*	0	0	0	1	0	1	1	0	0	1	0	1	1	0
Chironomidae	*Chironomus acidophilus*	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Chironomidae	*Chironomus atrella*	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Chironomidae	*Chironomus bifurcatus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Chironomidae	*Chironomus dilutus*	1	0	0	0	0	0	0	0	0	0	0	1	0	1
Chironomidae	*Chironomus entis*	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Chironomus maturus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Chironomidae	*Conchapelopia telema*	0	0	1	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Corynoneura arctica*	0	0	0	0	0	0	1	1	0	0	0	0	0	1
Chironomidae	*Corynoneura scutellata*	0	1	0	0	0	0	0	0	0	0	0	1	0	1
Chironomidae	*Cricotopus sylvestris*	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Cricotopus triannulatus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Cricotopus trifascia*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Cryptochironomus digitatus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Dicrotendipes modestus*	0	1	1	1	0	0	0	0	1	0	1	0	0	0
Chironomidae	*Dicrotendipes tritomus*	1	1	0	1	1	1	1	0	1	0	1	1	1	1
Chironomidae	*Eukiefferiella endobryonia*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Glyptotendipes lobiferus*	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Chironomidae	*Lauterborniella agrayloides*	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Micropsectra nigripila*	1	0	0	0	0	0	0	0	1	0	0	0	0	1
Chironomidae	*Micropsectra subletteorum*	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Chironomidae	*Microtendipes pedellus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Orthocladius carlatus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Orthocladius smolandicus*	0	1	0	0	1	0	1	0	0	0	0	1	1	0
Chironomidae	*Parachironomus tenuicaudatus*	0	1	0	0	0	0	0	0	0	0	0	1	1	1
Chironomidae	*Paraphaenocladius impensus*	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Chironomidae	*Polypedilum convictum*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Procladius denticulatus*	0	1	0	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Psectrocladius obvius*	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Psectrocladius sordidellus*	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Chironomidae	*Rheocricotopus robacki*	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Chironomidae	*Smittia edwardsi*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Chironomidae	*Tanytarsus glabrescens*	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Chironomidae	*Tanytarsus mendax*	1	0	1	1	1	0	0	1	0	0	1	1	1	1
Chironomidae	*Thienemanniella xena*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Xenochironomus xenolabis*	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Culicidae	*Anopheles punctipennis*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Drosophilidae	*Drosophila funebris*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ephydridae	*Hydrellia albilabris*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Ephydridae	*Notiphila olivacea*	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Ephydridae	*Notiphila pulchra*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Limoniidae	*Antocha saxicola*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Limoniidae	*Dicranomyia frontalis*	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Limoniidae	*Discobola annulata*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Limoniidae	*Epiphragma fasciapenne*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Limoniidae	*Erioptera caliptera*	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Limoniidae	*Pseudolimnophila luteipennis*	1	0	0	0	0	0	0	0	0	0	1	1	0	1
Muscidae	*Coenosia tigrina*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Polleniidae	*Pollenia labialis*	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Simuliidae	*Simulium decorum*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Sphaeroceridae	*Copromyza neglecta*	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Syrphidae	*Lejops curvipes*	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Tabanidae	*Chrysops ater*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Tabanidae	*Hybomitra lasiophthalma*	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Tachinidae	*Ptilodexia conjuncta*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Tipulidae	*Tipula oleracea*	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Tipulidae	*Tipula sayi*	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Tipulidae	*Tipula tephrocephala*	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Family	Scientific Name	L001	L002	L003	L004	L005	L007	L010[1]	L011[1]	L012[1]	P005	P007	P008	P009	P015
Order: Ephemeroptera															
Caenidae	*Caenis diminuta*	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Ephemerellidae	*Eurylophella lutulenta*	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ephemeridae	*Hexagenia atrocaudata*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Order: Hemiptera															
Corixidae	*Palmacorixa buenoi*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Pleidae	*Neoplea striola*	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Order: Lepidoptera															
Crambidae	*Parapoynx maculalis*	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Geometridae	*Protoboarmia porcelaria*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Order: Megaloptera															
Sialidae	*Sialis vagans*	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Order: Neuroptera															
Chrysopidae	*Meleoma signoretii*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Order: Plecoptera															
Capniidae	*Allocapnia vivipara*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Order: Psocoptera															
Caeciliusidae	*Valenzuela burmeisteri*	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Caeciliusidae	*Valenzuela flavidus*	1	0	0	0	0	0	1	0	1	0	0	0	0	1
Stenopsocidae	*Graphopsocus cruciatus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Order: Trichoptera															
Leptoceridae	*Leptocerus americanus*	1	1	0	1	0	0	0	0	0	0	0	0	0	0
Limnephilidae	*Glyphopsyche irrorata*	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Limnephilidae	*Nemotaulius hostilis*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Uenoidae	*Neophylax oligius*	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Class: Malacostraca															
Order: Amphipoda															
Hyalellidae	*Hyalella azteca*	0	1	0	0	0	0	0	0	1	0	0	0	0	0
Order: Decapoda															
Cambaridae	*Orconectes propinquus*	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Class: Ostracoda															
Order: Podocopida															
Cyprididae	*Cypridopsis vidua*	0	1	1	0	1	0	0	0	1	0	1	1	0	0
Phylum: Rotifera															
Class: Eurotatoria															
Order: Ploima															
Synchaetidae	*Polyarthra vulgaris*	0	0	0	0	1	0	0	0	0	0	0	0	0	0

Notes:
1. L010 and L011 are outside of the RSA_{AQU}.
2. L012 is in the RSA_{AQU}.

G.2.3 Wetlands

Table G-11. Fall 2022 detections of invertebrate species in wetlands in the AOI.

Family	Scientific Name	W127 marsh	W132 marsh	W139 swamp
Phylum: Annelida				
Class: Clitellata				
Order: Haplotaxida				
Naididae	*Slavina appendiculata*	0	1	0
Phylum: Arthropoda				
Class: Branchiopoda				
Order: Diplostraca				
Bosminidae	*Bosmina longirostris*	0	1	0
Chydoridae	*Alona circumfimbriata*	0	1	0
Class: Insecta				
Order: Coleoptera				
Carabidae	*Agonum placidum*	0	0	1
Curculionidae	*Sciaphilus asperatus*	0	0	1
Dytiscidae	*Acilius confusus*	0	1	0
Dytiscidae	*Hydrovatus pustulatus*	0	1	0
Dytiscidae	*Ilybiosoma seriatum*	0	0	1
Dytiscidae	*Ilybius biguttulus*	0	1	0
Dytiscidae	*Neoporus clypealis*	1	0	0
Haliplidae	*Haliplus immaculicollis*	0	1	0
Scirtidae	*Contacyphon obscurus*	0	1	0
Scirtidae	*Scirtes tibialis*	0	1	0
Order: Diptera				
Anthomyzidae	*Anthomyza dichroa*	0	0	1
Ceratopogonidae	*Culicoides venustus*	0	1	0
Chironomidae	*Conchapelopia telema*	0	0	1
Chironomidae	*Corynoneura scutellata*	1	0	0
Chironomidae	*Glyptotendipes glaucus*	0	1	0
Chironomidae	*Micropsectra subletteorum*	0	0	1
Chironomidae	*Micropsectra xantha*	0	0	1
Chironomidae	*Microtendipes pedellus*	1	0	0
Chironomidae	*Prodiamesa olivacea*	0	0	1
Chironomidae	*Tanytarsus glabrescens*	0	1	0
Chironomidae	*Tanytarsus mendax*	0	1	0
Ephydridae	*Hydrellia albilabris*	1	1	0
Limoniidae	*Helius flavipes*	0	1	0
Limoniidae	*Pseudolimnophila inornata*	0	1	0
Limoniidae	*Pseudolimnophila luteipennis*	1	1	0
Psychodidae	*Psychoda alternata*	0	1	0
Sciomyzidae	*Elgiva solicita*	0	1	0
Sciomyzidae	*Sepedon armipes*	0	1	0
Sciomyzidae	*Tetanocera annae*	1	1	0
Sphaeroceridae	*Copromyza neglecta*	0	1	0
Tabanidae	*Tabanus atratus*	1	0	0
Tabanidae	*Tabanus superjumentarius*	0	1	0
Tipulidae	*Tipula oropezoides*	0	0	1
Tipulidae	*Tipula tephrocephala*	0	0	1
Order: Ephemeroptera				
Caenidae	*Caenis diminuta*	0	1	0
Order: Hemiptera				
Pleidae	*Neoplea striola*	0	1	0

Family	Scientific Name	W127 marsh	W132 marsh	W139 swamp
Order: Orthoptera				
Gryllidae	*Eunemobius carolinus*	0	1	0
Order: Plecoptera				
Perlodidae	*Isoperla nana*	0	0	1
Order: Trichoptera				
Limnephilidae	*Platycentropus radiatus*	0	1	0
Class: Ostracoda				
Order: Podocopida				
Cyprididae	*Cypridopsis vidua*	0	1	0

Table G-12. Fall 2022 detections of invertebrate species in wetlands outside of the AOI.

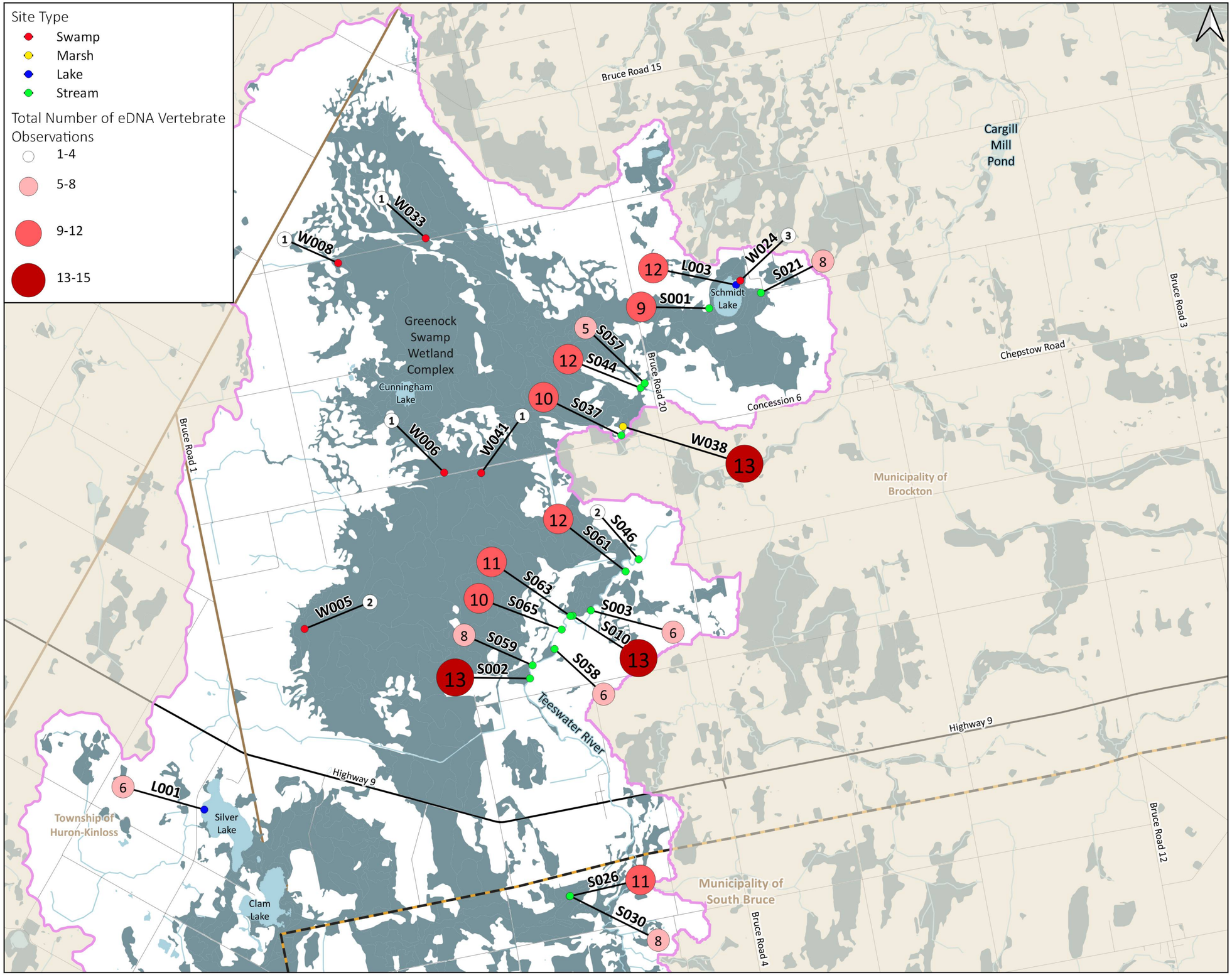
Family	Scientific Name	S113 swamp	W005 swamp	W006 swamp	W008 swamp	W009 swamp	W018 swamp	W033 swamp	W041 swamp	W061 marsh	W064 marsh	W067 marsh
Phylum: Annelida												
Class: Clitellata												
Order: Crassiclitellata												
Lumbricidae	*Dendrobaena octaedra*	0	0	1	0	0	0	0	1	0	0	0
Lumbricidae	*Lumbricus terrestris*	0	0	0	1	0	0	0	0	0	0	0
Lumbricidae	*Octolasion tyrtaeum*	0	0	0	0	0	0	0	0	0	0	1
Order: Enchytraeida												
Enchytraeidae	*Cernosvitoviella minor*	0	0	1	0	1	1	0	1	0	0	0
Enchytraeidae	*Globulidrilus riparius*	0	1	0	0	0	0	0	0	1	0	0
Enchytraeidae	*Henlea perpusilla*	0	1	0	0	0	0	0	0	0	0	0
Order: Haplotaxida												
Naididae	*Aulodrilus pluriseta*	0	0	0	0	0	0	0	0	0	0	1
Naididae	*Branchiura sowerbyi*	0	0	0	0	0	0	0	0	1	0	0
Naididae	*Nais communis*	1	0	1	0	1	1	0	0	0	0	1
Naididae	*Nais stolci*	0	0	0	0	0	0	0	0	1	0	0
Phylum: Arthropoda												
Class: Insecta												
Order: Coleoptera												
Carabidae	*Clivina fossor*	0	0	0	0	0	0	0	0	1	0	0
Carabidae	*Elaphrus clairvillei*	0	1	0	0	0	0	0	0	0	0	0
Chrysomelidae	*Longitarsus suspectus*	0	0	0	0	0	0	0	0	1	0	0
Corylophidae	*Orthoperus scutellaris*	0	0	0	0	0	1	0	0	0	0	0
Curculionidae	*Sciaphilus asperatus*	0	0	0	0	0	0	0	0	1	0	1
Dytiscidae	*Hydrocolus persimilis*	0	0	1	0	0	0	0	0	0	0	0
Dytiscidae	*Ilybiosoma seriatum*	0	0	0	1	0	0	0	0	0	0	0
Dytiscidae	*Ilybius biguttulus*	0	0	1	0	1	0	1	0	0	1	1
Dytiscidae	*Neoporus clypealis*	0	0	1	0	0	0	0	0	0	0	0
Dytiscidae	*Neoporus undulatus*	0	0	0	0	0	0	1	0	0	0	0
Elateridae	*Athous rufifrons*	0	0	1	0	0	0	0	0	0	0	0
Elmidae	*Optioservus fastiditus*	0	0	0	0	0	0	0	0	0	0	1
Elmidae	*Stenelmis crenata*	0	0	0	0	0	0	0	0	1	0	0
Hydrophilidae	*Hydrobius fuscipes*	0	0	1	0	1	0	0	0	0	0	0
Phalacridae	*Olibrus semistriatus*	0	0	0	0	0	0	0	0	1	0	0
Psephenidae	*Psephenus herricki*	0	0	0	0	0	0	0	0	1	0	0
Scarabaeidae	*Melinopterus prodromus*	0	0	1	0	0	0	0	1	0	0	0
Scirtidae	*Contacyphon obscurus*	0	1	1	1	1	1	1	1	0	0	0
Scirtidae	*Prionocyphon limbatus*	0	0	0	1	0	0	1	0	0	0	0
Staphylinidae	*Erichsonius nanus*	0	0	1	0	0	0	0	0	0	0	0
Staphylinidae	*Lathrobium simplex*	0	0	0	1	0	0	0	0	0	0	0

Family	Scientific Name	S113 swamp	W005 swamp	W006 swamp	W008 swamp	W009 swamp	W018 swamp	W033 swamp	W041 swamp	W061 marsh	W064 marsh	W067 marsh
Staphylinidae	*Myllaena arcana*	0	0	0	0	0	1	0	0	0	0	0
Staphylinidae	*Olophrum obtectum*	0	0	0	0	0	0	0	0	0	1	0
Staphylinidae	*Philonthus lomatus*	0	0	1	0	0	0	0	0	0	0	0
Staphylinidae	*Philonthus monaeses*	0	0	0	1	0	0	0	0	0	0	0
Staphylinidae	*Tachinus limbatus*	0	0	0	0	0	0	0	0	1	0	0
Tenebrionidae	*Isomira quadristriata*	0	0	0	1	0	0	0	0	0	0	0
Order: Diptera												
Agromyzidae	*Nemorimyza posticata*	0	0	0	0	0	0	0	0	1	0	0
Anthomyzidae	*Anthomyza dichroa*	0	0	0	1	0	0	0	0	0	0	0
Ceratopogonidae	*Culicoides haematopotus*	0	0	0	0	0	0	0	0	1	0	0
Ceratopogonidae	*Culicoides mulrennani*	0	1	0	0	0	0	0	0	0	0	0
Ceratopogonidae	*Dasyhelea turficola*	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Bryophaenocladius ictericus*	0	0	0	0	0	0	0	1	0	0	0
Chironomidae	*Chironomus acidophilus*	0	0	0	1	0	0	1	0	0	0	0
Chironomidae	*Chironomus lugubris*	0	0	0	0	0	1	0	0	0	0	0
Chironomidae	*Chironomus maturus*	1	0	0	0	0	0	0	0	0	0	1
Chironomidae	*Chironomus melanescens*	0	1	0	0	0	0	0	0	0	0	0
Chironomidae	*Cladopelma edwardsi*	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Cladopelma galeator*	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Conchapelopia telema*	0	0	0	0	0	0	0	0	1	0	1
Chironomidae	*Corynoneura scutellata*	0	0	0	0	1	0	1	0	1	1	0
Chironomidae	*Cricotopus annulator*	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Cricotopus bicinctus*	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Cricotopus triannulatus*	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Cricotopus tristis*	0	0	0	0	0	0	0	0	1	0	1
Chironomidae	*Dicrotendipes modestus*	0	0	0	0	0	0	0	0	1	0	1
Chironomidae	*Dicrotendipes tritomus*	0	0	0	0	0	0	1	0	0	0	0
Chironomidae	*Lauterborniella agrayloides*	0	0	0	1	0	0	0	0	0	0	0
Chironomidae	*Limnophyes asquamatus*	0	0	0	1	0	0	0	0	0	0	0
Chironomidae	*Limnophyes minimus*	0	0	1	1	0	0	0	1	0	0	0
Chironomidae	*Limnophyes natalensis*	0	0	0	0	1	0	0	0	0	0	0
Chironomidae	*Micropsectra nigripila*	0	0	0	0	1	0	1	0	1	0	1
Chironomidae	*Micropsectra polita*	0	0	0	0	0	0	0	0	1	1	0
Chironomidae	*Micropsectra subletteorum*	0	0	1	1	0	0	0	0	0	0	0
Chironomidae	*Micropsectra xantha*	0	0	0	1	0	0	0	0	1	1	1
Chironomidae	*Microtendipes pedellus*	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Nilotanypus fimbriatus*	0	0	0	0	0	0	0	0	0	1	0
Chironomidae	*Pagastia orthogonia*	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Paraphaenocladius impensus*	0	1	1	0	1	1	0	0	1	0	0
Chironomidae	*Parochlus kiefferi*	0	0	1	0	0	0	0	0	1	0	0
Chironomidae	*Polypedilum aviceps*	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Polypedilum convictum*	0	0	0	0	0	0	0	0	1	0	0
Chironomidae	*Prodiamesa olivacea*	0	0	0	1	0	0	0	0	0	0	0
Chironomidae	*Rheocricotopus robacki*	0	0	0	0	0	0	0	0	0	0	1
Chironomidae	*Stempellinella fimbriata*	0	0	0	0	1	0	0	0	1	0	1
Chironomidae	*Tanytarsus glabrescens*	0	0	0	0	0	0	0	0	0	0	1
Chironomidae	*Thienemanniella xena*	0	0	0	0	1	0	0	0	1	0	1
Chironomidae	*Tvetenia paucunca*	0	0	0	0	0	0	0	0	1	1	1
Chironomidae	*Xenochironomus xenolabis*	0	0	0	0	0	0	0	0	0	0	1
Culicidae	*Anopheles punctipennis*	0	0	0	1	0	0	0	0	0	0	0
Culicidae	*Culex territans*	0	0	0	1	0	0	0	0	0	0	0

Family	Scientific Name	S113 swamp	W005 swamp	W006 swamp	W008 swamp	W009 swamp	W018 swamp	W033 swamp	W041 swamp	W061 marsh	W064 marsh	W067 marsh
Culicidae	*Ochlerotatus thibaulti*	0	0	0	0	0	1	0	0	0	0	0
Dolichopodidae	*Dolichopus albiciliatus*	0	0	1	0	1	1	0	1	0	0	0
Dolichopodidae	*Gymnopternus lividifrons*	0	0	0	0	0	0	0	1	0	0	0
Dryomyzidae	*Dryomyza anilis*	0	0	0	0	0	0	0	0	1	0	0
Ephydridae	*Hydrellia albilabris*	0	0	0	1	1	0	0	0	0	0	0
Ephydridae	*Hydrellia notata*	0	0	0	0	0	0	0	0	1	0	0
Fanniidae	*Fannia falcata*	0	0	1	0	0	0	0	0	0	0	0
Fanniidae	*Fannia sociella*	0	0	1	1	0	0	0	0	1	0	0
Heleomyzidae	*Suillia laevis*	0	0	1	0	0	0	0	0	0	0	0
Lauxaniidae	*Poecilominettia puncticeps*	0	0	1	0	1	0	0	0	0	0	0
Limoniidae	*Antocha saxicola*	0	0	0	0	0	0	0	0	1	0	0
Limoniidae	*Discobola annulata*	0	1	1	0	0	1	0	0	0	0	0
Limoniidae	*Epiphragma fasciapenne*	0	1	1	0	0	0	0	0	0	0	0
Limoniidae	*Erioptera ebenina*	0	0	0	1	0	0	0	0	0	0	0
Limoniidae	*Euphylidorea luteola*	0	0	0	0	1	0	0	0	0	0	0
Limoniidae	*Helius flavipes*	0	0	1	1	1	0	0	0	0	0	0
Limoniidae	*Hexatoma spinosa*	0	0	0	0	0	0	0	0	1	0	0
Limoniidae	*Molophilus hirtipennis*	0	0	1	0	0	0	0	0	0	0	0
Limoniidae	*Pseudolimnophila luteipennis*	0	0	0	1	1	1	1	0	0	0	0
Muscidae	*Lispe albitarsis*	0	0	0	0	1	0	0	0	0	0	0
Muscidae	*Neodexiopsis rufitibia*	0	0	0	0	0	1	0	0	0	0	0
Mycetophilidae	*Exechia nigroscutellata*	0	0	1	0	0	0	0	0	0	0	0
Mycetophilidae	*Mycomya pulchella*	0	0	1	0	0	0	0	0	0	0	0
Pediciidae	*Dicranota guerini*	0	0	0	0	0	0	0	0	0	0	1
Periscelididae	*Cyamops nebulosus*	0	0	0	0	1	0	0	0	0	0	0
Psychodidae	*Psychoda phalaenoides*	0	1	0	1	0	0	0	0	0	0	0
Ptychopteridae	*Bittacomorpha clavipes*	0	0	1	0	1	0	0	0	0	1	1
Ptychopteridae	*Ptychoptera quadrifasciata*	0	0	0	0	0	0	0	0	0	0	1
Rhagionidae	*Chrysopilus quadratus*	0	1	0	0	0	0	0	0	0	0	0
Sciomyzidae	*Sepedon armipes*	0	0	0	0	0	0	0	0	1	0	0
Sciomyzidae	*Tetanocera annae*	0	0	1	0	1	0	0	0	0	0	0
Sphaeroceridae	*Copromyza neglecta*	0	0	0	0	0	0	0	0	1	0	0
Syrphidae	*Chalcosyrphus nemorum*	0	0	0	0	1	0	0	0	0	0	0
Syrphidae	*Eristalis anthophorina*	0	0	0	0	0	0	0	0	1	0	0
Syrphidae	*Helophilus fasciatus*	0	0	0	0	0	1	0	0	0	0	0
Tabanidae	*Chrysops calvus*	0	0	0	0	0	0	0	0	0	1	0
Tephritidae	*Campiglossa albiceps*	0	0	0	0	0	0	0	0	0	0	1
Tipulidae	*Tipula abdominalis*	0	0	0	0	1	0	0	0	1	1	0
Tipulidae	*Tipula sayi*	0	1	1	0	1	0	0	1	0	0	0
Tipulidae	*Tipula senega*	0	0	0	0	0	0	0	1	0	0	0
Tipulidae	*Tipula tephrocephala*	0	0	1	1	0	0	0	0	0	0	0
Tipulidae	*Tipula tricolor*	0	0	0	0	1	0	0	0	0	1	0
Order: Ephemeroptera												
Caenidae	*Caenis diminuta*	0	0	0	0	0	0	1	0	0	0	0
Ephemeridae	*Hexagenia atrocaudata*	0	0	0	0	0	0	0	0	1	0	0
Leptophlebiidae	*Paraleptophlebia adoptiva*	0	0	0	0	0	0	0	0	0	1	0
Order: Hemiptera												
Belostomatidae	*Belostoma flumineum*	0	0	0	0	0	0	0	0	1	0	0
Cicadellidae	*Typhlocyba hockingensis*	0	0	1	1	0	1	0	0	0	0	0
Pentatomidae	*Euschistus variolarius*	0	0	1	0	0	0	0	0	0	0	0
Order: Lepidoptera												

Family	Scientific Name	S113 swamp	W005 swamp	W006 swamp	W008 swamp	W009 swamp	W018 swamp	W033 swamp	W041 swamp	W061 marsh	W064 marsh	W067 marsh
Erebidae	*Palthis angulalis*	0	0	0	0	1	0	0	0	0	0	0
Erebidae	*Pyrrharctia isabella*	0	0	0	0	0	0	0	0	1	0	0
Tortricidae	*Argyrotaenia velutinana*	0	0	0	0	0	0	0	0	1	0	0
Tortricidae	*Epinotia lindana*	0	0	0	1	0	0	0	0	0	0	0
Order: Megaloptera												
Corydalidae	*Chauliodes rastricornis*	0	1	1	1	1	0	1	0	0	0	0
Corydalidae	*Nigronia serricornis*	0	0	0	0	0	0	0	0	0	0	1
Sialidae	*Sialis vagans*	0	0	0	0	0	0	0	0	1	0	0
Order: Neuroptera												
Coniopterygidae	*Conwentzia pineticola*	0	0	0	1	0	0	0	0	0	0	0
Hemerobiidae	*Micromus posticus*	0	0	0	0	0	1	0	0	1	0	0
Order: Plecoptera												
Capniidae	*Paracapnia angulata*	0	0	0	0	0	0	0	0	1	0	0
Nemouridae	*Soyedina vallicularia*	0	0	0	0	0	0	0	0	0	0	1
Order: Psocoptera												
Caeciliusidae	*Valenzuela flavidus*	0	0	1	1	1	1	0	1	0	0	1
Ectopsocidae	*Ectopsocus meridionalis*	0	0	1	1	1	1	0	1	0	0	0
Lepidopsocidae	*Echmepteryx hageni*	0	0	0	1	0	0	0	0	0	0	0
Psocidae	*Trichadenotecnum majus*	0	1	1	1	0	0	0	1	0	0	0
Stenopsocidae	*Graphopsocus cruciatus*	0	1	1	1	0	0	0	0	0	0	0
Order: Trichoptera												
Lepidostomatidae	*Lepidostoma vernale*	0	0	0	0	0	0	0	0	0	0	1
Limnephilidae	*Limnephilus indivisus*	0	1	0	0	1	1	0	0	0	0	0
Limnephilidae	*Limnephilus ornatus*	0	0	0	0	0	0	0	0	0	1	1
Limnephilidae	*Platycentropus radiatus*	0	0	0	0	1	0	1	0	1	1	1
Class: Malacostraca												
Order: Decapoda												
Cambaridae	*Orconectes immunis*	0	0	0	0	0	0	0	0	0	1	0
Class: Ostracoda												
Order: Podocopida												
Cyprididae	*Cypridopsis vidua*	1	1	0	0	0	0	1	0	1	1	0

APPENDIX H – VERTEBRATE SPECIES DETECTIONS IN SUMMER AND FALL



NWMO Biodiversity Impact Studies

Total Summer Vertebrate Results - North LSA_{AQU}

Figure H-1a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site

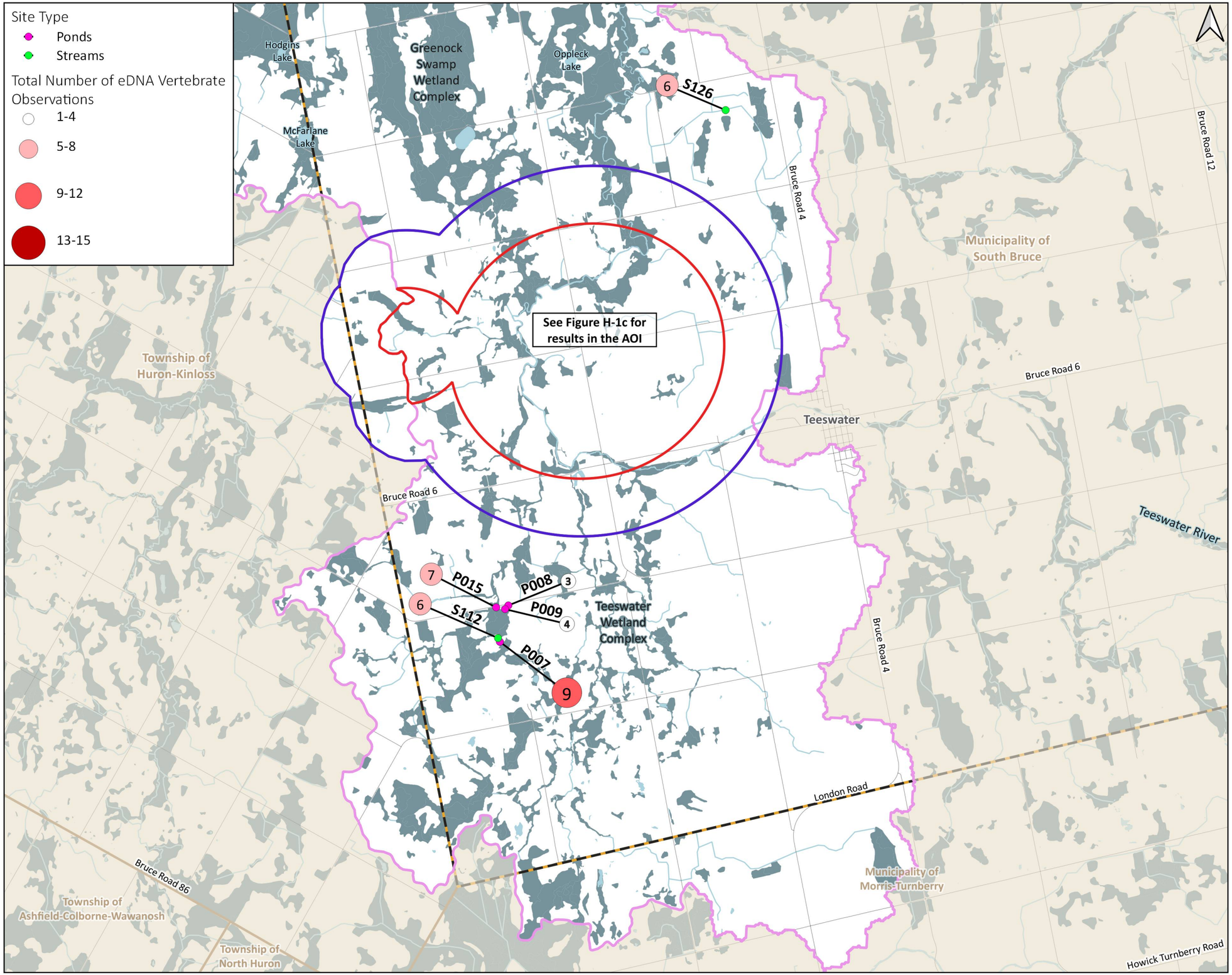
1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A102a	



NWMO Biodiversity Impact Studies

Total Summer Vertebrate Results - South LSA_{AQU}

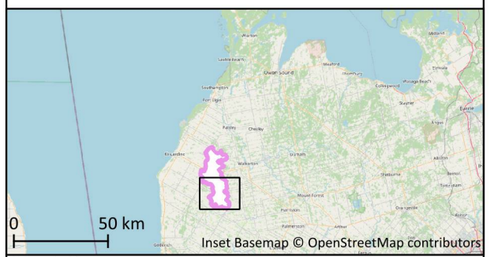
Figure H-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site

1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A102b	

Site Type
- Ponds
- Swamp
- Marsh
- Streams

Total Number of eDNA Vertebrate Observations
- 1-4
- 5-8
- 9-12
- 13-15

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Bruce Road 6
Kinloss Culross
Teeswater River

NWMO Biodiversity Impact Studies

Total Summer Vertebrate Results - AOI

Figure H-1c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site

1:20,000
0 0.5 1 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A102c	

Site Type
- Swamp
- Lake
- Stream

Total Number of eDNA Vertebrate Observations
- 2-5
- 6-9
- 10-13
- 14-18

Map 1

Bruce Road 15
Bruce Road 1
Bruce Road 20
Bruce Road 3
Bruce Road 12
Bruce Road 4
Chepstow Road
Concession 6
Highway 9
Greenock Swamp Wetland Complex
Cunningham Lake
Schmidt Lake
Cargill Mill Pond
Hines Lake
Clarke's Lake
Robson Lake
Silver Lake
Clam Lake
Teeswater River
Municipality of Brockton
Municipality of South Bruce
Township of Chatsworth

W033 10
W008 6
L012 14
S031 18
S019 14
L003 10
S021 10
S001 12
S057 7
S044 6
S037 10
W006 6
W041 2
S046 17
S061 11
S063 16
S003 16
S065 5
S010 11
S059 7
S058 10
W005 7
W018 7
S002 12
S055 9
L001 10
S011 13
L002 16
S026 8
S030 11
W009 6

Map 2
L010 11
L011 8
S124 8

NWMO Biodiversity Impact Studies

Total Fall Vertebrate Results - North LSA_{AQU}

Figure H-2a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA

Map 2
Map 1
0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A103a	

Site Type
- Ponds
- Swamp
- Marsh
- Lake
- Streams

Total Number of eDNA Vertebrate Observations
- 2-5
- 6-9
- 10-13
- 14-18

Hodgins Lake
McFarlane Lake
Greenock Swamp Wetland Complex
Oppleck Lake
Teeswater Wetland Complex
Teeswater
Teeswater River
Municipality of South Bruce
Township of Huron-Kinloss
Township of Ashfield-Colborne-Wawanosh
Township of North Huron
Municipality of Morris-Turnberry
Bruce Road 4
Bruce Road 6
Bruce Road 12
Bruce Road 86
London Road
Howick Turnberry Road

See Figure H-2c for results in the AOI

9 L007
12 S126
7 W061
S080 8
8 P015
P008 5
S081
S033 8
5 S112
P009 4
12
P007 5
L005 9
S113 5
P005 6
S090 6
S045
6 W064
W067 8
11
L004 9
S049 13

NWMO Biodiversity Impact Studies

Total Fall Vertebrate Results - South LSA_{AQU}

Figure H-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

The number inside the observation symbols represents the count of detected species at that given site.

1:65,000
0 1 2 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A103b	

Site Type
- Ponds
- Swamp
- Marsh
- Lake
- Streams

Total Number of eDNA Vertebrate Observations
- 2-5
- 6-9
- 10-13
- 14-18

Concession 10
Concession 8
Sideroad 25 North
Sideroad 20
Bruce Road 6
Kinloss Culross
Teeswater River

W132 6 S056 7 S067 S040 9
L006 4
7 S100 10 S072 8 S013 10 S093 11 S094 10 S096 10 S014
8 S009 S073 11 S074 13
S016 12 S075 15
9 S101 S042 12
S015 15
S034 8
5 S102
S051 11
W127 3
13 S077 S076 11
8 W139
5 S006
4 S108
S038 8
5 P010 S029 7
S095 11
S022 7
S099 10

NWMO Biodiversity Impact Studies

Total Fall Vertebrate Results - AOI

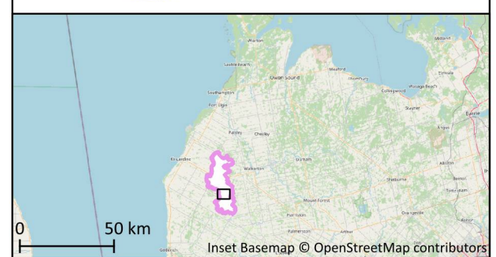
Figure H-2c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

The number inside the observation symbols represents the count of detected species at that given site.

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A103c	

APPENDIX I – SPECIES OF INTEREST DETECTIONS

NWMO Biodiversity Impact Studies

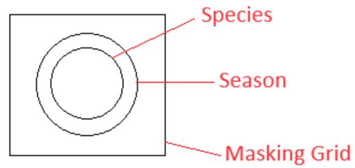
eDNA Results: Species of Conservation Concern - North LSA_{AQU}

Figure I-1a

Bruce Road 15
Municipality of Kincardine
Bruce Road 1
Cunningham Lake
Bruce Road 20
Schmidt Lake
Chepstow Road
Bruce Road 3
Concession 6
Municipality of Brockton
Greenock Swamp Wetland Complex
Teeswater River
Township of Huron-Kinloss
Highway 9
Silver Lake
Clam Lake
Municipality of South Bruce
Bruce Road 4

7490
7087
7285
6780

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Watercourse
- Wetland
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary



1:65,000
0 1 2 km

ZOETICA

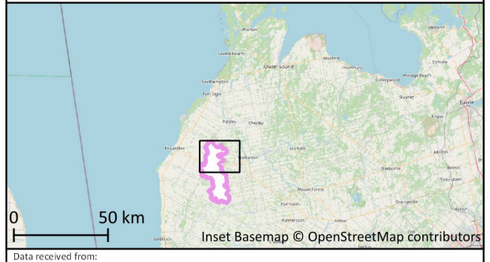
1km x 1km grid square with detection

Season
- Summer
- Fall

Species
- Digger Crayfish (R)
- Monarch (SAR)
- Pugnose Shiner (SAR)

SAR and Provincially Rare species were masked with a 1km grid and may occur anywhere within that grid square. Circle colour(s) within the grid represent the species detected. Species may have been detected more than once within a grid square.

SAR = Species at Risk **R = Provincially Rare**



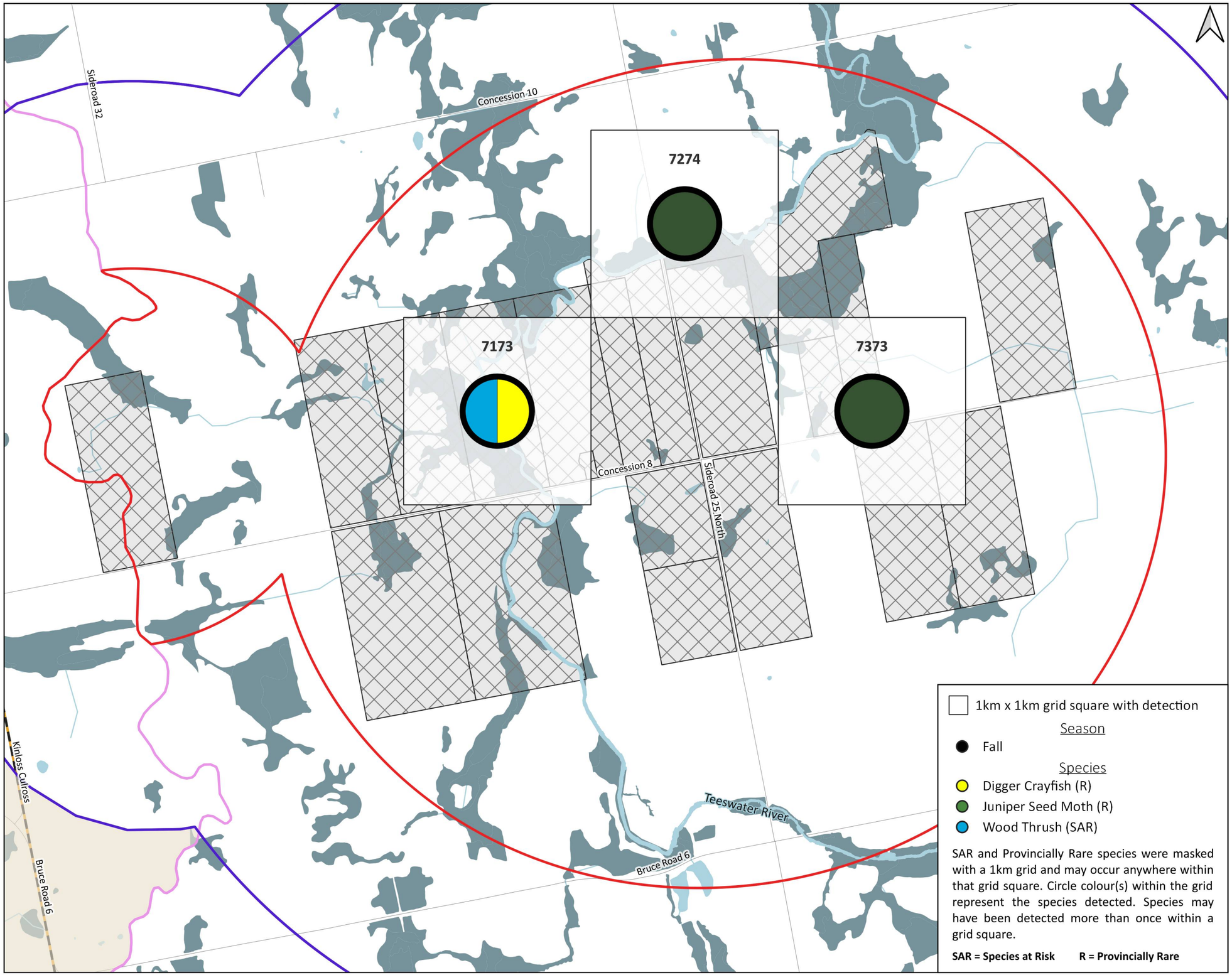
Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A100a	

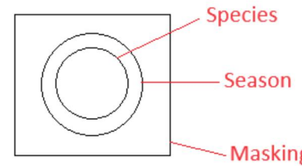
NWMO Biodiversity Impact Studies

eDNA Results: Species of Conservation Concern - AOI

Figure I-1b



- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Watercourse
- Wetland
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary
- NWMO Purchased or Optioned Land



1:20,000
0 0.5 1 km

ZOETICA

1km x 1km grid square with detection

Season

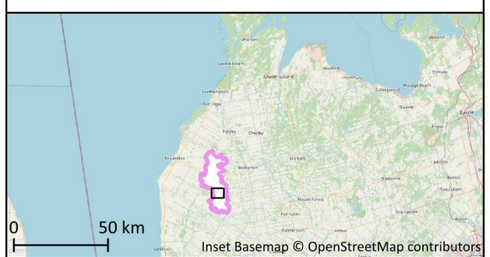
- Fall

Species

- Digger Crayfish (R)
- Juniper Seed Moth (R)
- Wood Thrush (SAR)

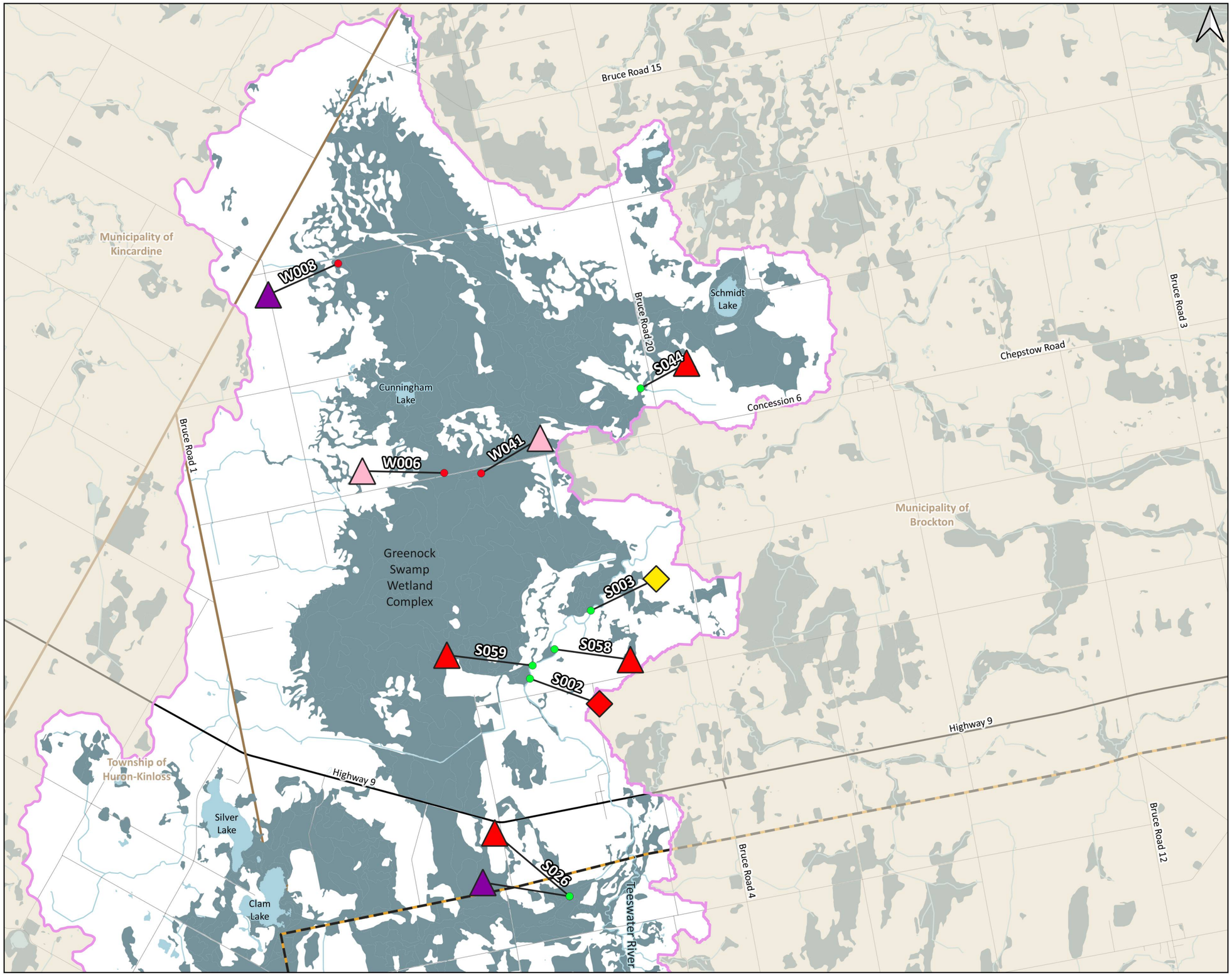
SAR and Provincially Rare species were masked with a 1km grid and may occur anywhere within that grid square. Circle colour(s) within the grid represent the species detected. Species may have been detected more than once within a grid square.

SAR = Species at Risk **R = Provincially Rare**



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A100b	



NWMO Biodiversity Impact Studies

eDNA Results: Invasive Species North LSA_{ECO}

Figure I-2a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Watercourse
- Wetland
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary

Site Type

- Swamp
- Stream

Season

- Fall
- Summer

Species

- Common Earthworm [2]
- Red Earthworm [5]
- Octagonal Tail-worm [2]
- Rusty Crayfish [1]

1:65,000

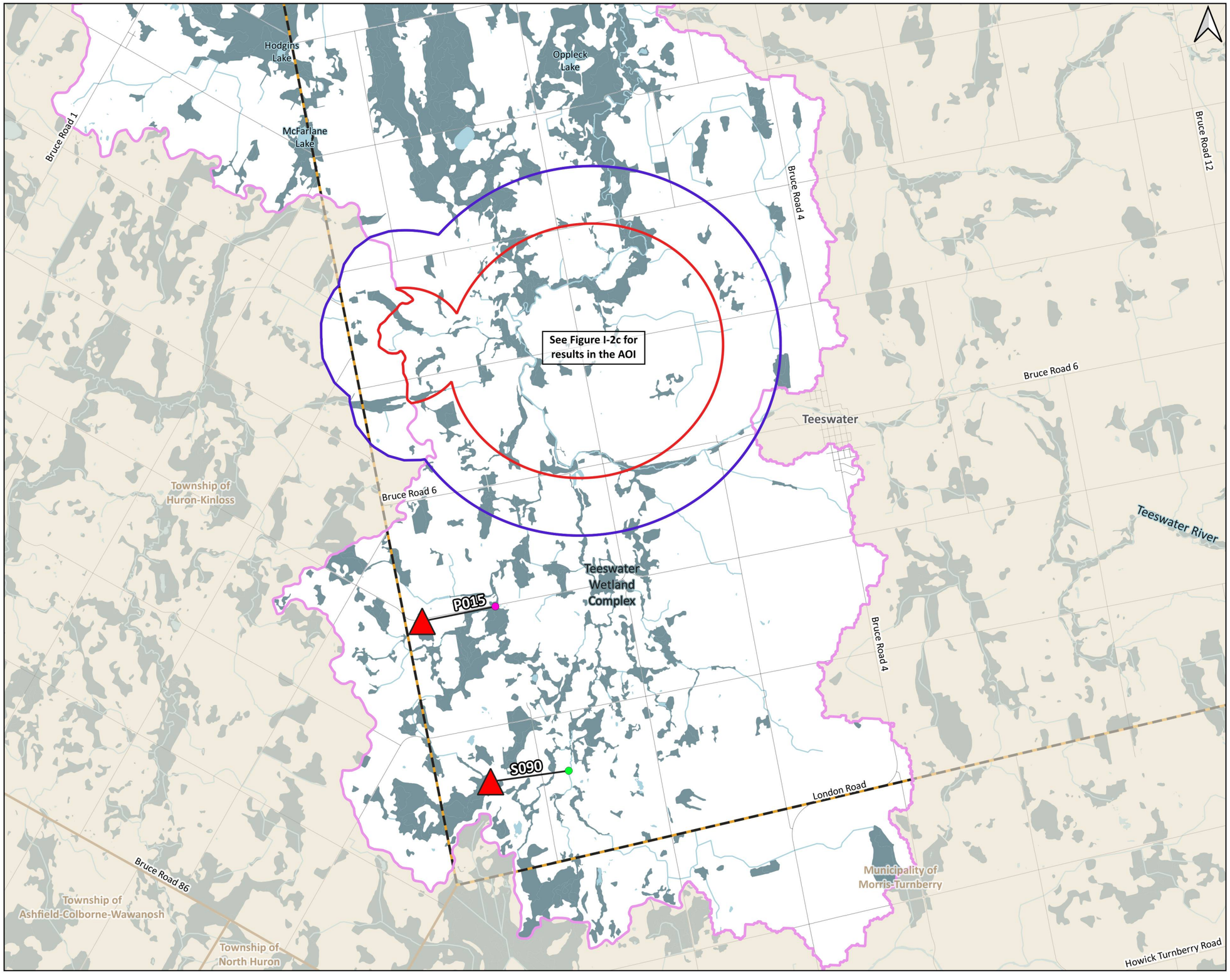
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A101a	



NWMO Biodiversity Impact Studies

eDNA Results: Invasive Species South LSA_{ECO}

Figure I-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Watercourse
- Wetland
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary

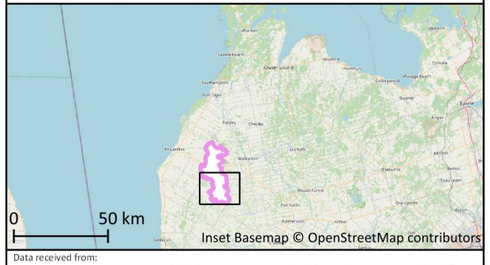
Site Type
- Pond
- Stream

Season
- Fall

Species
- Red Earthworm [2]

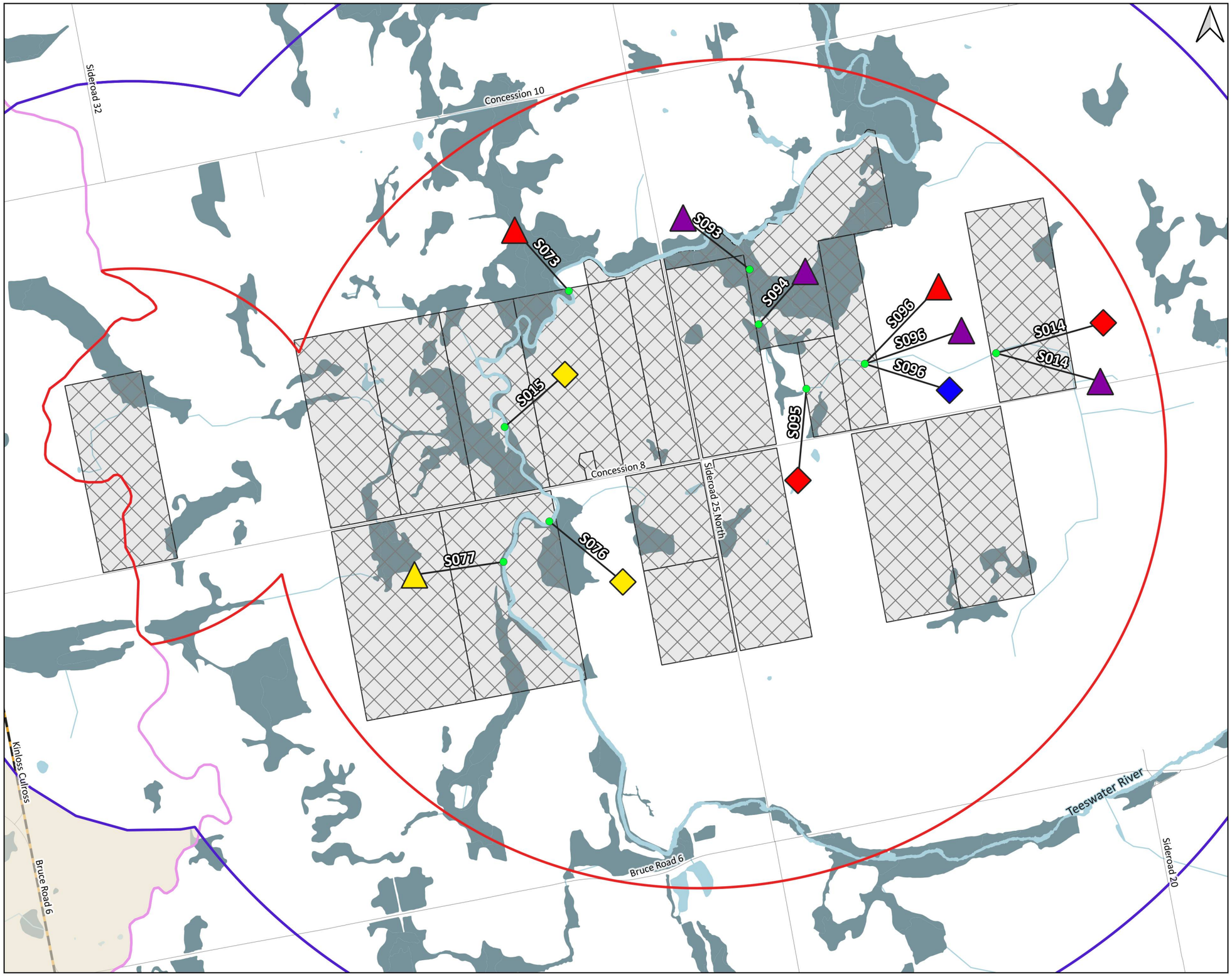
1:65,000
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A101b	



NWMO Biodiversity Impact Studies

eDNA Results: Invasive Species AOI

Figure I-2c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Watercourse
- Wetland
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary
- NWMO Purchased or Optioned Land

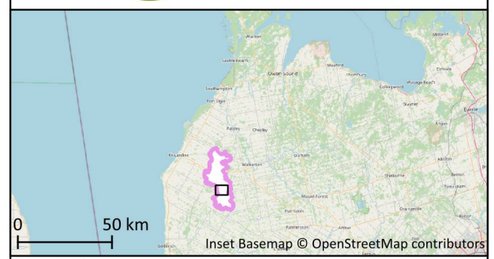
Site Type
- Stream

Season
- Fall
- Summer

Species
- Common Earthworm [4]
- Red Earthworm [4]
- Rusty Crayfish [3]
- LDD Moth [1]

1:20,000
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB eDNA Rev. B (NSC); NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CW	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A101c	

APPENDIX J – SUMMARY OF SAMPLING EFFORT AND COVARIATES

Table J-1. Summary of planned, sampled, and unsampleable eDNA sampling locations within the BIS aquatic study areas.

	AOI			**LSA_{AQU}**			**Outside LSA_{AQU}**			***Total***		
Habitat Grouping	Planned	Actual	Dry or Inaccessible	Planned	Actual	Dry or Inaccessible	Planned	Actual	Dry or Inaccessible	*Planned*	*Actual*	*Dry or Inaccessible*
Waterbodies ≤ 1 ha	7	1	0	10	5	1	N/A	N/A	N/A	*17*	*6*	*1*
Waterbodies > 1 ha	1	1	0	8	6	0	3	3	*0*	*12*	*10*	*0*
Watercourses	32	30	2	40	26	4	9	3	*1*	*81*	*59*	*7*
Wetlands – Swamp	20	3	17	31	8	28	N/A	N/A	N/A	*51*	*11*	*45*
Wetlands – Marsh	10	2	8	9	3	6	N/A	N/A	N/A	*19*	*5*	*14*
Reclassified Watercourses	0	0	0	0	1 (stream to watercourse)	0	0	0	0	*0*	*1*	*0*
Reclassified Waterbodies	0	4 (ponds to 2 swamps and 2 marshes)	1 (pond to wetland)	0	0	3 (ponds to wetlands)	0	0	0	*0*	*4*	*4*
Reclassified Wetlands	0	0	0	0	1 (marsh to watercourse)	0	0	0	0	*0*	*1*	*0*
***Total*[1]**	*70*	*41*	*28*	*98*	*50*	*42*	*12*	*6*	*1*	*180*	*97*	*71*

Notes:
1. Sites planned for eDNA sampling that were not visited in 2022 were not accessible at the time of surveys.

Table J-2. 2022 eDNA sample site conditions. All reported values are summarized and not filtered for outliers.

Variable	Sample Size	Minimum	Mean	Standard Deviation	Maximum
pH	534	4.7	7.9	0.5	8.9
Water Temperature (°C)	535	7.4	14.6	4.5	27.1
Dissolved Oxygen (mg/L)	533	0.2	7.0	2.7	14.5
Conductivity (µs/cm)	535	0.02	0.6	0.3	2.6
Turbidity (NTU)	521	0.3	7.4	15.7	261
Flow Value	534	0	0.1	0.2	1.2
Canopy Cover (%)	543	0	27.8	33.0	100
Cloud Cover (%)	543	0	42.7	41.0	100
Air Temperature (°C)	543	4	16.3	6.2	28
Past 24-hour Precipitation (mm)	543	0	0.6	1.6	26.4

APPENDIX K – COUNT OF SPECIES DETECTED BY SITE, SEASON, AND TAXA GROUP

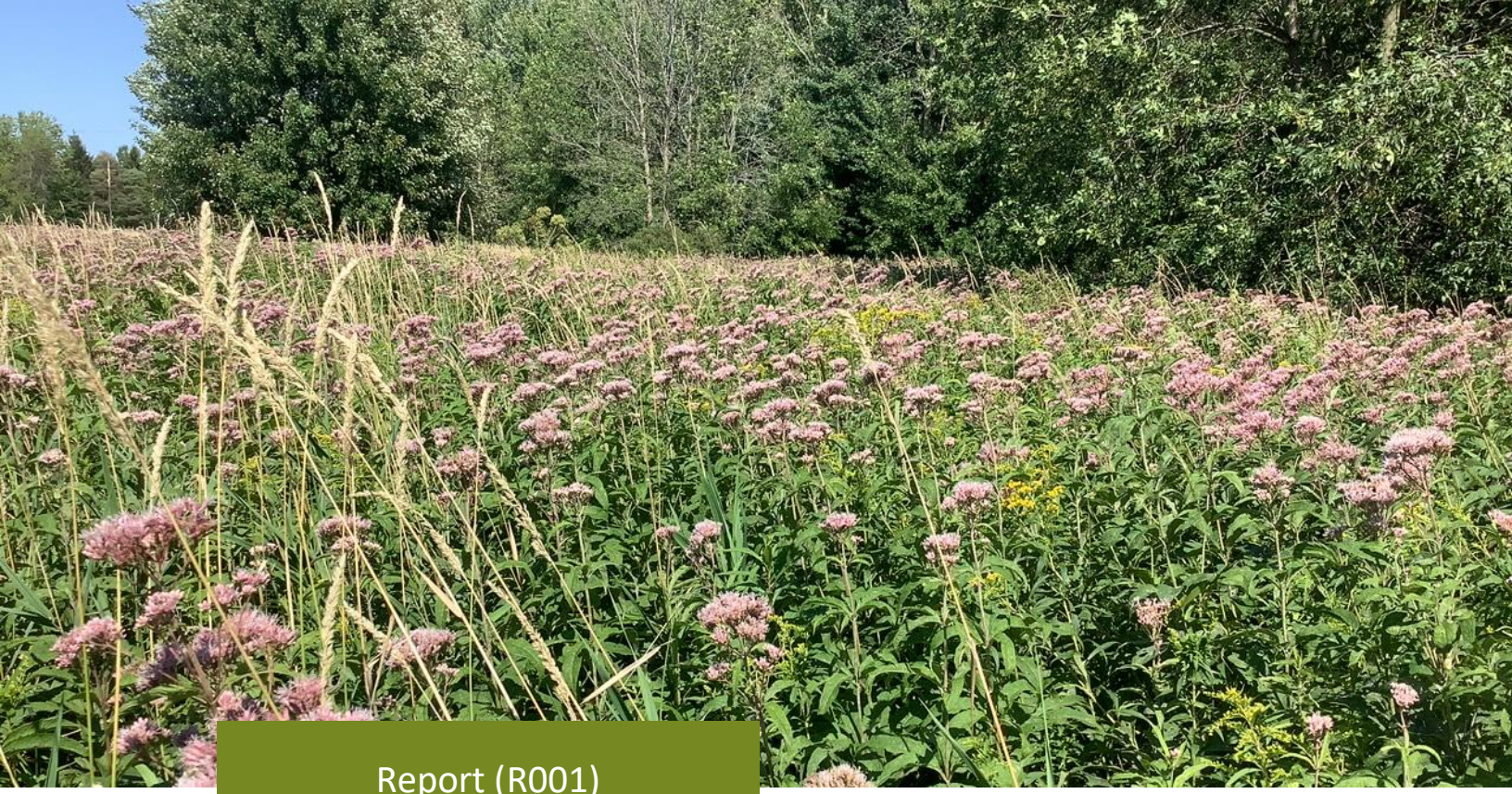
Table K-1. Counts of unique species detected with eDNA by taxa type, season, and site. Counts include all detections to species, before geographic curation and further investigations by the Hanner Lab.

Station ID	Study Area	Fish Species	Mammal Species	Bird Species	Amphibian Species	All Vertebrate Species	Invertebrate Species
Summer							
S006	AOI	3	1	0	0	4	26
S009	AOI	8	1	1	0	10	27
S013	AOI	9	1	1	0	11	38
S014	AOI	3	3	2	0	8	40
S015	AOI	7	0	1	0	8	43
S016	AOI	9	1	1	0	11	33
S029	AOI	8	3	1	0	12	15
S034	AOI	3	2	1	0	6	10
S038	AOI	9	2	2	0	13	13
S040	AOI	9	2	2	0	13	26
S042	AOI	6	1	0	0	7	36
S051	AOI	6	1	2	0	9	30
S056	AOI	6	1	2	0	9	29
S067	AOI	7	1	2	0	10	38
S072	AOI	8	3	2	0	13	34
S073	AOI	6	2	1	0	9	37
S074	AOI	5	1	0	0	6	26
S075	AOI	7	1	0	0	8	26
S076	AOI	10	4	1	0	15	38
S077	AOI	7	1	0	0	8	40
S093	AOI	5	2	2	0	9	45
S094	AOI	4	4	1	0	9	56
S095	AOI	8	4	2	0	14	45
S096	AOI	4	5	3	0	12	44
S099	AOI	1	0	1	0	2	4
S100	AOI	5	3	2	0	10	18
S101	AOI	3	0	1	0	4	23
S102	AOI	3	0	1	0	4	22
S108	AOI	2	0	0	0	2	26
P010	AOI	6	1	0	0	7	9
P002	AOI	1	0	2	0	3	8
P013	AOI	0	1	0	2	3	3
W127	AOI	2	3	2	1	8	16
P012	AOI	0	1	2	1	4	6
P016	AOI	3	2	3	0	8	13
W113	AOI	2	0	1	0	3	6
W124	AOI	2	0	1	0	3	7
W139	AOI	2	2	2	0	6	17
S001	LSA_{AQU}	6	2	1	0	9	10
S002	LSA_{AQU}	9	2	2	0	13	26
S003	LSA_{AQU}	4	1	1	0	6	33
S010	LSA_{AQU}	8	3	2	0	13	15
S021	LSA_{AQU}	6	1	1	0	8	12
S026	LSA_{AQU}	6	3	2	0	11	15
S030	LSA_{AQU}	4	4	0	0	8	17
S037	LSA_{AQU}	8	1	1	0	10	12
S044	LSA_{AQU}	7	1	4	0	12	7

Station ID	Study Area	Fish Species	Mammal Species	Bird Species	Amphibian Species	All Vertebrate Species	Invertebrate Species
S046	LSA_{AQU}	2	0	0	0	2	13
S057	LSA_{AQU}	5	0	0	0	5	14
S058	LSA_{AQU}	5	1	0	0	6	31
S059	LSA_{AQU}	4	3	1	0	8	19
S061	LSA_{AQU}	8	2	2	0	12	27
S063	LSA_{AQU}	7	2	2	0	11	39
S065	LSA_{AQU}	7	2	1	0	10	18
S112	LSA_{AQU}	4	0	2	0	6	9
S126	LSA_{AQU}	4	2	0	0	6	13
L001	LSA_{AQU}	5	1	0	0	6	11
L003	LSA_{AQU}	8	2	1	1	12	9
P007	LSA_{AQU}	4	2	2	1	9	6
P008	LSA_{AQU}	1	2	0	0	3	14
P009	LSA_{AQU}	1	1	1	1	4	18
P015	LSA_{AQU}	4	3	0	0	7	13
W038	LSA_{AQU}	9	2	2	0	13	10
W005	LSA_{AQU}	1	1	0	0	2	12
W006	LSA_{AQU}	1	0	0	0	1	0
W008	LSA_{AQU}	1	0	0	0	1	3
W024	LSA_{AQU}	3	0	0	0	3	7
W033	LSA_{AQU}	1	0	0	0	1	6
W041	LSA_{AQU}	1	0	0	0	1	4
Fall							
S006	AOI	3	1	1	0	5	18
S009	AOI	5	2	1	0	8	14
S013	AOI	7	1	0	0	8	20
S014	AOI	4	3	3	0	10	20
S015	AOI	7	3	5	0	15	26
S016	AOI	8	2	2	0	12	24
S022	AOI	3	2	2	0	7	36
S029	AOI	4	3	0	0	7	9
S034	AOI	3	2	3	0	8	11
S038	AOI	6	1	1	0	8	9
S040	AOI	7	2	0	0	9	28
S042	AOI	9	2	1	0	12	38
S051	AOI	8	2	1	0	11	27
S056	AOI	5	1	0	0	6	18
S067	AOI	6	1	0	0	7	22
S072	AOI	9	1	0	0	10	32
S073	AOI	7	2	2	0	11	34
S074	AOI	8	3	2	0	13	29
S075	AOI	9	4	2	0	15	37
S076	AOI	9	1	1	0	11	26
S077	AOI	8	4	1	0	13	34
S093	AOI	4	4	2	0	10	30
S094	AOI	4	6	1	0	11	52
S095	AOI	3	4	4	0	11	26
S096	AOI	3	5	2	0	10	23
S099	AOI	4	2	4	0	10	12
S100	AOI	5	1	1	0	7	28
S101	AOI	7	2	0	0	9	32
S102	AOI	4	1	0	0	5	20

Station ID	Study Area	Fish Species	Mammal Species	Bird Species	Amphibian Species	All Vertebrate Species	Invertebrate Species
S108	AOI	2	0	2	0	4	11
L006	AOI	3	0	0	1	4	9
P010	AOI	4	1	0	0	5	10
W127	AOI	2	0	0	1	3	7
W132	AOI	2	0	0	1	3	28
W139	AOI	2	3	2	1	8	11
S001	LSA_{AQU}	8	3	1	0	12	19
S002	LSA_{AQU}	9	3	0	0	12	26
S003	LSA_{AQU}	8	5	3	0	16	16
S010	LSA_{AQU}	5	2	3	1	11	18
S011	LSA_{AQU}	8	5	0	0	13	25
S021	LSA_{AQU}	5	4	1	0	10	20
S026	LSA_{AQU}	3	4	0	1	8	34
S030	LSA_{AQU}	6	4	0	1	11	27
S033	LSA_{AQU}	6	4	1	1	12	16
S037	LSA_{AQU}	6	2	2	0	10	32
S044	LSA_{AQU}	4	2	0	0	6	45
S045	LSA_{AQU}	5	5	1	0	11	15
S046	LSA_{AQU}	8	6	3	0	17	37
S049	LSA_{AQU}	8	2	3	0	13	19
S055	LSA_{AQU}	6	3	0	0	9	45
S057	LSA_{AQU}	6	1	0	0	7	30
S058	LSA_{AQU}	4	5	0	1	10	36
S059	LSA_{AQU}	5	2	0	0	7	53
S061	LSA_{AQU}	6	2	3	0	11	58
S063	LSA_{AQU}	10	3	2	1	16	23
S065	LSA_{AQU}	4	1	0	0	5	24
S080	LSA_{AQU}	4	2	2	0	8	23
S081	LSA_{AQU}	4	2	1	1	8	15
S090	LSA_{AQU}	3	3	0	0	6	26
S112	LSA_{AQU}	3	1	0	1	5	25
S126	LSA_{AQU}	5	3	3	1	12	23
L001	LSA_{AQU}	6	3	1	0	10	13
L002	LSA_{AQU}	11	4	1	0	16	16
L003	LSA_{AQU}	8	1	1	0	10	6
L004	LSA_{AQU}	4	3	2	0	9	9
L005	LSA_{AQU}	4	3	1	1	9	11
L007	LSA_{AQU}	6	2	1	0	9	5
P005	LSA_{AQU}	2	2	1	1	6	5
P007	LSA_{AQU}	3	1	0	1	5	17
P008	LSA_{AQU}	3	2	0	0	5	20
P009	LSA_{AQU}	1	2	0	1	4	13
P015	LSA_{AQU}	5	2	1	0	8	29
W061	LSA_{AQU}	4	2	1	0	7	52
W064	LSA_{AQU}	3	3	0	0	6	16
W067	LSA_{AQU}	4	4	0	0	8	28
W005	LSA_{AQU}	3	2	2	0	7	17
W006	LSA_{AQU}	4	2	0	0	6	39
W008	LSA_{AQU}	2	1	3	0	6	33
W009	LSA_{AQU}	2	3	1	0	6	31
W018	LSA_{AQU}	2	3	2	0	7	18
W033	LSA_{AQU}	4	3	3	0	10	13

Station ID	Study Area	Fish Species	Mammal Species	Bird Species	Amphibian Species	All Vertebrate Species	Invertebrate Species
W041	LSA_{AQU}	1	0	1	0	2	13
S113	LSA_{AQU}	2	1	2	0	5	3
S019	RSA_{AQU}	8	4	2	0	14	49
S031	RSA_{AQU}	13	4	1	0	18	53
L012	RSA_{AQU}	8	4	2	0	14	37
S124	Outside RSA_{AQU}	6	2	0	0	8	5
L010	Outside RSA_{AQU}	10	1	0	0	11	11
L011	Outside RSA_{AQU}	6	2	0	0	8	10



Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 BASELINE REPORT (CHAPTER 2: VEGETATION)

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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Cover Image: TEM field work - incidentals 2022

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GLOSSARY AND ABBREVIATIONS

AHM	Aquatic Habitat Mapping
ANSI	Area of Natural and Scientific Interest
AOI	Area of Interest
BIS	Biodiversity Impact Studies
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
BV	Biodiversity Value. The biotic environmental components that will be considered for study within The Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components.
Critical habitat	Habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species (*Species at Risk Act*, S.C. 2002, c. 29). Identification of critical habitat is not a required component of a recovery strategy under the Ontario *Endangered Species Act*. However, the approach used to identify critical habitat, in conjunction with the best scientific information available, is recommended when developing a habitat regulation. A habitat regulation is a legal instrument under the *ESA* that prescribes an area that will be protected as the habitat of the species.
CNSC	Canadian Nuclear Safety Commission
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EAB	Emerald ash borer
ECCC	Environment and Climate Change Canada
Ecoregion	Second highest level of the ELC hierarchy (Crins et al. 2009). Large geographic areas primarily identified by sub-continental climatic regimes and bedrock geology.
Ecosite	Second lowest level of the ELC hierarchy (Crins et al. 2009). The land within an ecosite will generally contain similar substrate and vegetation.
Ecosite classification dataset	The dataset of ecosite classification created for the BIS using South Western Ontario Orthophotography Project (SWOOP) 2020 imagery.
ECS	Ecoregional Criterion Schedule
EDDMapS	Early Detection and Distribution Mapping System
eDNA	Environmental DNA
ELC	Ecological Land Classification
EMBP	Environmental Media Baseline Program
EO	Element Occurrence. An EO is an area of land and/or water where a species or vegetation community is or was present. EOs represent areas important to the conservation of a species or vegetation community. In Ontario, the NHIC generates each EO from one or

	more observations, based on international standard EO specifications developed by NatureServe (NDMNRF 2021).
ESA	Ontario *Endangered Species Act*
Facultative wetland species	A species that usually occurs in wetlands (estimated probability 67 to 99%), but occasionally found in non-wetlands (estimated probability 1 to 33%).
GBIF	Global Biodiversity Information Facility
GIS	Geographic Information System
GLSE	Great Lakes Shoreline Ecosystem classification system
GSWC	Greenock Swamp Wetland Complex
Habitat suitability / suitable habitat	The ability of the habitat, in its current condition, to provide the life requisites of a species.
IA	Impact Assessment
IUCN	International Union for Conservation of Nature
LSA	Local Study Area LSA_{TER} = Terrestrial Local Study Area LSA_{AQU} = Aquatic Local Study Area LSA_{ECO} = combined LSA_{TER} and LSA_{AQU} for studying ecosystem function and services
MECP	Ontario Ministry of the Environment, Conservation and Parks
MNRF	Ontario Ministry of Natural Resources and Forestry
NHIC	Ontario Natural Heritage Information Centre
NWMO	Nuclear Waste Management Organization
Restricted species/element	Restricted species are commercially exploited or sensitive to disturbance; these species could be harmed if data are not stored and shared securely.
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose traditional territories include the project location.
RSA	Regional Study Area RSA_{VEG} = Regional Study Area for vegetation
SAR	Species at Risk. For the purposes of the BIS, SAR include species listed under Schedule 1 of the federal *Species at Risk Act* (*SARA*), species designated as Species at Risk in Ontario (SARO) and listed under the provincial *Endangered Species Act, 2007* (*ESA*), and species assessed as Extirpated, Endangered, Threatened, or Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).
SARA	Federal *Species at Risk Act*
SARO	Species at Risk in Ontario
SNA	Species Not Assessed
SOLRIS	Southern Ontario Land Resource Information System

SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the vdefined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SOP	Standard Operating Procedure
Species of conservation concern	Includes provincially and/or federally listed SAR (Extirpated, Endangered, Threatened, Special Concern) and provincially rare (SRANK S1, S2, S3, SH) species. Regionally rare species may also be scoped in if identified by stakeholders and/or rights-holders as VCs.
Species of interest	Includes species of conservation concern, culturally important species, indicator species, and invasive species (where applicable).
SRANK	Subnational Rank. SRANK is the conservation status of a species or vegetation community within a particular province, territory, or state. In Ontario, the NHIC assigns SRANKs using the best available information and considering factors such as abundance, distribution, population trends, and trends (NDMNRF 2021). Species assigned S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), and SH (Possibly Extirpated) are considered provincially rare by the NHIC. See the NatureServe website for more information.
SWH	Significant Wildlife Habitat. Defined in the Ontario Provincial Policy Statement, 2020 as: *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. *Significant* – in regard to wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Candidate SWH are areas that meet the ELC ecosite code(s) and/or habitat criteria outlined in the SWH ecoregional criterion schedule (ECS). Confirmed SWH are areas that meet the defining criteria outlined in the SWH ECS. Detailed field investigations are usually needed to confirm SWH.
Taxon	A unit used for biological classification (i.e., taxonomy); can refer to a group of any rank, such as a species, family, class, or order.
TEM	Terrestrial Ecosystem Mapping
The Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines. 'TISG Template' refers to the Tailored Impact Statement Guidelines Template (generic version) (IAAC 2022).
TWC	Teeswater Wetland Complex
VC	Valued Component. For impact assessments of designated projects under the *Impact Assessment Act*, the Agency's Glossary of Terms defines VCs as "environmental, health, social, economic or additional elements or conditions of the natural and human

	environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties. Valued components may be identified as having scientific, biological, social, health, cultural, traditional, economic, historical, archaeological and/or aesthetic importance."
Vegetation	'True plants' (e.g., trees, shrubs, herbs, ferns, and mosses), lichens, and fungi
Weed	Species listed as noxious weeds on the Ontario Weed Control Act

1.0 VEGETATION

1.1 Introduction

Ontario has a high species richness of plant life with over 2,000 native plant species (Morton and Venn 1990, Newmaster et al. 1998) that are adapted to a variety of conditions in aquatic, wetland, and terrestrial environments. Within the region of southern Ontario around the Saugeen Ojibway Nation (SON)-South Bruce siting area, there are occurrence records of over 1,200 species of plants ("GBIF Occurrence Download" 2023). For the purposes of the Adaptive Phased Management Project's (hereafter, 'the Project') Biodiversity Impact Studies (BIS), vegetation refers to both 'true plants' (e.g., trees, shrubs, herbs, ferns, and mosses) and lichens and fungi. Plants are primary producers, meaning that they convert sunlight to energy that other organisms can use. People and wildlife depend on plants to provide food and materials (e.g., wood) that sustain life. Plants also provide nutrients to the environment as they decompose, and their leaves provide shade that is vital for thermal regulation of aquatic and terrestrial habitat conditions that support certain species. Plant roots help to stabilize soils, and plant leaves protect against detachment and entrainment of soil particles due to heavy rain, reducing erosion. Fungi are also important components of healthy ecosystems as they can be decomposers which cycle nutrients, minerals, and carbon to make them available for plants and other organisms (Harmon et al. 1994). Fungi can form mutualistic associations with plant roots (i.e., mycorrhizal fungi), which can increase carbon sequestration in the soil (Clemmensen et al. 2013). Lichens are symbionts between fungi and algae or cyanobacteria, which can also fix carbon and nitrogen and provide food and habitat to wildlife (Zedda and Rambold 2015). As such, vegetation is an integral and highly valued component of healthy, functioning ecosystems that provide services to people, fish, wildlife, and invertebrates (see Chapter 9 for more information on ecosystem function and services).

The Canadian Nuclear Safety Commission's (CNSC) *Guidance on Deep Geological Repository Site Characterization* outlines elements of the aquatic and terrestrial environment that should be characterized in the Area of Interest (AOI), including vegetation, soil quality[1], terrestrial habitat, aquatic macrophytes, and species at risk (SAR) (CNSC 2018). In addition, the Tailored Impact Statement Guidelines Template (generic version) ('TISG Template'[2]) identifies vegetation, riparian and wetland environments, and SAR as elements of the biophysical environment that could be scoped into the impact assessment (IA) as valued components (VCs) (IAAC 2022). Such scoping requires a detailed baseline description and project effects assessment (IAAC 2022). A full list of regulatory requirements pertaining to biodiversity is available in Appendix E of the *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach* (BPPA) Report (Zoetica 2021).

Vegetation biodiversity values (BVs) for the BIS include species and communities of conservation concern (including those designated as at-risk and rare), weedy/introduced/invasive species, and species of interest to stakeholders and rights-holders[3]. Species of conservation concern, along with culturally important and invasive species (where applicable), are currently included as "species of interest" for all BVs for the purposes of the BIS. For the current Chapter 2 (Vegetation) of this 2023 BIS Baseline Report,

[1] For the Project, soil quality will be studied through the Environmental Media Baseline Program (EMBP) rather than the BIS.
[2] Please see Chapter 1 for limitations of and planned updates to the TISG Template. (IAAC 2022)
[3]Species of interest to stakeholders and rights holders may include species of conservation concern and weedy/introduced/invasive species but may also include species that do not fall within these categories.

mapping of species observations is limited to SAR, provincially rare, and invasive species. Although vegetation was mentioned during engagement, the cultural importance of species cannot be ascertained by Zoetica™ at this time, as this task requires further coordination with other disciplines studying the potential impacts of the Project. A review of engagement conducted to date that is of relevance to the BIS is presented in Appendix B of the BPPA Report (Zoetica 2021). The scope of species of interest for BIS baseline reporting will be expanded in future years of the BIS baseline program to include culturally important species when more information is gathered through Tier 2 studies and engagement.

For the BIS, both terrestrial and aquatic vegetation have been divided into five sub-categories:

1. **Vegetation Community** – A group of associated vegetation species within a specific area. In Ontario, one current method to delineate vegetation communities is through the Ecological Land Classification (ELC) System (Lee et al. 1998). Using the ELC system, vegetation and substrate type are combined into over 200 ecosite classifications.

2. **Rare and Exemplary Vegetation Community** – A group of associated vegetation species within a specific area that exhibits a suite of factors indicating rare and exemplary status within the province of Ontario. These include rare vegetation communities that are considered Significant Wildlife Habitat (SWH) (OMNR 2000).

3. **Rare Vegetation** – Vegetation species that are naturally rare or have become rare due to other factors including human disturbance. While some rare vegetation populations may be globally or nationally secure, they are still considered more at risk of extinction than common species. Rare species may also be listed as SAR. At-risk vegetation species potentially occurring within the SON-South Bruce siting area are presented in Table 5-3 of the BPPA Report (Zoetica 2021).

4. **Culturally Important Vegetation** – Vegetation species used by Indigenous communities and other local communities for cultural purposes (i.e., food, medicinal, material, or spiritual).

5. **Weeds, Invasive Species, and Introduced Species of Concern** – Weeds are undesirable vegetation species that often occur in cultivated areas. Introduced species are non-native species that have established outside of their natural range. Some introduced vegetation may become invasive. Invasive species can be detrimental to natural ecosystem processes and services, the economy, and human health. Invasive vegetation species may also outcompete and cause declines in native, desired vegetation. The International Union for Conservation of Nature (IUCN) considers invasive species one of the biggest threats to biodiversity (IUCN 2020).

The current Chapter 2 of the 2023 BIS Baseline Program focuses on sub-categories (2) through (5) (i.e., SWH and vegetation species of interest). A discussion of terrestrial vegetation communities (subcategory 1), as determined through desk-based Terrestrial Ecosystem Mapping (TEM), is provided in Appendix B, Chapter 1. Tier 1 Aquatic Habitat Mapping (AHM) studies aimed to collect baseline data for wetland, riparian, and aquatic vegetation communities (see Appendix D, Chapter 1).

1.1.1 Objectives

The objectives of vegetation studies for the BIS are to:

1. Determine the presence, distribution, and abundance of relevant SWH and species of interest, including:

a. Species of conservation concern, including SAR,
b. Species of interest and potential importance to local stakeholders and rights-holders,
c. Weedy, introduced, and invasive species; and,

2. Provide additional baseline data to help inform the Project's biodiversity IA and mitigation measures, and to assist in the potential development of monitoring program(s) to address environmental, regulatory, and stakeholder/rights-holder concerns and adapt the management program accordingly.

The current Chapter 2 on Vegetation begins to fulfill the requirements of the TISG Template required for vegetation (see Appendix C in the BPPA Report (Zoetica 2021)).

1.2 Methods

1.2.1 Study Areas

The BIS study areas for vegetation include the AOI, two local study areas (LSA_{TER} for terrestrial species, LSA_{AQU} for riparian, wetland, and aquatic species), and a regional study area (RSA_{VEG}). See Section 3.0 in Chapter 1 of the 2023 BIS Baseline Report and Section 5.2.1.4 of the BPPA Report (Zoetica 2021) for more details on study area descriptions and rationale.

1.2.2 Collation of Species Observations and Habitat Data

Zoetica began desk-based investigations of vegetation by identifying species of interest and SWH that could occur within the BIS study areas. Appendix D and Section 3.1 in the BPPA Report (Zoetica 2021) provide a comprehensive list of SAR, including at-risk vegetation species, and the methods used to compile this list. Provincially rare vegetation species and communities are indicated by their subnational rank (SRANK; S1, S2, S3, SH) and tracked by the Ontario Natural Heritage Information Centre (NHIC)[4]. Zoetica also compiled a list of regulated and non-regulated invasive species, including vegetation, in Ontario to help direct the BIS program (see **Table A-3**). Zoetica classified species listed as noxious weeds on the Ontario *Weed Control Act* as 'weeds'. For species not listed as invasive or weedy, Zoetica confirmed their status as introduced if their SRANK on the NHIC Ontario Species List was SNA (Species Not Assessed).

Species are designated as noxious weeds in Ontario if they are "difficult to manage on agricultural land once established and will reduce the yield and quality of the crop being grown, negatively affect the health and well-being of livestock, and/or pose a risk to the health and well-being of agricultural workers" (OMAFRA 2022). Invasive species can each have different impacts on the environments to which they are introduced, including modifying the ecosystem physically (e.g., altering water flow, elevation, canopy cover) or chemically (e.g., altering water chemistry or soil nutrient composition), and outcompeting native species to establish a mono-species stand (Simberloff 2010). Introduced species are not expected to have significant negative effects on human health, the economy, or ecosystem functioning at the current time.

[4] For the purposes of this BIS Baseline Report chapter, conservation statuses described in text for at-risk species refer to their Species at Risk in Ontario (SARO) listings unless otherwise indicated. Conservation statuses are from the NHIC's Ontario species list, current to March 1, 2023, and updated for any discrepancies with provincial and federal SAR listings up to August 15, 2023. As such, species and status listings may differ from those presented in Zoetica's 2021 BPPA Report (Zoetica 2021).

Zoetica collated existing data from government, community science (e.g., iNaturalist), and other biodiversity databases. For this 2023 BIS Baseline Report, data on verified species and habitat records were sourced from the NHIC; Ontario Ministry of Natural Resources and Forestry (MNRF); Global Biodiversity Information Facility (GBIF); and Early Detection and Distribution Mapping System (EDDMapS) Ontario. These datasets periodically pull observations from other biodiversity-related projects and programs (e.g., iNaturalist, museum and academic institution records), and so provided a comprehensive desk-based source of data to investigate vegetation species of interest and biodiversity found or likely to be found in the BIS study areas. Zoetica searched the Southern Ontario Land Resource Information System (SOLRIS) and datasets from the Ontario Geological Survey (e.g., Surficial Geology, Physiography) for candidate rare vegetation community SWH. In addition, Zoetica investigated findings from the previous environmental studies conducted for the Project in the SON-South Bruce siting area (Tulloch Environmental 2020, 2021). **Table 1-1** summarizes the desk-based datasets, data layers, and reports investigated and analyzed for vegetation for the 2023 BIS Baseline Report. Data reported on maps were limited to observations from 1970 onward as older observations were considered historic and less reliable. Data on desk-based observations of species of interested are presented in **Table B-1**. See also Appendix A, Chapter 1 for data quality scoring. A full list of the species mentioned in this report, including common and scientific names, is available in **Table A-1** in Appendix A.

Table 1-1. Spatial datasets and reports analyzed for vegetation for the 2023 BIS Baseline Report.

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains relevant[1] data?
Tulloch Environmental *Phase 2 preliminary environmental studies for APM Project*	July 2020 Site Reconnaissance (Tulloch Environmental 2020)	Report	10/2020	N
	October 2020 Natural Heritage Features (Tulloch Environmental 2021)	Report	04/2021	N
Ontario Natural Heritage Information Centre (NHIC)	Plant Community Occurrence	Shapefile	12/2020	N
	Plant Community Observation	Shapefile	12/2020	N
	Species Occurrences	Shapefile	12/2020	Y
Ontario Ministry of Natural Resources and Forestry (MNRF)	Wildlife Activity Site	Shapefile	12/2020	N
	Wildlife Activity Area	Shapefile	12/2020	N
	Southern Ontario Land Resource Information System (SOLRIS) 3.0	TIFF (Raster)	08/2022	N
	Karst	PDF Map	08/2022	N
	Surficial Geology	Shapefile	08/2022	N
	Physiography	Shapefile	08/2022	N
	Greenock Swamp ANSI Report (Johnson 1994a, 1994b)	Reports	10/2020	Y
Global Biodiversity Information Facility (GBIF)	Species Occurrences	Comma Separated Values	09/2021	Y
Early Detection and Distribution Mapping System (EDDMapS) Ontario	Invasive Species Observations	Shapefile	01/2022	Y

Environment and Climate Change Canada (ECCC) and Ontario Ministry of the Environment, Conservation and Parks (MECP)[2]	Federal and Provincial SAR Recovery Strategies	Reports	Various	Y

Notes:
1. Zoetica determined dataset relevance based on geographic and temporal relevance as well as relevance to vegetation. For example, data that were not within the relevant BIS study areas, data that were too old to be considered relevant, or data that did not include records of vegetation species were labelled "N" for not containing relevant data.
2. SAR recovery strategies are published by the ECCC and MECP but authors may differ. Refer to Appendix D of the BPPA Report (Zoetica 2021) for a full list of potentially occurring SAR that had provincial and/or federal recovery strategies available at the time of writing the BPPA Report (note: new documents are continually posted on the SARO website and *SARA* Public Registry).

Additional externally sourced datasets for vegetation may be investigated in future years of the BIS baseline program. However, it is likely that additional information on vegetation species that is more spatially and temporally accurate and specific will be obtained on the ground through field studies (see Section 1.2.3) and engagement with knowledgeable stakeholders/rights-holders, such as local field naturalists, regional MNRF staff, rare plant experts, and Indigenous community members.

1.2.3 Tier 1 Studies

Field studies conducted in 2022 focused on collecting Tier 1 foundational habitat data and species detections through TEM and AHM studies and incidental observations. Detailed methods for the Tier 1 studies are available in the *Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design* (BPD) Report and associated Standard Operating Procedures (SOPs) (Zoetica 2022). In addition to the utility of each Tier 1 study outlined below for understanding vegetation in the BIS study areas, incidental observations of vegetation species collected during the terrestrial and aquatic field studies are also informative in describing biodiversity.

The BIS also included eDNA studies that were primarily focused on animals rather than vegetation, and so results are not presented in this chapter (see Appendix E, Chapter 1). Additional years of Tier 1 studies will provide a more comprehensive picture of the vegetation species of interest present at the SON-South Bruce siting area.

1.2.3.1 Terrestrial Ecosystem Mapping

TEM work completed to date is described in Appendix B, Chapter 1. Desk-based data including aerial imagery from the South Western Ontario Orthophotography Project was used to classify and map ecosites according to Ontario's Ecological Land Classification (ELC) and Great Lakes Shoreline Ecosystems (GLSE) systems. The ecosite classification dataset was used to identify candidate SWH. Field contractors surveyed plots in 2022 to ground-truth ecosite identifications and investigate candidate SWH. Field contractors recorded the presence of species of interest identified by Zoetica (see Section 1.2.2) at full and ground plot surveys, and identified additional rare, invasive, introduced, and weedy species.

1.2.3.2 Identification of Candidate SWH

Rare vegetation communities and provincially and regionally rare vegetation species are considered SWH. Zoetica investigated the SWH Ecoregional Criterion Schedule for Ecoregion 6E (hereafter '6E ECS') (OMNRF 2015) and found eight vegetation-related SWH types of potential relevance to the SON-South Bruce siting area:

- Cliffs and Talus Slopes
- Sand Barren
- Alvar
- Old Growth Forest
- Savannah
- Tallgrass Prairie
- Other Rare Vegetation Communities
- Special Concern and Rare Species

Further details about candidate SWH investigations conducted to date and rationale for inclusion (or exclusion) of SWH types listed in the 6E ECS are presented in Appendix C, Chapter 1.

1.2.3.3 Aquatic Habitat Mapping

Aquatic Habitat Mapping (AHM) work completed to date is described in Appendix D, Chapter 1. Surveys included characterizing wetland, riparian, and in-stream (aquatic) vegetation. Results from 2022 AHM studies on the biodiversity of wetland environments, including vegetation, are summarized in Chapter 3. Vegetation species of interest detected in AHM field work are discussed in this chapter. Full species lists of riparian and aquatic vegetation observed during AHM studies are included in Appendix G of Appendix D, Chapter 1.

1.2.4 Mapping Considerations

Due to the sensitivity of at-risk and rare species and nesting/denning habitat features, spatial data from NHIC are represented by a 1 km grid rather than a point, as per the NHIC's Sensitive Data Location Standards (NHIC n.d.). Descriptive reporting will also follow sensitivity standards and will not be detailed enough to allow for precise geolocation. GBIF and EDDMapS data reported on maps were limited to observations from 1970 onward as older observations were considered historic and not as reliable. See also Appendix A, Chapter 1 for data quality scoring.

For GBIF and EDDMapS species observation data, when there were multiple entries with a count of one at the same location, Zoetica assumed the entries were all the same individual. For simplicity, mapped species observations present the cumulative number of observations and counts and do not represent the number of individuals.

Incidental observations were recorded during various Tier 1 baseline field programs and were noted on different data forms (Incidental Observation Form or noted in TEM, AHM, or eDNA survey forms). Incidental observations varied in method of observation (audio, visual, etc.) and life history stage of organisms, and may have been recorded in transit to a site and thus not associated with habitat data. As well, expertise in species identification may have varied among field contractors working on different field programs. Thus, not all pertinent information may have been available (e.g., observation type, demographics) or collected in a directly comparable manner (e.g., quantity). Field-based observations of provincially tracked species (at-risk and/or rare) are also represented by a 1 km grid, rather than a point, on maps to align with the NHIC's Sensitive Data Location Standards (NHIC n.d.). Data associated with mapped incidentals are included in Appendix B.

1.3 Results

1.3.1 Summary of Vegetation Diversity in Field Surveys

Desk-based mapping and field data from the 2022 TEM and AHM surveys provided preliminary descriptions of the vegetation community at the SON-South Bruce siting area. TEM surveys evaluated the vegetation composition in five layers (Tree, Shrub, Herb, Moss-Lichen-Seedling, and Epiphyte Layers). Species were detected in 1–7 plots in each layer. Here, Zoetica outlined the most reported species in each layer within the AOI and LSA_{TER}, and the threshold above which a species is included in this category of "most commonly reported" varied depending on the distribution of data in each species layer. Across the AOI, LSA_{TER}, and LSA_{AQU}, TEM surveys detected 33 taxa in the Tree layer (A). The most reported tree species were red maple, green ash, American elm, yellow birch, black ash, eastern white cedar, sugar maple, and balsam fir. There were 91 taxa in the Shrub layer (B). The most reported species in the AOI and LSA_{TER} (recorded in > three plots) were black ash, green ash, red osier dogwood, American elder, eastern white cedar, and nannyberry. In the Herb layer (C), field crews detected 338 taxa. The most reported taxa in the AOI and LSA_{TER} (> three plots) were common milkweed, sedge species, white turtlehead, broad-leaved enchanter's nightshade, spinulose wood fern, spotted joe-pye weed, spotted jewelweed, harlequin blue flag, northern water-horehound, sensitive fern, reed canarygrass (invasive), giant goldenrod, wrinkleleaf goldenrod, white panicle aster, and purple-stemmed aster. The Moss, Lichen, and Seedling Layer (D) contained 52 taxa. Species were all found in less than three plots in the AOI and LSA_{TER}. The most reported taxa in the LSA_{AQU} were red maple, green ash, and moss species. The Epiphyte layer (E) contained mostly records of unknown mosses and lichens, and five records of taxa identified to species or genus. Taxa listed in each layer are not necessarily unique from one another; for example, red maple was found in layers A, B, C, and D. See Section 4.2.2 and Tables D-2 through D-6 in Appendix B, Chapter 1 for a complete discussion of the vegetation found in each layer.

As milkweed species were detected in the herb layer during TEM studies, and monarch (Special Concern) breeding habitat depends on the presence of milkweed, Zoetica cross-checked the 2022 incidental observations for presence of monarch within the AOI and LSA_{TER}. Field contractors recorded monarch in seven grid cells that are within or overlap the AOI. Two TEM plots with milkweed species in the southwestern AOI were within or very close to grid cells containing incidental observations of monarch (see Figure B-1 in Chapter 6).

TEM surveys also revealed that vegetation cover, particularly in the tree and shrub layers, was generally lower in the AOI and LSA_{TER} than in the broader LSA_{ECO} (a study area encompassing the outer limits of the LSA_{TER} and the LSA_{AQU}; see Section 3.0 in Chapter 1). Structural stage of plots in the AOI was generally lower in the north and west regions and higher in the eastern region. See Section 4.2.2 in Appendix B, Chapter 1 for a fuller discussion of vegetation structure and cover. Appendix B, Chapter 1 also presents results on tree attributes for wildlife use (in Section 4.2.3.2) and forest health (in Section 4.3), which are relevant to vegetation.

In AHM surveys, each aquatic/riparian vegetation species was detected in 1–35 survey sites in a given dataset (waterbodies, wetlands, or watercourses). Here, Zoetica outlines the most reported species in each aquatic habitat type within the AOI and LSA_{AQU}, and the threshold above which a species is included in this category of "most reported" varied depending on the distribution of data in each dataset. AHM surveys of waterbodies detected 66 riparian vegetation taxa, 13 emergent taxa, five floating taxa, and 18 taxa of submergent vegetation. The most reported riparian species in waterbodies (> 10 plots) were

eastern white cedar, tamarack, reed canarygrass, sedge species, and willow species**.** The most reported emergent taxon was cattail species (nine plots), followed by softstem bulrush and bur-reed species in three and four plots, respectively. Commonly reported floating taxa (> three plots) were duckweed species, spatterdock species, and water-lily species. The most reported submergent taxon was water-milfoil in ten plots, followed by waterweed species, coontail species, sago pondweed, and stonewort species in three plots each. In wetlands, field crews detected 41 riparian taxa, nine emergent taxa, five floating taxa, and five submergent taxa. Most riparian species in wetlands were found in only one or two plots; the most reported species (three or four plots) were reed canarygrass, red osier dogwood, silver maple, sensitive fern, and ostrich fern. The most reported emergent taxa (> two plots) were reed canarygrass, sedge species, and cattail species. Floating duckweed species were found in six plots, with the other four floating taxa found in only one plot each. Submergent bladderwort species were found in two plots, with the other four submergent species found in only one plot each. In watercourses, field crews detected 20 submergent taxa, 23 emergent taxa, nine floating taxa, and 72 taxa on the watercourse banks. Commonly reported emergent species (> seven plots) were reed canarygrass, eastern burreed, arrowhead species, and water speedwell. The most reported floating taxa (> seven plots) were duckweed species, marsh speedwell, spatterdock species, and water speedwell. Commonly reported submergent taxa (> four plots) were watercress species, American eelgrass, water-milfoil species, and largeleaf pondweed. See Appendix G of Appendix D, Chapter 1 for full tables of vegetation species detected in AHM surveys.

Incidental observations from AHM, TEM, and eDNA field surveys included 168 taxa of vegetation (**Table A-4**). Of these, 106 were identified to at least the species level, and 47 to the genus level. Incidental observations recorded many species of interest, including one that was not detected in the desk-based or TEM/AHM survey data: green dragon (Special Concern, S3).

Further discussion of vegetation species detected in field surveys in this iteration of Chapter 2 of the 2023 BIS Baseline Report will be limited to indicators of important habitat (Section 1.3.2), species of interest (Section 1.3.3), and a brief presentation of community characterization based on ecosite mapping (Section 1.3.4).

1.3.2 Presence, Distribution, and Abundance of Important Habitat

1.3.2.1 Significant Wildlife Habitat

A summary of the candidate SWH identified to date and of relevance to vegetation is presented in Appendix C, Chapter 1. Based on ecosite analyses, Old Growth Forest could potentially occur within the AOI and LSA_{TER}. In contrast, ecosites where Alvars may occur are relatively rare compared to other habitat types. To date, there has been no evidence of Cliffs and Talus Slopes, Sand Barren, Savannah, or Tallgrass Prairie SWHs within the SON-South Bruce siting area. Determining the presence of other rare vegetation communities will require further discussion with NHIC and MNRF. Two Special Concern and/or rare vegetation species were detected in 2022 field data: eastern green-violet (S2) and green dragon. Field contractors noted thousands of eastern green-violet individuals at two sites in forests containing sugar maple in the AOI, which likely constitutes SWH for this species. Field contractors observed single individuals of green dragon at two sites in the LSA_{AQU} south of the AOI. If SON-South Bruce is selected, Tier 2 Studies may examine the habitat surrounding these observations to determine whether it constitutes SWH for green dragon.

Desk-based SWH ecosite analyses have not been completed to the extent of the RSA_{VEG} due to limited coverage of the refined ecosite dataset. However, Tier 1 TEM studies were completed across the LSA_{ECO} (combined LSA_{TER} and LSA_{AQU} for studying ecosystem function and services, see Chapter 9) which encompassed a portion of the RSA_{VEG}. Thus, limited SWH ecosite analyses within the RSA_{VEG} are reported in Appendix C, Chapter 1 and future studies will complete SWH analyses to the extent of the RSA_{VEG}. Additional rare and at-risk vegetation species (not communities) are discussed below in Section 1.3.3.1.

1.3.2.2 Critical Habitat

As of August 2023, there are two at-risk vegetation species with federal recovery strategies where critical habitat (represented by 100 x 100 km squares) has been identified within the BIS study areas for vegetation (see Table 5-3 in the BPPA Report (Zoetica 2021)). As shown in **Figure B-1**, there are known critical habitat squares for goldenseal (Special Concern, S2; ECCC 2020) and American ginseng (Endangered, S2; ECCC 2018) that overlap with the AOI, LSA_{TER}, LSA_{AQU}, and RSA_{VEG}. American ginseng and goldenseal also have provincial recovery strategies (Jolly 2016, MECP 2019a) and provincial government response statements (MECP 2017, 2020) available. Further discussions with Environment and Climate Change Canada (ECCC) and/or the Ontario Ministry of the Environment, Conservation and Parks (MECP) are needed to determine whether critical habitat for these at-risk plants occur within the BIS study areas, as spatial masking of the data makes this impossible to know at present. In addition, it is possible that new critical habitat will be identified by ECCC recovery practitioners during the timeline of the BIS baseline program and Project IA; should this occur, relevant critical habitat will be discussed in this section in future iterations of the BIS Baseline Report.

American ginseng was listed as Endangered in 2008 when the Ontario *Species at Risk Act* came into effect. American ginseng is a long-lived perennial herb that grows in deciduous forest understories. Individuals take a long time to mature, and grow in very small populations, which makes the species very susceptible to habitat loss and degradation from deforestation. The roots are known to be illegally harvested, which also threatens this species (MECP 2019b).

Other federally listed species at risk found in the BIS study areas (see Section 1.3.3.1) do not currently have federal definitions of their critical habitat. For black ash (Endangered), no federal recovery strategy has been issued and thus there is no outline of critical habitat. For butternut (Endangered, S2?), a federal recovery strategy issued in 2014 stated that it was difficult to determine critical habitat because habitat loss is not the main threat to butternut. Green dragon does not have a federal recovery strategy or identified critical habitat, though habitat loss and degradation are the most significant threats to its populations (Donley et al. 2013). Notably, its known distribution in Ontario is restricted to the area southwest of a line from Hamilton to the Maitland River in Huron County (Donley et al. 2013), and the BIS study areas are north of that line. Therefore, these incidental observations fall outside of the known range of green dragon.

1.3.3 Presence, Distribution, and Abundance of Species of Interest

A total of 66 vegetation species of interest have been detected within the BIS study areas based on desk-based and field-based investigations conducted to date (**Table 1-2**). See **Table B-1** for details (count) of desk-based observations and **Table B-2** for details (count, observation type, Tier 1 survey source) of field-based incidental observations. Thirty-six of these species have occurred within the AOI (**Table 1-2**; **Figure B-2**; **Figure B-3**; **Figure B-4**). Terrestrial vegetation (as identified in **Table A-1**) is only studied within the AOI and LSA_{TER}, while aquatic and wetland/riparian vegetation is studied in the AOI and LSA_{AQU}. Therefore,

for mapping and reporting, Zoetica disregarded observations of terrestrial vegetation at sites in the LSA_{AQU} outside of the LSA_{TER}, and observations of aquatic and wetland/riparian vegetation at sites outside of the LSA_{AQU}. Field observations of species of interest included GPS coordinates, some of which appear overlapping on the map (**Figure B-3**) but may have been slightly different. Therefore, Zoetica quantified the number of sites that a species of interest occurred at (i.e., in Sections 1.3.3.1 and 1.3.3.3) using QGIS instead of visual inspection of the map.

1.3.3.1 Species of Conservation Concern

Note: an element occurrence (EO) for restricted species V1[5] was included in the NHIC dataset received by Zoetica. The EO is relevant to the BIS. However, because restricted species V1 is considered a restricted species/element in terms of sharing and presenting spatial data, the record is neither mapped nor described in detail in this Chapter.

Desk- and field-based data from 2022 indicate five at-risk vegetation species and 14 provincially rare species have been recorded within the BIS study areas (see **Table 1-2**; **Figure B-2**; **Figure B-3**). The SAR are black ash, restricted species V1, butternut, green dragon, and Hill's pondweed (Special Concern, S2S3). Hill's pondweed is an aquatic species, and black ash and green dragon are facultative wetland species; thus, these SAR will be studied in the LSA_{AQU} (see Section 1.2.1). As a terrestrial plant, butternut will be studied in the LSA_{TER}.

Black ash was added to SARO as an Endangered species in January 2022 due to its high susceptibility to the invasive emerald ash borer (COSEWIC 2018); and a provincial recovery strategy for black ash was published in September 2022 (Catling et al. 2022). Federally, black ash was assessed as Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in November 2018, and this species is still under consideration for a status change (listing) under Schedule 1 of the federal *Species at Risk Act* at the time of preparing this report (September 2023). As such, no federal recovery strategy has been developed for black ash (as of August 2023). Butternut is a widespread but uncommon tree that was listed as Endangered in Ontario in 2008 and reconfirmed as Endangered in 2017. Butternut populations have declined over recent decades due to butternut canker, a fast-spreading fungus that can kill a tree within a few years (Poisson and Ursic 2013). A federal recovery strategy has been issued for butternut, but it does not include maps of critical habitat because the main threat is not habitat loss, but rather disease from the canker (EC 2010). Butternut hybridizes with introduced species of the same genus (*Juglans*), and such hybrids are not considered at-risk. Green dragon has been listed as Special Concern in both Ontario and Canada since the 1980s. It grows in moist deciduous forests and floodplains, often along rivers or creeks. To disperse offspring, adults release vegetative offshoots that disperse via flooding upstream or downstream. Green dragon is primarily threatened by habitat loss and degradation, threats that are exacerbated by its small and isolated populations. Within Ontario, it occurs only in southwestern Ontario where development pressure contributes to habitat loss and degradation. Many of its historical populations are now extirpated (Donley et al. 2013). The two incidental observations of green dragon in 2022 were north of its known distribution in Ontario. See Chapter 3 (Wetlands and Riparian Environments) for a full assessment of the aquatic plant Hill's pondweed.

[5] Due to their sensitive nature, detections of restricted species are not described in detail nor made discernable on maps.

Of the species at risk, black ash was detected throughout all three study areas. Field contractors incidentally recorded black ash in 54 grid squares across the AOI and the LSA_{AQU} north and south of the AOI (**Table B-2**; **Figure B-3**). Black ash was also recorded on GBIF at a site on Schmidt Lake in the northern LSA_{AQU} (**Figure B-2**). Butternut was the only other SAR incidentally observed in the AOI, in one grid square in the southwestern quadrat. Field contractors incidentally observed green dragon in two grid squares in the southern LSA_{AQU} (**Table B-2**; **Figure B-3**). Hill's pondweed was detected on GBIF at one site in the GSWC in the northern LSA_{AQU} (**Figure B-2**).

One provincially rare vegetation species, eastern green-violet, was incidentally observed in the AOI during 2022 field surveys (**Figure B-3**). Field contractors detected populations of eastern green-violet in two grid squares in the northeastern AOI. No provincially rare vegetation species were observed in the LSA_{TER} during 2022 field studies. Three provincially rare vegetation species potentially occur in the LSA_{TER}, outside the AOI, based on desk-based point locations and NHIC 1 km grids[6] (**Figure B-2**): Bush's pocket moss (S3), beaked spikerush (S3), and rigid sedge (S3?). However, these observations, along with most of the NHIC and GBIF records for at-risk and rare vegetation species, are quite old, with each species last observed in 1977, 1976, and 1987, respectively. For the latter two species, both records have been designated as "Historical" EOs by the NHIC due to lack of observations for at least 20 years (when NHIC last ranked the EOs in 2009). None of these three species were detected during 2022 field surveys. During TEM surveys, field contractors recorded the provincially rare American tree moss (S3) in the LSA_{AQU} north of the AOI (**Figure B-3**a; **Table B-3**). Four provincially rare species have observations in the LSA_{AQU} outside the LSA_{TER} on GBIF: beaked spikerush at a site west of McGlinn Lake, large-leaved leafy moss (S3) and floating crystalwort (S3) at the same site in the GSWC, slender mountain-mint (S3) at a site near Schmidt Lake, and tubercled orchid (S3) at a site in the GSWC (**Table 1-2**; **Figure B-2**). Greater round-leaved orchid (S2) has an NHIC 1 km grid observation in the GSWC north of the AOI (**Figure B-2**).

Within the LSA_{AQU}, there were GBIF records of occurrence of two SAR (black ash and Hill's pondweed), and eight provincially rare vegetation species in the GSWC (**Table B-1**; **Figure B-2**). Black ash was the only recent observation from 2018; all other records were from 1987 when specimens were collected for the Canadian Museum of Nature and University of Michigan. Similarly, the NHIC has designated the EOs for rigid sedge, beaked spikerush, and greater round-leaved orchid as "Historical". The Greenock Swamp Area of Natural and Scientific Interest (ANSI) Life Science Inventory report identified eight provincially rare vegetation species within the Greenock Swamp ANSI: Hill's pondweed, rigid sedge, beaked spikerush, restricted species V1, greater round-leaved orchid, green arrow arum (S3), eastern green-violet, and scarlet beebalm (S3) (Johnson 1994a). The first five species listed were also found within the BIS study areas through collation of NHIC and/or GBIF data (see **Table 1-2**; **Figure B-2**). Zoetica added green arrow arum, a rare wetland species, to this list of vegetation species of interest based on the Greenock Swamp ANSI Life Science Inventory findings. Eastern green-violet was also incidentally observed in the AOI during 2022 field studies (**Table B-2**). Scarlet beebalm is a terrestrial plant, but as there are no spatial data associated with the Greenock Swamp ANSI report, Zoetica cannot determine whether this species was observed within or outside the LSA_{TER}. Green arrow arum and scarlet beebalm are not mapped in this BIS Baseline Report due to the lack of spatial data associated with the Greenock Swamp ANSI report.

[6] Due to the sensitivity of at-risk and rare species, spatial data from NHIC are represented by a 1 km grid rather than a point, as per the NHIC's Sensitive Data Location Standards. Descriptive reporting follows sensitivity standards and are not detailed enough to allow for precise geolocation.

Table 1-2. List of vegetation species of interest with records within the AOI, LSA_{TER}, and LSA_{AQU}, as identified through desk-based and Tier 1 field-based research. Species of conservation concern (at-risk and provincially rare), species mentioned during engagement, and weedy/introduced/invasive species are noted, where applicable. Incid. = incidental species observations from AHM, TEM, and eDNA field work in 2022. In study area columns, '-' means not detected, whereas '/' means not applicable to that study area (i.e., terrestrial species do not apply to the LSA_{AQU} and aquatic/wetland/riparian species do not apply to the LSA_{TER}).

Species Common Name	Reason for Interest						Dataset Detected In				Study Area[1]		
	SAR	Rare	Engage.	Weed	Introd.	Invasive	Desk-based	TEM	AHM	Incid.	AOI	LSA_{TER}	LSA_{AQU}
Vascular Plants													
Alder buckthorn	-	-	-	-	-	Y	-	Y	-	-	-	/	Y
Beaked spikerush	-	Y	-	-	-	-	Y	-	-	-	-	/	Y
Bittersweet nightshade	-	-	-	-	Y	-	Y	Y	Y	Y	Y	/	Y
Black ash	Y	-	-	-	-	-	Y	Y	-	Y	Y	/	Y
Bladder campion	-	-	-	-	Y	-	Y	Y	-	-	-	/	Y
Broad-leaved cattail	-	-	-	-	-	Y	-	-	-	Y	-	/	Y
Broad-leaved helleborine	-	-	-	-	Y	-	-	Y	-	-	Y	-	/
Bull thistle	-	-	-	Y	-	-	Y	-	Y	-	Y	-	/
Butternut	Y	-	-	-	-	-	-	-	-	Y	Y	-	/
Canada thistle	-	-	-	Y	-	-	-	-	Y	-	Y	-	/
Coltsfoot	-	-	-	Y	-	-	Y	Y	-	-	Y	-	/
Common buttercup	-	-	-	-	Y	-	-	Y	-	-	-	/	Y
Common dandelion	-	-	-	-	Y	-	-	Y	-	-	Y	-	/
Common timothy	-	-	-	-	Y	-	-	Y	-	-	Y	-	/
Curled dock	-	-	-	-	Y	-	-	Y	-	-	-	/	Y
Eastern green-violet	-	Y	-	-	-	-	Y	-	-	Y	-	Y	/
Eastern poison ivy	-	-	-	Y	-	-	-	Y	-	-	Y	/	Y
English plantain	-	-	-	-	Y	-	Y	Y	-	-	Y	-	/
European buckthorn	-	-	-	Y	-	Y	Y	Y	Y	Y	Y	/	Y
European common reed	-	-	-	-	-	Y	Y	-	-	Y	-	/	Y
European water-horehound	-	-	-	-	Y	-	Y	-	-	-	-	/	Y
Garden bird's-foot trefoil	-	-	-	-	Y	-	-	Y	-	-	Y	-	/
Goutweed	-	-	-	-	-	Y	Y	-	-	-	-	/	Y
Greater round-leaved orchid	-	Y	-	-	-	-	Y	-	-	-	-	/	Y

Species Common Name	Reason for Interest						Dataset Detected In				Study Area[1]		
	SAR	Rare	Engage.	Weed	Introd.	Invasive	Desk-based	TEM	AHM	Incid.	AOI	LSA_{TER}	LSA_{AQU}
Greek anemone	-	-	-	-	Y	-	Y	-	-	-	-	Y	/
Green arrow arum	-	Y	-	-	-	-	Y	-	-	-	-	/	Y
Green dragon	Y	Y	-	-	-	-	-	-	-	Y	-	/	Y
Hill's pondweed	Y	Y	-	-	-	-	Y	-	-	-	-	/	Y
Knapweed spp.	-	-	-	Y	-	-	-	Y	-	-	Y	-	Y
Lesser burdock	-	-	-	-	Y	-	-	Y	-	-	Y	-	/
Manitoba maple	-	-	-	-	-	Y	-	-	-	Y	-	/	Y
Meadow fescue	-	-	-	-	Y	-	-	Y	-	-	Y	-	/
Multiflora rose	-	-	-	-	-	Y	-	Y	-	-	-	Y	/
Narrow-leaved cattail	-	-	-	-	Y	-	-	Y	Y	-	Y	/	Y
Norway maple	-	-	-	-	-	Y	Y	-	Y	-	Y	-	/
Norway spruce	-	-	-	-	Y	-	-	Y	-	-	Y	-	/
Orchard grass	-	-	-	-	Y	-	-	Y	-	Y	Y	-	/
Oxeye daisy	-	-	-	-	Y	-	-	-	-	Y	-	Y	/
Poison-ivy	-	-	-	Y	-	-	Y	Y	-	Y	Y	/	Y
Purple loosestrife	-	-	-	-	-	Y	Y	-	-	Y	Y	/	-
Queen Anne's lace / wild carrot	-	-	-	-	Y	-	-	Y	-	Y	Y	-	/
Red clover	-	-	-	-	Y	-	-	Y	-	-	Y	-	/
Redtop	-	-	-	-	Y	-	-	-	-	Y	Y	/	Y
Reed canarygrass	-	-	-	-	-	Y	Y	Y	Y	Y	Y	/	Y
Restricted species V1	Y	Y	-	-	-	-	Y	-	-	-	RESTRICTED SPECIES		
Rigid sedge	-	Y	-	-	-	-	Y	-	-	-	-	/	Y
Rough bluegrass	-	-	-	-	Y	-	Y	-	-	-	-	/	Y
Scarlet beebalm		Y	-	-	-	-	Y	-	-	-	Unclear[2]		
Scots pine	-	-	-	-	-	Y	Y	-	Y	Y	Y	-	/
Slender mountain-mint	-	Y	-	-	-	-	Y	-	-	-	-	/	Y
Small-flowered hairy willowherb	-	-	-	-	Y	-	Y	-	-	-	-	/	Y
Smooth bedstraw	-	-	-	Y	-	-	-	Y	-	-	Y	-	/
Soybean	-	-	-	-	Y	-	-	-	Y	Y	Y	-	/

Species Common Name	Reason for Interest						Dataset Detected In				Study Area[1]		
	SAR	Rare	Engage.	Weed	Introd.	Invasive	Desk-based	TEM	AHM	Incid.	AOI	LSA_{TER}	LSA_{AQU}
Spotted lady's-thumb	-	-	-	-	Y	-	-	Y	-	-	-	/	Y
Stinging nettle	-	-	-	-	Y	-	-	-	Y	Y	Y	/	Y
Sulphur cinquefoil	-	-	-	-	Y	-	-	Y	-	-	Y	-	/
Swamp dodder	-	-	-	Y	-	-	-	Y	-	-	-	/	Y
Sweet cherry	-	-	-	-	Y	-	-	-	-	Y	Y	-	/
Tubercled orchid	-	Y	-	-	-	-	Y	-	-	-	-	/	Y
Water speedwell	-	-	-	-	Y	-	-	-	Y	-	Y	/	Y
Western poison ivy	-	-	-	Y	-	-	-	Y	-	-	Y	/	Y
White clover	-	-	-	-	Y	-	-	Y	-	-	Y	-	/
White sweet-clover	-	-	-	-	-	Y	-	Y	-	-	Y	Y	/
White willow	-	-	-	-	Y	-	Y	-	Y	-	Y	/	Y
Mosses & Liverworts													
American tree moss	-	Y	-	-	-	-	-	Y	-	-	-	/	Y
Bush's pocket moss	-	Y	-	-	-	-	Y	-	-	-	-	Y	/
Floating crystalwort	-	Y	-	-	-	-	Y	-	-	-	-	/	Y
Large-leaved leafy moss	-	Y	-	-	-	-	Y	-	-	-	-	/	Y

Notes:
[1]For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed within its boundaries.
[2]Scarlet beebalm was reported in the Greenock Swamp ANSI, but as there were no spatial data associated with the report, Zoetica cannot determine whether the species was found within or outside of the relevant study areas (AOI and LSA_{TER}).

1.3.3.2 Species of Interest to Stakeholders and Rights-Holders, and Species of Potential Socio-economic Importance

Community concerns relevant to vegetation were expressed during engagement conducted for the Project (see Table 5-5 and Appendix B of the BPPA Report (Zoetica 2021)). The need for rare plant inventories and studies of forest health was mentioned. There is great concern for forest health in the region; several invasive terrestrial species, including emerald ash borer (EAB), were noted to have a huge impact on the health and diversity of forests in the region. Studies of forest health are included in the BIS design (see Section 5.2.1 in the BPD Report (Zoetica 2022)) and work began in 2022 as part of Tier 1 TEM studies (see Appendix B, Chapter 1). These studies rated tree health as "fair" in most plots, largely due to signs of EAB, and to a lesser extent due to beech bark disease, fungus, cankers, and severe canopy decline. Field crews also evaluated the presence of standing snag trees as an indicator of a healthy ecosystem, and evidence of deer overbrowsing which can negatively impact forest health. See Chapter 9 for a discussion of EAB and other forest pests and diseases.

Concerns were raised during engagement regarding the protection of agricultural crops. The scope of the BIS focuses on vegetation as a component of biodiversity and does not include the study of agricultural crops or contaminants in vegetation. However, the Environmental Media Baseline Program (EMBP) will assess contaminant concentration in both traditionally harvested vegetation (e.g., roots and berries, medicinal and edible species) and agricultural vegetation deemed important to stakeholders and rights-holders (CanNorth 2021).

Existing observations of provincially rare vegetation were discussed in Section 1.3.3.1. No other specific vegetation species have been mentioned by stakeholders or rights-holders to date. However, the socio-economic or socio-ecological importance of additional vegetation species to local communities and/or Indigenous communities will be sought through future engagement.

1.3.3.2.1 Merchantable Timber

This section will be included in future BIS Baseline Reports after Tier 2 and Tier 3 data collection have been completed and analyzed.

1.3.3.3 Weedy, Introduced, and Invasive Species

A total of 48 weedy, introduced, or invasive vegetation species (all vascular plants) were detected within the BIS study areas in desk- and/or field-based observations (see **Table 1-2**; **Figure B-2**; **Figure B-4**). These include one provincially regulated species (European common reed – restricted), eight noxious weeds regulated under the Ontario *Weed Control Act* (knapweed species, Canada thistle, bull thistle, swamp dodder, smooth bedstraw, poison ivy (inc. eastern and western varieties), coltsfoot, and European buckthorn), 11 non-regulated invasive species (i.e., identified as species of concern by the Ontario Invading Species Awareness Program, Invasive Species Centre, and/or the Ontario Invasive Plant Council), and 29 species that are not considered invasive but are designated as exotic/introduced by the NHIC (SRANK: SNA) (see **Table A-3**). No prohibited invasive vegetation species (under the Ontario *Invasive Species Act*) have been reported within the BIS study areas for vegetation. The non-regulated species that are considered invasive are alder buckthorn, broad-leaved cattail, Manitoba maple, Norway maple, goutweed, purple loosestrife, white sweet-clover, reed canarygrass, Scots pine, European buckthorn, and multiflora rose (**Table 1-2**). All invasive vegetation records from EDDMapS and GBIF are recent (2014 – 2021). Only three exotic/introduced species (bladder campion, rough bluegrass, white willow) consisted

of older museum specimen collection records from the 1980s, but bladder campion and white willow were both detected by field contractors in 2022 in the LSA_{ECO} (**Table B-3**) and AOI (**Table B-6**), respectively.

In desk-based data, there were no observations of weedy/introduced/invasive vegetation species within the AOI, but there were several observations by field teams in 2022. Field contractors incidentally observed bittersweet nightshade at five sites in the central and western AOI, broad-leaved helleborine at one site in the northeastern AOI and one in the western AOI, bull thistle and Canada thistle at one site in the northern AOI, coltsfoot at a site in the north-central AOI, common dandelion at a site in the northern AOI, common Timothy at two sites in the western AOI, eastern poison ivy at one sites in the north-central AOI, English plantain at three sites in the northern and western AOI, European buckthorn at four sites in the northern and western AOI, European reed at three sites in the southwestern AOI, garden bird's-foot trefoil at a site in the northwestern AOI, knapweed sp. at one site in the western AOI, narrow-leaved cattail at three sites in the southwestern AOI, Norway maple at a sites in the central AOI, orchard grass at two sites in the northern AOI, poison ivy at a site in the eastern AOI, purple loosestrife at one site in the central AOI and one in the northeastern AOI, redtop at one site in the north-central AOI, reed canarygrass at 63 sites throughout the AOI (except for the southeastern area), Scots pine at three sites in the northern AOI, soybean at two sites in the western AOI, stinging nettle at 15 sites throughout the AOI (except the southeastern area), sweet cherry at one site in the northeastern AOI, water speedwell at ten sites throughout the central AOI, western poison ivy at two sites in the western AOI, white willow at three sites in the north and western AOI, wild carrot at four sites in the northern and western AOI, and lesser burdock, meadow fescue, Norway spruce, red clover, smooth bedstraw, sulphur cinquefoil, white clover, and white sweet-clover all at one site in the northern AOI (**Figure B-4** – Map 4; **Table B-3**; **Table B-4**; **Table B-5**; **Table B-6**).

Desk-based data included one weedy/introduced/invasive observation within the LSA_{TER}: introduced Greek anemone was recorded at a site south of the AOI (**Figure B-2**). Field contractors observed reed canarygrass at six locations in the northern and eastern LSA_{TER}, oxeye daisy and redtop at a site in the northwestern LSA_{TER}, orchard grass and stinging nettle each at one site in the northeastern LSA_{TER}, and multiflora rose and white sweet-clover at a site in the eastern LSA_{TER} (**Figure B-4** – Map 4).

In desk-based data in the LSA_{AQU}, weedy/introduced/invasive vegetation was most frequently observed near Schmidt Lake in the GSWC (**Figure B-2**), which is likely due to increased disturbance as this lake is a popular recreational area. European buckthorn (weedy and invasive), broad-leaved cattail (invasive), and four introduced species (European highbush cranberry, bittersweet nightshade, European water-horehound, and small-flowered hairy willowherb) were found at Schmidt Lake in the desk-based data. Invasive goutweed was detected in EDDMapS data east of the AOI in the LSA_{AQU}. Introduced species rough bluegrass, bladder campion, and white willow were found elsewhere in the GSWC. No weedy, invasive, or introduced species were detected in the LSA_{AQU} south of the LSA_{TER} in desk-based data.

Field contractors detected several weedy/introduced/invasive species in the LSA_{AQU} outside of the AOI. Just north of the AOI, redtop was observed at the same site as oxeye daisy. In and around Schmidt Lake (northeastern LSA_{AQU}), field contractors detected bittersweet nightshade, bladder campion, broad-leaved cattail, broad-leaved helleborine, coltsfoot, common buttercup, common dandelion, English plantain, multiflora rose, orchard grass, poison ivy, red clover, reed canarygrass, stinging nettle, western poison ivy, white clover, and wild carrot across several sites (**Figure B-4** – Map 1). Elsewhere in the far northern LSA_{AQU}, field contractors detected European buckthorn at two sites, poison ivy at three sites, and broad-

leaved helleborine, bittersweet nightshade, and eastern poison ivy at one site each. Clustered in the GSWC east of Cunningham Lake, field contractors found western poison ivy and poison ivy at seven sites each, European buckthorn and reed canarygrass at six sites each, bittersweet nightshade at four sites, common dandelion at three sites, broad-leaved helleborine at two sites, and common buttercup, English plantain, European reed, garden bird's-foot trefoil, knapweed sp., lesser burdock, orchard grass, spotted lady's-thumb, water speedwell, white sweet-clover, and wild carrot at one site each (**Figure B-4** – Map 1). In the east-central GSWC, field contractors recorded eight detections of reed canarygrass, seven poison ivy, four broad-leaved helleborine, three stinging nettle, three European buckthorn, two water speedwell, two European reed, and one each of common buttercup, common dandelion, bittersweet nightshade, and western poison ivy (**Figure B-4** – Map 2). Around Silver Lake in the west-central LSA_{AQU}, field contractors recorded reed canarygrass, Scots pine, and European buckthorn at one site, and reed canarygrass at another site (**Figure B-4** – Map 2). In the LSA_{AQU} north of the LSA_{TER}, field contractors recorded European buckthorn at 13 sites, reed canarygrass at seven sites, bittersweet nightshade at five sites, broad-leaved helleborine at four sites, western poison ivy at four sites, common dandelion at three sites, and Manitoba maple, lesser burdock, swamp dodder, eastern poison ivy, common buttercup, and water speedwell at one site each (**Figure B-4** – Map 3).

In the LSA_{AQU} south of the AOI, field contractors detected reed canarygrass at 11 sites, European buckthorn at seven sites, water speedwell at six sites, broad-leaved cattail at four sites, alder buckthorn, bittersweet nightshade, broad-leaved helleborine, narrow-leaved cattail, and stinging nettle at three sites each, and bull thistle, Canada thistle, common dandelion, curled dock, English plantain, poison ivy, and wild carrot at one site each (**Figure B-4** – Maps 4 and 5; **Table B-3**; **Table B-4**; **Table B-6**).

1.3.4 Additional Baseline Data to Inform the IA

1.3.4.1 Community Characterization

A detailed discussion of ELC mapping and ecosite-level analyses, including maps, is available in Appendix B, Chapter 1. These ecosite summaries provide a high-level overview of terrestrial vegetation communities in the AOI, LSA_{TER}, and the LSA_{ECO}. A summary of ecosite groupings within the BIS study areas for vegetation – AOI, LSA_{TER}, and LSA_{AQU}– is presented in Appendix B, Chapter 1. The RSA_{VEG} has not been studied yet, but data from this area will be included in future iterations of the BIS Baseline Report.

The Greenock Swamp ANSI Life Science Inventory report provides some insight into wetland vegetation communities within the BIS study areas, as the ANSI overlaps with the LSA_{AQU} and northern parts of the LSA_{TER} (see Section 1.3.1.2, Chapter 9). Approximately 680 vascular plants from 108 families, and over 125 species of non-vascular plants (including bryophytes, lichens, fungi, and algae), have been identified within the Greenock Swamp ANSI (Johnson 1994a). However, the list of non-vascular plants is admittedly "*quite incomplete, due to the surveyor's limited familiarity in the field with many genera and species of non-vascular plants*" (Johnson 1994a). A summary of the Greenock Swamp ANSI vascular plant inventory is provided in **Table A-2**.

1.4 Discussion

This Chapter 2 (Vegetation) of the 2023 BIS Baseline Report focused on desk- and field-based analyses of rare vegetation communities and species of interest observations. This iteration of the report includes one field season of Tier 1 data. Preliminary examinations of the vegetation community within the BIS

study areas conducted through TEM and AHM surveys revealed the presence of a diversity of vegetation species (see Appendices B and D, Chapter 1). Additional years of study will provide a more comprehensive picture of the vegetation community. Complete results from additional Tier 1 terrestrial and aquatic habitat assessments and incidental observations, along with results from any future Tier 2 studies, will be reported in future iterations of the BIS Baseline Report.

To date, 16 vegetation species of conservation concern have been detected through desk- and/or field-based methods within the AOI, LSA_{TER}, and LSA_{AQU} (**Table 1-2**). These include at-risk black ash, green dragon, restricted species V1, butternut, and Hill's pondweed. Where a species has only been detected using desk-based data (i.e., restricted species V1, Bush's pocket moss, beaked spikerush, rigid sedge, large-leaved leafy moss, floating crystalwort, slender mountain-mint, and tubercled orchid), caution should be taken as those data could be as old as 1970, and the conditions supporting the species' presence in the area may have changed. In addition to habitats for provincially rare beaked spikerush, rigid sedge, and Bush's pocket moss, candidate SWH have been identified for Alvar and Old Growth Forest within the LSA_{TER}. Critical habitat for American ginseng and goldenseal overlaps the BIS study areas. If endangered American ginseng is found within the AOI and/or LSA_{TER} and could be directly or indirectly impacted by the Project, mitigation must consider the general habitat description for American ginseng (MECP 2021a) that is protected under the Ontario *Endangered Species Act* (*ESA*):

- Category 1 habitat (lowest tolerance to alteration) is the area occupied by American ginseng and the area of forest or treed swamp ELC community classes within 100 m of the occupied area.
- Category 2 habitat (moderate tolerance to alteration) is the area of forest or treed swamp ELC community classes between 100 m and 150 m of the occupied area, and contiguous with Category 1.

Ontario's general habitat description for American ginseng is also consistent with identification of critical habitat for this species as per the federal recovery strategy; namely, "areas of suitable habitat within a 150 m critical function zone around existing occurrence records of American ginseng" (ECCC 2018). Further discussions with knowledgeable stakeholders and rights-holders, along with additional baseline data collection through Tier 2 field studies, will help determine the locations of sensitive habitats for American ginseng, goldenseal, and other at-risk and rare vegetation species and communities.

The observation of butternut was not confirmed to be definitively the native species, as this must be determined by a Butternut Health Expert per the MECP (MECP 2021b). If SON-South Bruce is selected for Tier 2 studies, Zoetica will plan for Butternut Health Assessments following MECP guidelines within the AOI, which include guidance for field identification of butternut hybrids (MECP 2021b). The field location with the butternut observation in 2022, which was in the AOI (**Figure B-3**), would be revisited at this point to confirm the species identification.

The observations of green dragon were further north than the known species' range in Ontario, described as "southwest of a line from Hamilton to the Maitland River in Huron County" in the Management Plan (Donley et al. 2013). Green dragon releases vegetative offshoots into the water and relies on flooding to disperse these offshoots either up or downstream (Donley et al. 2013). The Maitland River flows through the Wingham Wetland Complex area in the southern LSA_{AQU} before emptying into Lake Huron at the town of Goderich. The green dragon observations were in the southern LSA_{AQU} around the TWC. Therefore, it may be feasible for offshoots to have dispersed upstream from the known range into the LSA_{AQU}. However,

additional years of observation would confirm that these individuals survive and/or recruit offspring in the area. These individuals could represent a population "sink" where offspring disperse to an area but do not establish a successful population due to poor survival and/or reproduction. It is also possible that the species is spreading further north as climate change warms the areas north of its historically known range. The Management Plan states: "Since Green Dragon is conspicuous at its peak and often sought after by botanists, it is unlikely that the species has merely been overlooked at historical sites" (Donley et al. 2013). Therefore, searches for green dragon around the locations of the 2022 observations in future years should indicate whether the species is persisting in this area outside of its known range.

Forty-eight weedy/introduced/invasive species have been detected through desk- and/or field-based methods within the AOI, LSA_{TER}, and LSA_{AQU}. These include eight noxious weeds regulated under the Ontario *Weed Control Act*, one regulated invasive species, and 11 species listed as "of concern" (i.e., non-regulated invasive species) by the Ontario Invading Species Awareness Program, Invasive Species Centre, and/or the Ontario Invasive Plant Council (**Table 1-2**). The remaining 29 species are not noxious weeds or invasive, but are classified as exotic / introduced / non-native by the NHIC. Such species may currently be less of a concern than noxious weeds or invasive species, which are differentiated by their negative impacts on the environment, economy, and/or human health.

Methods for Tier 2 field studies planned for vegetation may include a combination of floristic inventory and intuitive meander techniques to detect rare species, culturally important species, and weeds, introduced, and invasive species within the LSA_{TER} and LSA_{AQU}. Depending on the rarity of candidate SWH ecosites (polygons) in the LSA_{TER} (see Appendix C, Chapter 1), surveys for potential rare and exemplary vegetation communities will be conducted as per the *Standard for Terrestrial Ecosystem Mapping in British Columbia* (RIC 1998). Refer to Section 5.2.1 of the BPPA Report (Zoetica 2021) for more information.

A more complete discussion of vegetation will be included in future iterations of the BIS Baseline Report after additional years of Tier 1 field data have been collected and analyzed. Tier 2 studies will be completed if the SON-South Bruce siting area is selected for additional baseline investigations for the Project.

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APPENDIX A – SPECIES NAMES & VEGETATION SPECIES DETECTED

Table A-1. Common and scientific names for species mentioned in this report. Species names follow the NHIC's Ontario species lists (current to March 1, 2023). Habitat is classified as terrestrial if the species is an Upland (UPL) or Facultative Upland (FACU) species, wetland/riparian if the species is a Facultative Wetland (FACW), or Facultative (FAC; meaning occurs in wetlands and non-wetlands) species, and aquatic if the species is an Obligate Wetland (OBL) species (Lichvar et al. 2012) as listed on the USDA Plants Database (USDA and NRCS 2023) - Northcentral & Northeast region. For species without wetland codes, the habitat was gathered from species' profiles on Go Botany ("Native Plant Trust Go Botany" 2023), unless otherwise cited in a footnote.

Common Name	Scientific Name	Habitat
VEGETATION		
Balsam fir	*Abies balsamea*	Wetland/Riparian (FAC)
Fir	*Abies* sp.	N/A
Manitoba maple	*Acer negundo*	Wetland/Riparian (FAC)
Black maple	*Acer nigrum*	Terrestrial (FACU)
Norway maple	*Acer platanoides*	Terrestrial (UPL)
Red maple	*Acer rubrum*	Wetland/Riparian (FAC)
Silver maple	*Acer saccharinum*	Wetland/Riparian (FACW)
Sugar maple	*Acer saccharum*	Terrestrial (FACU)
Maple	*Acer* sp.	N/A
Freeman's maple	*Acer x freemanii*	N/A
Jointed goatgrass	*Aegilops cylindrica*	Terrestrial
Goutweed	*Aegopodium podagraria*	Wetland/Riparian (FAC)
Redtop	*Agrostis gigantea*	Wetland/Riparian (FACW)
Tree-of-heaven	*Ailanthus altissima*	Terrestrial (UPL)
Garlic mustard	*Alliaria petiolata*	Terrestrial (FACU)
European black alder	*Alnus glutinosa*	Wetland/Riparian (FACW)
Slender meadow foxtail	*Alopecurus myosuroides*	Wetland/Riparian (FACW)
Common ragweed	*Ambrosia artemisiifolia*	Terrestrial (FACU)
Ragweed spp.	*Ambrosia* spp.	N/A
Great ragweed	*Ambrosia trifida*	Wetland/Riparian (FAC)
Greek anemone	*Anemone blanda*	Terrestrial
Wild chervil	*Anthriscus sylvestris*	Terrestrial
Lesser burdock	*Arctium minus*	Terrestrial (FACU)
Green dragon	*Arisaema dracontium*	Wetland/Riparian (FACW)
Giant reed	*Arundo donax*	Terrestrial
Common milkweed	*Asclepias syriaca*	Terrestrial (UPL)
Milkweed	*Asclepias* sp.	N/A
Mountain grape	*Mahonia aquifolium*	Terrestrial (UPL)
Japanese barberry	*Berberis thunbergii*	Terrestrial (FACU)
Common barberry	*Berberis vulgaris*	Terrestrial (FACU)
Yellow birch / swamp birch	*Betula alleghaniensis*	Wetland/Riparian (FAC)
White birch / paper birch	*Betula papyrifera*	Terrestrial (FACU)
Birch	*Betula* sp.	N/A

Common Name	Scientific Name	Habitat
Small-spike false nettle	*Boehmeria cylindrica*	Aquatic (OBL)
Flowering-rush	*Butomus umbellatus*	Aquatic (OBL)
Carolina fanwort	*Cabomba caroliniana*	Aquatic (OBL)
Bluejoint reedgrass	*Calamagrostis canadensis*	Aquatic (OBL)
Fringed sedge	*Carex crinita*	Aquatic (OBL)
Lake sedge	*Carex lacustris*	Aquatic (OBL)
Woolly-fruit sedge	*Carex lasiocarpa*	Aquatic (OBL)
Sedge species	*Carex* spp.	N/A
Tussock sedge	*Carex stricta*	Aquatic (OBL)
Rigid sedge	*Carex tetanica*	Wetland/Riparian (FACW)
Eastern rough sedge	*Carex scabrata*	Aquatic (OBL)
Blue beech	*Carpinus caroliniana*	Wetland/Riparian (FAC)
Diffuse knapweed	*Centaurea diffusa*	Terrestrial
Iberian starthistle	*Centaurea iberica*	Terrestrial
Brown knapweed	*Centaurea jacea*	Terrestrial (FACU)
Black knapweed	*Centaurea nigra*	Terrestrial
Yellow starthistle	*Centaurea solstitialis*	Terrestrial
Knapweed spp.	*Centaurea* spp.	N/A
Spotted knapweed	*Centaurea stoebe*	Terrestrial
Spotted knapweed	*Centaurea stoebe* ssp. *micranthos*	Terrestrial
Coontail species	*Ceratophyllum* spp.	N/A
Leatherleaf	*Chamaedaphne calyculata*	Aquatic (OBL)
Stonewort species	Charales	N/A
White turtlehead	*Chelone glabra*	Aquatic (OBL)
Woodreed	*Cinna* sp.	N/A
Broad-leaved enchanter's nightshade	*Circaea canadensis*	Terrestrial (FACU)
Canada thistle	*Cirsium arvense*	Terrestrial (FACU)
Bull thistle	*Cirsium vulgare*	Terrestrial (FACU)
Clematis	*Clematis* sp.	N/A
American tree moss	*Climacium americanum*	Wetland/Riparian[7]
Yellow clintonia	*Clintonia borealis*	Wetland/Riparian (FAC)
Poison-hemlock	*Conium maculatum*	Wetland/Riparian (FACW)
Bunchberry	*Cornus canadensis*	Wetland/Riparian (FAC)
Silky dogwood	*Cornus obliqua*	Wetland/Riparian (FACW)
Red-osier dogwood	*Cornus sericea*	Wetland/Riparian (FACW)
Dogwood	*Cornus* sp.	N/A
Hawthorn	*Crataegus* sp.	N/A
Common crupina	*Crupina vulgaris*	Terrestrial
Smallseed alfalfa dodder	*Cuscuta approximata*	Terrestrial
Compact dodder	*Cuscuta compacta*	Terrestrial

[7] See description of habitat at ("American Tree Moss" n.d.)

Common Name	Scientific Name	Habitat
Flax dodder	*Cuscuta epilinum*	Terrestrial
Clover dodder	*Cuscuta epithymum*; *C. epithymum* var. *epithymum*	Terrestrial
Swamp dodder	*Cuscuta gronovii*	Wetlands/Riparian
Japanese dodder	*Cuscuta japonica*	Terrestrial[8]
Dodder spp.	*Cuscuta* spp.	N/A
Showy lady's slipper	*Cypripedium reginae*	Wetland/Riparian (FACW)
Orchard grass	*Dactylis glomerata*	Terrestrial (FACU)
Wild carrot / Queen Anne's lace	*Daucus carota*	Terrestrial (UPL)
Swamp loosestrife	*Decodon verticillatus*	Aquatic (OBL)
Chinese yam	*Dioscorea polystachya*	Terrestrial
Spinulose wood fern	*Dryopteris carthusiana*	Wetland/Riparian (FACW)
Paterson's curse	*Echium plantagineum*	Terrestrial
Brazilian elodea	*Egeria densa*	Aquatic (OBL)
Common water-hyacinth	*Eichhornia crassipes*	Aquatic (OBL)
Autumn olive	*Elaeagnus umbellata*	Terrestrial
Beaked spikerush	*Eleocharis rostellata*	Aquatic (OBL)
Waterweed species	*Elodea* spp.	N/A
Small-flowered hairy willowherb	*Epilobium parviflorum*	Wetland/Riparian (FACW)
Broad-leaved helleborine	*Epipactis helleborine*	Terrestrial (UPL)
Horsetail	*Equisetum* sp.	N/A
Woolly cupgrass	*Eriochloa villosa*	Terrestrial[9]
Tawny cottongrass	*Eriophorum virginicum*	Aquatic (OBL)
Winged euonymus	*Euonymus alatus*	Terrestrial
Boneset	*Eupatorium* sp.	N/A
Cypress spurge	*Euphorbia cyparissias*	Terrestrial
Leafy spurge	*Euphorbia esula; E. virgata*	Terrestrial
Large-leaf aster	*Eurybia macrophylla*	Terrestrial (UPL)
Grass-leaved goldenrod	*Euthamia graminifolia*	Wetland/Riparian (FAC)
Spotted joe-pye weed	*Eutrochium maculatum*	Aquatic (OBL)
Joe-pye weed	*Eutrochium* sp.	N/A
American beech	*Fagus grandifolia*	Terrestrial (FACU)
Bush's pocket moss	*Fissidens bushii*	Terrestrial
Alder / glossy buckthorn	*Frangula alnus*	Wetland/Riparian (FAC)
White ash	*Fraxinus americana*	Territorial (FACU)
Black ash	*Fraxinus nigra*	Wetland/Riparian (FACW)
Green ash / red ash	*Fraxinus pennsylvanica*	Wetland/Riparian (FACW)
Ash	*Fraxinus* sp.	N/A
Smooth bedstraw	*Galium mollugo*	Terrestrial (FACU)
Fowl mannagrass	*Glyceria striata*	Aquatic (OBL)

[8] (DiTomaso et al. 2013)
[9] (Minnesota Wildflowers 2023)

Common Name	Scientific Name	Habitat
Soybean	*Glycine max*	Terrestrial
English ivy	*Hedera helix*	Terrestrial (FACU)
Giant hogweed	*Heracleum mantegazzianum*	Wetland/Riparian (FAC)
Hawkweed	*Hieracium* sp.	N/A
Eastern green-violet	*Hybanthus concolor*	Terrestrial (FACU)
Goldenseal	*Hydrastis canadensis*	Terrestrial
Hydrilla	*Hydrilla verticillata*	Aquatic (OBL)
European frog-bit	*Hydrocharis morsus-ranae*	Aquatic (OBL)
Common winterberry	*Ilex verticillata*	Wetland/Riparian (FACW)
Spotted jewelweed	*Impatiens capensis*	Wetland/Riparian (FACW)
Purple jewelweed	*Impatiens glandulifera*	Wetland/Riparian (FAC)
Yellow iris	*Iris pseudacorus*	Aquatic (OBL)
Harlequin blue flag	*Iris versicolor*	Aquatic (OBL)
Tansy ragwort	*Jacobaea vulgaris*	Terrestrial (UPL)
Twinleaf	*Jeffersonia diphylla*	Terrestrial
Butternut	*Juglans cinerea*	Terrestrial (FACU)
Black walnut	*Juglans nigra*	Terrestrial (FACU)
Himalayan knotweed	*Koenigia polystachya*	Wetland/Riparian[10]
Canada wood nettle	*Laportea canadensis*	Wetland/Riparian (FACW)
European larch	*Larix decidua*	Terrestrial
Tamarack	*Larix laricina*	Wetland/Riparian (FACW)
Duckweed species	Lemnaceae spp.	N/A
Oxeye daisy	*Leucanthemum vulgare*	Terrestrial (UPL)
Northern spicebush	*Lindera benzoin*	Wetland/Riparian (FACW)
Loesel's twayblade	*Liparis loeselii*	Wetland/Riparian (FACW)
Cardinal flower	*Lobelia cardinalis*	Aquatic (OBL)
Meadow fescue	*Lolium pratense*	Terrestrial (FACU)
Japanese honeysuckle	*Lonicera japonica*	Terrestrial (FACU)
Maack's honeysuckle	*Lonicera maackii*	Terrestrial
Morrow's honeysuckle	*Lonicera morrowii*	Terrestrial (FACU)
Bush honeysuckle spp. (exotic)	*Lonicera* spp.	N/A
Tatarian honeysuckle	*Lonicera tatarica*	Terrestrial (FACU)
Bell's honeysuckle	*Lonicera x bella*	N/A
Dwarf honeysuckle	*Lonicera xylosteum*	Terrestrial
Garden bird's-foot trefoil	*Lotus corniculatus*	Terrestrial (FACU)
European water-horehound	*Lycopus europaeus*	Aquatic (OBL)
Northern water-horehound	*Lycopus uniflorus*	Aquatic (OBL)
Purple loosestrife	*Lythrum salicaria*	Aquatic (OBL)
Barberry	*Mahoberberis* spp.; *Mahonia* spp.	N/A
Apple	*Malus* sp.	N/A

[10] (Invasive Species Centre 2023)

Common Name	Scientific Name	Habitat
Ostrich fern	*Matteuccia struthiopteris*	Wetland/Riparian (FAC)
White sweet-clover	*Melilotus albus*	Terrestrial (FACU)
Japanese stiltgrass	*Microstegium vimineum*	Wetland/Riparian (FAC)
Amur silvergrass	*Miscanthus sacchariflorus*	Terrestrial
Chinese silvergrass	*Miscanthus sinensis*	Terrestrial (UPL)
Miscanthus spp.	*Miscanthus* spp.	N/A
Scarlet beebalm	*Monarda didyma*	Terrestrial (FACU)
White mulberry	*Morus alba*	Terrestrial (FACU)
Sweet gale	*Myrica gale*	Aquatic (OBL)
Brazilian water-milfoil / parrot feather	*Myriophyllum aquaticum*	Aquatic (OBL)
Eurasian water-milfoil	*Myriophyllum spicatum*	Aquatic (OBL)
Water-milfoil	*Myriophyllum* spp.	N/A
Serrated tussock	*Nassella trichotoma*	Terrestrial[11]
Watercress species	*Nasturtium* or *Rorippa* spp.	N/A
Starry stonewort	*Nitellopsis obtusa*	Aquatic[12]
Yellow pond-lily / spatterdock	*Nuphar* spp.	N/A
Water-lily species	Nymphaeaceae	N/A
Yellow floatingheart	*Nymphoides peltata*	Aquatic (OBL)
Sensitive fern	*Onoclea sensibilis*	Wetland/Riparian (FACW)
Broomrape	*Orobanche* spp.	N/A
Royal fern	*Osmunda regalis*	Wetland/Riparian
Ironwood / eastern hop-hornbeam	*Ostrya virginiana*	Terrestrial (FACU)
American ginseng	*Panax quinquefolius*	Wetland/Riparian[13]
Dallisgrass	*Paspalum dilatatum*	Wetland/Riparian (FAC)
Wild parsnip	*Pastinaca sativa*	Terrestrial
Green arrow arum	*Peltandra virginica*	Aquatic (OBL)
Spotted lady's-thumb	*Persicaria maculosa*	Wetland/Riparian (FAC)
Mile-a-minute vine	*Persicaria perfoliata*	Wetland/Riparian (FAC)
Reed canarygrass	*Phalaris arundinacea*	Wetland/Riparian (FACW)
Canarygrass	*Phalaris* sp.	N/A
Common Timothy	*Phleum pratense*	Terrestrial (FACU)
European (common) reed	*Phragmites australis* ssp. *australis*	Wetland/Riparian (FACW)
Ninebark	*Physocarpus* sp.	N/A
Norway Spruce	*Picea abies*	Terrestrial
White spruce	*Picea glauca*	Terrestrial (FACU)
Black spruce	*Picea mariana*	Wetland/Riparian (FACW)
Spruce	*Picea* sp.	N/A
Red pine	*Pinus resinosa*	Terrestrial (FACU)

[11] (CABI 2019)
[12] (Kipp et al. 2020)
[13] (Crowley et al. 2023)

Common Name	Scientific Name	Habitat
Pine	*Pinus* sp.	N/A
Eastern white pine	*Pinus strobus*	Terrestrial (FACU)
Scots pine	*Pinus sylvestris*	Terrestrial
Water lettuce	*Pistia stratiotes*	Aquatic (OBL)
English plantain	*Plantago lanceolata*	Terrestrial (FACU)
Club-spur orchid	*Platanthera clavellata*	Wetland/Riparian (FACW)
Tubercled orchid	*Platanthera flava*	Wetland/Riparian (FACW)
Greater round-leaved orchid	*Platanthera macrophylla*	Wetland/Riparian (FAC)
Canada bluegrass	*Poa compressa*	Terrestrial (FACU)
Rough bluegrass	*Poa trivialis*	Wetland/Riparian (FACW)
Ferns	Polypodiopsida	N/A
Pickerelweed	*Pontederia cordata*	Aquatic (OBL)
Balsam poplar	*Populus balsamifera*	Wetland/Riparian (FACW)
Aspen	*Populus* sp.	N/A
Poplar	*Populus* sp.	N/A
Trembling aspen	*Populus tremuloides*	Terrestrial (FACU)
Largeleaf pondweed	*Potamogeton amplifolius*	Aquatic (OBL)
Hill's pondweed	*Potamogeton hillii*	Aquatic (OBL)
Sulphur cinquefoil	*Potentilla recta*	Terrestrial
Sweet cherry	*Prunus avium*	Terrestrial (FACU)
Black cherry	*Prunus serotina*	Terrestrial (FACU)
Cherry	*Prunus* sp.	N/A
Chokecherry	*Prunus virginiana*	Terrestrial (FACU)
Kudzu	*Pueraria montana*	Terrestrial (UPL)
Slender mountain-mint	*Pycnanthemum tenuifolium*	Wetland/Riparian (FAC)
White oak	*Quercus alba*	Terrestrial (FACU)
Bur oak	*Quercus macrocarpa*	Terrestrial (FACU)
Northern red oak	*Quercus rubra*	Terrestrial (FACU)
Oak	*Quercus* sp.	N/A
Common buttercup	*Ranunculus acris*	Wetland/Riparian (FAC)
Japanese knotweed	*Reynoutria japonica* var. *japonica*	Terrestrial (FACU)
Giant knotweed	*Reynoutria sachalinensis*	Terrestrial (UPL)
Bohemian knotweed	*Reynoutria x bohemica*	Terrestrial (FACU)
European buckthorn	*Rhamnus cathartica*	Wetland/Riparian (FAC)
Buckthorn	*Rhamnus* sp.	N/A
Russian knapweed	*Rhaponticum repens*	Terrestrial[14]
Large-leaved leafy moss	*Rhizomnium magnifolium*	Wetland/riparian[15]
Floating crystalwort	*Riccia fluitans*	Aquatic
Black locust	*Robinia pseudoacacia*	Terrestrial (FACU)

[14] (Washington State Noxious Weed Control Board n.d.)
[15] (Karanosky 2023)

Common Name	Scientific Name	Habitat
Watercress	*Rorippa* sp.	N/A
Multiflora rose	*Rosa multiflora*	Terrestrial (FACU)
Dwarf raspberry	*Rubus pubescens*	Wetland/Riparian (FACW)
Raspberry	*Rubus* sp.	N/A
Curled dock	*Rumex crispus*	Wetland/Riparian (FAC)
Dock	*Rumex* sp.	N/A
Arrowhead species	*Sagittaria* spp.	N/A
White willow	*Salix alba*	Wetland/Riparian (FACW)
Peach-leaf willow	*Salix amygdaloides*	Wetland/Riparian (FACW)
Willow species	*Salix spp.*	N/A
American elder	*Sambucus canadensis*	Wetland/Riparian
Elderberry	*Sambucus* sp.	N/A
Northern pitcher plant	*Sarracenia purpurea*	Aquatic (OBL)
Dark-green bulrush	*Scirpus atrovirens*	Aquatic (OBL)
Common woolly bulrush	*Scirpus cyperinus*	Aquatic (OBL)
South African ragwort	*Senecio inaequidens*	Terrestrial
Madagascar ragwort	*Senecio madagascariensis*	Terrestrial
Bladder campion	*Silene vulgaris*	Wetland/Riparian
Common water-parsnip	*Sium suave*	Aquatic (OBL)
Bittersweet nightshade	*Solanum dulcamara*	Wetland/Riparian (FAC)
Silverleaf nightshade	*Solanum elaeagnifolium*	Terrestrial
Tall goldenrod	*Solidago altissima*	Terrestrial (FACU)
Canada goldenrod	*Solidago canadensis*	Terrestrial (FACU)
Giant goldenrod	*Solidago gigantea*	Wetland/Riparian (FACW)
Grey-stemmed goldenrod	*Solidago nemoralis*	Terrestrial
Wrinkleleaf goldenrod	*Solidago rugosa*	Wetland/Riparian (FAC)
Goldenrod	*Solidago* sp.	N/A
Perennial sowthistle	*Sonchus arvensis*	Terrestrial (FACU)
Spiny sowthistle	*Sonchus asper*	Terrestrial (FACU)
Annual sowthistle	*Sonchus oleraceus*	Terrestrial (FACU)
Sow-thistle spp.	*Sonchus spp.*	N/A
Eastern burreed / American burreed	*Sparganium americanum*	Aquatic (OBL)
Burreed	*Sparganium* sp.	N/A
Sphagnum	*Sphagnum* sp.	N/A
Meadowsweet	*Spiraea* sp.	N/A
Sheathed dropseed	*Sporobolus vaginiflorus*	Terrestrial
American bladdernut	*Staphylea trifolia*	Wetland/Riparian (FAC)
Water soldier	*Stratiotes aloides*	Aquatic
Witchweed	*Striga* spp.	N/A
Sago pondweed	*Stuckenia pectinata*	Aquatic (OBL)
White panicle aster / panicled aster	*Symphyotrichum lanceolatum*	Wetland/Riparian (FACW)
New England aster	*Symphyotrichum novae-angliae*	Wetland/Riparian (FACW)

Common Name	Scientific Name	Habitat
Old field aster	*Symphyotrichum pilosum*	Terrestrial (FACU)
Purple-stemmed aster	*Symphyotrichum puniceum*	Aquatic (OBL)
Common dandelion	*Taraxacum officinale*	Terrestrial (FACU)
Canada yew	*Taxus canadensis*	Terrestrial (FACU)
Eastern white cedar	*Thuja occidentalis*	Wetland/Riparian (FACW)
Cedar	*Thuja* sp.	N/A
Basswood	*Tilia americana*	Terrestrial (FACU)
Erect hedge-parsley	*Torilis japonica*	Terrestrial
Poison-ivy	*Toxicodendron radicans*	Wetland/Riparian (FAC)
Eastern poison ivy	*Toxicodendron radicans* var. *radicans*	Wetland/Riparian (FAC)
Western poison ivy	*Toxicodendron radicans* var. *rydbergii*	Wetland/Riparian (FAC)
Toxicodendron	*Toxicodendron* sp.	N/A
(European) water chestnut	*Trapa natans*	Aquatic (OBL)
Red clover	*Trifolium pratense*	Terrestrial (FACU)
White clover	*Trifolium repens*	Terrestrial (FACU)
Wheat	*Triticum* sp.	N/A
Eastern hemlock	*Tsuga canadensis*	Terrestrial (FACU)
Hemlock	*Tsuga* sp.	N/A
Coltsfoot	*Tussilago farfara*	Terrestrial (FACU)
Narrow-leaved cattail	*Typha angustifolia*	Aquatic (OBL)
Broad-leaved cattail	*Typha latifolia*	Aquatic (OBL)
Cattail species	*Typha* spp.	N/A
American elm / white elm	*Ulmus americana*	Wetland/Riparian (FACW)
Siberian elm	*Ulmus pumila*	Terrestrial (FACU)
Elm	*Ulmus* sp.	N/A
Stinging nettle	*Urtica dioica*	Wetland/Riparian (FAC)
Bladderwort species	*Utricularia* spp.	N/A
American eelgrass	*Vallisneria americana*	Aquatic (OBL)
Water speedwell	*Veronica anagallis-aquatica*	Aquatic (OBL)
Marsh speedwell	*Veronica scutellata*	Aquatic (OBL)
Nannyberry	*Viburnum lentago*	Wetland/Riparian (FAC)
European highbush cranberry	*Viburnum opulus*	Wetland/Riparian (FACW)
Lesser periwinkle	*Vinca minor*	Terrestrial
Black swallowwort / black dog-strangling vine	*Vincetoxicum nigrum*	Terrestrial
European (pale) swallowwort	*Vincetoxicum rossicum*	Terrestrial
Riverbank grape	*Vitis riparia*	Wetland/Riparian (FAC)
Wild grape	*Vitis* sp.	N/A
Corn	*Zea mays*	Terrestrial
Syrian bean-caper	*Zygophyllum fabago*	Terrestrial[16]

[16] (CFIA 2016)

Common Name	Scientific Name	Habitat
OTHER SPECIES		
Emerald ash borer	*Agrilus planipennis*	N/A
Beech bark disease	*Neonectria faginata*	N/A

Table A-2. Vascular plants of the Greenock Swamp ANSI (Johnson 1994a).

Family[1]	**Common Name**	**No. Species**
Equisetaceae	Horsetail Family	5
Lycopodiaceae	Clubmoss Family	5
Selaginellaceae	Spikemoss Family	1
Ophioglossaceae	Adder's Tongue Family	4
Osmundaceae	Flowering Fern Family	3
Dennstaedtiaceae	Bracken Family	2
Pteridaceae	Maidenhair Fern Family	1
Dryopteridaceae	Wood Fern Family	13
Thelypteridaceae	Beech Fern Family	3
Taxaceae	Yew Family	1
Pinaceae	Pine Family	6
Cupressaceae	Cypress Family	1
Typhaceae	Cat-tail Family	2
Sparganiaceae	Bur-reed Family	4
Potamogetonaceae	Pondweed Family	9
Najadaceae	Naiad Family	1
Juncaginaceae	Arrow-grass Family	1
Alismataceae	Water-plantain Family	3
Hydrocharitaceae	Frog's-bit Family	1
Gramineae (Poaceae)	Grass Family	54
Cyperaceae	Sedge Family	80
Araceae	Arum Family	3
Lemnaceae	Duckweed Family	4
Pontederiaceae	Pickerel-weed Family	1
Juncaceae	Rush Family	8
Liliaceae	Lily Family	19
Smilacaceae	Greenbrier Family	2
Iridaceae	Iris Family	2
Orchidaceae	Orchid Family	22
Salicaceae	Willow Family	18
Myricaceae	Wax-myrtle Family	1
Juglandaceae	Walnut Family	1
Betulaceae	Birch Family	6
Fagaceae	Beech Family	3
Ulmaceae	Elm Family	2
Urticaceae	Nettle Family	4
Aristolochiaceae	Birthwort Family	1
Polygonaceae	Buckwheat Family	13
Chenopodiaceae	Goosefoot Family	2
Amaranthaceae	Amaranth Family	2
Portulacaceae	Purslane Family	2

Family[1]	Common Name	No. Species
Caryophyllaceae	Pink Family	7
Ceratophyllaceae	Hornwort Family	2
Cabombaceae	Cabomba Family	1
Nymphaeaceae	Water Lily Family	2
Ranunculaceae	Crowfoot Family	21
Berberidaceae	Barberry Family	2
Menispermaceae	Moonseed Family	1
Lauraceae	Laurel Family	1
Papaveraceae	Poppy Family	1
Fumariaceae	Fumitory Family	2
Cruciferae (Brassicaceae)	Mustard Family	10
Sarraceniaceae	Pitcher Plant Family	1
Droseraceae	Sundew Family	1
Saxifragaceae	Saxifrage Family	6
Grossulariaceae	Gooseberry Family	6
Rosaceae	Rose Family	41
Leguminosae (Fabaceae)	Pea Family	13
Linaceae	Flax Family	1
Oxalidaceae	Wood-sorrel Family	2
Geraniaceae	Geranium Family	1
Rutaceae	Rue Family	1
Polygalaceae	Milkwort Family	1
Euphorbiaceae	Spurge Family	5
Callitrichaceae	Water Starwort Family	1
Anacardiaceae	Cashew Family	2
Aquifoliaceae	Holly Family	2
Celastraceae	Staff-tree Family	1
Aceraceae	Maple Family	5
Balsaminaceae	Touch-me-not Family	1
Rhamnaceae	Buckthorn Family	2
Vitaceae	Vine Family	2
Tiliaceae	Basswood Family	1
Malvaceae	Mallow Family	1
Guttiferae (Clusiaceae)	St. John's-wort Family	2
Violaceae	Violet Family	13
Thymelaeaceae	Mezereum Family	2
Lythraceae	Loosestrife Family	2
Onagraceae	Evening Primrose Family	10
Haloragaceae	Water Milfoil Family	2
Araliaceae	Ginseng Family	4
Umbelliferae (Apiaceae)	Carrot Family	11
Cornaceae	Dogwood Family	5

Family[1]	Common Name	No. Species
Pyrolaceae	Wintergreen Family	4
Monotropaceae	Indian Pipe Family	1
Ericaceae	Heath Family	11
Primulaceae	Primrose Family	6
Oleaceae	Olive Family	3
Gentianaceae	Gentian Family	2
Menyanthaceae	Buckbean Family	1
Apocynaceae	Dogbane Family	3
Asclepiadaceae (Apocynaceae)	Milkweed Family	2
Convolvulaceae	Morning Glory Family	3
Polemoniaceae	Phlox Family	1
Hydrophyllaceae	Waterleaf Family	2
Boraginaceae	Borage Family	5
Verbenaceae	Vervain Family	3
Labiatae (Lamiaceae)	Mint Family	15
Solanaceae	Nightshade Family	3
Scrophulariaceae	Figwort Family	13
Orobanchaceae	Broom-rape Family	1
Lentibulariaceae	Bladderwort Family	4
Plantaginaceae	Plantain Family	3
Rubiaceae	Madder Family	11
Caprifoliaceae	Honeysuckle Family	13
Dipsacaceae	Teasel Family	1
Cucurbitaceae	Gourd Family	1
Campanulaceae	Bluebell Family	5
Compositae (Asteraceae)	Composite Family	61

Notes:
1. Taxonomic family names from the Greenock Swamp ANSI report are presented. Updated family names from the NHIC's Ontario species list (current to April 11, 2022) are provided in parentheses, where applicable.

Table A-3. List of regulated and non-regulated invasive and noxious weed species of concern in Ontario. This list does not imply potential occurrence in the SON-South Bruce siting area, as several invasive species "on the radar" have not yet been found in Ontario or even Canada; however, these species are known to have significant ecological, social, health, and/or economic impacts in other areas of North America and worldwide, where they have been introduced.

Subgroup	Common Name	Scientific Name	Ontario *ISA*[1]		Noxious Weed[2]	CFIA[3]	Ont. ISAP[4]	ISC[5]	Ont. IPC[6]
			Prohibited	Restricted					
Terrestrial	Norway Maple	*Acer platanoides*							X
Terrestrial	Jointed Goatgrass	*Aegilops cylindrica*			X	X			
Terrestrial	Goutweed	*Aegopodium podagraria*					X		X
Terrestrial	Tree-of-heaven	*Ailanthus altissima*						X	
Terrestrial	Garlic Mustard	*Alliaria petiolata*					X	X	X
Terrestrial	European Black Alder	*Alnus glutinosa*							X
Terrestrial	Slender Meadow Foxtail	*Alopecurus myosuroides*				X			
Terrestrial	Common Ragweed	*Ambrosia artemisiifolia*			X				
Terrestrial	Ragweed spp.	*Ambrosia* spp.			X				
Terrestrial	Great Ragweed	*Ambrosia trifida*			X				
Terrestrial	Wild Chervil	*Anthriscus sylvestris*			X		X		
Terrestrial	Giant Reed	*Arundo donax*				X			
Terrestrial	Mountain Grape	*Berberis aquifolium*				X			
Terrestrial	Japanese Barberry	*Berberis thunbergii*				X	X		
Terrestrial	Common Barberry	*Berberis vulgaris*			X	X			
Aquatic	Flowering-rush	*Butomus umbellatus*					X	X	X
Aquatic	Carolina Fanwort	*Cabomba caroliniana*		X			X	X	
Terrestrial	Diffuse Knapweed	*Centaurea diffusa*			X				
Terrestrial	Iberian starthistle	*Centaurea iberica*				X			
Terrestrial	brown knapweed	*Centaurea jacea*			X				
Terrestrial	black knapweed	*Centaurea nigra*			X				
Terrestrial	Yellow starthistle	*Centaurea solstitialis*				X			
Terrestrial	Knapweed spp.	*Centaurea* spp.			X				
Terrestrial	Spotted knapweed	*Centaurea stoebe*			X				X
Terrestrial	Spotted Knapweed	*Centaurea stoebe* ssp. *micranthos*			X				X

Subgroup	Common Name	Scientific Name	Ontario *ISA*[1]		Noxious Weed[2]	CFIA[3]	Ont. ISAP[4]	ISC[5]	Ont. IPC[6]
			Prohibited	Restricted					
Terrestrial	Canada Thistle	*Cirsium arvense*			X				
Terrestrial	Bull Thistle	*Cirsium vulgare*			X				
Terrestrial	Poison-hemlock	*Conium maculatum*			X				
Terrestrial	Common Crupina	*Crupina vulgaris*			X	X			
Terrestrial	Smallseed Alfalfa Dodder	*Cuscuta approximata*			X	X			
Terrestrial	Compact Dodder	*Cuscuta compacta*			X	X			
Terrestrial	Flax Dodder	*Cuscuta epilinum*			X	X			
Terrestrial	Clover Dodder	*Cuscuta epithymum*			X	X			
Terrestrial	Clover Dodder	*Cuscuta epithymum* var. *epithymum*			X	X			
Terrestrial	Japanese Dodder	*Cuscuta japonica*			X	X			
Terrestrial	Dodder spp.	*Cuscuta* spp.			X	X			
Terrestrial	Chinese yam	*Dioscorea polystachya*				X			
Terrestrial	Paterson's curse	*Echium plantagineum*				X			
Aquatic	Brazilian Elodea	*Egeria densa*	X				X		
Aquatic	Common Water-hyacinth	*Eichhornia crassipes*					X		
Terrestrial	Autumn Olive	*Elaeagnus umbellata*							X
Terrestrial	Woolly Cupgrass	*Eriochloa villosa*			X	X			
Terrestrial	Winged Euonymus	*Euonymus alatus*					X		
Terrestrial	Cypress Spurge	*Euphorbia cyparissias*			X				
Terrestrial	Leafy Spurge	*Euphorbia esula*			X				
Terrestrial	Leafy Spurge	*Euphorbia virgata*			X				
Wetland	Glossy Buckthorn	*Frangula alnus*							X
Terrestrial	Smooth Bedstraw	*Galium mollugo*			X				
Terrestrial	English Ivy	*Hedera helix*					X		
Terrestrial	Giant Hogweed	*Heracleum mantegazzianum*			X		X	X	X
Aquatic	Hydrilla	*Hydrilla verticillata*	X				X	X	
Aquatic	European Frog-bit	*Hydrocharis morsus-ranae*		X			X	X	X
Terrestrial	Purple Jewelweed	*Impatiens glandulifera*					X	X	
Aquatic	Yellow Iris	*Iris pseudacorus*					X		

Subgroup	Common Name	Scientific Name	Ontario *ISA*[1]		Noxious Weed[2]	CFIA[3]	Ont. ISAP[4]	ISC[5]	Ont. IPC[6]
			Prohibited	Restricted					
Terrestrial	Tansy Ragwort	*Jacobaea vulgaris*			X				
Terrestrial	Himalayan Knotweed	*Koenigia polystachya*		X				X	
Terrestrial	Japanese Honeysuckle	*Lonicera japonica*							X
Terrestrial	Maack's Honeysuckle	*Lonicera maackii*					X	X	X
Terrestrial	Morrow's Honeysuckle	*Lonicera morrowii*					X	X	X
Terrestrial	Bush honeysuckle spp. (exotic)	*Lonicera* spp.					X		X
Terrestrial	Tatarian Honeysuckle	*Lonicera tatarica*					X	X	X
Terrestrial	Bell's Honeysuckle	*Lonicera x bella*						X	X
Terrestrial	dwarf honeysuckle	*Lonicera xylosteum*							X
Terrestrial	Purple Loosestrife	*Lythrum salicaria*					X	X	X
Terrestrial	Barberry	*Mahoberberis* spp.; *Mahonia* spp.				X			
Terrestrial	White Sweet-clover	*Melilotus albus*							X
Terrestrial	Japanese Stiltgrass	*Microstegium vimineum*				X	X	X	
Terrestrial	Amur Silvergrass	*Miscanthus sacchariflorus*					X		
Terrestrial	Chinese Silvergrass	*Miscanthus sinensis*					X		
Terrestrial	Miscanthus spp.	*Miscanthus* spp.					X		
Terrestrial	White Mulberry	*Morus alba*							X
Aquatic	Brazilian Water-milfoil / Parrot feather	*Myriophyllum aquaticum*	X				X		
Aquatic	Eurasian Water-milfoil	*Myriophyllum spicatum*					X	X	X
Terrestrial	Serrated Tussock	*Nassella trichotoma*			X	X			
Aquatic	Starry Stonewort	*Nitellopsis obtusa*					X	X	
Aquatic	Yellow Floatingheart	*Nymphoides peltata*		X			X	X	
Terrestrial	Broomrape	*Orobanche* spp.				X			
Terrestrial	Dallisgrass	*Paspalum dilatatum*				X			
Terrestrial	Wild Parsnip	*Pastinaca sativa*			X		X	X	X
Terrestrial	Mile-a-minute Vine	*Persicaria perfoliata*				X			
Terrestrial	Reed Canarygrass	*Phalaris arundinacea*							X

Subgroup	Common Name	Scientific Name	Ontario *ISA*[1]		Noxious Weed[2]	CFIA[3]	Ont. ISAP[4]	ISC[5]	Ont. IPC[6]
			Prohibited	Restricted					
Terrestrial	European Reed	*Phragmites australis* ssp. *australis*		X			X	X	X
Terrestrial	Scots Pine	*Pinus sylvestris*							X
Aquatic	Water Lettuce	*Pistia stratiotes*					X		
Terrestrial	Kudzu	*Pueraria montana*			X	X	X	X	
Terrestrial	Japanese Knotweed	*Reynoutria japonica* var. *japonica*		X			X	X	X
Terrestrial	Giant Knotweed	*Reynoutria sachalinensis*		X				X	
Terrestrial	Bohemian Knotweed	*Reynoutria x bohemica*		X				X	
Terrestrial	European Buckthorn	*Rhamnus cathartica*			X	X	X	X	X
Terrestrial	Russian Knapweed	*Rhaponticum repens*			X				
Terrestrial	Black Locust	*Robinia pseudoacacia*							X
Terrestrial	Multiflora Rose	*Rosa multiflora*							X
Terrestrial	perennial sowthistle	*Sonchus arvensis*			X				
Terrestrial	spiny sowthistle	*Sonchus asper*			X				
Terrestrial	annual sowthistle	*Sonchus oleraceus*			X				
Terrestrial	Sow-thistle spp.	*Sonchus spp.*			X				
Terrestrial	South African ragwort	*Senecio inaequidens*				X			
Terrestrial	Madagascar ragwort	*Senecio madagascariensis*				X			
Terrestrial	Silverleaf nightshade	*Solanum elaeagnifolium*				X			
Aquatic	Water Soldiers	*Stratiotes aloides*	X				X	X	
Terrestrial	Witchweed	*Striga* spp.				X			
Terrestrial	Erect Hedge-parsley	*Torilis japonica*							X
Terrestrial	Poison Ivy	*Toxicodendron radicans*			X				
Terrestrial	Eastern Poison Ivy	*Toxicodendron radicans* var. *radicans*			X				
Terrestrial	Western Poison Ivy	*Toxicodendron radicans* var. *rydbergii*			X				
Aquatic	(European) Water Chestnut	*Trapa natans*	X				X	X	
Terrestrial	Coltsfoot	*Tussilago farfara*			X				
Terrestrial	Lesser Periwinkle	*Vinca minor*					X		
Terrestrial	Black Swallowwort	*Vincetoxicum nigrum*		X	X		X		X

Subgroup	Common Name	Scientific Name	Ontario *ISA*[1]		Noxious Weed[2]	CFIA[3]	Ont. ISAP[4]	ISC[5]	Ont. IPC[6]
			Prohibited	Restricted					
Terrestrial	European (Pale) Swallowwort	*Vincetoxicum rossicum*		X	X		X	X	X
Terrestrial	Syrian bean-caper	*Zygophyllum fabago*				X			

Notes:
1. Prohibited and Restricted species regulated under the Ontario Invasive Species Act (ISA) are presented on the Ontario Ministry of Natural Resources and Forestry's (MNRF) website, accessed on September 18, 2023: https://www.ontario.ca/page/managing-invasive-species-ontario
2. Noxious weeds regulated under the Ontario Weed Control Act are presented on the Ontario Ministry of Agriculture, Food and Rural Affairs website, last updated January 1, 2015 and accessed on September 18, 2023: http://www.omafra.gov.on.ca/english/crops/facts/noxious_weeds.htm
3. The Canadian Food Inspection Agency (CFIA) maintains a "List of pests regulated by Canada" under the authority of the federal Plant Protection Act and the attendant Plant Protection Regulations. This comprehensive list of pests is not included in Table D-2; rather, the regulatory status is noted for invasive species of concern identified by other sources/organizations. The CFIA website was last modified on July 26, 2023; accessed on September 18, 2023: https://inspection.canada.ca/plant-health/plant-pests-invasive-species/regulated-pests/eng/1363317115207/1363317187811
4. Ontario's Invading Species Awareness Program (ISAP) is a partnership between the MNRF and the Ontario Federation of Anglers and Hunters. The webpages for Invasive Aquatic Plants and Invasive Terrestrial Plants were accessed on September 18, 2023: http://www.invadingspecies.com/invaders/
5. The Invasive Species Centre (ISC) is a resource for Ontario and the rest of Canada. Based in Sault Ste. Marie, Ontario, the Board of Directors Organizations include the Great Lakes Fishery Commission, Grand Council Treaty #3, City of Ottawa, International Joint Commission, Wildlife Habitat Canada, University of Waterloo, BioForest, Nature Conservancy of Canada, Natural Resources Canada, Fisheries and Oceans Canada, and the CFIA. The webpages for Invasive Plants and Invasive Aquatic Plants were accessed on September 18, 2023: https://www.invasivespeciescentre.ca/invasive-species/
6. The Ontario Invasive Plant Council (IPC) is a multi-sector, non-profit group committed to the collaboration of organizations and citizens in order to effectively respond to the threat of invasive plants in Ontario. Their invasive plant list/website was accessed on September 18, 2023: https://www.ontarioinvasiveplants.ca/invasive-plants/species/

Table A-4. Incidental observations of vegetation, including vascular plants, moss, lichens, and fungi, during TEM, AHM, and eDNA field surveys within the AOI, LSA_{TER}, and/or LSA_{AQU} in 2022.

Common Name	Scientific Name	SAR	Rare	Introd./Invasive
American beech	*Fagus grandifolia*	N	N	N
American bladdernut	*Staphylea trifolia*	N	N	N
American elm / white elm	*Ulmus americana*	N	N	N
Apple	*Malus* sp.	NA	NA	NA
Arrowhead	*Sagittaria* sp.	NA	NA	NA
Ash	*Fraxinus* sp.	NA	NA	NA
Aspen	*Populus* sp.	NA	NA	NA
Asters	Asteraceae spp.	NA	NA	NA
Balsam[1]	*Abies balsamea* OR *Populus balsamifera*	NA	NA	NA
Balsam fir	*Abies balsamea*	N	N	N
Balsam poplar	*Populus balsamifera*	N	N	N
Basswood	*Tilia americana*	N	N	N
Beech	*Fagus* sp.	NA	NA	NA
Birch	*Betula* sp.	NA	NA	NA
Bittersweet nightshade	*Solanum dulcamara*	N	NA	Y
Black ash	*Fraxinus nigra*	Y	N	N
Black cherry	*Prunus serotina*	N	N	N
Black maple	*Acer nigrum*	N	N	N
Black spruce	*Picea mariana*	N	N	N
Black walnut	*Juglans nigra*	N	N	N
Bladderwort	*Utricularia* sp.	NA	NA	NA
Blue beech	*Carpinus caroliniana*	N	N	N
Bluejoint reedgrass	*Calamagrostis canadensis*	N	N	N
Boneset	*Eupatorium* sp.	N	N	N
Broad-leaf cattail	*Typha latifolia*	N	N	N
Buckthorn	*Rhamnus* sp.	NA	NA	NA
Bunchberry	*Cornus canadensis*	N	N	N
Bur Oak	*Quercus macrocarpa*	N	N	N
Bur-reed	*Sparganium* sp.	NA	NA	NA
Butternut	*Juglans cinerea*	Y	Y	N
Canada bluegrass	*Poa compressa*	N	N	Y
Canada goldenrod	*Solidago canadensis*	N	N	N
Canada wood nettle	*Laportea canadensis*	N	N	N
Canada yew	*Taxus canadensis*	N	N	N
Canarygrass	*Phalaris* sp.	NA	NA	NA
Cardinal flower	*Lobelia cardinalis*	N	N	N
Cattail	*Typha* sp.	NA	NA	NA
Cedar	*Thuja* sp.	NA	NA	NA
Cherry	*Prunus* sp.	NA	NA	NA

Common Name	Scientific Name	SAR	Rare	Introd./Invasive
Chokecherry	*Prunus virginiana*	N	N	N
Clematis	*Clematis* sp.	NA	NA	NA
Club-spur orchid	*Platanthera clavellata*	N	N	N
Common water-parsnip	*Sium suave*	N	N	N
Common winterberry	*Ilex verticillata*	N	N	N
Common woolly bulrush	*Scirpus cyperinus*	NA	NA	NA
Corn	*Zea mays*	NA	NA	NA
Dark-green bulrush	*Scirpus atrovirens*	N	N	N
Dock	*Rumex* sp.	NA	NA	NA
Dogwood	*Cornus* sp.	NA	NA	NA
Duckweed	Lemnaceae spp.	NA	NA	NA
Dwarf raspberry	*Rubus pubescens*	N	N	N
Eastern green-violet	*Hybanthus concolor*	N	Y	N
Eastern hemlock	*Tsuga canadensis*	N	N	N
Eastern rough sedge	*Carex scabrata*	NA	NA	NA
Eastern white cedar	*Thuja occidentalis*	N	N	N
Eastern white pine	*Pinus strobus*	N	N	N
Elderberry	*Sambucus* sp.	NA	NA	NA
Elm	*Ulmus* sp.	NA	NA	NA
European buckthorn	*Rhamnus cathartica*	N	N	Y
European larch	*Larix decidua*	N	N	Y
European reed	*Phragmites australis* ssp. *australis*	N	N	Y
Ferns	Polypodiopsida	NA	NA	NA
Fescue	*Festuca* sp.	NA	NA	NA
Fir	*Abies* sp.	NA	NA	NA
Fowl mannagrass	*Glyceria striata*	N	N	N
Freeman's maple	*Acer x freemanii*	N	N	N
Fringed sedge	*Carex crinita*	N	N	N
Fungus	Fungi	NA	NA	NA
Giant goldenrod	*Solidago gigantea*	N	N	N
Goldenrod	*Solidago* sp.	NA	NA	NA
Grass-leaved goldenrod	*Euthamia graminifolia*	N	N	N
Green ash / red ash	*Fraxinus pennsylvanica*	N	N	N
Green dragon	*Arisaema dracontium*	Y	Y	N
Grey-stemmed goldenrod	*Solidago nemoralis*	N	N	N
Hawkweed	*Hieracium* sp.	NA	NA	NA
Hawthorn	*Crataegus* sp.	NA	NA	NA
Hemlock	*Tsuga* sp.	NA	NA	NA
Horsetail	*Equisetum* sp.	NA	NA	NA
Iris	*Iris* sp.	NA	NA	NA
Ironwood / eastern hop-hornbeam	*Ostrya virginiana*	N	N	N

Common Name	Scientific Name	SAR	Rare	Introd./Invasive
Joe-pye weed	*Eutrochium* sp.	NA	NA	NA
Lake sedge	*Carex lacustris*	N	N	N
Large-leaf aster	*Eurybia macrophylla*	N	N	N
Leatherleaf	*Chamaedaphne calyculata*	N	N	N
Lichens	NA	NA	NA	NA
Loesel's twayblade	*Liparis loeselii*	N	N	N
Loosestrife	Dicotyledonaeae sp.	NA	NA	NA
Manitoba maple	*Acer negundo*	N	N	N
Maple	*Acer* sp.	NA	NA	NA
Meadowsweet	*Spiraea* sp.	NA	NA	NA
Milkweed	*Asclepias* sp.	NA	NA	NA
Moss	Bryophyta	NA	NA	NA
Nannyberry	*Viburnum lentago*	N	N	N
Nettle	Dicotyledonaeae sp.	NA	NA	NA
New England aster	*Symphyotrichum novae-angliae*	N	N	N
Ninebark	*Physocarpus* sp.	NA	NA	NA
Northern pitcher plant	*Sarracenia purpurea*	NA	NA	NA
Northern red oak	*Quercus rubra*	N	N	N
Northern spicebush	*Lindera benzoin*	N	N	N
Oak	*Quercus* sp.	NA	NA	NA
Old field aster	*Symphyotrichum pilosum*	N	N	N
Orchard grass	*Dactylis glomerata*	N	N	Y
Ostrich fern	*Matteuccia struthiopteris*	N	N	N
Ox-eye daisy	*Leucanthemum vulgare*	N	N	Y
Panicled aster	*Symphyotrichum lanceolatum*	N	N	N
Parsnip	Apiaceae sp.	NA	NA	NA
Peach-leaf willow	*Salix amygdaloides*	N	N	N
Pickerelweed	*Pontederia cordata*	N	N	N
Pine	*Pinus* sp.	NA	NA	NA
Poison ivy	*Toxicodendron radicans*	N	N	N
Pond lily	Nymphaeaceae sp.	NA	NA	NA
Poplar	*Populus* sp.	NA	NA	NA
Purple loosestrife	*Lythrum salicaria*	N	N	Y
Purple-stemmed aster	*Symphyotrichum puniceum*	N	N	N
Queen Anne's lace / wild carrot	*Daucus carota*	N	N	Y
Raspberry	*Rubus* sp.	NA	NA	NA
Red maple	*Acer rubrum*	N	N	N
Red osier dogwood	*Cornus sericea*	N	N	N
Red pine	*Pinus resinosa*	N	N	N
Redtop	*Agrostis gigantea*	N	N	Y
Reed canarygrass	*Phalaris arundinacea*	N	N	N
Reeds	Poaceae sp.	NA	NA	NA

Common Name	Scientific Name	SAR	Rare	Introd./Invasive
Riverbank grape	*Vitis riparia*	N	N	N
Royal fern	*Osmunda regalis*	N	N	N
Rubus	*Rubus* sp.	NA	NA	NA
Scots pine	*Pinus sylvestris*	N	N	Y
Sedges	*Carex* spp.	NA	NA	NA
Sensitive fern	*Onoclea sensibilis*	N	N	N
Sheathed dropseed	*Sporobolus vaginiflorus*	NA	NA	NA
Showy lady's slipper	*Cypripedium reginae*	N	N	N
Siberian elm	*Ulmus pumila*	N	N	Y
Silky dogwood	*Cornus obliqua*	N	N	N
Silver maple	*Acer saccharinum*	N	N	N
Small-spike false nettle	*Boehmeria cylindrica*	NA	NA	NA
Soybean	*Glycine max*	N	N	Y
Sphagnum	*Sphagnum* sp.	NA	NA	NA
Spotted jewelweed	*Impatiens capensis*	N	N	N
Spotted joe-pye weed	*Eutrochium maculatum*	N	N	N
Spruce	*Picea* sp.	NA	NA	NA
Stinging nettle	*Urtica dioica*	N	N	Y
Sugar maple	*Acer saccharum*	N	N	N
Swamp loosestrife	*Decodon verticillatus*	N	N	N
Sweet cherry	*Prunus avium*	N	N	Y
Sweet gale	*Myrica gale*	N	N	N
Tall goldenrod	*Solidago altissima*	N	N	N
Tamarack	*Larix laricina*	N	N	N
Tawny cottongrass	*Eriophorum virginicum*	N	N	N
Thistle	Dicotyledonaeae sp.	NA	NA	NA
Toxicodendron	*Toxicodendron* sp.	NA	NA	NA
Trembling aspen	*Populus tremuloides*	N	N	N
Tussock sedge	*Carex stricta*	N	N	N
Twinleaf	*Jeffersonia diphylla*	N	N	N
Vines	Dicotyledonaeae sp.	NA	NA	NA
Watercress	*Nasturtium* or *Rorippa* sp.	NA	NA	NA
Wheat	*Triticum* sp.	NA	NA	NA
Wheatgrass	Poaceae sp.	NA	NA	NA
White ash	*Fraxinus americana*	N	N	N
White birch / paper birch	*Betula papyrifera*	N	N	N
White oak	*Quercus alba*	N	N	N
White spruce	*Picea glauca*	N	N	N
Wild grape	*Vitis* sp.	NA	NA	NA
Wild parsnip	*Pastinaca sativa*	N	N	Y
Willow	*Salix* sp.	NA	NA	NA
Woodreed	*Cinna* sp.	NA	NA	NA

Common Name	Scientific Name	SAR	Rare	Introd./Invasive
Woolly-fruit sedge	*Carex lasiocarpa*	N	N	N
Yellow birch	*Betula alleghaniensis*	N	N	N
Yellow clintonia	*Clintonia borealis*	N	N	N
Yellow pond-lily	*Nuphar* sp.	NA	NA[2]	NA

APPENDIX B – DETECTIONS OF VEGETATION SPECIES OF INTEREST

Table B-1. Desk-based observations of vegetation species of interest within the BIS study areas.

Grid	Source	Species	Count	Coordinates	AOI	LSA_{TER}	LSA_{AQU}
6682	GBIF	Bladder Campion	U	466132, 4882230	0	/	1
6777	GBIF	Beaked Spikerush	U	-	0	/	1
6984	GBIF	Floating Crystalwort	1	-	0	/	1
6984	GBIF	Large-leaved Leafy Moss	1	-	0	/	1
6986	GBIF	Tubercled Orchid	U	-	0	/	1
6988	GBIF	Hill's Pondweed	1	-	0	/	1
7083	GBIF	Rough Bluegrass	U	470652, 4883045	0	/	1
7270	GBIF	Bush's Pocket Moss	1	-	0	1	/
7370	GBIF	Greek Anemone	U	473159, 4870312	0	1	/
7377	GBIF	White Willow	1	473298, 4877480	0	/	1
7574	EDDMapS	Goutweed	U	475363, 4874307	0	/	1
7590	GBIF	European Highbush Cranberry	U	475318, 4890945	0	/	1
7590	GBIF	Black Ash	U	-	0	/	1
7590	EDDMapS	European Buckthorn	U	475315, 4890950	0	/	1
7590	EDDMapS	Broad-leaved Helleborine	U	475318, 4890945	0	0	/
7590	EDDMapS	Bittersweet Nightshade	U	475084, 4890970	0	0	1
7590	EDDMapS	Small-flowered Hairy Willowherb	U	475318, 4890945	0	/	1
7590	EDDMapS	European Highbush Cranberry	U	475431, 4890862	0	/	1
7591	GBIF	Broad-leaved Cattail	U	475041, 4891238	0	/	1
7591	EDDMapS	Coltsfoot	U	475172, 4891128	0	0	/
7591	EDDMapS	European Water-horehound	U	475172, 4891128	0	/	1
7690	GBIF	Slender Mountain-mint	1	-	0	/	1

Notes:
Refer to **Figure B-2** for the grid locations. Coordinates are not provided for SAR or provincially rare species due to their sensitive nature.
For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected. '/' = study area does not apply to that species.
Count of 'U' = unspecified.

Table B-2. Field-based incidental observations of vegetation species of interest within the BIS study areas in 2022.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{AQU}
6779	Black Ash	Visual	low density	Incidental	-	0	/	1
6779	European Buckthorn	Visual	high density	TEM	467603, 4879509	0	/	1
6878	Manitoba Maple	Visual	high density	TEM	468136, 4878721	0	/	1
6883	Black Ash	Visual	med density	Incidental	-	0	/	1
6978	Black Ash	Visual	low density	Incidental	-	0	/	1
6978	Black Ash	Visual	>1	TEM	-	0	/	1
6980	European Buckthorn	Visual	med density	Incidental	469996, 4880644	0	/	1
6983	Black Ash	Visual	med density	Incidental	-	0	/	1
6983	Black Ash	Visual	low density	Incidental	-	0	/	1
6983	Black Ash	Visual	low density	Incidental	-	0	/	1
6983	Black Ash	Visual	low density	Incidental	-	0	/	1
6983	Black Ash	Visual	high density	TEM	-	0	/	1
6984	Black Ash	Visual	med density	Incidental	-	0	/	1
6984	Black Ash	Visual	low density	TEM	-	0	/	1
6987	Black Ash	Visual	1	Incidental	-	0	/	1
6987	Black Ash	Visual	low density	Incidental	-	0	/	1
6992	Black Ash	Visual	1	Incidental	-	0	/	1
6992	Black Ash	Visual	med density	Incidental	-	0	/	1
7066	Black Ash	Visual	med density	Incidental	-	0	/	1
7067	Black Ash	Visual	low density	Incidental	-	0	/	1
7067	Broad-leaved Cattail	Visual	med density	TEM	470652, 4867712	0	/	1
7067	Reed Canarygrass	Visual	med density	TEM	470652, 4867712	0	/	1
7068	Bittersweet Nightshade	Visual	1	TEM	470585, 4868014	0	/	1
7068	Broad-leaved Cattail	Visual	>1	TEM	470585, 4868014	0	/	1
7068	Reed Canarygrass	Visual	>1	TEM	470585, 4868014	0	/	1
7073	Reed Canarygrass	Visual	high density	AHM	470676, 4873571	1	/	1
7077	Black Ash	Visual	med density	Incidental	-	0	/	1
7077	Black Ash	Visual	low density	Incidental	-	0	/	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{AQU}
7077	Black Ash	Visual	low density	Incidental	-	0	/	1
7077	Black Ash	Visual	med density	Incidental	-	0	/	1
7077	Black Ash	Visual	high density	Incidental	-	0	/	1
7077	Black Ash	Visual	1	TEM	-	0	/	1
7078	Black Ash	Visual	med density	Incidental	-	0	/	1
7081	Black Ash	Visual	med density	Incidental	-	0	/	1
7081	Black Ash	Visual	med density	Incidental	-	0	/	1
7081	Black Ash	Visual	high density	TEM	-	0	/	1
7082	Black Ash	Visual	high density	Incidental	-	0	/	1
7082	Black Ash	Visual	high density	TEM	-	0	/	1
7082	Black Ash	Visual	low density	TEM	-	0	/	1
7082	European Reed	Visual	1	TEM	470403, 4882665	0	/	1
7082	European Reed	Visual	high density	TEM	470403, 4882665	0	/	1
7085	Black Ash	Visual	high density	Incidental	-	0	/	1
7085	Black Ash	Visual	high density	TEM	-	0	/	1
7085	Black Ash	Visual	low density	TEM	-	0	/	1
7087	Black Ash	Visual	med density	Incidental	-	0	/	1
7087	Black Ash	Visual	low density	Incidental	-	0	/	1
7088	Black Ash	Visual	low density	Incidental	-	0	/	1
7088	Black Ash	Visual	low density	Incidental	-	0	/	1
7088	Black Ash	Visual	1	TEM	-	0	/	1
7090	Black Ash	Visual	low density	Incidental	-	0	/	1
7090	Black Ash	Visual	high density	Incidental	-	0	/	1
7090	Black Ash	Visual	high density	Incidental	-	0	/	1
7091	Black Ash	Visual	med density	Incidental	-	0	/	1
7163	European Buckthorn	Visual	med density	Incidental	471669, 4863559	0	/	1
7164	Black Ash	Visual	low density	Incidental	-	0	/	1
7164	Black Ash	Visual	1	SWH	-	0	/	1
7165	Black Ash	Visual	low density	Incidental	-	0	/	1
7168	Black Ash	Visual	1	Incidental	-	0	/	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{AQU}
7168	Black Ash	Visual	low density	Incidental	-	0	/	1
7169	Black Ash	Visual	low density	Incidental	-	0	/	1
7169	Black Ash	Visual	med density	Incidental	-	0	/	1
7169	Black Ash	Visual	med density	Incidental	-	0	/	1
7169	European Buckthorn	Visual	>1	TEM	471723, 4869229	0	/	1
7169	European Buckthorn	Visual	high density	TEM	471654, 4869561	0	/	1
7171	Reed Canarygrass	Visual	>1	AHM	471620, 4871965	1	/	1
7172	European Reed	Visual	high density	Incidental	471555, 4872207	1	/	1
7172	European Reed	Visual	high density	Incidental	471620, 4872128	1	/	1
7172	European Reed	Visual	med density	Incidental	471509, 4872314	1	/	1
7172	Stinging Nettle	Visual	>1	AHM	471965, 4872042	1	/	1
7172	Stinging Nettle	Visual	>1	eDNA	471567, 4872220	1	/	1
7172	Stinging Nettle	Visual	>1	TEM	471780, 4872825	1	/	1
7172	Butternut	Visual	low density	Incidental	-	1	1	/
7172	Reed Canarygrass	Visual	>1	TEM	471780, 4872825	1	/	1
7172	Reed Canarygrass	Visual	>1	TEM	471524, 4872315	1	/	1
7173	Black Ash	Visual	med density	Incidental	-	1	/	1
7173	Black Ash	Visual	med density	Incidental	-	1	/	1
7173	Black Ash	Visual	med density	Incidental	-	1	/	1
7173	Black Ash	Visual	1	TEM	-	1	/	1
7173	Reed Canarygrass	Visual	>1	AHM	471632, 4873124	1	/	1
7173	Stinging Nettle	Visual	>1	eDNA	471570, 4873310	1	/	1
7173	Reed Canarygrass	Visual	high density	TEM	471633, 4873111	1	/	1
7174	Black Ash	Visual	med density	Incidental	-	1	/	1
7174	Black Ash	Visual	med density	Incidental	-	1	/	1
7174	Black Ash	Visual	med density	Incidental	-	1	/	1
7174	Black Ash	Visual	low density	Incidental	-	1	/	1
7174	Black Ash	Visual	low density	Incidental	-	1	/	1
7174	Black Ash	Visual	low density	Incidental	-	1	/	1
7174	European Buckthorn	Visual	low density	Incidental	471911, 4874469	1	/	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{AQU}
7174	Reed Canarygrass	Visual	>1	eDNA	471641, 4874450	1	/	1
7174	European Buckthorn	Visual	1	TEM	471447, 4874552	1	/	1
7175	Oxeye Daisy	Visual	1	TEM	471128, 4875017	0	1	/
7175	Redtop	Visual	1	TEM	471128, 4875017	0	/	1
7184	Black Ash	Visual	med density	Incidental	-	0	/	1
7184	Black Ash	Visual	med density	Incidental	-	0	/	1
7184	Black Ash	Visual	med density	Incidental	-	0	/	1
7184	Black Ash	Visual	med density	Incidental	-	0	/	1
7184	Black Ash	Visual	med density	Incidental	-	0	/	1
7184	Black Ash	Visual	med density	Incidental	-	0	/	1
7184	Black Ash	Visual	low density	Incidental	-	0	/	1
7184	Black Ash	Visual	med density	Incidental	-	0	/	1
7184	Black Ash	Visual	med density	TEM	-	0	/	1
7184	Black Ash	Visual	low density	TEM	-	0	/	1
7184	Black Ash	Visual	high density	TEM	-	0	/	1
7184	Poison Ivy	Visual	med density	Incidental	471069, 4884932	0	/	1
7185	Black Ash	Visual	med density	Incidental	-	0	/	1
7185	Black Ash	Visual	med density	Incidental	-	0	/	1
7185	Black Ash	Visual	low density	Incidental	-	0	/	1
7185	Black Ash	Visual	med density	Incidental	-	0	/	1
7185	Black Ash	Visual	low density	TEM	-	0	/	1
7185	Black Ash	Visual	1	SWH	-	0	/	1
7186	Black Ash	Visual	high density	Incidental	-	0	/	1
7186	Black Ash	Visual	med density	Incidental	-	0	/	1
7186	Black Ash	Visual	high density	Incidental	-	0	/	1
7186	Black Ash	Visual	low density	Incidental	-	0	/	1
7186	Black Ash	Visual	high density	TEM	-	0	/	1
7186	Poison Ivy	Visual	high density	Incidental	471693, 4886004	0	/	1
7187	Black Ash	Visual	low density	Incidental	-	0	/	1
7188	Black Ash	Visual	low density	Incidental	-	0	/	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{AQU}
7188	Black Ash	Visual	med density	Incidental	-	0	/	1
7188	Black Ash	Visual	med density	Incidental	-	0	/	1
7188	Black Ash	Visual	med density	Incidental	-	0	/	1
7188	Black Ash	Visual	med density	Incidental	-	0	/	1
7188	Black Ash	Visual	high density	Incidental	-	0	/	1
7188	Black Ash	Visual	1	SWH	-	0	/	1
7188	European Reed	Visual	high density	Incidental	471455, 4888221	0	/	1
7188	Reed Canarygrass	Visual	high density	TEM	471545, 4888514	0	/	1
7189	Black Ash	Visual	med density	Incidental	-	0	/	1
7190	Black Ash	Visual	med density	Incidental	-	0	/	1
7190	Black Ash	Visual	med density	Incidental	-	0	/	1
7190	Black Ash	Visual	med density	Incidental	-	0	/	1
7190	Black Ash	Visual	med density	Incidental	-	0	/	1
7190	Black Ash	Visual	med density	Incidental	-	0	/	1
7190	Black Ash	Visual	low density	Incidental	-	0	/	1
7190	Black Ash	Visual	>1	SWH	-	0	/	1
7263	Black Ash	Visual	low density	Incidental	-	0	/	1
7264	Black Ash	Visual	med density	Incidental	-	0	/	1
7266	Green Dragon	Visual	1	Incidental	-	0	/	1
7269	Broad-leaved Cattail	Visual	high density	TEM	472057, 4869322	0	/	1
7269	Broad-leaved Cattail	Visual	high density	SWH	472057, 4869322	0	/	1
7269	Green Dragon	Visual	1	Incidental	-	0	/	1
7269	Reed Canarygrass	Visual	>1	eDNA	472635, 4869767	0	/	1
7269	Stinging Nettle	Visual	>1	eDNA	472721, 4869288	0	/	1
7272	Bittersweet Nightshade	Visual	med density	eDNA	472410, 4872793	1	/	1
7272	Reed Canarygrass	Visual	>1	AHM	472820, 4872954	1	/	1
7272	Purple Loosestrife	Visual	1	AHM	472820, 4872954	1	/	1
7273	Black Ash	Visual	low density	Incidental	-	1	/	1
7273	Orchard Grass	Visual	high density	TEM	472750, 4873946	1	1	/
7273	Queen Anne's Lace/Wild Carrot	Visual	1	TEM	472750, 4873946	1	1	/

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{AQU}
7273	Redtop	Visual	1	TEM	472750, 4873946	1	/	1
7273	Reed Canarygrass	Visual	high density	TEM	472750, 4873946	1	/	1
7274	Reed Canarygrass	Visual	>1	AHM	472613, 4874349	1	/	1
7274	Scots Pine	Visual	>1	AHM	472936, 4874506	1	1	/
7274	Stinging Nettle	Visual	>1	eDNA	472619, 4874359	1	/	1
7274	Reed Canarygrass	Visual	high density	TEM	472774, 4874308	1	/	1
7275	Reed Canarygrass	Visual	high density	TEM	472938, 4875735	0	/	1
7277	Black Ash	Visual	high density	Incidental	-	0	/	1
7278	Black Ash	Visual	med density	Incidental	-	0	/	1
7278	Black Ash	Visual	med density	Incidental	-	0	/	1
7278	Black Ash	Visual	low density	Incidental	-	0	/	1
7278	Black Ash	Visual	low density	Incidental	-	0	/	1
7279	Black Ash	Visual	low density	Incidental	-	0	/	1
7279	Black Ash	Visual	low density	Incidental	-	0	/	1
7279	European Buckthorn	Visual	low density	Incidental	472258, 4879830	0	/	1
7279	Reed Canarygrass	Visual	>1	TEM	472555, 4879980	0	/	1
7280	Black Ash	Visual	low density	Incidental	-	0	/	1
7280	European Buckthorn	Visual	med density	Incidental	472710, 4880128	0	/	1
7280	European Buckthorn	Visual	low density	Incidental	472345, 4880244	0	/	1
7280	European Buckthorn	Visual	med density	Incidental	472188, 4880031	0	/	1
7284	Black Ash	Visual	low density	Incidental	-	0	/	1
7284	Black Ash	Visual	1	TEM	-	0	/	1
7284	Stinging Nettle	Visual	>1	TEM	472596, 4884989	0	/	1
7285	Black Ash	Visual	low density	Incidental	-	0	/	1
7286	Black Ash	Visual	high density	Incidental	-	0	/	1
7286	Black Ash	Visual	low density	Incidental	-	0	/	1
7286	Black Ash	Visual	low density	Incidental	-	0	/	1
7286	Black Ash	Visual	low density	Incidental	-	0	/	1
7286	Black Ash	Visual	>1	SWH	-	0	/	1
7286	Black Ash	Visual	>1	SWH	-	0	/	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{AQU}
7288	Black Ash	Visual	low density	Incidental	-	0	/	1
7289	Black Ash	Visual	med density	Incidental	-	0	/	1
7289	Black Ash	Visual	low density	Incidental	-	0	/	1
7289	Black Ash	Visual	med density	Incidental	-	0	/	1
7289	Black Ash	Visual	med density	Incidental	-	0	/	1
7373	Black Ash	Visual	med density	Incidental	-	1	/	1
7373	Black Ash	Visual	med density	Incidental	-	1	/	1
7373	Eastern Green-violet	Visual	high density	Incidental	-	1	1	/
7374	Black Ash	Visual	med density	Incidental	-	1	/	1
7374	Black Ash	Visual	low density	Incidental	-	1	/	1
7374	Black Ash	Visual	1	eDNA	-	1	/	1
7374	Eastern Green-violet	Visual	high density	Incidental	-	1	1	/
7374	Purple Loosestrife	Visual	med density	eDNA	473708, 4874843	1	/	1
7375	Orchard Grass	Visual	high density	TEM	473132, 4875376	0	1	/
7375	Scots Pine	Visual	high density	TEM	473310, 4875032	1	1	/
7375	Stinging Nettle	Visual	>1	eDNA	473408, 4875191	1	/	1
7375	Stinging Nettle	Visual	low density	TEM	473421, 4875348	0	/	1
7375	Stinging Nettle	Visual	>1	TEM	473462, 4875100	1	/	1
7375	Sweet Cherry	Visual	low density	TEM	473310, 4875032	1	1	/
7375	Reed Canarygrass	Visual	high density	TEM	473421, 4875348	0	/	1
7375	Reed Canarygrass	Visual	high density	TEM	473462, 4875100	1	/	1
7375	Reed Canarygrass	Visual	high density	TEM	473370, 4875229	1	/	1
7375	European Buckthorn	Visual	high density	TEM	473310, 4875032	1	/	1
7375	Reed Canarygrass	Visual	high density	TEM	473435, 4875002	1	/	1
7375	Reed Canarygrass	Visual	high density	TEM	473421, 4875348	0	/	1
7375	Reed Canarygrass	Visual	high density	TEM	473462, 4875100	1	/	1
7375	Reed Canarygrass	Visual	high density	TEM	473370, 4875229	1	/	1
7375	Reed Canarygrass	Visual	high density	SWH	473421, 4875348	0	/	1
7385	Black Ash	Visual	med density	Incidental	-	0	/	1
7385	Black Ash	Visual	med density	Incidental	-	0	/	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{AQU}
7385	Black Ash	Visual	low density	Incidental	-	0	/	1
7385	Black Ash	Visual	low density	Incidental	-	0	/	1
7385	Black Ash	Visual	med density	Incidental	-	0	/	1
7388	Black Ash	Visual	low density	Incidental	-	0	/	1
7388	Black Ash	Visual	low density	Incidental	-	0	/	1
7388	Black Ash	Visual	low density	Incidental	-	0	/	1
7389	Black Ash	Visual	med density	Incidental	-	0	/	1
7389	Black Ash	Visual	med density	Incidental	-	0	/	1
7389	Black Ash	Visual	low density	Incidental	-	0	/	1
7389	Black Ash	Visual	low density	Incidental	-	0	/	1
7477	Black Ash	Visual	med density	Incidental	-	0	/	1
7490	Black Ash	Visual	med density	Incidental	-	0	/	1
7490	Black Ash	Visual	1	Incidental	-	0	/	1
7490	Black Ash	Visual	med density	Incidental	-	0	/	1
7490	Black Ash	Visual	med density	Incidental	-	0	/	1
7490	Black Ash	Visual	low density	Incidental	-	0	/	1
7490	Black Ash	Visual	1	TEM	-	0	/	1
7490	Black Ash	Visual	med density	TEM	-	0	/	1
7490	Broad-leaved Cattail	Visual	>1	eDNA	474900, 4890402	0	/	1
7490	Bittersweet Nightshade	Visual	1	eDNA	474900, 4890402	0	/	1
7490	Reed Canarygrass	Visual	>1	eDNA	474900, 4890402	0	/	1
7490	Stinging Nettle	Visual	>1	eDNA	474900, 4890402	0	/	1
7490	Stinging Nettle	Visual	>1	eDNA	474900, 4890402	0	/	1
7490	Stinging Nettle	Visual	>1	eDNA	474900, 4890402	0	/	1
7493	Black Ash	Visual	high density	Incidental	-	0	/	1
7576	Black Ash	Visual	med density	Incidental	-	0	/	1
7577	Black Ash	Visual	high density	Incidental	-	0	/	1
7589	Black Ash	Visual	med density	Incidental	-	0	/	1
7589	Black Ash	Visual	high density	TEM	-	0	/	1
7589	Black Ash	Visual	med density	TEM	-	0	/	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{TER}	LSA_{AQU}
7590	Stinging Nettle	Visual	>1	eDNA	475131, 4890532	0	/	1
7591	Black Ash	Visual	high density	Incidental	-	0	/	1

Notes:
See **Figure B-3** for Grid locations of masked observations. Coordinates are not provided for some observations due to the sensitive nature of SAR and provincially rare species.
For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected. '/' = study area does not apply to that species.
All 2022 field species observations are considered incidental; however, the source type is presented to allow interpretation of field effort and visited locations. "eDNA" refers to field observations and not the results of metabarcoding analyses.

Table B-3. Vegetation species of interest detected in the TEM field data from 2022. I = introduced; W = Weed; IV = invasive; R = provincially rare; SAR= Species at Risk.

Site	Study Area	Lesser burdock – I	Knapweed sp. – W	American tree moss – R	Swamp dodder – W	Orchard grass – I	Wild carrot – I	Broad-leaved helleborine – I	Alder buckthorn – IV	Black ash – SAR	Smooth bedstraw – W	Meadow fescue – I	Garden bird's-foot trefoil – I	White sweet-clover – IV	Spotted lady's-thumb – I	Reed canarygrass – IV	Common Timothy – I	Norway spruce – I	English plantain – I	Sulphur cinquefoil – I	Common buttercup – I	European buckthorn – IV, W	Multiflora rose – IV	Curled dock – I	Bladder campion – I	Bittersweet nightshade – I	Common dandelion – I	Poison ivy – W	Eastern poison ivy – W	Western poison ivy – W	Red clover – I	White clover – I	Coltsfoot – W	Narrow-leaved cattail – I
TEM_001	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
TEM_002	**LSA_{ECO}**	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
TEM_003	**AOI**	1	0	0	0	1	1	0	0	0	1	1	0	1	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0	0	1	1	0	0
TEM_004	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_005	**LSA_{ECO}**	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_006	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
TEM_007	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_008	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
TEM_009	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_010	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0
TEM_011	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
TEM_012	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_013	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
TEM_014	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_015	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_016	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_017	**LSA_{ECO}**	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0
TEM_018	**LSA_{ECO}**	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
TEM_019	**LSA_{ECO}**	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
TEM_020	**LSA_{ECO}**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
TEM_021	**LSA_{ECO}**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_022	**LSA_{ECO}**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_023	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_024	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
TEM_025	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_026	**LSA_{ECO}**	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0
TEM_027	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
TEM_028	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_029	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
TEM_030	**LSA_{ECO}**	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_031	**LSA_{ECO}**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_032	**LSA_{ECO}**	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

Site	Study Area	Lesser burdock – I	Knapweed sp. – W	American tree moss – R	Swamp dodder – W	Orchard grass – I	Wild carrot – I	Broad-leaved helleborine – I	Alder buckthorn – IV	Black ash – SAR	Smooth bedstraw – W	Meadow fescue – I	Garden bird's-foot trefoil – I	White sweet-clover – IV	Spotted lady's-thumb – I	Reed canarygrass – IV	Common Timothy – I	Norway spruce – I	English plantain – I	Sulphur cinquefoil – I	Common buttercup – I	European buckthorn – IV, W	Multiflora rose – IV	Curled dock – I	Bladder campion – I	Bittersweet nightshade – I	Common dandelion – I	Poison ivy – W	Eastern poison ivy – W	Western poison ivy – W	Red clover – I	White clover – I	Coltsfoot – W	Narrow-leaved cattail – I
TEM_033	**LSA_{ECO}**	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	0	0	0	0
TEM_034	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
TEM_035	**AOI**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
TEM_036	**LSA_{TER}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_037	**LSA_{ECO}**	0	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
TEM_038	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
TEM_039	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_040	**AOI**	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_041	**AOI**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0
TEM_042	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
TEM_043	**LSA_{ECO}**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0
TEM_044	**LSA_{ECO}**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
TEM_045	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_046	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_047	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
TEM_048	**LSA_{ECO}**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_049	**LSA_{TER}**	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
TEM_050	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	0
TEM_051	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_052	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
TEM_053	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_054	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0
TEM_055	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
TEM_056	**LSA_{ECO}**	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
TEM_057	**AOI**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_058	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_059	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_060	**AOI**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
TEM_061	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_062	**LSA_{ECO}**	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	1	0	0	0	1	1	0	0
TEM_063	**AOI**	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
TEM_064	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_065	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Site	Study Area	Lesser burdock – I	Knapweed sp. – W	American tree moss – R	Swamp dodder – W	Orchard grass – I	Wild carrot – I	Broad-leaved helleborine – I	Alder buckthorn – IV	Black ash – SAR	Smooth bedstraw – W	Meadow fescue – I	Garden bird's-foot trefoil – I	White sweet-clover – IV	Spotted lady's-thumb – I	Reed canarygrass – IV	Common Timothy – I	Norway spruce – I	English plantain – I	Sulphur cinquefoil – I	Common buttercup – I	European buckthorn – IV, W	Multiflora rose – IV	Curled dock – I	Bladder campion – I	Bittersweet nightshade – I	Common dandelion – I	Poison ivy – W	Eastern poison ivy – W	Western poison ivy – W	Red clover – I	White clover – I	Coltsfoot – W	Narrow-leaved cattail – I
TEM_066	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
TEM_067	**LSA_{ECO}**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
TEM_068	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
TEM_069	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0
TEM_070	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_071	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_072	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
TEM_073	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_074	**LSA_{ECO}**	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0
TEM_075	**AOI**	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_076	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_077	**AOI**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
TEM_078	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0
TEM_079	**AOI**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
TEM_080	**LSA_{ECO}**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
TEM_081	**LSA_{ECO}**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_082	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TEM_083	**AOI**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
TEM_084	**LSA_{ECO}**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table B-4. Vegetation species of interest detected at waterbody sites within the BIS study areas relevant to vegetation during AHM field surveys in 2022.

Site	Study Area	Bull thistle – W	Canada thistle – W	European buckthorn – IV, W	Narrow-leaved cattail – I	Reed canarygrass – IV	Scots pine - IV
SB_L001	LSA_{AQU}	0	0	1	0	1	1
SB_L003	LSA_{AQU}	0	0	0	0	1	0
SB_L004	LSA_{AQU}	1	0	1	0	1	0
SB_L005	LSA_{AQU}	0	0	1	0	1	0
SB_L006	AOI	1	1	0	0	1	0
SB_L007	LSA_{AQU}	0	0	0	0	0	0
SB_P003	LSA_{AQU}	0	0	0	0	0	0
SB_P005	LSA_{AQU}	0	0	0	0	0	0
SB_P007	LSA_{AQU}	0	0	0	0	0	0
SB_P008	LSA_{AQU}	0	1	0	1	0	0
SB_P009	LSA_{AQU}	0	0	0	1	1	0
SB_P010	AOI	0	0	0	0	1	0
SB_P015	LSA_{AQU}	0	0	0	1	0	0

Note:
Includes species classified as emergent, submergent, and floating and those observed in the riparian zones.
I = introduced; W = Weed; IV = invasive; R = provincially rare; SAR= Species at Risk.

Table B-5. Vegetation species of interest detected at wetland sites within the BIS study areas relevant to vegetation during AHM field surveys in 2022. I = introduced; W = Weed; IV = invasive; R = provincially rare; SAR= Species at Risk.

Site	Study Area	Bittersweet nightshade – I	Norway maple - IV	Reed canarygrass - IV	Stinging nettle – I
SB_P002	AOI	1	1	1	0
SB_P004	LSA_{AQU}	0	0	0	0
SB_P006	LSA_{AQU}	0	0	0	0
SB_P011	LSA_{AQU}	0	0	0	0
SB_P012	AOI	0	0	1	1
SB_P013	AOI	0	0	1	0
SB_P014	AOI	0	0	0	0
SB_P016	AOI	0	0	1	0
SB_S113	LSA_{AQU}	0	0	0	0
SB_W002	LSA_{AQU}	0	0	0	0
SB_W003	LSA_{AQU}	0	0	0	0
SB_W005	LSA_{AQU}	0	0	0	0
SB_W006	LSA_{AQU}	0	0	0	0
SB_W008	LSA_{AQU}	0	0	0	0
SB_W009	LSA_{AQU}	0	0	0	0
SB_W011	LSA_{AQU}	0	0	0	0
SB_W013	LSA_{AQU}	0	0	0	0
SB_W017	LSA_{AQU}	0	0	0	0
SB_W018	LSA_{AQU}	0	0	0	0
SB_W023	LSA_{AQU}	0	0	0	0
SB_W024	LSA_{AQU}	0	0	0	0
SB_W025	LSA_{AQU}	0	0	0	0
SB_W028	LSA_{AQU}	0	0	0	0
SB_W032	LSA_{AQU}	0	0	0	0
SB_W033	LSA_{AQU}	0	0	0	0
SB_W035	LSA_{AQU}	0	0	0	0
SB_W037	LSA_{AQU}	0	0	0	0
SB_W038	LSA_{AQU}	0	0	1	0
SB_W041	LSA_{AQU}	0	0	0	0
SB_W044	LSA_{AQU}	0	0	0	0
SB_W045	LSA_{AQU}	0	0	0	0
SB_W046	LSA_{AQU}	0	0	0	0
SB_W051	LSA_{AQU}	0	0	0	0
SB_W053	LSA_{AQU}	0	0	1	0
SB_W054	LSA_{AQU}	0	0	0	0
SB_W055	LSA_{AQU}	0	0	0	0
SB_W056	LSA_{AQU}	0	0	0	0

Site	Study Area	Bittersweet nightshade – I	Norway maple - IV	Reed canarygrass - IV	Stinging nettle – I
SB_W057	LSA_{AQU}	0	0	0	0
SB_W058	LSA_{AQU}	0	0	0	0
SB_W059	LSA_{AQU}	0	0	0	0
SB_W060	LSA_{AQU}	0	0	0	0
SB_W062	LSA_{AQU}	0	0	0	0
SB_W065	LSA_{AQU}	0	0	0	0
SB_W066	LSA_{AQU}	0	0	0	0
SB_W067	LSA_{AQU}	0	0	0	0
SB_W068	LSA_{AQU}	0	0	0	0
SB_W069	LSA_{AQU}	0	0	0	0
SB_W071	LSA_{AQU}	0	0	0	0
SB_W073	LSA_{AQU}	0	0	0	0
SB_W075	LSA_{AQU}	0	0	0	0
SB_W076	LSA_{AQU}	0	0	0	0
SB_W112	LSA_{AQU}	0	0	0	0
SB_W113	AOI	0	0	0	0
SB_W114	AOI	0	0	0	0
SB_W115	AOI	0	0	0	0
SB_W116	AOI	0	0	0	0
SB_W117	AOI	0	0	0	0
SB_W118	AOI	0	0	0	0
SB_W119	AOI	0	0	0	0
SB_W120	AOI	0	0	0	0
SB_W121	AOI	0	0	0	0
SB_W122	AOI	0	0	0	0
SB_W123	AOI	0	0	0	0
SB_W124	AOI	0	0	0	0
SB_W125	AOI	0	0	0	0
SB_W126	AOI	0	0	0	0
SB_W127	AOI	0	0	0	0
SB_W128	AOI	0	0	0	0
SB_W129	AOI	0	0	0	0
SB_W130	AOI	0	0	0	0
SB_W131	AOI	0	0	0	0
SB_W132	AOI	0	0	1	0
SB_W133	AOI	0	0	0	0
SB_W134	AOI	0	0	0	0
SB_W135	AOI	0	0	0	0
SB_W136	AOI	0	0	0	0
SB_W137	AOI	0	0	0	0

Site	Study Area	Bittersweet nightshade – I	Norway maple - IV	Reed canarygrass - IV	Stinging nettle – I
SB_W138	AOI	0	0	0	0
SB_W164	AOI	0	0	0	0
SB_W165	AOI	0	0	0	0
SB_W166	AOI	0	0	0	0

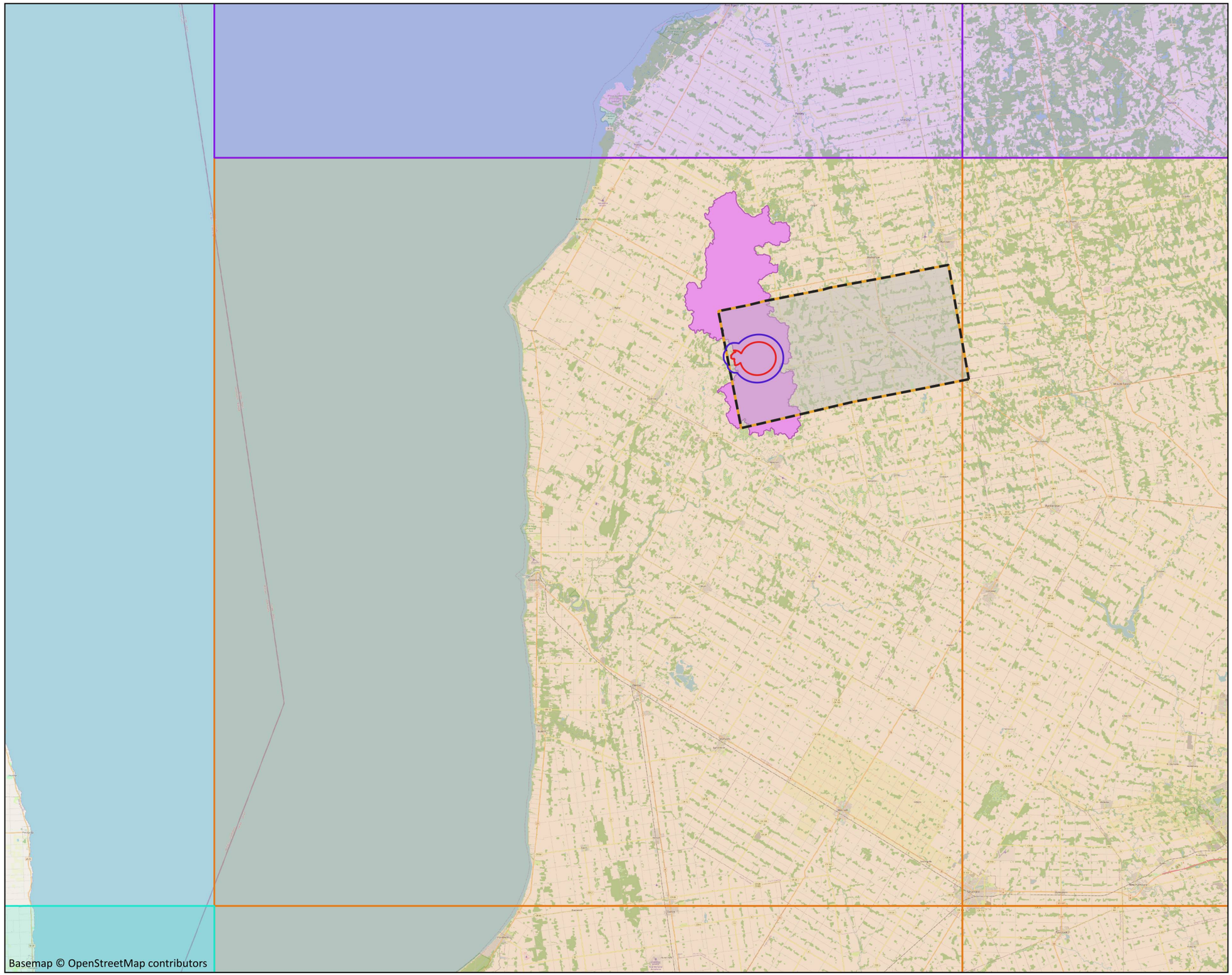
Table B-6. Vegetation species of interest detected at watercourse sites within the BIS study areas relevant to vegetation during AHM field surveys in 2022. I = introduced; W = Weed; IV = invasive; R = provincially rare; SAR= Species at Risk.

Site	Study Area	Narrow-leaved cattail – I	Reed canarygrass – IV	Scot's pine – IV	Soybean – I	Stinging nettle – I	Water speedwell – I	White willow – I
SB_S001	LSA_{AQU}	0	0	0	0	0	0	0
SB_S002	LSA_{AQU}	0	1	0	0	0	1	0
SB_S003	LSA_{AQU}	0	1	0	0	0	0	0
SB_S004	AOI	0	1	0	0	0	0	1
SB_S006	AOI	1	1	0	0	0	1	0
SB_S007	AOI	0	1	0	0	1	1	0
SB_S008	AOI	0	1	0	0	0	0	1
SB_S009	AOI	0	0	0	0	0	0	0
SB_S010	LSA_{AQU}	0	1	0	0	0	0	0
SB_S011	LSA_{AQU}	0	0	0	0	0	0	0
SB_S012	AOI	0	0	0	0	0	0	0
SB_S013	AOI	0	1	0	0	1	0	0
SB_S014	AOI	0	0	0	0	0	0	0
SB_S015	AOI	0	1	0	0	0	1	0
SB_S016	AOI	0	1	0	0	1	1	0
SB_S018	LSA_{AQU}	0	1	0	0	0	0	0
SB_S021	LSA_{AQU}	0	0	0	0	0	0	0
SB_S026	LSA_{AQU}	0	1	0	0	0	0	0
SB_S029	AOI	0	1	0	0	0	0	0
SB_S030	LSA_{AQU}	0	1	0	0	0	0	0
SB_S032	AOI	0	0	0	0	0	0	0
SB_S033	LSA_{AQU}	0	0	0	0	0	1	0
SB_S034	AOI	0	1	0	1	0	0	0
SB_S035	AOI	0	1	1	0	0	0	0
SB_S037	LSA_{AQU}	0	1	0	0	0	1	0
SB_S038	AOI	0	1	0	0	0	0	0

Site	Study Area	Narrow-leaved cattail – I	Reed canarygrass – IV	Scot's pine – IV	Soybean – I	Stinging nettle – I	Water speedwell – I	White willow – I
SB_S039	AOI	0	1	0	0	0	0	0
SB_S040	AOI	0	1	0	0	0	0	0
SB_S042	AOI	0	1	0	0	1	1	0
SB_S044	LSA_{AQU}	0	0	0	0	0	0	0
SB_S045	LSA_{AQU}	0	0	0	0	0	1	0
SB_S046	LSA_{AQU}	0	0	0	0	1	0	0
SB_S047	LSA_{AQU}	0	1	0	0	1	1	0
SB_S048	AOI	0	0	0	0	0	0	0
SB_S049	LSA_{AQU}	0	1	0	0	0	0	0
SB_S050	AOI	0	0	0	0	0	0	0
SB_S051	AOI	0	1	0	0	0	0	0
SB_S052	LSA_{AQU}	0	1	0	0	0	0	0
SB_S053	AOI	0	1	0	1	0	0	0
SB_S056	AOI	0	1	0	0	1	0	0
SB_S057	LSA_{AQU}	0	0	0	0	0	0	0
SB_S058	LSA_{AQU}	0	1	0	0	0	0	0
SB_S059	LSA_{AQU}	0	0	0	0	0	0	0
SB_S061	LSA_{AQU}	0	0	0	0	1	0	0
SB_S062	LSA_{AQU}	0	0	0	0	0	0	0
SB_S063	LSA_{AQU}	0	1	0	0	0	0	0
SB_S064	LSA_{AQU}	0	1	0	0	0	1	0
SB_S065	LSA_{AQU}	0	1	0	0	0	0	0
SB_S067	AOI	0	1	0	0	0	0	0
SB_S068	AOI	0	1	0	0	0	1	0
SB_S069	AOI	0	0	0	0	0	0	0
SB_S070	AOI	0	1	0	0	0	0	0
SB_S071	AOI	0	1	0	0	0	0	0
SB_S072	AOI	0	1	0	0	1	0	0

Site	Study Area	Narrow-leaved cattail – I	Reed canarygrass – IV	Scot's pine – IV	Soybean – I	Stinging nettle – I	Water speedwell – I	White willow – I
SB_S073	AOI	0	1	0	0	0	0	0
SB_S074	AOI	0	1	0	0	0	0	0
SB_S075	AOI	0	1	0	0	1	0	0
SB_S076	AOI	0	1	0	0	0	0	0
SB_S077	AOI	0	1	0	0	1	0	0
SB_S079	LSA_{AQU}	0	0	0	0	0	0	0
SB_S080	LSA_{AQU}	0	0	0	0	0	0	0
SB_S081	LSA_{AQU}	0	0	0	0	1	1	0
SB_S089	LSA_{AQU}	0	1	0	0	0	1	0
SB_S090	LSA_{AQU}	0	1	0	0	0	1	0
SB_S093	AOI	0	1	0	0	0	1	0
SB_S094	AOI	0	1	0	0	0	1	0
SB_S095	AOI	0	1	0	0	0	1	0
SB_S096	AOI	0	1	0	0	0	0	1
SB_S099	AOI	0	0	0	0	0	0	0
SB_S100	AOI	0	1	0	0	0	0	0
SB_S101	AOI	0	1	0	0	0	0	0
SB_S102	AOI	0	0	0	0	0	0	0
SB_S103	AOI	0	1	0	0	0	0	0
SB_S104	AOI	0	0	0	0	0	0	0
SB_S105	AOI	0	1	0	0	0	0	0
SB_S106	AOI	0	0	0	0	0	0	0
SB_S107	AOI	0	0	0	0	0	0	0
SB_S108	AOI	1	1	0	0	0	1	0
SB_S109	AOI	0	0	0	0	0	0	0
SB_S110	LSA_{AQU}	0	0	0	0	0	0	0
SB_S112	LSA_{AQU}	0	0	0	0	0	0	0
SB_S114	LSA_{AQU}	0	0	0	0	0	0	0

Site	Study Area	Narrow-leaved cattail – I	Reed canarygrass – IV	Scot's pine – IV	Soybean – I	Stinging nettle – I	Water speedwell – I	White willow – I
SB_S115	LSA_{AQU}	0	0	0	0	0	0	0
SB_S117	AOI	0	0	0	0	0	0	0
SB_S120	LSA_{AQU}	0	0	0	0	0	0	0
SB_S121	AOI	0	0	0	0	0	0	0
SB_S126	LSA_{AQU}	0	1	0	0	0	1	0
SB_W061	LSA_{AQU}	0	0	0	0	0	0	0
SB_W064	LSA_{AQU}	0	0	0	0	0	0	0
SB_W139	AOI	0	0	0	0	0	0	0



NWMO Biodiversity Impact Studies

Critical Habitat for Goldenseal and American Ginseng

Figure B-1

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- South Bruce Boundary

100 x 100 km standardized UTM grid squares within which critical habitat is found

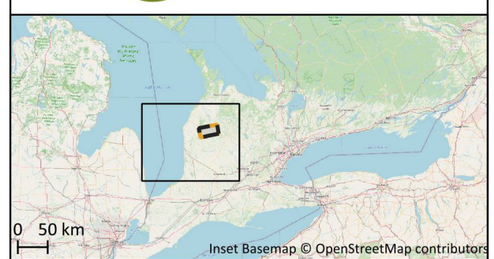
- Goldenseal and American Ginseng
- American Ginseng
- Goldenseal

This map shows the extent of known critical habitat for goldenseal and American ginseng. Other critical habitat for these species and other at risk species may be present and not yet identified.

1:500,000

0 10 20 km

ZOETICA



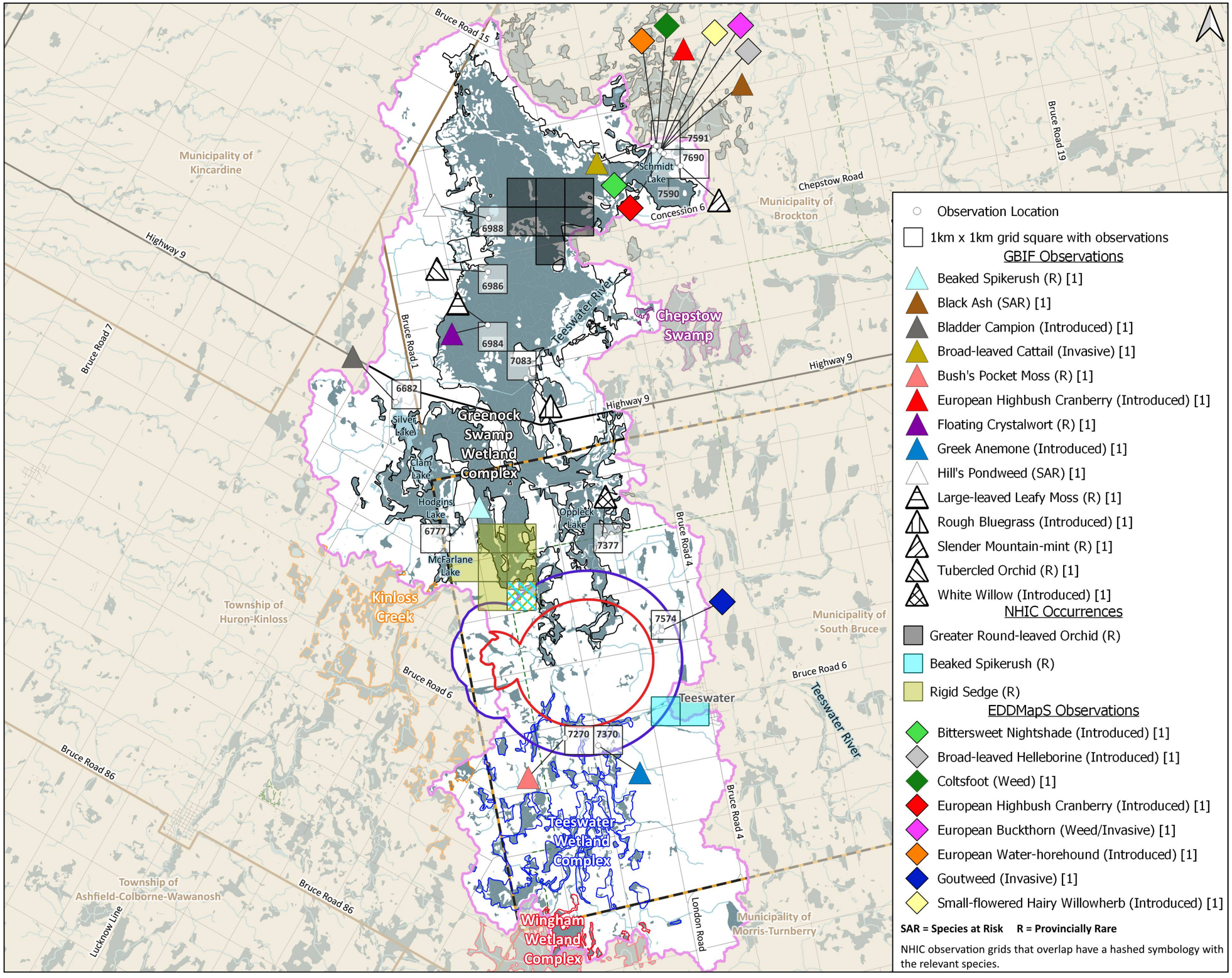
Data received from:
Ontario GeoHub — Municipal Boundary - Lower Tier (MMAH); UTM (Universal Transverse Mercator) 100 KM Grid (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: HB
October 16, 2023	Map ID: NWMO_BIS_D116b	

NWMO Biodiversity Impact Studies

Species of Interest Desk-based Observations: Vegetation

Figure B-2



- Observation Location
- 1km x 1km grid square with observations

GBIF Observations

- Beaked Spikerush (R) [1]
- Black Ash (SAR) [1]
- Bladder Campion (Introduced) [1]
- Broad-leaved Cattail (Invasive) [1]
- Bush's Pocket Moss (R) [1]
- European Highbush Cranberry (Introduced) [1]
- Floating Crystalwort (R) [1]
- Greek Anemone (Introduced) [1]
- Hill's Pondweed (SAR) [1]
- Large-leaved Leafy Moss (R) [1]
- Rough Bluegrass (Introduced) [1]
- Slender Mountain-mint (R) [1]
- Tubercled Orchid (R) [1]
- White Willow (Introduced) [1]

NHIC Occurrences

- Greater Round-leaved Orchid (R)
- Beaked Spikerush (R)
- Rigid Sedge (R)

EDDMapS Observations

- Bittersweet Nightshade (Introduced) [1]
- Broad-leaved Helleborine (Introduced) [1]
- Coltsfoot (Weed) [1]
- European Highbush Cranberry (Introduced) [1]
- European Buckthorn (Weed/Invasive) [1]
- European Water-horehound (Introduced) [1]
- Goutweed (Invasive) [1]
- Small-flowered Hairy Willowherb (Introduced) [1]

SAR = Species at Risk **R = Provincially Rare**

NHIC observation grids that overlap have a hashed symbology with the relevant species.

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

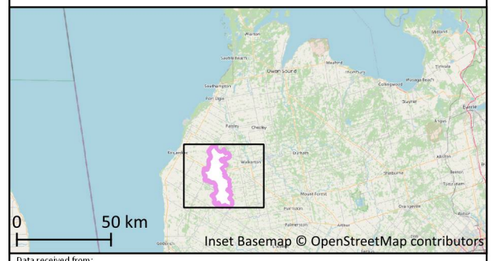
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:130,000

0 2 4 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NHIC Species Occurrences (MNRF)
GBIF.org — GBIF Occurrence Download - Accessed Oct., 2021
EDDMapS Ontario — Invasive Species Observations - Accessed Jan.12, 2022
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
December 11, 2023	Map ID: NWMO_BIS_A079	

NWMO Biodiversity Impact Studies

Species of Interest Field Observations (SAR and Provincially Rare): Vegetation North LSA $_{AQU}$

Figure B-3a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

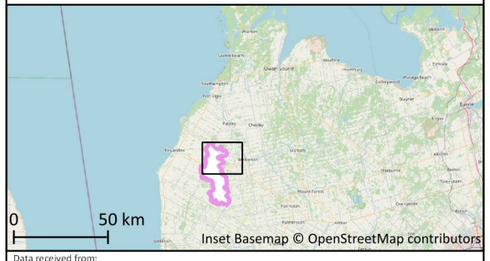
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:65,000

0 1 2 km

ZOETICA



Species Observed

- American Tree Moss (R)
- Black Ash (SAR)
- Butternut (SAR)
- Eastern Green-violet (R)
- Green Dragon (SAR)

SAR = Species at Risk **R = Provincially Rare**

SAR and Provincially Rare species were masked with a 1km grid and may occur anywhere within that grid square. Circle colour(s) within the grid represent the species observed incidentally. Species may have been observed more than once within a grid square.

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
January 19, 2024	Map ID: NWMO_BIS_A119a	

NWMO Biodiversity Impact Studies

Species of Interest Field Observations (SAR and Provincially Rare): Vegetation South LSA $_{AQU}$

Figure B-3b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

See Figure B-3a for Full Legend

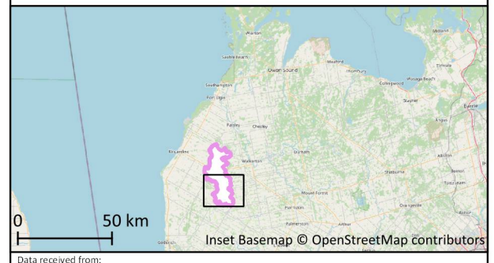
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
January 19, 2024	Map ID: NWMO_BIS_A119b	

NWMO Biodiversity Impact Studies

Species of Interest Field Observations (SAR and Provincially Rare): Vegetation AOI

Figure B-3c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

See Figure B-3a for Full Legend

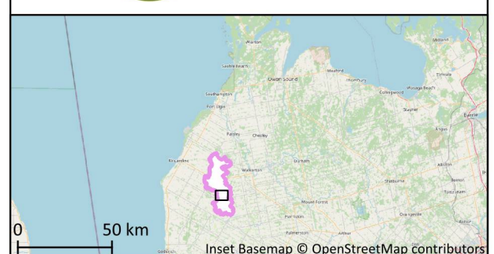
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:20,000

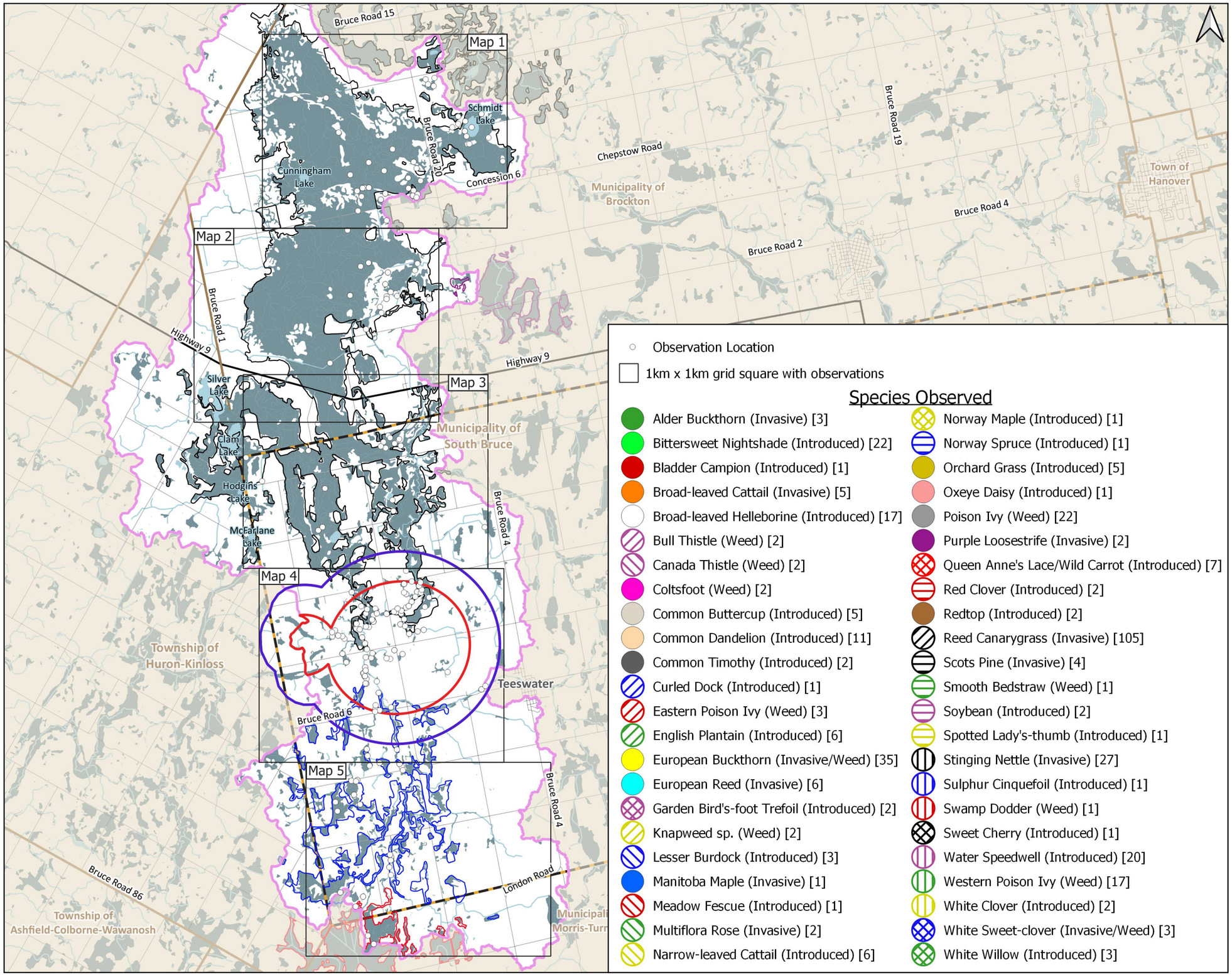
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
January 19, 2024	Map ID: NWMO_BIS_A119c	



Observation Location

1km x 1km grid square with observations

Species Observed

- Alder Buckthorn (Invasive) [3]
- Bittersweet Nightshade (Introduced) [22]
- Bladder Campion (Introduced) [1]
- Broad-leaved Cattail (Invasive) [5]
- Broad-leaved Helleborine (Introduced) [17]
- Bull Thistle (Weed) [2]
- Canada Thistle (Weed) [2]
- Coltsfoot (Weed) [2]
- Common Buttercup (Introduced) [5]
- Common Dandelion (Introduced) [11]
- Common Timothy (Introduced) [2]
- Curled Dock (Introduced) [1]
- Eastern Poison Ivy (Weed) [3]
- English Plantain (Introduced) [6]
- European Buckthorn (Invasive/Weed) [35]
- European Reed (Invasive) [6]
- Garden Bird's-foot Trefoil (Introduced) [2]
- Knapweed sp. (Weed) [2]
- Lesser Burdock (Introduced) [3]
- Manitoba Maple (Invasive) [1]
- Meadow Fescue (Introduced) [1]
- Multiflora Rose (Invasive) [2]
- Narrow-leaved Cattail (Introduced) [6]
- Norway Maple (Introduced) [1]
- Norway Spruce (Introduced) [1]
- Orchard Grass (Introduced) [5]
- Oxeye Daisy (Introduced) [1]
- Poison Ivy (Weed) [22]
- Purple Loosestrife (Invasive) [2]
- Queen Anne's Lace/Wild Carrot (Introduced) [7]
- Red Clover (Introduced) [2]
- Redtop (Introduced) [2]
- Reed Canarygrass (Invasive) [105]
- Scots Pine (Invasive) [4]
- Smooth Bedstraw (Weed) [1]
- Soybean (Introduced) [2]
- Spotted Lady's-thumb (Introduced) [1]
- Stinging Nettle (Invasive) [27]
- Sulphur Cinquefoil (Introduced) [1]
- Swamp Dodder (Weed) [1]
- Sweet Cherry (Introduced) [1]
- Water Speedwell (Introduced) [20]
- Western Poison Ivy (Weed) [17]
- White Clover (Introduced) [2]
- White Sweet-clover (Invasive/Weed) [3]
- White Willow (Introduced) [3]

NWMO Biodiversity Impact Studies

Species of Interest Field Observations (Invasive): Vegetation - Overview Map

Figure B-4a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

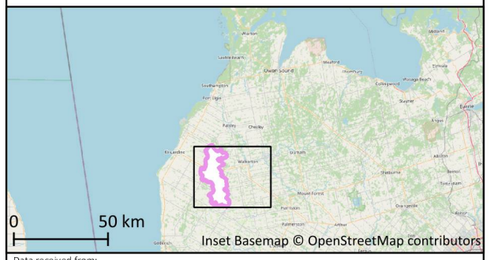
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:125,000

0 2 4 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Noun Project — CC BY 3.0: "Eye" by Nicholas Menghini
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
January 19, 2024	Map ID: NWMO_BIS_A124a	

NWMO Biodiversity Impact Studies

Species of Interest Field Observations (Invasive): Vegetation - Map 1

Figure B-4b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

See Figure B-4a for Full Legend

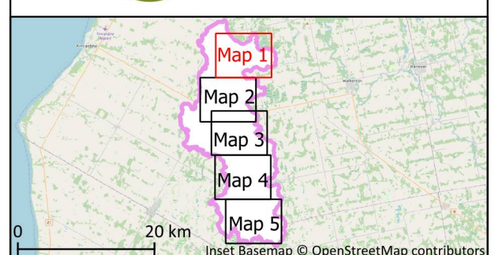
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:25,000

0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Noun Project — CC BY 3.0: "Eye" by Nicholas Menghini
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
January 19, 2024	Map ID: NWMO_BIS_A124b	

NWMO Biodiversity Impact Studies

Species of Interest Field Observations (Invasive): Vegetation - Map 2

Figure B-4c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

See Figure B-4a for Full Legend

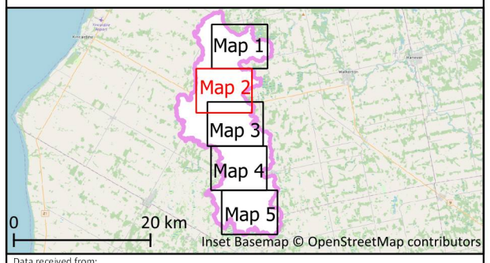
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:25,000

0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Noun Project — CC BY 3.0: "Eye" by Nicholas Menghini
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
January 19, 2024	Map ID: NWMO_BIS_A124c	

NWMO Biodiversity Impact Studies

Species of Interest Field Observations (Invasive): Vegetation - Map 3

Figure B-4d

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

See Figure B-4a for Full Legend

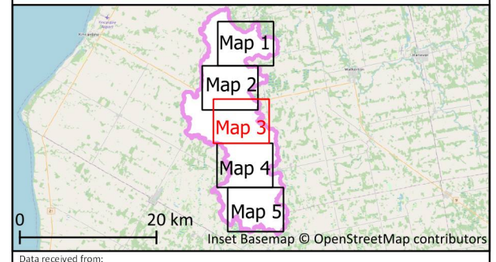
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:25,000

0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Noun Project — CC BY 3.0: "Eye" by Nicholas Menghini
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
January 19, 2024	Map ID: NWMO_BIS_A124d	

NWMO Biodiversity Impact Studies

Species of Interest Field Observations (Invasive): Vegetation - Map 4

Figure B-4e

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

See Figure B-4a for Full Legend

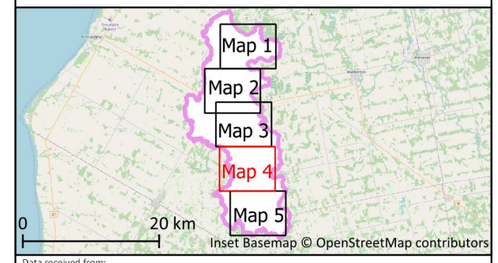
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

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ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Noun Project — CC BY 3.0: "Eye" by Nicholas Menghini
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
January 19, 2024	Map ID: NWMO_BIS_A124e	



Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 BASELINE REPORT (CHAPTER 3: WETLANDS AND RIPARIAN ENVIRONMENTS)

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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GLOSSARY AND ABBREVIATIONS

AHM	Aquatic Habitat Mapping
AOI	Area of Interest
BIS	Biodiversity Impact Studies
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approaches
BV	Biodiversity Value; The biotic environmental components that will be considered for study within the Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components.
Candidate SWH	Areas that meet the ELC ecosite code(s) and/or candidate habitat criteria outlined in the SWH ecoregional criteria schedules. For the purposes of the BIS, Zoetica has defined the following: *'Broad' candidate SWH* – ecosite codes that match criteria but are highly prevalent in the BIS study area(s) and have limited utility for informing subsequent baseline study design or the IA. Example: woodland raptor nesting habitat "may be found in all forested ELC Ecosites" (OMNRF 2017) but the defining criteria for the SWH are the nests themselves. '*Refined*' *candidate SWH* – areas that meet or partially meet additional habitat criteria and/or have records of selected wildlife species presence during the appropriate season (part of the defining criteria for the SWH). Certain rare vegetation communities are also automatically considered 'refined' candidate SWH when the ecosite criteria are met (e.g., cliff and cliff rim, talus slope, rock barren). 'Refined' candidate SWH will be prioritized for subsequent field studies to determine if the candidate SWH should be identified as confirmed SWH.
CNSC	Canadian Nuclear Safety Commission
DGR	Deep Geological Repository
ECCC	Environment and Climate Change Canada
Ecoregion	Second highest level of the ELC hierarchy (Crins et al. 2009). Large geographic areas primarily identified by sub-continental climatic regimes and bedrock geology.
Ecosite	The second lowest level of the ELC hierarchy. The land within an ecosite will generally contain similar substrate and vegetation.
Ecosite Classification Dataset	The dataset of ecosite classification created for the BIS using SWOOP 2020 Imagery
Ecosystem function	In the context of biodiversity, ecosystem functions include the physiochemical and biological processes that occur within the ecosystem to maintain biodiversity.
Ecosystem services	Ecosystem services are the direct and indirect benefits to human well-being that the natural environment provides through healthy ecosystems. Ecosystem services include provisioning services, such as the production of food and water; regulating services, such as the control of climate and disease; supporting services, such as nutrient cycles and oxygen production; and cultural services, such as spiritual and recreational benefits.

eDNA	Environmental DNA
ELC	Ecological Land Classification
EMBP	Environmental Media Baseline Program
GSWC	Greenock Swamp Wetland Complex
Habitat suitability / suitable habitat	The ability of the habitat, in its current condition, to provide the life requisites of a species.
IA	Impact Assessment
IAAC	Impact Assessment Agency of Canada
LSA	Local Study Area LSA_{ECO} = Local Study Area for ecosystem function and services LSA_{AQU} = Aquatic Local Study Area (fully encompassed by the LSA_{ECO})
Meta-analysis	Examination of data from several different studies to determine overall trends.
MNRF	Ontario Ministry of Natural Resources and Forestry
NWMO	Nuclear Waste Management Organization
OHN	Ontario Hydro Network
OWES	Ontario Wetland Evaluation System
PSW	Provincially Significant Wetland
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose traditional territories include the project location.
RSA	Regional Study Area RSA_{ECO} = Regional Study Area for ecosystem function and services
SARA	Federal *Species at Risk Act*
SARO	Species at Risk in Ontario
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SWH	Significant Wildlife Habitat; Defined in the Ontario Provincial Policy Statement, 2020 as: *Wildlife habitat* – areas where plants, animals, and other organisms live and find adequate food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas important to migratory and non-migratory species. *Significant* – regarding wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system

TEM	Terrestrial Ecosystem Mapping
The Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines. 'TISG Template' refers to the Tailored Impact Statement Guidelines Template (generic version) (IAAC 2022).
TWC	Teeswater Wetland Complex
VC	Valued Component. For impact assessments of designated projects under the *Impact Assessment Act*, the Agency's Glossary of Terms defines VCs as "environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties. Valued components may be identified as having scientific, biological, social, health, cultural, traditional, economic, historical, archaeological and/or aesthetic importance."

1.0 WETLANDS AND RIPARIAN ENVIRONMENTS

1.1 Introduction

Wetlands and riparian environments fulfill a wide range of ecological, hydrological, and biochemical functions, while supporting biodiversity. Wetlands are habitats at the interface between aquatic and terrestrial environments, and are considered natural heritage features in Ontario, which require protection and sustainable management (OMNR 2010). Wetlands include swamps, fens, marshes, bogs, sloughs, and peatlands and occur where the water table is at or near the surface (such as in areas surrounding watercourses and waterbodies). Riparian areas include wetlands and other vegetated areas next to waterbodies and watercourses. The Ontario Wetlands Evaluation System (OWES) assesses the value of wetlands based on their ecosystem and human utility values, and identifies particular valued wetlands at a provincial scale to be prioritized for protection. The OWES Manuals are divided into Southern and Northern Ontario, with the Adaptive Phased Management Project's (hereafter, 'the Project') Saugeen Ojibway Nation (SON)-South Bruce siting area falling within the southern Ontario region (MNRF 2013).

Wetlands and riparian habitat play important roles in supporting ecosystem function and services (see Chapter 9). Many wildlife species depend upon wetlands for various life-history phases and movement and migrations through connected, undisturbed habitat networks. Some species that rely on wetlands and riparian habitat are listed as at-risk under the federal *Species at Risk Act* (*SARA*) and the provincial Species at Risk in Ontario (SARO) schedule (e.g., birds, amphibians, insectivorous bats). In addition, wetlands and riparian habitats provide social benefits to humans, as they moderate storm flows and reduce flood risks, store water to counteract drought conditions in the dry season, improve water quality through natural filtration, provide erosion control, support species of social and cultural importance (e.g., fish), and contribute to outdoor recreational opportunities. Wetlands act as "carbon sinks" in Ontario, contribute to a stable long-term water supply as they serve as areas of groundwater recharge and discharge, and contribute to improved water quality by trapping sediments, removing excess nutrients, and degrading contaminants (OMNR 2010). Thus, the preservation of wetlands helps preserve many functions central to maintaining biodiversity and ecosystem function and services. Some of these benefits, such as water quality, are examined through the Environmental Media Baseline Program (EMBP) pillar of the Project (CanNorth 2021a). A further discussion on ecosystem function and services is provided in Chapter 9.

The Canadian Nuclear Safety Commission's (CNSC) *Guidance on Deep Geological Repository Site Characterization* requires that the aquatic and terrestrial environment be characterized as ecosystem components in the Area of Interest (AOI) (CNSC 2018). While this guidance document does not specifically identify the characterization of wetlands and riparian environments, these components fall within other ecosystem components (e.g., fish habitat, terrestrial habitat). In addition, the Tailored Impact Statement Guidelines (TISG) Template (generic version) ('TISG Template'[1]) includes guidance to characterize the project's effects on riparian and wetland environments (IAAC 2022). A full list of acts, regulations and other biodiversity considerations is available in Appendix E of the *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approaches* (BPPA) Report (Zoetica 2021).

[1] Please see Chapter 1 for limitations of and planned updates to the TISG Template. (IAAC 2022)

This Chapter 3 (Wetlands and Riparian Environments) provides an overview of wetland and riparian environments within the relevant Biodiversity Impact Studies (BIS) study areas (see Section 1.2.1). The function and value of ecosystems, including wetland and riparian ecosystems, are considered in Chapter 9 of the BIS Baseline Report. Information presented in the current Chapter 3 will be used to describe baseline ecosystem function and services in Chapter 9.

1.1.1 Objectives

The general objectives of wetland and riparian environment studies for the BIS are to:

1. Determine the presence, distribution, and abundance of wetland and riparian habitat within the relevant BIS study areas (see Section 3.0, Chapter 1) to meet the requirements of the TISG Template, including:
    a. Identifying any potentially rare or unique wetland types within the BIS study areas (see Section 1.2.1); and,
    b. Determining whether these wetlands are within a geographic area of Canada where wetland loss or degradation has reached critical levels;
2. Describe the wetland and riparian environments in the context of the biodiversity they support; and
3. Provide additional baseline data to inform the Project's biodiversity Impact Assessment (IA) and mitigation measures and to assist in the potential development of monitoring program(s) to address environmental, regulatory, and stakeholder/rights-holder concerns.

Zoetica recognizes that additional TISG requirements exist for Wetlands and Riparian Environments (see Appendix C of Zoetica's BPPA Report (Zoetica 2021)). Several of these requirements (e.g., related to hydrological function) are addressed through studies planned as part of the Environmental Media Baseline Program (EMBP) (CanNorth 2021b). Additional wetland function and value studies, including an OWES assessment, may also be conducted after site selection to address TISG Template requirements. The current Chapter 3 begins to fulfill the requirements of the TISG Template required for wetland and riparian environments.

1.2 Methods

1.2.1 Study Areas

The BIS study areas for wetland and riparian environments include the AOI, a local study area (LSA_{ECO}), and a regional study area for ecosystem function and services (RSA_{ECO}). See Section 3.0 in Chapter 1 for further detail on study areas. Potential effects of the Project on wetlands and riparian habitat are not anticipated to extend beyond the LSA_{ECO}. The RSA_{ECO} is included for studying wetland and riparian environments in order to capture habitat information relevant to biodiversity values (e.g., fish, birds, herpetofauna, and semi-aquatic mammals) that depend on these habitats and which may interact with the Project beyond the LSA_{ECO}. Further rationale for developing these study areas can be found in Zoetica's BPPA Report (Zoetica 2021).

Thus far, desk- and field-based work completed for Tier 1 baseline studies has been primarily focused within the LSA_{ECO}. Ecosites were classified and mapped for Tier 1 TEM work (see Section 1.2.3.1), but this

dataset did not extend to the boundaries of the RSA_{ECO} (see Appendix B, Chapter 1). Therefore, analyses involving ecosite data (e.g., to identify wetland types) are currently limited to the LSA_{ECO}.

1.2.2 Collation of Existing Data

Zoetica began desk-based investigations of wetland and riparian environments by delineating and identifying wetlands and aquatic habitat through the Ontario Hydro Network (OHN) database. In 2021, wetlands were delineated into specific wetland types (swamp, marsh, bog, fen) during desk-based terrestrial ecosite mapping exercises (see Section 1.2.3.1). Zoetica continued with desk-based research and mapping by collating existing data from government, citizen science, and other biodiversity databases.

Table 1-1. Spatial datasets and reports analyzed for wetland and riparian environments for the 2023 BIS Baseline Report.

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains relevant[1] data?
Ontario Ministry of Natural Resources and Forestry (MNRF)	OHN Watercourses	Shapefile	12/2019	Y
	OHN Waterbodies	Shapefile	12/2019	Y
	Wetlands	Shapefile	09/2020	Y

Notes:
1. Zoetica determined dataset relevance based on geographic and temporal relevance as well as relevance to wetland and riparian environments or species. For example, data that were not within the relevant BIS study areas, data that were too old to be considered relevant, or data that did not include records of wetland or aquatic species would have been labelled "N" for not containing relevant data.

1.2.3 Tier 1 Studies

Detailed methods for the Tier 1 studies outlined below are available in the *Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design* (BPD) Report and associated Standard Operating Procedures (SOPs) (Zoetica 2022).

1.2.3.1 Terrestrial Ecosystem Mapping

Terrestrial Ecosystem Mapping (TEM) work completed to date is described in Appendix B, Chapter 1. The ecosite classification dataset resulting from TEM work was used for desk-based delineation of various wetland types and in planning AHM surveys for collecting habitat information in wetlands. Ecosite mapping included only natural and naturalized areas, excluding anthropogenic areas like agriculture, roads, and dense development. The ecosite classification dataset was also used to identify candidate Significant Wildlife Habitat (SWH). Field contractors surveyed plots in 2022 to ground-truth ecosite identifications and investigate candidate SWH. Several SWHs are related to wetlands and/or riparian environments, and these are addressed with regards to wetland and riparian function (Sections 1.2.6.1 and 1.3.3.1) in this Chapter 3 of the BIS Baseline Report.

1.2.3.2 Aquatic Habitat Mapping

Aquatic Habitat Mapping (AHM) completed to date is described in Appendix D, Chapter 1. Relevant information was collected in watercourses, waterbodies, and wetlands to characterize habitat for fish and other aquatic and semi-aquatic biodiversity values (BVs), and to characterize riparian and aquatic vegetation. During the summer of 2022, field contractors conducted AHM surveys in various aquatic habitats within the AOI and the aquatic local study area (LSA_{AQU}), which comprises a large portion of and

is fully contained within the LSA_{ECO}. AHM surveys evaluated riparian habitat, including documenting riparian type (wetland, forest, shrubland, meadow), predominant riparian species observed, and riparian stage within three buffer distances from the aquatic habitat sites. Field contractors conducted AHM surveys of wetlands from July 13 to September 29, 2022, and found that most (88.75%) were too dry to sample. Thus, AHM data presented in this Chapter are limited and will be updated in future iterations of the BIS Baseline Report after additional Tier 1 AHM studies are conducted in 2024.

1.2.3.3 Environmental DNA Metabarcoding

Environmental DNA (eDNA) metabarcoding studies[2] completed to date are described in Appendix E, Chapter 1. Thus far, field contractors have conducted two rounds of eDNA studies: once in the summer and once in the fall of 2022. These studies were conducted in various aquatic habitats, including wetlands. These data can serve as a starting point for determining biodiversity within wetland and riparian habitats. The two vertebrate primers and the invertebrate primer used for eDNA studies were primarily intended to capture aquatic and semi-aquatic species such as fish, amphibians, turtles, and invertebrates, but also captured other vertebrate BVs that may use these aquatic environments (see Section 2.6 of the BPD Report (Zoetica 2022)).

1.2.4 Presence, Distribution, and Abundance of Wetlands in the BIS Study Areas

1.2.4.1 Wetland Classification and Extent

Wetlands in relevant BIS study areas were first characterized following desk-based methods described in Section 1.2.3.1. Wetland ecosites were mapped to identify predominant ecosites within relevant study areas and to determine if rare wetland ecosites were present within the AOI or LSA_{ECO}. In the summer of 2022, field campaigns commenced within the AOI and LSA_{ECO} to confirm ecosite classifications determined through desk-based mapping (see Appendix B, Chapter 1). Zoetica has received the 2022 field data and included it in this 2023 BIS Baseline Report. In addition to TEM studies, AHM studies (see Section 1.2.3.2 and Appendix D, Chapter 1) were conducted in a selection of wetland ecosite polygons to characterize aquatic features (e.g., vegetation) within these habitat types.

1.2.4.2 Provincially Significant Wetland Mapping

In addition to ecosite mapping, desk-based studies for wetlands included collating information on any Provincially Significant Wetlands (PSWs) that may occur in the AOI, LSA_{ECO}, and RSA_{ECO}. The MNRF Wetlands shapefile contains all wetlands that have been evaluated by the province, including the ones deemed provincially significant (MNRF 2020). PSWs are provincially protected wetlands that may require specialized mitigation. For example, they are typically given a 120 m riparian buffer (MNRF 2013).

1.2.5 Biodiversity in Wetland Environments

Tier 1 field studies in the summer of 2022 were aimed at characterizing wildlife habitat information within various terrestrial (through TEM studies; see Section 1.2.3.1) and aquatic habitats (through AHM studies; see Section 1.2.3.2). Aquatic and terrestrial vegetation species were recorded as part of TEM and AHM field surveys. In addition to habitat studies, eDNA studies in 2022 (see Section 1.2.3.3) included detections of vertebrate and invertebrate species in wetland habitats. Field contractors also recorded any incidental

[2] In all sections of this 2023 BIS Baseline Report, where eDNA studies and results are noted, they refer to the use of eDNA in combination with metabarcoding for multi-species identification.

observations of flora and fauna while in the field, which included aquatic and riparian vegetation (see **Table B-4**).

1.2.6 Presence, Distribution, and Abundance of Important Habitat

1.2.6.1 SWH Relevant to Wetland and Riparian Function

Wetlands are important for sustaining a high number of species, and a variety of SWHs are related to wetland and riparian habitats. AHM surveys of wetlands will provide information on wetland and riparian habitat quality and functioning. Zoetica used the SWH criteria outlined in the Significant Wildlife Habitat Criteria Schedule for Ecoregion 6E (OMNRF 2015) to summarize SWH related to wetland and riparian environments that support various BVs (see Appendix C, Chapter 1 for more information on SWH).

1.2.7 Additional Baseline Data Collection to Inform the IA

1.2.7.1 Riparian Buffers

Watercourses, waterbodies, and wetlands are aquatic features typically afforded protective buffers based on standard mitigation practices (Environment Canada 2013). Wetlands of provincial significance often receive a buffer 120 m wide (MNRF 2013). The minimum riparian buffer width recommended by Environment and Climate Change Canada (ECCC) for watercourses and waterbodies is 30 m (Environment Canada 2013).

In a meta-analysis of buffer sizes to protect water quality, habitat, and organisms, Sweeney and Newbold (2014) found that a minimum of 30 m of riparian vegetation, ideally treed, was needed. This buffer width would protect small watercourses from harmful temperature fluctuations that could affect the ability of aquatic habitat to host fish and other aquatic organisms with specific thermal tolerances. Numerous other reports included in the meta-analysis recommended riparian buffers of 30 m or larger (Erman et al. 1977, Newbold et al. 1980, Wenger 1999, Mayer et al. 2007, Rykken et al. 2007, Richardson et al. 2012). In a review of the effects of climate change on the ability of watercourses and waterbodies to support fish, vegetation buffers of 15 m provided partial but vital functionality and were ranked as very highly important (Zoetica and LFFA 2020). Riparian buffer widths between 15 and 30 m provided temperature stability and supported fish communities in streams and were ranked as highly important (Zoetica and LFFA 2020). Riparian buffer widths of up to 100 m provided moderate to complete functionality for habitat and ecosystem services and were ranked as moderately important (Zoetica and LFFA 2020). Areas greater than 100 m benefitted watercourses and waterbodies by enhancing protection against increased sediment runoff and nitrate removal, but were deemed to have less of a role in watercourse resilience against climate change (Zoetica and LFFA 2020). For the BIS, Zoetica buffered PSWs using the legally required 120 m riparian buffer. Riparian buffers surrounding non-PSW aquatic habitats were mapped at three levels: 15, 30, and 100 m corresponding to the buffer zones deemed to have moderate to very high importance in providing resilience to climate change (see **Figure D-3**). Comparing the habitats within these buffers can help inform which areas should be considered most important to avoid disturbing.

For the purposes of mapping, all wet areas (wetlands, waterbodies, and watercourses) were grouped together (represented as light blue) and buffers were applied around the outer extent of the wet areas. Waterbodies were outlined in dark blue and labelled when feasible. PSW outlines were drawn around evaluated wetlands that were deemed provincially significant in the Wetlands database (MNRF 2020), but desk-based ecosite delineations done for the BIS revealed additional wetlands around the edges of these

polygons in several places. Therefore, the PSW buffer is interrupted by wetlands in several places (**Figure D-3**).

1.3 Results

1.3.1 Presence, Distribution, and Abundance of Wetlands in the BIS Study Areas

1.3.1.1 Wetland Classification and Extent

Zoetica classified ecosites within natural and naturalized areas of the BIS study areas to determine the presence of any rare or unique wetland ecosites. A detailed breakdown of wetland ecosite classification and distribution within the BIS aquatic study areas is presented in Appendix B, Chapter 1. This section summarizes the major wetland types (marsh, swamp, fen) within the mapped areas of the relevant study areas. The total areas and proportions of each wetland type found in each study area are reported in **Table 1-2**. These data are based on desk-based ecosite classification followed by field surveys in 2022 to ground-truth the classifications. Wetland habitat types within the AOI are presented in **Figure D-1**a, and those in the LSA_{ECO} are presented in **Figure D-1**b and c. Most ecosite code updates from field data did not alter the broader category of ecosite (e.g., "hardwood swamp"; see Appendix B, Chapter 1 for further explanation) and so updated figures presented in this report do not differ strongly from the 2022 iteration of the BIS Baseline Report.

Swamp habitat was the most dominant wetland type in all study areas, with most swamps in both the AOI and LSA_{ECO} classified as hardwood swamp followed by mixedwood swamp. In the AOI, conifer swamp was next most abundant, followed by shrub swamp. In the LSA_{ECO}, shrub swamp was marginally more abundant than conifer swamp, but each covered < 1% of the LSA_{ECO} (**Table 1-2**). Swamp habitat was distributed evenly within the AOI except within the southeastern portion, where only a small amount of wetland habitat exists (**Figure D-1**a). The northwestern quadrat of the AOI included conifer, mixedwood, hardwood, and shrub swamp habitat. The northeastern quadrat included mixedwood and hardwood swamp, with a small area of conifer swamp. The southern half of the AOI included conifer and hardwood swamp, with one small area of mixedwood swamp. In the northern portion of the LSA_{ECO}, swamp habitat was consolidated primarily within the Greenock Swamp Wetland Complex (GSWC). Swamp in this area was mainly hardwood swamp, with larger consolidated polygons of mixedwood swamp on the central and eastern side of the GSWC (**Figure D-1**b). In the southern portion of the LSA_{ECO}, swamp habitat occurred in smaller patches than in the northern LSA_{ECO}, and was distributed fairly evenly on the western side where wetlands were more prevalent, likely due to the presence of the Teeswater Wetland Complex (TWC; **Figure D-1**c).

Marsh habitat represented < 3.2% of the area in both the AOI and the LSA_{ECO} (**Table 1-2**). Within the AOI, marsh habitat primarily occurred along sections of the Teeswater River with smaller polygons mapped on tributaries in the western and northern AOI (**Figure D-1**a). In the northern LSA_{ECO}, most marsh habitat was around or near lakes, except for one relatively large marsh surrounded by hardwood swamp in the GSWC just north of Highway 9. Marsh occurred around Schmidt and Cunningham Lakes and in a few polygons east of Schmidt Lake and southwest and southeast of Cunningham Lake. Additional marsh habitat was mapped around Silver and Clam Lakes, and small polygons occurred northwest and northeast of McGlinn

Lake and along the Teeswater River closer to the AOI (**Figure D-1**b). In the southern LSA_{ECO}, marsh habitat occurred primarily on Alps Creek, the Teeswater River, and other small unnamed tributaries (**Figure D-1**c).

No fen habitat was mapped within the AOI, and <0.1% of the LSA_{ECO} contained fen wetland (**Table 1-2**) in a small area north of the AOI and south of McGlinn Lake (**Figure D-1**b). No fen sites were field surveyed in 2022. No bog habitat occurred in the AOI or LSA_{ECO}.

Table 1-2. Area and proportion of each wetland type within the AOI and LSA_{ECO}.

Study Areas		Conifer Swamp		Hardwood Swamp		Mixedwood Swamp		Shrub Swamp		Marsh		Fen	
	(ha)	(ha)	(%)[1]	(ha)	(%)[1]	(ha)	(%)[1]	(ha)	(%)[1]	(ha)	(%)[1]	(ha)	(%)[1]
AOI	1,827.41	26.27	1.44	72.11	3.95	55.65	3.05	20.23	1.11	56.91	3.11	-	-
LSA_{ECO}	27,879.5	239.25	0.86	5022.63	18.02	1927.29	6.91	245.49	0.88	388.16	1.39	17.90	< 0.1

Notes:
Area and proportion of wetland ecosite type are calculated using the ecosite classification dataset updated with field ecosite verification for 26.4% of wetland sites in 2022. See Appendix B, Chapter 1 for further details on the ecosite classification dataset.
Wetlands within the RSA_{ECO} were not calculated as ecosystem classification was not conducted within this area. If the SON-South Bruce site is selected, the RSA_{ECO} may be mapped in future years.
[1] Percentages are the percent of the total area of the study area that is covered by the ecosite. Notably, the entirety of the study areas are not mapped in the ecosite classification dataset.

Zoetica briefly reviewed available desk-based data to determine whether wetlands in the BIS study areas are in an area where wetland loss or degradation has reached critical levels. Wetland decline in Ontario has been most severe in the southwestern region (Ducks Unlimited Canada 2010). Thus, it is likely that southwestern Ontario, and thus the SON-South Bruce siting area, is considered a region within Canada where wetland loss or degradation has reached critical levels.

1.3.1.2 Provincially Significant Wetlands

The MNRF's Wetlands dataset (accessed via Ontario GeoHub) revealed several PSWs within the AOI, LSA_{ECO}, and RSA_{ECO} (MNRF 2020). Portions of the GSWC (140.9 ha) and the TWC (33.7 ha) occur in the northern and southern sections of the AOI, respectively (**Figure D-2**a). Together, these features represent approximately 9.6% of the area of the AOI. In the LSA_{ECO}, the major contiguous areas of the GSWC, representing 8,055 ha of the Complex, are contained in the northern part of the LSA_{ECO}. The TWC is contained in the southern portion of the LSA_{ECO} (**Figure D-2**). In addition, portions of the Wingham Wetland Complex (135.4 ha) occur in the southern LSA_{ECO}, the Kinloss Creek Wetland Complex (47.0 ha total) occurs along the western side of the LSA_{ECO}, and Chepstow Swamp Wetland Complex (13.6 ha total) occurs in the northeastern portion of the LSA_{ECO} (**Figure D-2**). All PSW areas represent approximately 33.0% of the LSA_{ECO} (see **Table 1-3**). Seventeen PSWs are fully or partially contained within RSA_{ECO} (see **Table 1-3**; **Figure D-2**b) and represent approximately 8.7% of the RSA_{ECO}. **Table 1-3** presents a breakdown of the area of each PSW contained within the RSA_{ECO}.

Table 1-3. Provincially Significant Wetlands partially or fully contained within the AOI, LSA_{ECO} and RSA_{ECO}, and the percentages of each study area covered by each PSW.

		AOI		LSA_{ECO}		RSA_{ECO}	
	Area	1,827.4 ha		27,879.5 ha		186,892.6 ha	
PSW	(ha)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Greenock Swamp Wetland Complex	8,916.6	140.9	7.7	8,055.0	28.9	8,916.6	4.8
Teeswater Wetland Complex	977.1	33.7	1.8	961.3	3.4	977.1	0.5
Wingham Wetland Complex	724.4	-	-	135.4	0.5	724.4	0.4
Kinloss Creek	786.0	-	-	47.0	0.2	786.0	0.4
Chepstow Swamp	314.3	-	-	13.6	0.0	314.3	0.2
Saratoga Wetland Complex	2,031.7	-	-	-	-	837.5	0.4
Dickies Creek Wetland Complex	808.1	-	-	-	-	808.1	0.4
Howick Bog	606.2	-	-	-	-	606.2	0.3
Bluevale Wetland Complex	443.0	-	-	-	-	443.0	0.2
Wroxeter Wetland Complex	1,168.6	-	-	-	-	369.6	0.2
St Augustine Wetland Complex	470.6	-	-	-	-	393.2	0.2
Anderson Creek Wetland Complex	326.8	-	-	-	-	326.8	0.2
St Helens Wetland Complex	198.2	-	-	-	-	198.2	0.1
Sangs Creek	187.6	-	-	-	-	184.5	0.1
Otter Creek	155.3	-	-	-	-	155.3	0.1
Lakelet Lake Wetland Complex	750.0	-	-	-	-	120.4	0.1
Edengrove Wetland Complex	110.0	-	-	-	-	10.0	0.0
Total	**18,974.5**	**174.6**	**9.6**	**9,212.2**	**33.0**	**16,171.2**	**8.7**

Notes: Totals are calculated from numbers with additional decimal points; whereas numbers reported in table are rounded to one decimal place. This accounts for any minor differences between the sums of values in table and the 'Total' sums reported.

1.3.2 Biodiversity in Wetland Environments

Tier 1 field studies in the summer of 2022 included the collection of aquatic and riparian vegetation observations during AHM (see Appendix D, Chapter 1) and TEM (see Appendix B, Chapter 1) field surveys, and the detection of vertebrate and invertebrate species via eDNA surveys (see Appendix E, Chapter 1). During AHM surveys, field contractors recorded a total of 17 aquatic vegetation taxa (species or genus), including five taxa of submergent, three taxa of floating, and nine taxa of emergent aquatic vegetation, in wetlands in the BIS aquatic study areas (see Table B-1).

eDNA surveys were unevenly distributed across the study areas and seasons, and so numbers of species detections cannot reliably be compared across study areas or seasons. In the AOI, eDNA studies detected 14 vertebrate species in wetlands in the summer, including five mammal, two amphibian, four bird, and three fish species. In the fall, eDNA surveys detected nine vertebrate species in the AOI, including three mammal, one amphibian, two bird, and three fish species. Summer eDNA studies in the LSA_{ECO} (outside the AOI) detected 13 vertebrate species in wetlands,, including two mammal, no amphibian, one bird, and ten fish species. Fall eDNA studies conducted in the LSA_{ECO} detected 13 vertebrate species in wetlands, including six mammal, no amphibian, seven bird, and no fish species (see **Table B-2**).

In the AOI, eDNA studies detected 51 invertebrate species in wetlands in the summer, and 43 in the fall. In the LSA_{ECO}, eDNA studies detected 34 invertebrate species in wetlands in the summer and 152 in the fall (**Table B-3**). See **Table B-2** and **Table B-3** for vertebrate and invertebrate species detected in wetlands, respectively. See Appendix E, Chapter 1 for a full breakdown of species detected via eDNA metabarcoding in various wetlands.

Table 1-4. eDNA species detections in wetlands in summer and fall 2022.

Study Area	Wetland type	Taxon	Number of species
AOI	Swamp	Mammal	4
AOI	Marsh	Mammal	4
AOI total unique species		Mammal	6
LSA_{ECO}	Swamp	Mammal	6
LSA_{ECO}	Marsh	Mammal	4
LSA_{ECO} total unique species		Mammal	6
AOI	Swamp	Amphibian	1
AOI	Marsh	Amphibian	2
AOI total unique species		Amphibian	2
LSA_{ECO}	Swamp	Amphibian	0
LSA_{ECO}	Marsh	Amphibian	0
LSA_{ECO} total unique species		Amphibian	0
AOI	Swamp	Bird	4
AOI	Marsh	Bird	3
AOI total unique species		Bird	5
LSA_{ECO}	Swamp	Bird	7
LSA_{ECO}	Marsh	Bird	1
LSA_{ECO} total unique species		Bird	7
AOI	Swamp	Fish	4
AOI	Marsh	Fish	4
AOI total unique species		Fish	4
LSA_{ECO}	Swamp	Fish	3
LSA_{ECO}	Marsh	Fish	9
LSA_{ECO} total unique species		Fish	10
AOI	Swamp	Invertebrate	36
AOI	Marsh	Invertebrate	49
AOI total unique species		Invertebrate	80
LSA_{ECO}	Swamp	Invertebrate	105
LSA_{ECO}	Marsh	Invertebrate	85
LSA_{ECO} total unique species		Invertebrate	168

Note:
Sample sizes among study areas and wetland types were uneven, so numbers of species detections should not be directly compared.

During AHM, TEM, and eDNA field surveys, contractors recorded any incidental observations of vegetation and animal species, which included several species that live in or near wetlands and riparian environments, or rely on them for a stage of their life history. In 2022, there were incidental observations of 27 taxa of aquatic vegetation (see **Table B-4**), four species of semi-aquatic mammals (see Chapter 4),

ten species of amphibians (see Chapter 5), seven species of waterbirds (see Chapter 7), 12 taxa of fish, two taxa of semi-aquatic invertebrates, and two taxa of aquatic invertebrates (see Chapter 8).

1.3.2.1 Species of Conservation Concern

Riparian tree black ash (Endangered) was detected in desk-based data, TEM surveys in the field, and incidentally by field contractors within the AOI and LSA_{ECO}. Black ash is discussed in more detail in Chapter 2, but dieback of black ash due to emerald ash borer may have significant impacts on wetlands, as it could cause higher water tables, increased potential for flooding, and altered soil nitrogen and carbon cycling (Kolka et al. 2018). Facultative wetland species green dragon (Special Concern, S3) was incidentally observed by field contractors in 2022 at two sites in the LSA_{ECO} south of the AOI (see Chapter 2). Growing in moist deciduous forests and floodplains, often along rivers or creeks, green dragon is threatened by habitat loss and degradation (Donley et al. 2013). Aquatic plant Hill's pondweed (Special Concern[3], S2S3) was detected in desk-based data at one site in the GSWC in the northern LSA_{ECO} (see Chapter 2). In southwestern Ontario, this species' habitat may be impacted by decreased water quality from cottages or abundant introduced curly-leaved pondweed (Parks Canada Agency 2014). Curly-leaved pondweed was detected in AHM surveys at a waterbody in the RSA_{AQU} (Cargill Mill Pond), but not within the AOI or LSA_{ECO} thus far (see Chapter 2).

1.3.3 Presence, Distribution, and Abundance of Important Habitat

1.3.3.1 SWH Relevant to Wetland and Riparian Function

Wetland and riparian environments can provide SWH for a variety of biodiversity values (see Appendix C, Chapter 1). Ecoregion 6E, where the SON-South Bruce siting area is located, contains 25 SWHs that are related to wetland and riparian environments. Candidate SWH in the BIS study areas, including those related to wetland and riparian environments, are examined in each respective BV chapter. Zoetica used ecosite information and field surveys to identify candidate and confirmed SWH in the BIS study areas; these findings are presented in Appendix C, Chapter 1. Of the 25 SWH supported by wetland and riparian habitats, 20 have candidate SWH and three (Seeps and Springs, Terrestrial Crayfish, and Deer Winter Congregation Areas) have areas that meet the criteria for confirmed SWH for BVs presented in the 2023 BIS Baseline Report (**Table 1-5**).

During AHM surveys in 2022, 81 wetlands were visited but only ten contained water and thus were sampleable. Sampled wetlands were three marshes and two swamps in the AOI, and five swamps in the LSA_{ECO}. Therefore, information on wetland quality and function is currently limited, but will be expanded in future iterations of the BIS Baseline Report as more field data is collected.

[3] For the purposes of this BIS Baseline Report chapter, conservation statuses described in text for at-risk species refer to their Species at Risk in Ontario (SARO) listings unless otherwise indicated. Conservation statuses are from the NHIC's Ontario species list, current to March 1, 2023, and updated for any discrepancies with provincial and federal SAR listings up to August 15, 2023. As such, species and status listings may differ from those presented in Zoetica's 2021 BPPA Report (Zoetica 2021)

Table 1-5. SWH related to wetland and riparian environments and associated biodiversity value(s) they support.

Significant Wildlife Habitat (Ecoregion 6E)	Biodiversity Value and Chapter	Candidate SWH detected in BV Study Areas?
Special Concern and Rare Wildlife Species	All wildlife chapters	Y
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Birds; Chapter 7	Y
Colonially-Nesting Bird Breeding Habitat (Ground)	Birds; Chapter 7	Y
Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)	Birds; Chapter 7	Y
Marsh Breeding Bird Habitat	Birds; Chapter 7	Y
Raptor Wintering Area	Birds; Chapter 7	Y
Shorebird Migratory Stopover Area	Birds; Chapter 7	Y
Waterfowl Nesting Area	Birds; Chapter 7	Y
Waterfowl Stopover and Staging Areas (Aquatic)	Birds; Chapter 7	Y
Amphibian Breeding Habitat (Wetlands)	Herpetofauna; Chapter 5	Y
Amphibian Breeding Habitat (Woodland)	Herpetofauna; Chapter 5	Y
Amphibian Movement Corridors	Herpetofauna; Chapter 5	Y
Reptile Hibernaculum	Herpetofauna; Chapter 5	Y
Turtle Nesting Areas	Herpetofauna; Chapter 5	Y
Turtle Wintering Areas	Herpetofauna; Chapter 5	Y
Seeps and Springs	Mammals; Chapter 4	Y
	Herpetofauna; Chapter 5	Y
	Birds; Chapter 7	Y
Terrestrial Crayfish	Fish and Fish Habitat: Chapter 8	Y
Other Rare Vegetation Communities	Vegetation; Chapter 2	-
Woodland Area-Sensitive Bird Breeding Habitat	Birds; Chapter 7	Y
Woodland Raptor Nesting Habitat	Birds; Chapter 7	Y
Bat Maternity Colonies	Mammals; Chapter 4	Y
Deer Movement Corridors	Mammals; Chapter 4	TBD
Deer Winter Congregation Areas	Mammals; Chapter 4	Y
Deer Yarding Areas	Mammals; Chapter 4	Y
Old Growth Forest	Vegetation; Chapter 2	Y

1.3.4 Additional Baseline Data Collection to Inform the IA

1.3.4.1 Riparian Buffers

The required 120 m buffers around PSWs covered approximately 15% of the AOI and 16% of the LSA_{ECO} (see **Table 1-6**). Buffering non-PSW watercourses, waterbodies, and wetlands using the provincially recommended 30 m riparian buffers resulted in classifying approximately 13% of the AOI and 12% of the LSA_{ECO} as area that directly contributes to the health of existing aquatic habitats. Using other buffer distances described in Section 1.2.7.1 resulted in areas ranging from approximately 6–38% of the study areas that may contribute to the health of the existing aquatic habitats (see **Table 1-6**). Wetlands that lack

provincial designation but are adjacent to PSWs are likely still ecologically important and may be awarded a 100 m buffer.

Table 1-6. Area and proportion of each buffer width surrounding aquatic habitat within the AOI and LSA_{ECO}.

Study Area		Non-PSW Buffers						PSW Buffers[1]			
		0 - 15 m		0 - 30 m		0 - 100 m		0 - 120 m		> 100 m	
Name	ha	ha	%	ha	%	ha	%	ha	%	ha	%
AOI	1,827	126.4	6.9%	243.7	13.3%	691.0	37.8%	268.5	14.7%	35.5	1.9%
LSA_{ECO}	27,879	1691.5	6.1%	3218.4	11.5%	8509.1	30.5%	4381.7	15.7%	1088.0	3.9%

Notes:
Data reported for each buffer width and study area are inclusive of all areas within those buffers or study areas, including smaller nested buffers or study areas. For example, the 30 m buffer of the LSA_{ECO} includes the 15 m buffer of the LSA_{ECO}, and all riparian buffers within the AOI.
[1] Column "> 100 m" indicates the area of the PSW buffer that is beyond the largest non-PSW buffer (100 m). This represents the additional area afforded protection by the PSW buffer regulations.

Figure D-3 depicts the riparian buffer width distances applied to wetlands, watercourses, and waterbodies within the AOI and LSA_{ECO}. Within the AOI, buffered riparian areas often connect wetlands, watercourses, and waterbodies (see **Figure D-3**a). Particularly for the 100 m non-PSW or 120 m PSW buffers, the edges of the buffers frequently overlap one another so that the land between two wetlands would be protected. These areas are more important in maintaining the health of the aquatic habitats they surround relative to other areas in the AOI. There are also several areas that lack any wetland, watercourse, waterbody, or buffer, primarily in the AOI's central, eastern, and southeastern portions. Within the LSA_{ECO}, PSWs and their buffers represent a vast proportion of the study area. They are oriented in a north-to-south alignment throughout the study area, and are mainly absent in the northwest and southeast areas of the LSA_{ECO} (see **Figure D-3**b and c). The provincially significant GSWC in the northern LSA_{ECO} and TWC in the southern LSA_{ECO} represent a large overall proportion of the LSA_{ECO}. Additional buffer areas within the LSA_{ECO} primarily represent riparian areas surrounding watercourses and waterbodies that drain into the GSWC and the TWC (**Figure D-3**).

During AHM surveys conducted within the BIS aquatic study areas in the summer of 2022 (see Appendix D, Chapter 1), riparian habitat was recorded within three riparian zones at each watercourse and waterbody visited. The two swamps that field teams surveyed south of the AOI were surrounded by mature forest and abundant riparian vegetation. The three swamps north of the AOI were surrounded by young or mature forest and abundant riparian vegetation. Streams and tributaries in the AOI occurred mainly in wetland and deciduous forest areas in the northern portion, and in agricultural landscapes in the central and southern portions (see Table B-4 in Appendix D, Chapter 1). Field teams surveyed two waterbodies in the AOI, which both had primarily vegetated shorelines adjacent to wetlands. Habitat around waterbodies surveyed in the LSA_{ECO} outside the AOI varied among wetlands and forests, with some grass/lawn and croplands (see Table C-3a in Appendix D, Chapter 1).

In addition to these data from AHM surveys, the ecosite classification dataset can provide information on habitats within the riparian zones (see **Table C-1**; **Figure D-4**; **Figure D-5**). However, the ecosite classification dataset only covers natural and naturalized areas within the BIS study areas, excluding anthropogenic lands. Zoetica mapped ecosites in the PSW (**Figure D-5**) and non-PSW (**Figure D-4**) buffers separately, due to overlap of buffers. Within the mapped area of the AOI, hardwood forest was the most

common ecosite within the non-PSW and PSW riparian buffers, followed by mixedwood forest (**Table C-1**). Both of these forest types were distributed fairly evenly throughout the mapped areas of non-PSW buffers within the AOI, and were present within all four quadrats. In the PSW buffers, hardwood forest was present around the southern end of the GSWC that protrudes into the AOI and the northern end of the TWC that enters the southern AOI. Mixedwood forest was well-represented in PSW buffers around the GSWC, but only in two small areas around the TWC in the AOI. Conifer forest was the next most abundant in non-PSW buffers, with a large patch in the far west of the AOI, and some smaller patches in the north, east, and southwest. Conifer forests were not as abundant in the PSW buffers (less abundant than meadows and plantations), and were only present in a few small patches around the GSWC and TWC. Meadows were the fourth most abundant in non-PSW buffers, largely concentrated in the north-central AOI with two smaller patches in the southwest and far west. In PSW buffers, meadows were present in larger patches around both the GSWC and TWC in the AOI. There were plantation ecosites in non-PSW buffers in the northwest and east-central AOI, and shrub ecosites in the west-central AOI along the Teeswater River. In PSW buffers, plantations occurred in the northwest around the GSWC and in the far south around the TWC, and shrub occurred in the same small patch as in non-PSW buffers on the Teeswater River around the GSWC. PSW buffers also included some wetlands; there were patches of hardwood swamp and mixedwood swamp around the GSWC, patches of marsh and conifer swamp around both the GSWC and TWC, and a couple patches of shrub swamp around the GSWC. Across the three non-PSW buffer widths, the ecosite type most often stayed the same for a given piece of shoreline. However, there were some regions, particularly in the western AOI, where the ecosite changed from one forest type to another between the 15-30 m buffers and the broader 100 m buffer. There were also some finer-scale ecosite changes in the northeastern quadrat of the AOI and in one area in the southwest, where riparian areas changed between meadow and different types of forest across the different buffer widths.

Within the broader LSA_{ECO}, hardwood forest was the most common ecosite in non-PSW and PSW riparian buffers (**Table C-1**). Based on visual inspection of the non-PSW buffer map, hardwood forest was dominant in the LSA_{ECO} north of the AOI, and common in the LSA_{ECO} south of the AOI but not as dominant (**Figure D-4**). The Teeswater River north of the AOI was mostly buffered by hardwood forest. Within PSW buffers, hardwood forest was more continuously distributed throughout the north and south LSA_{ECO} (**Figure D-5**). Mixedwood forest was the second most abundant ecosite within the non-PSW and PSW riparian buffers of the LSA_{ECO}, and occurred fairly evenly throughout the study area in both buffer types. Conifer forest, the third most abundant ecosite, was most common in the LSA_{ECO} south of the AOI, largely within the TWC, for both buffer types. Meadows were fourth most common in non-PSW buffers and occurred scattered throughout the LSA_{ECO}. Across both buffer types, there were meadow ecosites in the southeastern corner of the LSA_{ECO}, in small patches in the TWC, in the GSWC north and west of Cunningham Lake, and in a larger patch northwest of the AOI near Clam Lake. Plantations were also scattered throughout the LSA_{ECO}, particularly around the GSWC north of the AOI and within the TWC south of the AOI. Shrubland occurred in non-PSW and PSW buffers south of Cunningham Lake in the GSWC and in one small area in the central TWC along Alps Creek. In non-PSW buffers, there was a small area of field in the northeastern LSA_{ECO}. In PSW buffers, hardwood swamp was most common north of the AOI around the GSWC and Chepstow Swamp, while mixedwood swamp was more common south of the AOI in the TWC and in the southern GSWC. Marsh was fairly evenly distributed throughout the LSA_{ECO} in PSW buffers. Shrub swamp was present in buffers around the southern and central GSWC and in some patches around the TWC. Conifer swamp was present in small patches around the TWC, and around the GSWC in small

patches north of McFarlane Lake and east of Silver Lake. There was a fen ecosite just north of the AOI around the GSWC, which was a rarer ecosite on the landscape (see Appendix B, Chapter 1).

Overall in the LSA_{ECO} (inclusive of the AOI), hardwood forest was the most dominant ecosite in the non-PSW and PSW riparian buffer areas (**Table C-1**). Mixedwood forest was second most abundant in the non-PSW buffers but conifer forest was second most abundant in the PSW buffers, and vice versa for the third most abundant ecosites. Meadows were the next most abundant, followed by plantations, then shrubland and fields. Watercourse, waterbody, and wetland ecosites were not represented within the non-PSW riparian buffers because they were included within the riparian areas that the buffers are drawn around. There were some wetland ecosites within the PSW buffers due to differences between the Wetlands dataset and the ecosite classification dataset, but these represented only 0.1-0.2% of PSW buffer space. Thus, natural forest ecosites covered most of the mapped riparian buffers within the BIS study areas. Anthropogenic meadows, plantations, and fields constituted a total of only 2.5% of the non-PSW and 2.1% of the PSW riparian buffer areas. Overall, the recommended 30 m non-PSW buffers, coupled with the area of the wetlands they are buffering, constitute 27.4% of the AOI and 40.7% of the LSA_{ECO}. The PSWs and their 120 m buffers covered 24.2% and 48.8% of the AOI and LSA_{ECO}, respectively, which includes areas also covered by the non-PSW buffers. Additional years of data will improve descriptions of the quality of riparian habitat at surveyed sites within the LSA_{ECO} and will be presented in future iterations of the BIS Baseline Report.

1.4 Discussion

The current Chapter 3 of the 2023 BIS Baseline Report focussed on desk and field-based analyses of wetland and riparian habitat data within the BIS aquatic study areas. Additional years of relevant information collected during fieldwork conducted as part of TEM, AHM, and eDNA metabarcoding studies will be incorporated into future iterations of the BIS Baseline Report once Zoetica receives these data.

1.4.1 Presence, Distribution, and Abundance of Wetlands in the BIS Study Areas

Currently, information about the presence, distribution, and abundance of wetlands and riparian environments is based on a desk-based analysis of ecosites in the AOI and LSA_{ECO} followed by field-based ground-truthing for some sites during TEM surveys. Locations of PSWs within the AOI, LSA_{ECO} and RSA_{ECO} are determined by the Ontario MNRF (MNRF 2020). Zoetica may conduct additional desk-based TEM mapping in the RSA_{ECO} in future years if the SON-South Bruce siting area is selected.

No fens were field surveyed in 2022 to verify ecosite classification, but desk-based TEM mapping revealed that wetland fens were rare on the landscape, occurring only in a small area within the LSA_{ECO} north of the AOI and not present within the AOI. In addition, no bog wetlands were mapped within the AOI or LSA_{ECO}. Thus, peatland wetlands (fen and bogs) are rare within the SON-South Bruce siting area. A higher relative percent (by area) of marshes were present in the AOI relative to the LSA_{ECO} (**Table 1-2**) and were predominantly located around watercourses in both study areas (**Figure D-1**). Marshes naturally contain more open water than other wetland types; thus, they may also naturally contain more aquatic species. In the AOI and southern portion of the LSA_{ECO}, swamp habitat was relatively evenly distributed on the landscape, except for regions on the eastern side of these study areas (**Figure D-1**). However, in the northern portion of the LSA_{ECO}, swamp habitat occurred in more consolidated polygons within the GSWC.

This is likely because the GSWC, as a PSW, is protected from further fragmentation moreso than other areas within the AOI and the southern $LSA_{ECO,}$ where more agricultural areas are located. Field verification of ecosite classifications altered the amount of area covered by different wetland types in the AOI and LSA_{ECO}. Most notably, the amount of shrub swamp in the AOI increased from 7.4 ha in desk-based mapping (see Table C-1 in Appendix B, Chapter 1) to 20.2 ha after field surveys (**Table 1-2**). Field surveys also increased the amount of conifer swamp in the AOI and the amount of hardwood swamp and shrub swamp in the LSA_{ECO}. After field truthing, coverage by conifer swamp declined in the LSA_{ECO}, hardwood swamp declined in the AOI, and mixedwood swamp and marsh declined in both the AOI and LSA_{ECO}.

Desk-based searches of existing literature revealed 17 PSWs either fully or partially contained within the RSA_{ECO}, of which five were fully or partially contained within the LSA_{ECO}, and two (GSWC and TWC) were partially contained within the AOI (**Table 1-3**). According to the OHN Watercourses dataset, water from the TWC flows north and into the Teeswater River within the AOI, where it exits the northern AOI and flows through the southeastern side of the GSWC. Thus, the TWC is unlikely to be affected by water flow within the AOI. While waters from the AOI flow into the Teeswater River and exit the AOI in the north, waters from the GSWC generally flow towards the Teeswater River during most months. Waters from the Teeswater River may interact with waters contained within the GSWC during high-flow periods. However, more information from field studies is required to verify this assumption.

1.4.2 Biodiversity in Wetland Environments

To date, no desk-based information on biodiversity in wetland environments exists within searched datasets. In the summer of 2022, Tier 1 field surveys were conducted for TEM, AHM and eDNA in various aquatic habitats, including wetlands. Aquatic and riparian vegetation detected in AHM surveys included 17 taxa from 12 families (Table B-1). eDNA surveys detected several species that depend upon wetland and riparian environments, including herpetofauna, waterbirds, vegetation, and invertebrates (see **Table 1-4**). Incidental observations by field crews also included biodiversity that relies on wetlands and riparian environments. Additional years of Tier 1 data collection will allow for a more fulsome characterization of biodiversity in wetland environments, which will be discussed in this section in future iterations of the BIS Baseline Report.

1.4.3 Wetland and Riparian Function

This Chapter addressed wetland and riparian function as it pertains to the maintenance of biodiversity. To date, desk-based Tier 1 studies conducted for the BIS have revealed that wetland and riparian environments can contribute to at least 25 different SWHs within the SON-South Bruce siting area, of which 23 have been determined to be Candidate or Confirmed SWH in study areas relevant to the BVs they support. This finding demonstrates the diversity of habitats that wetlands and riparian environments provide for wildlife BVs. Thus, it is likely that wetlands (especially marshes and swamps) support a high richness of species in the SON-South Bruce siting area.

In addition to supporting SWH for biodiversity values, wetlands and riparian habitats provide numerous benefits to biodiversity. Riparian areas provide habitat and migratory travel corridors for various species that depend on the interface between land and water. These habitats often represent the longest and least impacted connected green corridors (e.g., used as travel corridors for wildlife), as riparian vegetation is often afforded more protection relative to upland vegetation and thus has undergone less disturbance and fragmentation. In addition, vegetation in the riparian zone can provide canopy cover (i.e., from tall trees) and shade, reducing temperatures of waterbodies, which is of growing importance in light of

climate change. The temperature moderation by riparian vegetation can be crucial for maintaining water temperatures within acceptable thermal tolerance ranges of fish and aquatic species.

The SON-South Bruce siting area contains numerous aquatic habitats within the AOI and LSA_{ECO}. Non-PSW wetland ecosites and their buffers of 30 m (needed to maintain the health of aquatic environments) covered approximately 27.4% and 40.7% of the AOI and LSA_{ECO}, respectively. The PSWs and their 120 m buffers covered 24.2% and 48.8% of the AOI and LSA_{ECO}, respectively. Most of the mapped riparian buffers contained natural forest ecosites, and there was limited representation by anthropogenic ecosites (**Figure D-4**; **Figure D-5**). However, it is important to note that 52.4 and 50.2% of 30 m non-PSW and 120 m PSW buffers within the AOI were unmapped areas, which are anthropogenic lands. As well, 44.7 and 65.5% of 30 m non-PSW ans PSW buffers within the LSA_{ECO} was unmapped. These data therefore indicate that the riparian buffers in some areas may be healthy and of good quality to support the wetlands and riparian areas. This may be due in part to the large coverage by PSWs within the study areas, particularly the GSWC and TWC, which have afforded protections to the 120 m buffers around many wetlands and riparian areas. However, roughly half of the riparian buffers are unmapped anthropogenic land, which is likely not of good quality to support the wetlands. Even areas within 30 m of non-PSW aquatic habitats that have habitat loss or low-quality habitat issues should optimally be left undeveloped or be revegetated to protect the aquatic habitats they surround from degradation, particularly as the effects of climate change increase. Additional years of AHM survey data on riparian habitat, species observations, and riparian stage may help to further describe the condition of riparian habitat in the BIS study areas.

1.4.4 Next Steps

Since field contractors found that most wetlands were too dry to sample, Zoetica recommends future AHM wetland surveys be done during the spring when wetlands are more likely to contain water. Additional relevant information collected during AHM surveys of wetlands will be integrated into future iterations of this Chapter.

Zoetica has proposed many Tier 2 studies aimed at characterizing biodiversity communities, anticipated to commence after site selection (see Section 5.2 of Zoetica's BPPA Report (Zoetica 2021) for proposed Tier 2 studies). If the SON-South Bruce siting area is selected for further study, relevant data will be integrated in this Chapter once received by Zoetica. Tier 2 studies may include characterizing biodiversity in wetland and riparian environments, and OWES assessments of wetland function in select non-PSW wetlands that may be affected by the Project. These studies are designed so that wetlands can be compared and rated relative to one another (within the southern Ontario region) and will provide a preliminary inventory of wetlands to support the development and protection of PSWs. Tier 2 OWES studies may focus on unevaluated wetlands, as opposed to comparatively well-studied PSWs, along with 120 m adjacent land buffers (around both evaluated and unevaluated wetlands).

In addition to studies designed to characterize biodiversity in wetlands, additional studies are planned as part of the EMBP (CanNorth 2021b) to characterize the environmental media components (water, sediment, soil) and hydrology. These studies are important for understanding the functioning of aquatic habitats in the SON-South Bruce siting area. Combined with BIS studies, they can provide useful information to address the TISG requirements related to wetlands and riparian habitats. Where possible, relevant information collected as part of EMBP studies will be integrated with biodiversity information presented in this chapter to help characterize the wetland and riparian environments within the AOI and other relevant study areas.

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APPENDIX A – SPECIES LIST

Table A-1. Common and scientific names for species mentioned in this Chapter. Species names follow the NHIC's Ontario species lists (current to March 1, 2023).

Common Name	Scientific Name
Vegetation	
American elm / white elm	*Ulmus americana*
Arrowhead	*Sagittaria* spp.
Ash	*Fraxinus* spp.
Basswood	*Tilia americana*
Bittersweet nightshade	*Solanum dulcamara*
Black ash	*Fraxinus nigra*
Black spruce	*Picea mariana*
Bladderwort	*Utricularia* spp.
Broad-leaf cattail	*Typha latifolia*
Buckthorn	*Rhamnus* spp.
Bur-reed	*Sparganium* spp.
Canada wood nettle	*Laportea canadensis*
Canary grass	*Phalaris* spp.
Cattail	*Typha* spp.
Cherry	*Prunus* spp.
Chokecherry	*Prunus virginiana*
Club-spur orchid	*Platanthera clavellata*
Common boneset	*Eupatorium perfoliatum*
Common water-parsnip	*Sium suave*
Common woolly bulrush /Wool grass	*Scirpus cyperinus*
Creeping spikerush	*Eleocharis palustris*
Curly-leaved pondweed	*Potamogeton crispus*
Dark-green bulrush	*Scirpus atrovirens*
Dogwood	*Cornus* spp.
Duckweed	Lemnaceae spp.
Eastern hemlock	*Tsuga canadensis*
Eastern rough sedge	*Carex scabrata*
Eastern white cedar	*Thuja occidentalis*
Eastern white pine	*Pinus strobus*
Elderberry	*Sambucus* spp.
European buckthorn	*Rhamnus cathartica*
European reed	*Phragmites australis* ssp. *australis*
Fowl mannagrass	*Glyceria striata*
Fringed sedge	*Carex crinita*
Goldenrod	*Solidago* spp.
Green ash / red ash	*Fraxinus pennsylvanica*
Hill's pondweed	*Potamogeton hillii*

Common Name	**Scientific Name**
Horsetail	*Equisetum* spp.
Joe-pye weed	*Eutrochium* spp.
Lake sedge	*Carex lacustris*
Loesel's twayblade	*Liparis loeselii*
Manitoba maple	*Acer negundo*
Maple	*Acer* spp.
Meadowsweet	*Spiraea* spp.
Milkweed	*Asclepias* spp.
New England aster	*Symphyotrichum novae-angliae*
Ninebark	*Physocarpus* spp.
Ostrich fern	*Matteuccia struthiopteris*
Peach-leaved willow	*Salix amygdaloides*
Pickerelweed	*Pontederia cordata*
Pond-lily	Nymphaeaceae spp.
Poplar	*Populus* spp.
Purple loosestrife	*Lythrum salicaria*
Raspberry	*Rubus* spp.
Red maple	*Acer rubrum*
Red oak	*Quercus rubra*
Red osier dogwood	*Cornus sericea*
Reed canarygrass	*Phalaris arundinacea*
Riverbank grape	*Vitis riparia*
Royal fern	*Osmunda regalis*
Sago pondweed	*Stuckenia pectinata*
Scots pine	*Pinus sylvestris*
Sedge	*Carex* spp.
Sensitive fern	*Onoclea sensibilis*
Showy lady's-slipper	*Cypripedium reginae*
Silky dogwood	*Cornus obliqua*
Silver maple	*Acer saccharinum*
Smartweed	*Polygonum* spp.
Softstem bulrush	*Scirpus torreyi*
Sphagnum	*Sphagnum* spp.
Spotted jewelweed	*Impatiens capensis*
Spotted joe-pye weed	*Eutrochium maculatum*
Stinging nettle	*Urtica dioica*
Swamp loosestrife	*Decodon verticillatus*
Sweet gale	*Myrica gale*
Tamarack	*Larix laricina*
Tape grass / American eelgrass	*Vallisneria americana*
Tussock sedge	*Carex stricta*
Water arum / wild calla	*Calla palustris*

Common Name	**Scientific Name**
Water-lily	*Nymphaea* spp.
Water-milfoil	*Myriophyllum* spp.
Water smartweed	*Persicaria amphibia*
Watercress	*Nasturtium* or *Rorippa* spp.
White birch / paper birch	*Betula papyrifera*
White spruce	*Picea glauca*
Willow	*Salix* spp.
Woodreed	*Cinna* spp.
Woolly-fruit sedge	*Carex lasiocarpa*
Yellow birch	*Betula alleghaniensis*
Yellow pond-lily	*Nuphar* spp.
Invertebrates	
Emerald ash borer	*Agrilus planipennis*
Mammals	
Beaver	*Castor canadensis*
Star-nosed mole	*Condylura cristata*
Human	*Homo sapiens*
Meadow vole	*Microtus pennsylvanicus*
Muskrat	*Ondatra zibethicus*
Raccoon	*Procyon lotor*
Pig	*Sus scrofa*
Amphibians	
Eastern newt	*Notophthalmus viridescens*
Wood frog	*Lithobates sylvaticus*
Birds	
Wood duck	*Aix sponsa*
Hermit thrush	*Catharus guttatus*
Swainson's thrush	*Catharus ustulatus*
Brown creeper	*Certhia americana*
Blue jay	*Cyanocitta cristata*
Ruby-crowned kinglet	*Corthylio calendula*
Golden-crowned kinglet	*Regulus satrapa*
Eastern phoebe	*Sayornis phoebe*
American robin	*Turdus migratorius*
Fish	
Northern redbelly dace	*Chrosomus eos*
Finescale dace	*Chrosomus neogaeus*
Brook stickleback	*Culaea inconstans*
Iowa darter	*Etheostoma exile*
Pumpkinseed	*Lepomis gibbosus*
Golden shiner	*Notemigonus crysoleucas*
Blacknose shiner	*Notropis heterolepis*

Appendix A– Species List

Common Name	**Scientific Name**
Fathead minnow	*Pimephales promelas*
Creek chub	*Semotilus atromaculatus*
Central mudminnow	*Umbra limi*

APPENDIX B – SPECIES DETECTED IN WETLANDS WITHIN THE AOI AND LSA_{ECO}

Table B-1. Predominant aquatic vegetation species detected during AHM surveys in wetlands in the AOI and in the LSA_{ECO} north and south of the AOI. Scientific names follow the NHIC's Ontario species lists (current to March 1, 2023).

		Swamp			Marsh			Pond[1]	
Common Name	**Scientific Name**	**AOI**	**North**	**South**	**AOI**	**North**	**South**	**AOI**	**South**
Submergent									
American eelgrass	*Vallisneria americana*	0	0	0	0	0	0	1	0
Water-milfoil	*Myriophyllum* spp.	0	0	0	1	0	0	0	0
Sago pondweed	*Stuckenia pectinata*	0	0	0	1	0	0	0	0
Bladderwort	*Utricularia* all	0	0	0	0	1	0	1	0
Water smartweed	*Persicaria amphibia*	0	0	0	0	0	0	1	0
Floating									
Duckweed	*Lemna* spp.	0	1	1	0	1	0	1	0
Smartweed	*Persicaria* spp.	0	0	0	0	0	0	1	0
Water-lily	*Nymphaea* spp.	0	0	0	1	0	0	0	0
Emergent									
Reed canarygrass	*Phalaris arundinacea*	0	0	0	1	0	0	1	0
Sedge	*Carex* spp.	0	0	0	1	0	1	0	0
Common woolly bulrush	*Scirpus cyperinus*	0	0	0	0	0	1	0	0
Softstem bulrush	*Scirpus torreyi*	0	0	0	1	0	0	0	0
Cattail	*Typha* spp.	0	0	0	0	1	1	1	0
Wild calla	*Calla palustris*	0	1	0	0	0	0	0	0
Creeping spikerush	*Eleocharis palustris*	0	0	0	0	1	0	0	0
Bittersweet nightshade	*Solanum dulcamara*	0	0	0	0	0	0	1	0
Common water-parsnip	*Sium suave*	0	0	0	0	0	0	1	0
	Total	0	2	1	6	4	3	9	0

[1]These sites were classified as ponds in desk-based data but re-classified as wetlands by field contractors.

Table B-2. Vertebrate species detected via eDNA metabarcoding studies in wetlands in the AOI and LSA_{ECO}. Scientific names follow the NHIC's Ontario species lists (current to March 1, 2023).

Common Name	Scientific Name	AOI		LSA_{ECO}	
		Marsh	Swamp	Marsh	Swamp
Mammals					
Beaver	*Castor canadensis*	-	-	-	✓
Star-nosed mole	*Condylura cristata*	-	✓	✓	✓
Human[1]	*Homo sapiens*	✓	✓	✓	✓
Meadow vole	*Microtus pennsylvanicus*	✓	-	-	-
Muskrat	*Ondatra zibethicus*	✓	-	✓	✓
Raccoon	*Procyon lotor*	✓	✓	✓	✓
Pig[1]	*Sus scrofa*	-	✓	-	✓
Amphibians					
Eastern newt	*Notophthalmus viridescens*	✓	✓	-	-
Wood frog	*Lithobates sylvaticus*	✓	-	-	-
Birds					
Wood duck	*Aix sponsa*	✓	✓	✓	✓
Hermit thrush	*Catharus guttatus*	-	✓	-	✓
Swainson's thrush	*Catharus ustulatus*	-	-	-	✓
Brown creeper	*Certhia americana*	-	-	-	✓
Blue jay	*Cyanocitta cristata*	-	✓	-	-
Ruby-crowned kinglet	*Corthylio calendula*	-	-	-	✓
Golden-crowned kinglet	*Regulus satrapa*	-	-	-	✓
Eastern phoebe	*Sayornis phoebe*	✓	-	-	-
American robin	*Turdus migratorius*	✓	✓	-	✓
Fish					
Northern redbelly dace	*Chrosomus eos*	✓	✓	✓	-
Finescale dace	*Chrosomus neogaeus*	-	-	✓	-
Brook stickleback	*Culaea inconstans*	✓	✓	-	✓
Iowa darter	*Etheostoma exile*	-	-	✓	✓
Pumpkinseed	*Lepomis gibbosus*	-	-	✓	-

Common Name	Scientific Name	AOI		LSA_{ECO}	
		Marsh	Swamp	Marsh	Swamp
Golden shiner	*Notemigonus crysoleucas*	-	-	✓	-
Blacknose shiner	*Notropis heterolepis*	-	-	✓	-
Fathead minnow	*Pimephales promelas*	-	-	✓	-
Creek chub	*Semotilus atromaculatus*	✓	✓	✓	-
Central mudminnow	*Umbra limi*	✓	✓	✓	✓
Total		13	13	14	16

Notes:

1. eDNA detections of human and pig are likely a results of contamination from nearby farming. Refer to Appendix E, Chapter 1 for further discussion on the caveats and limitations of eDNA metabarcoding results.

Table B-3. Invertebrate species detected via eDNA metabarcoding studies in wetlands in the AOI and LSA_{ECO}. Data are reported as '1' if the species was detected in that habitat, and '0' if the species was not detected in that habitat. A record of '0' does not mean the species is definitely absent from the habitat, only that it was not detected during 2022 eDNA metabarcoding studies.

			AOI		LSA_{ECO}	
Order	**Family**	**Scientific Name**	**Swamp**	**Marsh**	**Swamp**	**Marsh**
Phylum: Annelida						
Class: Clitellata						
Crassiclitellata	Lumbricidae	*Dendrobaena octaedra*	0	0	1	0
Crassiclitellata	Lumbricidae	*Lumbricus terrestris*	0	0	1	0
Crassiclitellata	Lumbricidae	*Octolasion tyrtaeum*	0	0	0	1
Enchytraeida	Enchytraeidae	*Cernosvitoviella minor*	0	0	1	0
Enchytraeida	Enchytraeidae	*Globulidrilus riparius*	0	0	1	1
Enchytraeida	Enchytraeidae	*Henlea perpusilla*	0	0	1	0
Haplotaxida	Naididae	*Aulodrilus pluriseta*	0	0	0	1
Haplotaxida	Naididae	*Branchiura sowerbyi*	0	0	0	1
Haplotaxida	Naididae	*Ilyodrilus templetoni*	0	1	0	0
Haplotaxida	Naididae	*Nais communis*	0	0	1	1
Haplotaxida	Naididae	*Nais stolci*	0	0	0	1
Haplotaxida	Naididae	*Slavina appendiculata*	0	1	0	1
Phylum: Arthropoda						
Class: Branchiopoda						
Diplostraca	Bosminidae	*Bosmina longirostris*	0	1	0	0
Diplostraca	Chydoridae	*Alona circumfimbriata*	0	1	0	0
Diplostraca	Daphniidae	*Simocephalus serrulatus*	0	0	0	1
Class: Insecta						
Coleoptera	Carabidae	*Agonum placidum*	1	0	0	0
Coleoptera	Carabidae	*Clivina fossor*	0	0	0	1
Coleoptera	Carabidae	*Elaphrus clairvillei*	0	0	1	0
Coleoptera	Carabidae	*Pterostichus melanarius*	1	0	0	0
Coleoptera	Chrysomelidae	*Longitarsus suspectus*	0	0	0	1
Coleoptera	Corylophidae	*Orthoperus scutellaris*	0	0	1	0

Order	Family	Scientific Name	AOI		LSA_{ECO}	
			Swamp	Marsh	Swamp	Marsh
Coleoptera	Curculionidae	*Barypeithes pellucidus*	1	0	0	0
Coleoptera	Curculionidae	*Sciaphilus asperatus*	1	0	0	1
Coleoptera	Dytiscidae	*Acilius confusus*	0	1	0	0
Coleoptera	Dytiscidae	*Clemnius laccophilinus*	0	0	1	0
Coleoptera	Dytiscidae	*Hydrocolus persimilis*	0	0	1	0
Coleoptera	Dytiscidae	*Hydrovatus pustulatus*	0	1	0	0
Coleoptera	Dytiscidae	*Ilybiosoma seriatum*	1	0	1	0
Coleoptera	Dytiscidae	*Ilybius biguttulus*	0	1	1	1
Coleoptera	Dytiscidae	*Neoporus clypealis*	0	1	1	0
Coleoptera	Dytiscidae	*Neoporus undulatus*	1	0	1	0
Coleoptera	Elateridae	*Athous rufifrons*	0	0	1	0
Coleoptera	Elmidae	*Optioservus fastiditus*	0	0	0	1
Coleoptera	Elmidae	*Stenelmis crenata*	0	0	0	1
Coleoptera	Haliplidae	*Haliplus immaculicollis*	0	1	0	0
Coleoptera	Hydrophilidae	*Berosus sayi*	1	0	0	0
Coleoptera	Hydrophilidae	*Coelostoma orbiculare*	0	1	0	0
Coleoptera	Hydrophilidae	*Hydrobius fuscipes*	0	0	1	0
Coleoptera	Hydrophilidae	*Hydrochara obtusata*	0	1	0	0
Coleoptera	Noteridae	*Hydrocanthus iricolor*	0	0	0	1
Coleoptera	Phalacridae	*Olibrus semistriatus*	0	0	0	1
Coleoptera	Psephenidae	*Psephenus herricki*	0	0	0	1
Coleoptera	Scarabaeidae	*Amphimallon majale*	1	1	0	0
Coleoptera	Scarabaeidae	*Melinopterus prodromus*	0	0	1	0
Coleoptera	Scirtidae	*Contacyphon obscurus*	0	1	1	0
Coleoptera	Scirtidae	*Prionocyphon limbatus*	0	0	1	0
Coleoptera	Scirtidae	*Scirtes tibialis*	0	1	0	1
Coleoptera	Staphylinidae	*Erichsonius nanus*	0	0	1	0
Coleoptera	Staphylinidae	*Hemiquedius ferox*	0	0	1	0
Coleoptera	Staphylinidae	*Lathrobium simplex*	0	0	1	0

			AOI		LSA_{ECO}	
Order	**Family**	**Scientific Name**	**Swamp**	**Marsh**	**Swamp**	**Marsh**
Coleoptera	Staphylinidae	*Myllaena arcana*	0	0	1	0
Coleoptera	Staphylinidae	*Olophrum obtectum*	0	0	0	1
Coleoptera	Staphylinidae	*Philonthus lomatus*	0	0	1	0
Coleoptera	Staphylinidae	*Philonthus monaeses*	0	0	1	0
Coleoptera	Staphylinidae	*Tachinus limbatus*	0	0	0	1
Coleoptera	Tenebrionidae	*Isomira quadristriata*	0	0	1	0
Diptera	Agromyzidae	*Nemorimyza posticata*	0	0	0	1
Diptera	Anthomyzidae	*Anthomyza dichroa*	1	0	1	0
Diptera	Bibionidae	*Bibio xanthopus*	1	0	0	0
Diptera	Ceratopogonidae	*Culicoides haematopotus*	0	0	0	1
Diptera	Ceratopogonidae	*Culicoides mulrennani*	0	1	1	0
Diptera	Ceratopogonidae	*Culicoides venustus*	0	1	0	0
Diptera	Ceratopogonidae	*Dasyhelea turficola*	0	0	0	1
Diptera	Chaoboridae	*Chaoborus albipes*	1	1	0	0
Diptera	Chaoboridae	*Chaoborus punctipennis*	1	0	0	1
Diptera	Chironomidae	*Bryophaenocladius ictericus*	0	0	1	0
Diptera	Chironomidae	*Chironomus acidophilus*	1	1	1	0
Diptera	Chironomidae	*Chironomus bifurcatus*	1	1	0	0
Diptera	Chironomidae	*Chironomus lugubris*	0	0	1	0
Diptera	Chironomidae	*Chironomus maturus*	1	1	1	1
Diptera	Chironomidae	*Chironomus melanescens*	0	0	1	0
Diptera	Chironomidae	*Cladopelma edwardsi*	0	0	0	1
Diptera	Chironomidae	*Cladopelma galeator*	0	0	0	1
Diptera	Chironomidae	*Conchapelopia telema*	1	0	0	1
Diptera	Chironomidae	*Corynoneura scutellata*	1	1	1	1
Diptera	Chironomidae	*Cricotopus annulator*	0	0	0	1
Diptera	Chironomidae	*Cricotopus bicinctus*	0	0	1	1
Diptera	Chironomidae	*Cricotopus triannulatus*	0	0	0	1
Diptera	Chironomidae	*Cricotopus tristis*	0	0	0	1

			AOI		LSA_{ECO}	
Order	**Family**	**Scientific Name**	**Swamp**	**Marsh**	**Swamp**	**Marsh**
Diptera	Chironomidae	*Dicrotendipes modestus*	0	0	0	1
Diptera	Chironomidae	*Dicrotendipes tritomus*	0	0	1	1
Diptera	Chironomidae	*Glyptotendipes glaucus*	0	1	0	0
Diptera	Chironomidae	*Gymnometriocnemus brumalis*	1	0	0	0
Diptera	Chironomidae	*Lauterborniella agrayloides*	0	0	1	0
Diptera	Chironomidae	*Limnophyes asquamatus*	0	0	1	0
Diptera	Chironomidae	*Limnophyes minimus*	0	0	1	0
Diptera	Chironomidae	*Limnophyes natalensis*	0	0	1	0
Diptera	Chironomidae	*Metriocnemus albolineatus*	1	0	0	0
Diptera	Chironomidae	*Micropsectra nigripila*	1	1	1	1
Diptera	Chironomidae	*Micropsectra polita*	0	0	0	1
Diptera	Chironomidae	*Micropsectra recurvata*	0	0	1	0
Diptera	Chironomidae	*Micropsectra subletteorum*	1	0	1	0
Diptera	Chironomidae	*Micropsectra xantha*	1	0	1	1
Diptera	Chironomidae	*Microtendipes pedellus*	0	1	0	1
Diptera	Chironomidae	*Nilotanypus fimbriatus*	0	0	0	1
Diptera	Chironomidae	*Orthocladius smolandicus*	0	0	1	0
Diptera	Chironomidae	*Pagastia orthogonia*	0	0	0	1
Diptera	Chironomidae	*Parachironomus tenuicaudatus*	1	1	0	1
Diptera	Chironomidae	*Paraphaenocladius impensus*	0	0	1	1
Diptera	Chironomidae	*Parochlus kiefferi*	0	0	1	1
Diptera	Chironomidae	*Polypedilum aviceps*	0	0	0	1
Diptera	Chironomidae	*Polypedilum convictum*	1	0	0	1
Diptera	Chironomidae	*Procladius denticulatus*	1	0	0	0
Diptera	Chironomidae	*Prodiamesa olivacea*	1	0	1	0
Diptera	Chironomidae	*Rheocricotopus robacki*	0	0	0	1
Diptera	Chironomidae	*Stempellinella fimbriata*	0	0	1	1
Diptera	Chironomidae	*Tanytarsus glabrescens*	0	1	0	1
Diptera	Chironomidae	*Tanytarsus mendax*	0	1	0	1

			AOI		LSA_{ECO}	
Order	**Family**	**Scientific Name**	**Swamp**	**Marsh**	**Swamp**	**Marsh**
Diptera	Chironomidae	*Thienemanniella xena*	0	0	1	1
Diptera	Chironomidae	*Tvetenia paucunca*	1	0	0	1
Diptera	Chironomidae	*Xenochironomus xenolabis*	0	0	0	1
Diptera	Culicidae	*Anopheles punctipennis*	0	0	1	0
Diptera	Culicidae	*Culex territans*	1	0	1	0
Diptera	Culicidae	*Ochlerotatus thibaulti*	0	0	1	0
Diptera	Dolichopodidae	*Dolichopus albiciliatus*	0	0	1	0
Diptera	Dolichopodidae	*Gymnopternus lividifrons*	0	0	1	0
Diptera	Drosophilidae	*Scaptomyza flava*	1	0	0	0
Diptera	Dryomyzidae	*Dryomyza anilis*	0	0	0	1
Diptera	Ephydridae	*Hydrellia albilabris*	0	1	1	0
Diptera	Ephydridae	*Hydrellia notata*	1	0	0	1
Diptera	Fanniidae	*Fannia falcata*	0	0	1	0
Diptera	Fanniidae	*Fannia latifrons*	0	0	1	0
Diptera	Fanniidae	*Fannia sociella*	0	0	1	1
Diptera	Heleomyzidae	*Suillia laevis*	0	0	1	0
Diptera	Lauxaniidae	*Poecilominettia puncticeps*	0	0	1	0
Diptera	Limoniidae	*Antocha saxicola*	0	0	0	1
Diptera	Limoniidae	*Discobola annulata*	0	0	1	0
Diptera	Limoniidae	*Epiphragma fasciapenne*	0	0	1	0
Diptera	Limoniidae	*Erioptera ebenina*	0	0	1	0
Diptera	Limoniidae	*Erioptera septemtrionis*	0	1	0	0
Diptera	Limoniidae	*Euphylidorea luteola*	0	0	1	0
Diptera	Limoniidae	*Helius flavipes*	0	1	1	0
Diptera	Limoniidae	*Hexatoma spinosa*	0	0	0	1
Diptera	Limoniidae	*Molophilus hirtipennis*	0	0	1	0
Diptera	Limoniidae	*Ormosia affinis*	0	0	1	0
Diptera	Limoniidae	*Pseudolimnophila inornata*	0	1	0	0
Diptera	Limoniidae	*Pseudolimnophila luteipennis*	0	1	1	0

			AOI		LSA_{ECO}	
Order	**Family**	**Scientific Name**	**Swamp**	**Marsh**	**Swamp**	**Marsh**
Diptera	Muscidae	*Lispe albitarsis*	0	0	1	0
Diptera	Muscidae	*Neodexiopsis rufitibia*	0	0	1	0
Diptera	Muscidae	*Pentacricia aldrichii*	0	0	1	0
Diptera	Mycetophilidae	*Exechia nigroscutellata*	0	0	1	0
Diptera	Mycetophilidae	*Mycomya pulchella*	0	0	1	0
Diptera	Pediciidae	*Dicranota guerini*	0	0	0	1
Diptera	Pediciidae	*Pedicia goldsworthyi*	1	0	0	0
Diptera	Periscelididae	*Cyamops nebulosus*	0	0	1	0
Diptera	Platystomatidae	*Rivellia steyskali*	1	1	0	0
Diptera	Psychodidae	*Psychoda alternata*	0	1	0	0
Diptera	Psychodidae	*Psychoda phalaenoides*	0	0	1	0
Diptera	Ptychopteridae	*Bittacomorpha clavipes*	0	0	1	1
Diptera	Ptychopteridae	*Ptychoptera quadrifasciata*	0	0	1	1
Diptera	Rhagionidae	*Chrysopilus quadratus*	0	0	1	0
Diptera	Sciomyzidae	*Atrichomelina pubera*	0	0	1	0
Diptera	Sciomyzidae	*Elgiva solicita*	0	1	0	0
Diptera	Sciomyzidae	*Sepedon armipes*	0	1	0	1
Diptera	Sciomyzidae	*Sepedon fuscipennis*	1	0	0	0
Diptera	Sciomyzidae	*Tetanocera annae*	0	1	1	0
Diptera	Sphaeroceridae	*Copromyza neglecta*	0	1	0	1
Diptera	Sphaeroceridae	*Pullimosina pullula*	0	1	0	0
Diptera	Syrphidae	*Allograpta obliqua*	1	0	0	0
Diptera	Syrphidae	*Chalcosyrphus nemorum*	0	0	1	0
Diptera	Syrphidae	*Eristalis anthophorina*	0	0	0	1
Diptera	Syrphidae	*Helophilus fasciatus*	0	0	1	0
Diptera	Tabanidae	*Chrysops calvus*	0	0	0	1
Diptera	Tabanidae	*Tabanus atratus*	0	1	0	0
Diptera	Tabanidae	*Tabanus superjumentarius*	0	1	0	0
Diptera	Tephritidae	*Campiglossa albiceps*	0	0	0	1

			AOI		LSA_{ECO}	
Order	**Family**	**Scientific Name**	**Swamp**	**Marsh**	**Swamp**	**Marsh**
Diptera	Tipulidae	*Nephrotoma cornicina*	1	0	0	0
Diptera	Tipulidae	*Tipula abdominalis*	0	0	1	1
Diptera	Tipulidae	*Tipula mallochi*	0	1	0	0
Diptera	Tipulidae	*Tipula oropezoides*	1	0	0	0
Diptera	Tipulidae	*Tipula sayi*	0	0	1	0
Diptera	Tipulidae	*Tipula senega*	0	0	1	0
Diptera	Tipulidae	*Tipula tephrocephala*	1	0	1	0
Diptera	Tipulidae	*Tipula tricolor*	0	0	1	1
Ephemeroptera	Caenidae	*Caenis diminuta*	0	1	1	0
Ephemeroptera	Ephemeridae	*Hexagenia atrocaudata*	0	0	0	1
Ephemeroptera	Leptophlebiidae	*Paraleptophlebia adoptiva*	0	0	0	1
Hemiptera	Belostomatidae	*Belostoma flumineum*	0	0	0	1
Hemiptera	Cicadellidae	*Typhlocyba hockingensis*	0	0	1	0
Hemiptera	Notonectidae	*Notonecta irrorata*	0	1	0	0
Hemiptera	Pentatomidae	*Euschistus variolarius*	0	0	1	0
Hemiptera	Pleidae	*Neoplea striola*	0	1	0	0
Lepidoptera	Erebidae	*Palthis angulalis*	0	0	1	0
Lepidoptera	Erebidae	*Pyrrharctia isabella*	0	0	0	1
Lepidoptera	Tortricidae	*Argyrotaenia velutinana*	0	0	0	1
Lepidoptera	Tortricidae	*Choristoneura fumiferana*	1	0	0	0
Lepidoptera	Tortricidae	*Epinotia lindana*	0	0	1	0
Megaloptera	Corydalidae	*Chauliodes rastricornis*	1	0	1	0
Megaloptera	Corydalidae	*Nigronia serricornis*	0	0	0	1
Megaloptera	Sialidae	*Sialis vagans*	0	0	0	1
Neuroptera	Coniopterygidae	*Conwentzia pineticola*	0	0	1	0
Neuroptera	Hemerobiidae	*Micromus posticus*	0	0	1	1
Neuroptera	Hemerobiidae	*Sympherobius amiculus*	1	0	0	0
Orthoptera	Gryllidae	*Eunemobius carolinus*	0	1	0	0
Plecoptera	Capniidae	*Paracapnia angulata*	0	0	0	1

Order	Family	Scientific Name	AOI		LSA_{ECO}	
			Swamp	Marsh	Swamp	Marsh
Plecoptera	Nemouridae	*Soyedina vallicularia*	0	0	0	1
Plecoptera	Perlodidae	*Isoperla nana*	1	0	0	0
Psocoptera	Caeciliusidae	*Valenzuela flavidus*	0	0	1	1
Psocoptera	Ectopsocidae	*Ectopsocus meridionalis*	0	0	1	0
Psocoptera	Lepidopsocidae	*Echmepteryx hageni*	0	0	1	0
Psocoptera	Psocidae	*Trichadenotecnum majus*	0	0	1	0
Psocoptera	Stenopsocidae	*Graphopsocus cruciatus*	0	0	1	0
Trichoptera	Lepidostomatidae	*Lepidostoma vernale*	0	0	0	1
Trichoptera	Limnephilidae	*Limnephilus indivisus*	0	0	1	0
Trichoptera	Limnephilidae	*Limnephilus ornatus*	0	0	0	1
Trichoptera	Limnephilidae	*Platycentropus radiatus*	0	1	1	1
Class: Malacostraca						
Decapoda	Cambaridae	*Fallicambarus fodiens*	0	0	1	0
Decapoda	Cambaridae	*Orconectes immunis*	0	0	0	1
Class: Ostracoda						
Podocopida	Cyprididae	*Cypridopsis vidua*	0	1	1	1
Phylum: Rotifera						
Class: Eurotatoria						
Ploima	Synchaetidae	*Polyarthra vulgaris*	0	0	0	1

Table B-4. Incidental observations of aquatic and riparian vegetation during TEM, AHM, and eDNA field surveys within the AOI or LSA_{ECO} in 2022.

Common Name	Scientific Name	Aquatic or Riparian	SAR	Rare	Introd./ Invasive	Notes
Algae	NA	Aquatic	NA	NA	NA	
American elm / white elm	*Ulmus americana*	Riparian	N	N	N	
Aquatic macrophytes	NA	Aquatic	NA	NA	NA	
Aquatic plants	NA	Aquatic	NA	NA	NA	
Arrowhead	*Sagittaria* sp.	Aquatic	NA	NA	NA	
Ash	*Fraxinus* sp.	Riparian	NA	NA	NA	
Basswood	*Tilia americana*	Riparian	N	N	N	
Bittersweet nightshade	*Solanum dulcamara*	Riparian	N	N	Y	
Black ash	*Fraxinus nigra*	Riparian	Y	N	N	END in Ontario, THR in Canada
Black spruce	*Picea mariana*	Riparian	N	N	N	
Bladderwort	*Utricularia* sp.	Aquatic	NA	NA	NA	
Broad-leaf cattail	*Typha latifolia*	Aquatic	N	N	N	
Buckthorn	*Rhamnus* sp.	Riparian	NA	NA	NA	
Bur-reed	*Sparganium* sp.	Aquatic	NA	NA	NA	
Canada wood nettle	*Laportea canadensis*	Riparian	N	N	N	
Canary grass	*Phalaris* sp.	Riparian	NA	NA	NA	
Cattail	*Typha* sp.	Aquatic	NA	NA	NA	
Cherry	*Prunus* sp.	Riparian	NA	NA	NA	
Chokecherry	*Prunus virginiana*	Riparian	N	N	N	
Club-spur orchid	*Platanthera clavellata*	Aquatic	N	N	N	
Common boneset	*Eupatorium perfoliatum*	Riparian	N	N	N	
Common water-parsnip	*Sium suave*	Aquatic	N	N	N	
Common woolly bulrush	*Scirpus cyperinus*	Aquatic	NA	NA	NA	
Dark-green bulrush	*Scirpus atrovirens*	Aquatic	N	N	N	
Dogwood	*Cornus* sp.	Riparian	NA	NA	NA	
Duckweed	Lemnaceae sp.	Aquatic	NA	NA	NA	
Eastern hemlock	*Tsuga canadensis*	Riparian	N	N	N	
Eastern rough sedge	*Carex scabrata*	Aquatic	NA	NA	NA	

Common Name	Scientific Name	Aquatic or Riparian	SAR	Rare	Introd./ Invasive	Notes
Eastern white cedar	*Thuja occidentalis*	Riparian	N	N	N	
Eastern white pine	*Pinus strobus*	Riparian	N	N	N	
Elderberry	*Sambucus* sp.	Riparian	NA	NA	NA	
European buckthorn	*Rhamnus cathartica*	Riparian	N	N	Y	
European reed	*Phragmites australis* ssp. *australis*	Aquatic	N	N	Y	
Ferns	Polypodiopsida	Riparian	NA	NA	NA	
Filamentous algae	NA	Aquatic	NA	NA	NA	
Floating vegetation	NA	Aquatic	NA	NA	NA	
Fowl mannagrass	*Glyceria striata*	Aquatic	N	N	N	
Fringed sedge	*Carex crinita*	Aquatic	N	N	N	
Goldenrod	*Solidago* sp.	Riparian	NA	NA	NA	
Green ash / red ash	*Fraxinus pennsylvanica*	Riparian	N	N	N	
Horsetail	*Equisetum* sp.	Aquatic	NA	NA	NA	
Hydrophytic vegetation	NA	Aquatic	NA	NA	NA	
Joe-pye weed	*Eutrochium* sp.	Riparian	NA	NA	NA	
Lake sedge	*Carex lacustris*	Aquatic	N	N	N	
Loesel's twayblade	*Liparis loeselii*	Aquatic	N	N	N	
Loosestrife	Dicotyledoneae sp.	Aquatic	NA	NA	NA	
Macroalgae	NA	Aquatic	NA	NA	NA	
Macrophytes	NA	Aquatic	NA	NA	NA	
Manitoba maple	*Acer negundo*	Riparian	N	N	N	
Maple	*Acer* sp.	Riparian	NA	NA	NA	
Meadowsweet	*Spiraea* sp.	Riparian	NA	NA	NA	
Milkweed	*Asclepias* sp.	Riparian	NA	NA	NA	
Moss	Bryophyta	Riparian	NA	NA	NA	
New England aster	*Symphyotrichum novae-angliae*	Riparian	N	N	N	
Ninebark	*Physocarpus* sp.	Riparian	NA	NA	NA	

Common Name	Scientific Name	Aquatic or Riparian	SAR	Rare	Introd./ Invasive	Notes
Ostrich fern	*Matteuccia struthiopteris*	Riparian	N	N	N	
Peach-leaf willow	*Salix amygdaloides*	Riparian	N	N	N	
Pickerelweed	*Pontederia cordata*	Aquatic	N	N	N	
Pond-lily	Nymphaeaceae sp.	Aquatic	NA	NA	NA	
Poplar	*Populus* sp.	Riparian	NA	NA	NA	
Purple loosestrife	*Lythrum salicaria*	Aquatic	N	N	Y	
Raspberry	*Rubus* sp.	Riparian	NA	NA	NA	
Red maple	*Acer rubrum*	Riparian	N	N	N	
Red oak	*Quercus rubra*	Riparian	N	N	N	
Red osier dogwood	*Cornus sericea*	Riparian	N	N	N	
Reed canarygrass	*Phalaris arundinacea*	Aquatic	N	N	N	
Reeds	Poaceae sp.	Aquatic	NA	NA	NA	
Riparian grasses	Poaceae	Riparian	NA	NA	NA	
Riparian herbs	NA	Riparian	NA	NA	NA	
Riparian vegetation	NA	Riparian	NA	NA	NA	
Riverbank grape	*Vitis riparia*	Riparian	N	N	N	
Royal fern	*Osmunda regalis*	Riparian	N	N	N	
Rubus	*Rubus* sp.	Riparian	NA	NA	NA	
Scots pine	*Pinus sylvestris*	Riparian	N	N	Y	
Sedges	*Carex* spp.	Aquatic	NA	NA	NA	
Sensitive fern	*Onoclea sensibilis*	Riparian	N	N	N	
Showy lady's-slipper	*Cypripedium reginae*	Riparian	N	N	N	
Silky dogwood	*Cornus obliqua*	Riparian	N	N	N	
Silver maple	*Acer saccharinum*	Riparian	N	N	N	
Sphagnum	*Sphagnum* sp.	Aquatic	NA	NA	NA	
Spotted jewelweed	*Impatiens capensis*	Riparian	N	N	N	
Spotted joe-pye weed	*Eutrochium maculatum*	Riparian	N	N	N	
Stinging nettle	*Urtica dioica*	Riparian	N	N	Y	
Submergent grasses	Poaceae sp.	Aquatic	NA	NA	NA	

Common Name	Scientific Name	Aquatic or Riparian	SAR	Rare	Introd./ Invasive	Notes
Submergent vegetation	NA	Aquatic	NA	NA	NA	
Swamp loosestrife	*Decodon verticillatus*	Aquatic	N	N	N	
Sweet gale	*Myrica gale*	Riparian	N	N	N	
Tamarack	*Larix laricina*	Riparian	N	N	N	
Tussock sedge	*Carex stricta*	Aquatic	N	N	N	
Watercress	*Nasturtium* or *Rorippa* sp.	Aquatic	NA	NA	NA	
White birch / paper birch	*Betula papyrifera*	Riparian	N	N	N	
White spruce	*Picea glauca*	Riparian	N	N	N	
Willow	*Salix* sp.	Riparian	NA	NA	NA	
Woodreed	*Cinna* sp.	Riparian	NA	NA	NA	
Woolly-fruit sedge	*Carex lasiocarpa*	Aquatic	N	N	N	
Yellow birch	*Betula alleghaniensis*	Riparian	N	N	N	
Yellow pond-lily	*Nuphar* sp.	Aquatic	NA	NA	NA	Some species of yellow pond-lily are rare

Notes:
Introd. = Introduced species
END = endangered; THR = threatened

APPENDIX C – HABITATS WITHIN RIPARIAN BUFFERS

For additional data on riparian habitats, see Table C-3a (waterbodies) and Table B-4 (watercourses), in Appendix D, Chapter 1 (AHM).

Table C-1. Amount and percent of each ecosite within the 15 m, 30 m, and 100 m riparian buffers, as well as the 120 m PSW buffers, of wetlands, waterbodies, and watercourses within the AOI and LSA_{ECO}.

	AOI										**LSA_{ECO}**									
	Non-PSW Buffers						**PSW Buffers**				**Non-PSW Buffers**						**PSW Buffers**			
	0 - 15 m		**0 - 30 m**		**0 - 100 m**		**0 - 120 m**		**> 100 m[1]**		**0 - 15 m**		**0 - 30 m**		**0 - 100 m**		**0 - 120 m**		**> 100 m[1]**	
	ha	**%**	**ha**	**%**	**ha**	**%**	**ha**	**%**	**ha**	**%**	**ha**	**%**	**ha**	**%**	**ha**	**%**	**ha**	**%**	**ha**	**%**
Conifer	8.4	6.7	15.7	6.5	30.3	4.4	6.3	2.3	0.4	1.2	112.0	6.6	206.2	6.4	431.4	5.1	227.7	5.2	40.7	3.7
Mixedwood	20.0	15.8	35.5	14.6	64.5	9.3	25.0	9.3	13.3	37.4	240.5	14.2	433.4	13.5	789.8	9.3	200.3	4.6	73.8	6.8
Hardwood	27.2	21.5	50.1	20.6	122.2	17.7	42.5	15.8	3.5	10.0	559.3	33.1	1031.2	32.0	2065.5	24.3	478.3	10.9	206.3	19.0
Plantation	1.8	1.4	3.7	1.5	9.2	1.3	7.1	2.6	0.6	1.8	16.6	1.0	32.2	1.0	79.2	0.9	54.6	1.2	13.4	1.2
Shrub	1.2	1.0	1.8	0.7	2.0	0.3	0.7	0.3	-	-	4.3	0.3	6.5	0.2	7.8	0.1	2.0	0.0	-	-
Meadow	5.2	4.1	9.1	3.7	18.0	2.6	10.4	3.9	1.0	2.8	38.5	2.3	66.1	2.1	124.3	1.5	41.1	0.9	9.6	0.9
Field	-	-	-	-	-	-	-	-	-	-	1.7	0.1	3.5	0.1	7.2	0.1	-	-	-	-
Wetlands[2]	0.0	0.0	0.0	0.0	0.0	0.0	41.6	0.2	-	-	0.0	0.0	0.0	0.0	0.0	0.0	508.3	0.1	0.0	0.0
Total Ecosites	**63.8**	**50.5**	**115.9**	**47.6**	**246.1**	**35.6**	**133.6**	**49.8**	**18.9**	**53.2**	**972.9**	**57.5**	**1779.0**	**55.3**	**3505.1**	**41.2**	**1512.2**	**34.5**	**343.7**	**31.6**
Unmapped[3]	62.6	49.5	127.8	52.4	444.9	64.4	134.8	50.2	16.6	46.8	718.6	42.5	1439.4	44.7	5004.0	58.8	2869.5	65.5	744.3	68.4

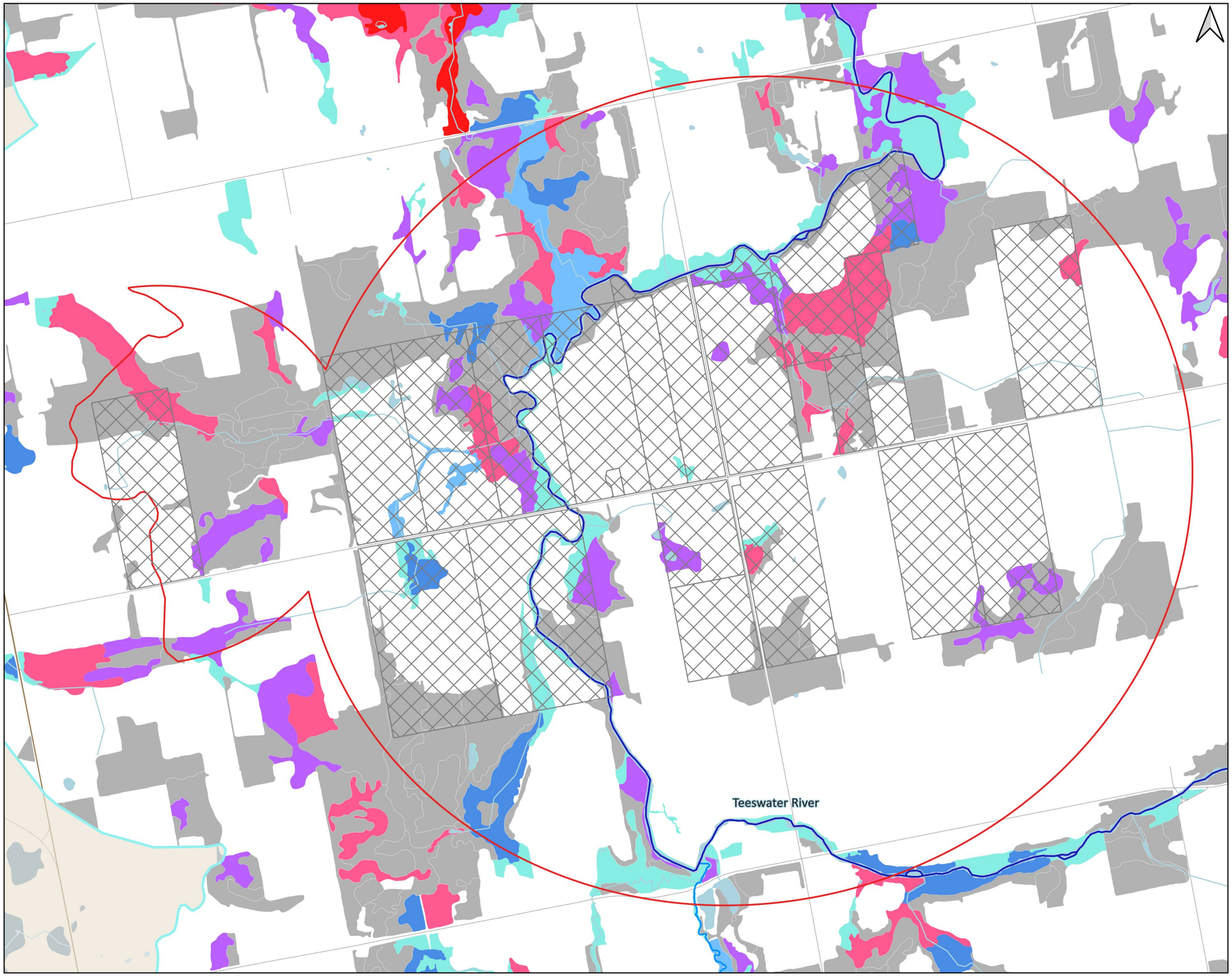
Notes:
Data reported for each buffer width and study area are inclusive of all areas within those buffers or study areas, including smaller nested buffers or study areas. For example, the 30 m buffer of the LSA_{ECO} includes the 15 m buffer of the LSA_{ECO}, and all riparian buffers within the AOI.
[1]Columns labelled "> 100 m" represent the area of the PSW buffer that is beyond the largest non-PSW buffer (100 m). This represents the additional area afforded protection by the PSW buffer regulations.
[2]Wetlands include swamps, marshes, fens, rivers, lakes, and anthropogenic water. Non-PSW riparian buffers are drawn around all wetlands, so contain no wetlands within them. PSW buffers may contain wetlands due to differences between the provincial PSW data layer and the mapped ecosites. See Section 1.3.3.1 for more information.
[3]The unmapped area is the amount of riparian buffer that was not covered by the ecosite classification dataset, which constitutes anthropogenic land (see Section 1.3.3.1 for more information).

APPENDIX D – MAPS OF WETLANDS AND RIPARIAN AREAS IN THE BIS STUDY AREAS

NWMO Biodiversity Impact Studies

Wetlands in the AOI

Figure D-1a



- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Teeswater River
- Alps Creek
- Other Watercourse
- Lake
- Wetland Outside LSA_{ECO}
- Municipal Boundary
- Local Road
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Upland Areas

1:75,000

0 0.5 1 km

ZOETICA



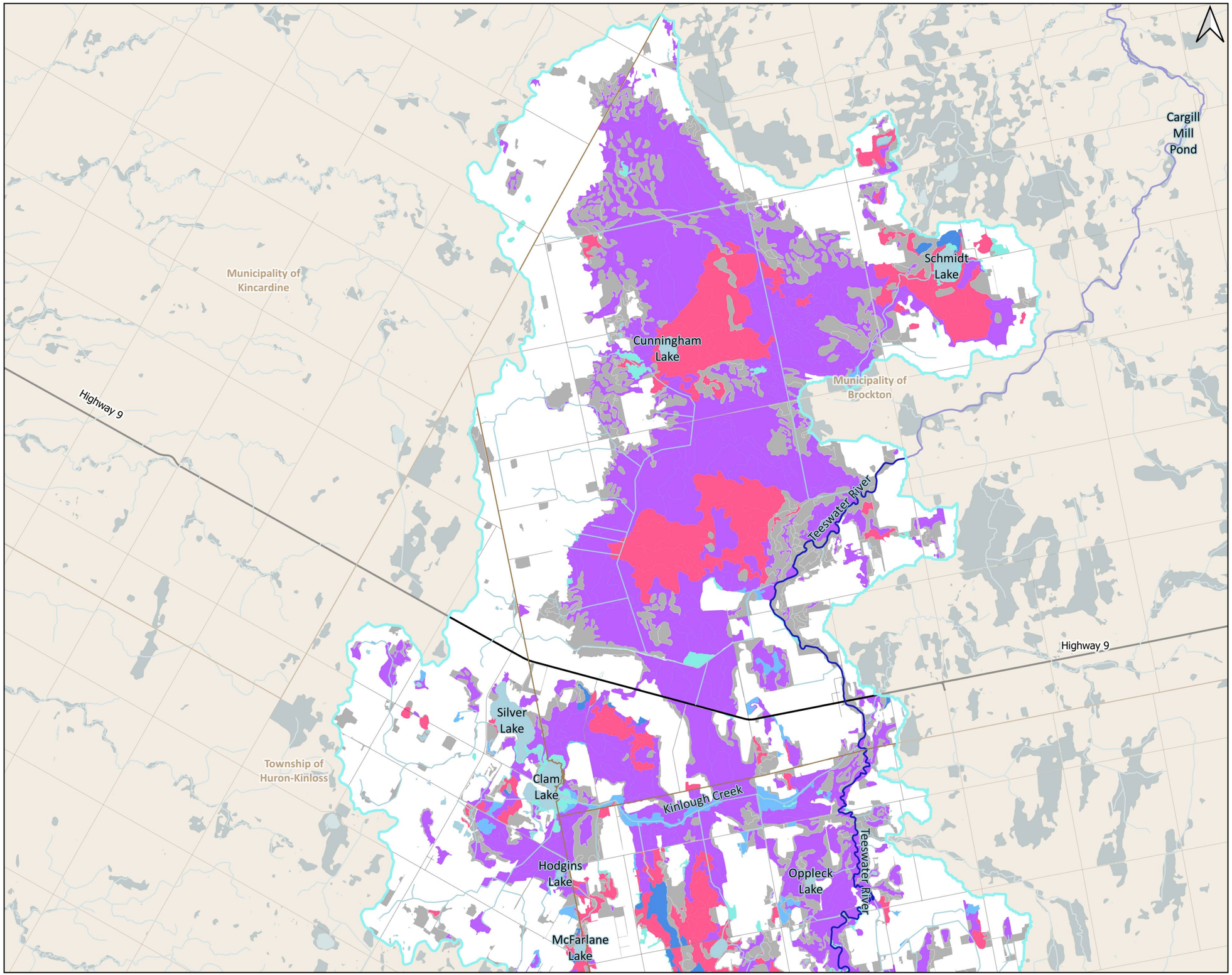
Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Segment (MNRF); Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Ecosite data were created for the BIS Project. Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_D182a	

NWMO Biodiversity Impact Studies

Wetlands in the North LSA_{ECO}

Figure D-1b

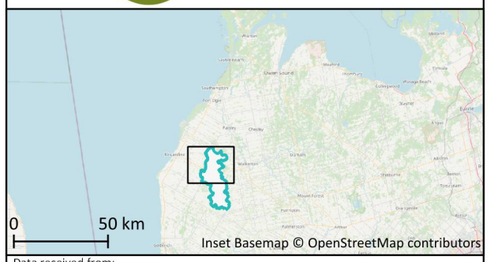


- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Teeswater River
- Alps Creek
- Other Watercourse
- Lake
- Wetlands Outside LSA_{ECO}
- Municipal Boundary
- Highway
- Local Road
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Upland Areas

1:75,000

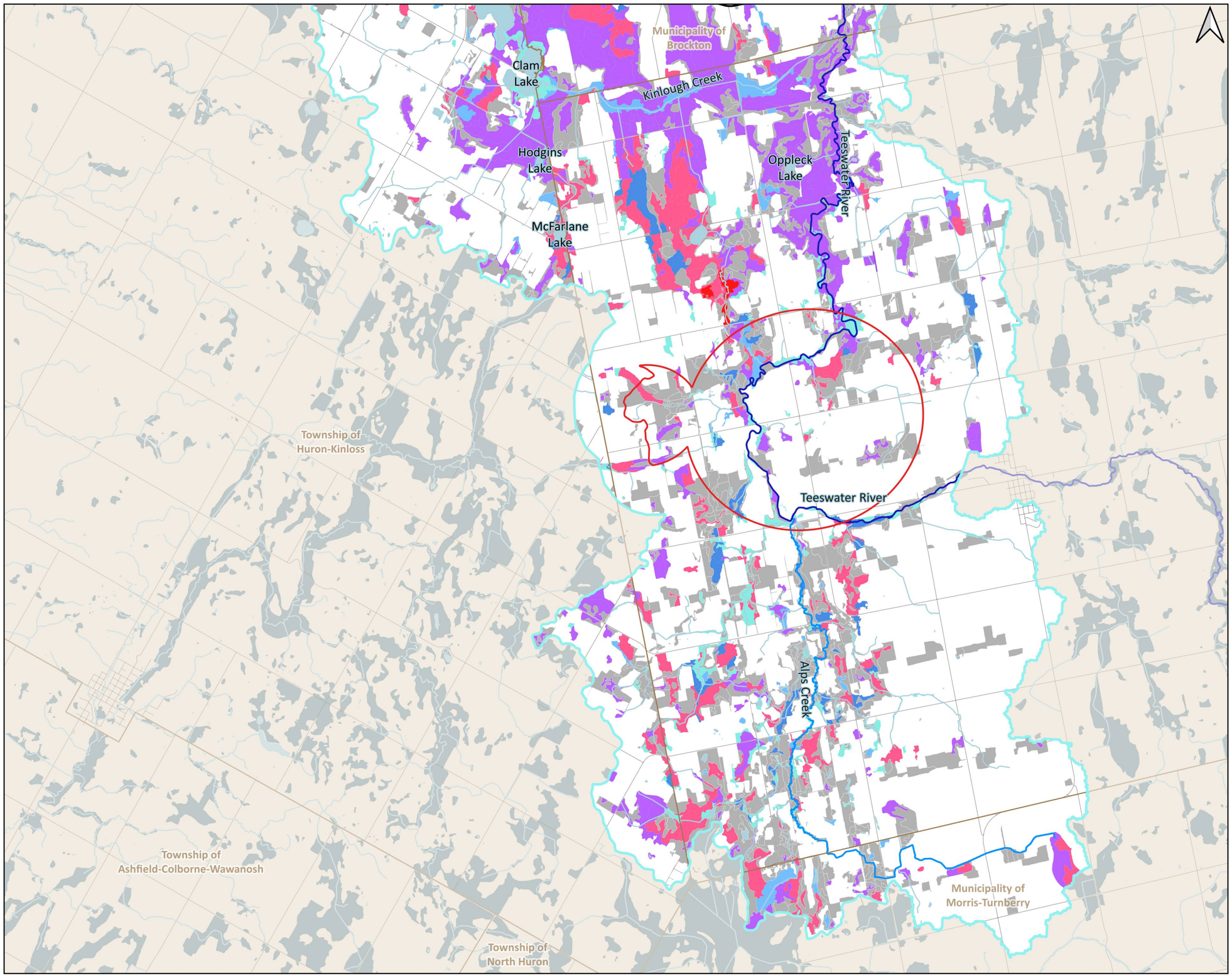
0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Segment (MNRF); Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Ecosite data were created for the BIS Project. Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_D182b	



NWMO Biodiversity Impact Studies

Wetlands in the South LSA_{ECO}

Figure D-1c

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Teeswater River
- Alps Creek
- Other Watercourse
- Lake
- Wetlands Outside LSA_{ECO}
- Municipal Boundary
- Local Road
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Upland Areas

1:75,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Segment (MNRF); Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Ecosite data were created for the BIS Project. Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_D182c	

NWMO Biodiversity Impact Studies

Provincially Significant Wetlands and Potential Reference Wetlands -AOI and LSA_{ECO}

Figure D-2a

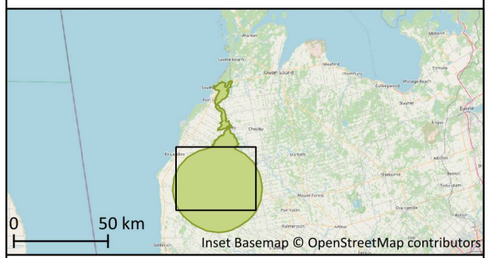
- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{ECO})
- Provincially Significant Wetland (PSW)
- Potential Reference Wetland
- Other Wetland
- Lake
- Watercourse
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary

Only PSWs located within the extent of the BIS study areas were labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

1:130,000

0 2 4 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; Trail Segments (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A033a	

NWMO Biodiversity Impact Studies

Provincially Significant Wetlands and Potential Reference Wetlands - RSA_{ECO}

Figure D-2b

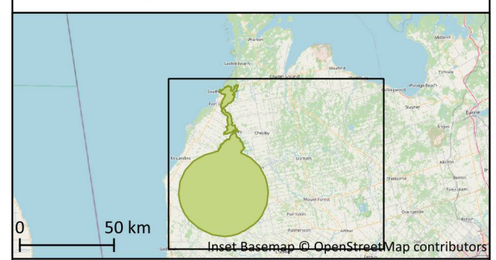
- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{ECO})
- Provincially Significant Wetland (PSW)
- Potential Reference Wetland
- Other Wetland
- Lake
- Watercourse
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary

Only PSWs located within the extent of the BIS study areas were labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

1:350,000

0 6 12 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; Trail Segments (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A033b	

NWMO Biodiversity Impact Studies

Riparian Buffers - AOI

Figure D-3a

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Water Feature (Wetland, Lake, or Watercourse)
- Wetlands Outside LSA_{ECO}
- Lake Shoreline
- Provincially Significant Wetland (PSW) Boundary

Riparian Buffers

- 15m
- 30m
- 100m
- 120m (PSW Only)

1:75,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment (NDMNRF); Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Ecosite data were created for the BIS Project. Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_D183a	

NWMO Biodiversity Impact Studies

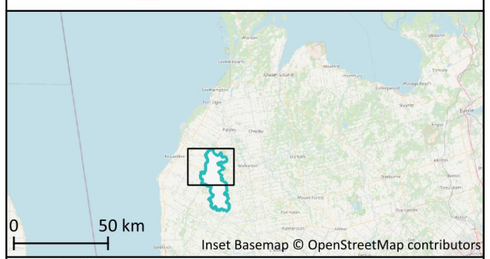
Riparian Buffers - North
LSA_{ECO}
Figure D-3b

- Local Study Area (LSA_{ECO})
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Water Feature (Wetland, Lake, or Watercourse)
- Wetlands Outside LSA_{ECO}
- Lake Shoreline
- Provincially Significant Wetland (PSW) Boundary

Riparian Buffers
- 15m
- 30m
- 100m
- 120m (PSW Only)

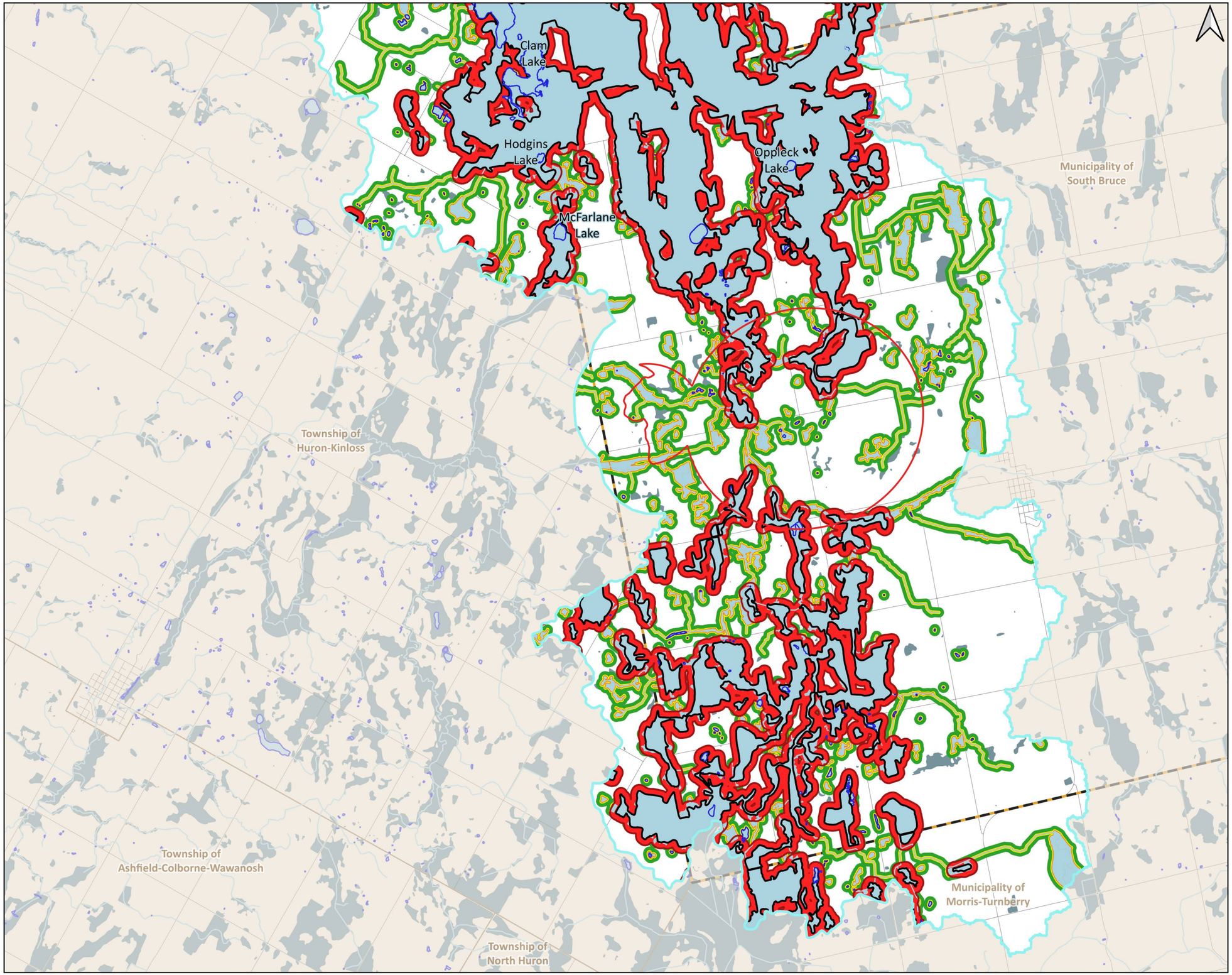
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0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment (NDMNRF); Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Ecosite data were created for the BIS Project. Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_D183b	



NWMO Biodiversity Impact Studies

Riparian Buffers - South LSA_{ECO}

Figure D-3c

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- South Bruce Boundary
- Municipal Boundary
- Local Road
- Water Feature (Wetland, Lake, or Watercourse)
- Wetlands Outside LSA_{ECO}
- Lake Shoreline
- Provincially Significant Wetland (PSW) Boundary

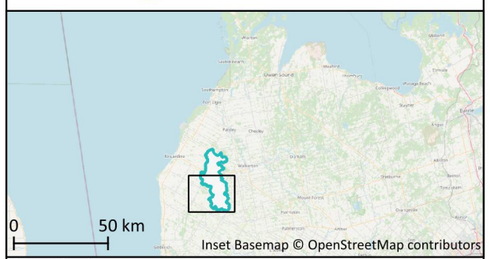
Riparian Buffers

- 15m
- 30m
- 100m
- 120m (PSW Only)

1:75,000

0 1 2 km

ZOETICA



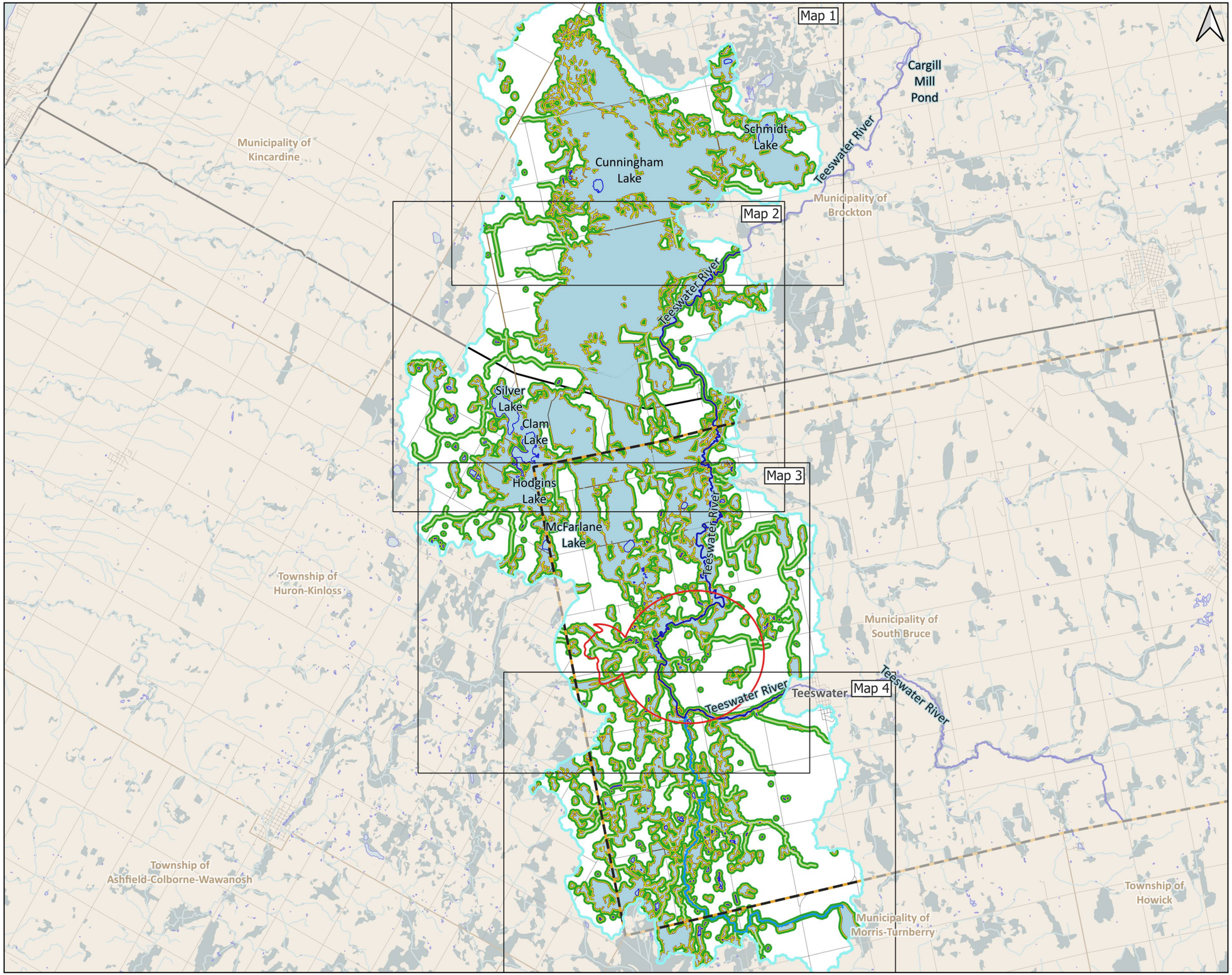
Data received from:
Ontario GeoHub — OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment (NDMNRF); Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Ecosite data were created for the BIS Project. Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_D183c	

NWMO Biodiversity Impact Studies

Ecosites within Riparian Buffers - Overview Map

Figure D-4a



- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Teeswater River
- Alps Creek
- Other Watercourse
- Lake Shoreline
- Water Feature (Wetland, Lake, or Watercourse)
- 15m Riparian Buffer
- 30m Riparian Buffer
- 100m Riparian Buffer

1:125,000

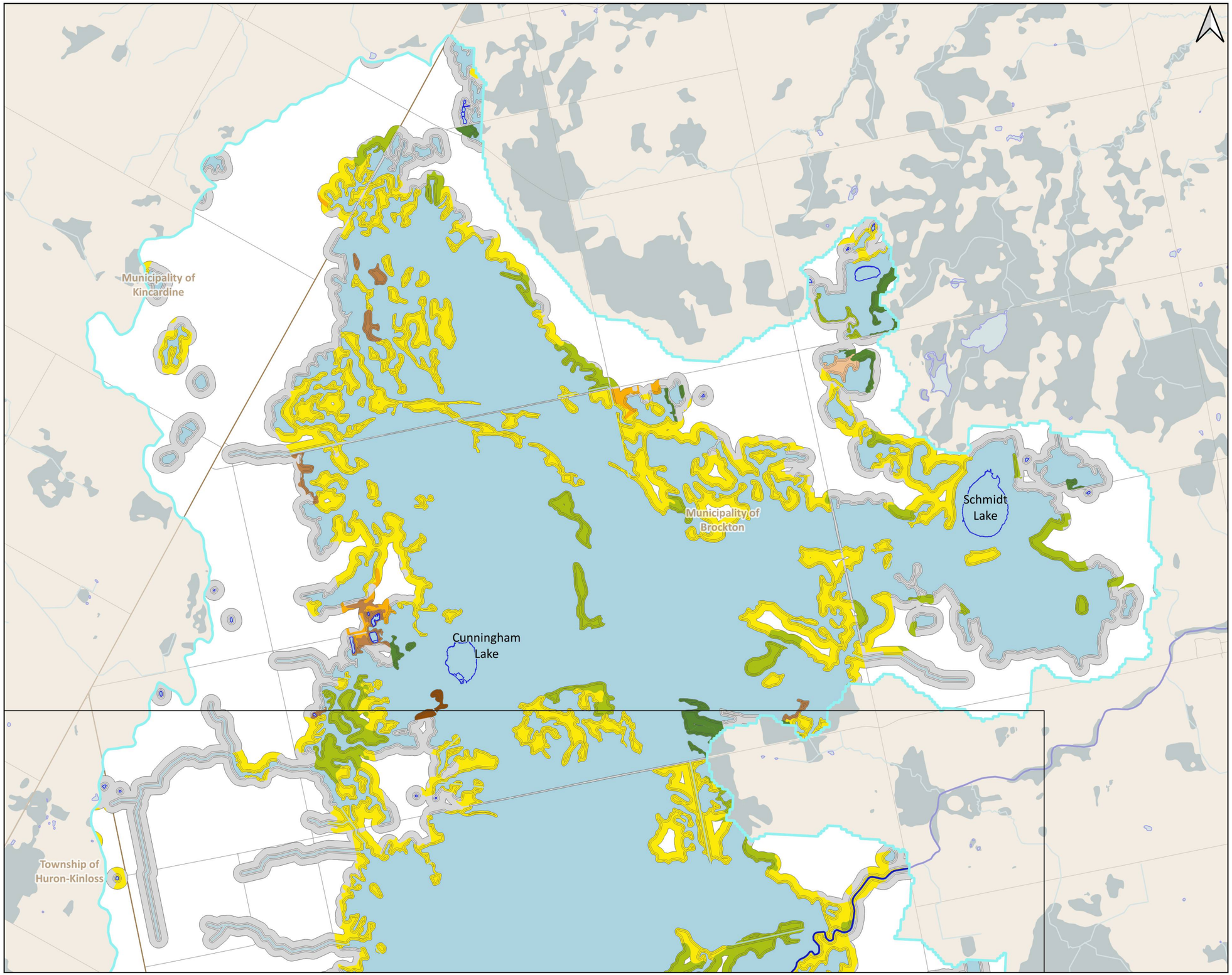
0 2 4 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; TerraNet Parcels
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_D190	



NWMO Biodiversity Impact Studies

Ecosites within Riparian Buffers - Map 1

Figure D-4b

- Local Study Area (LSA_{ECO})
- Municipal Boundary
- Local Road
- 15m, 30m, and 100m Buffers
- Teeswater River
- Other Watercourse
- Water Features
- Lake Shoreline
- Wetlands Outside LSA_{ECO}

Ecosite Group

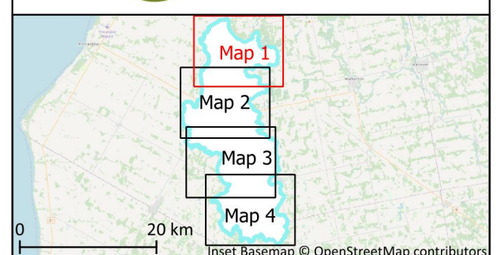
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Shrub
- Meadow
- Field
- *Unmapped*

Grey areas within the buffers represent areas that do not have ecosite mapping completed.

1:40,000

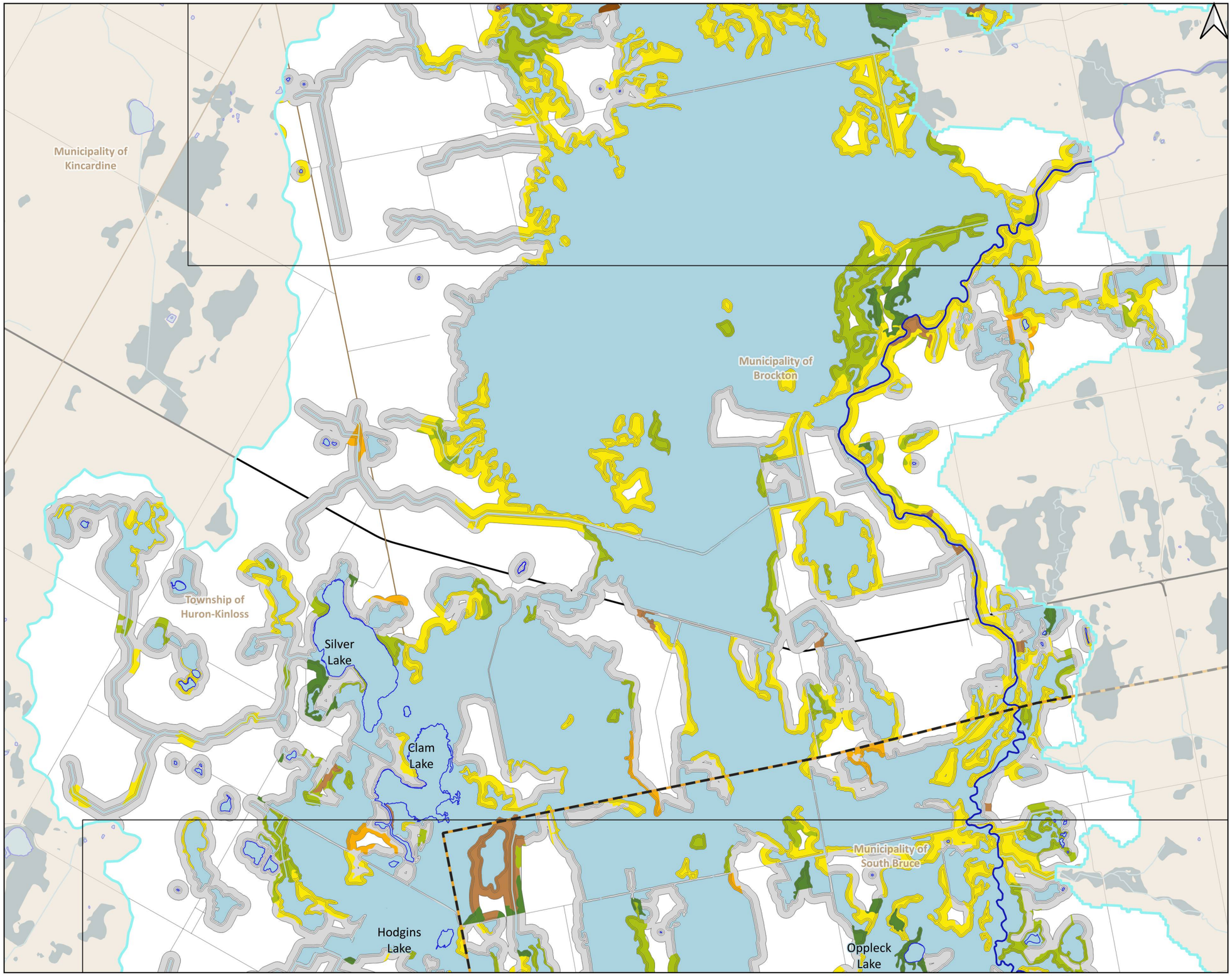
0 500 1,000 m

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; TerraNet Parcels
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_D190	



NWMO Biodiversity Impact Studies

Ecosites within Riparian Buffers - Map 2

Figure D-4c

- Local Study Area (LSA_{ECO})
- Municipal Boundary
- South Bruce Boundary
- Highway
- Local Road
- 15m, 30m, and 100m Buffers
- Teeswater River
- Other Watercourse
- Water Features
- Lake Shoreline
- Wetlands Outside LSA_{ECO}

Ecosite Group

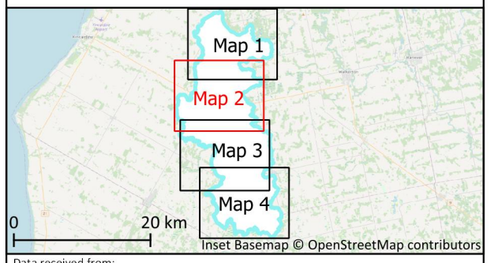
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Shrub
- Meadow
- Field
- *Unmapped*

Grey areas within the buffers represent areas that do not have ecosite mapping completed.

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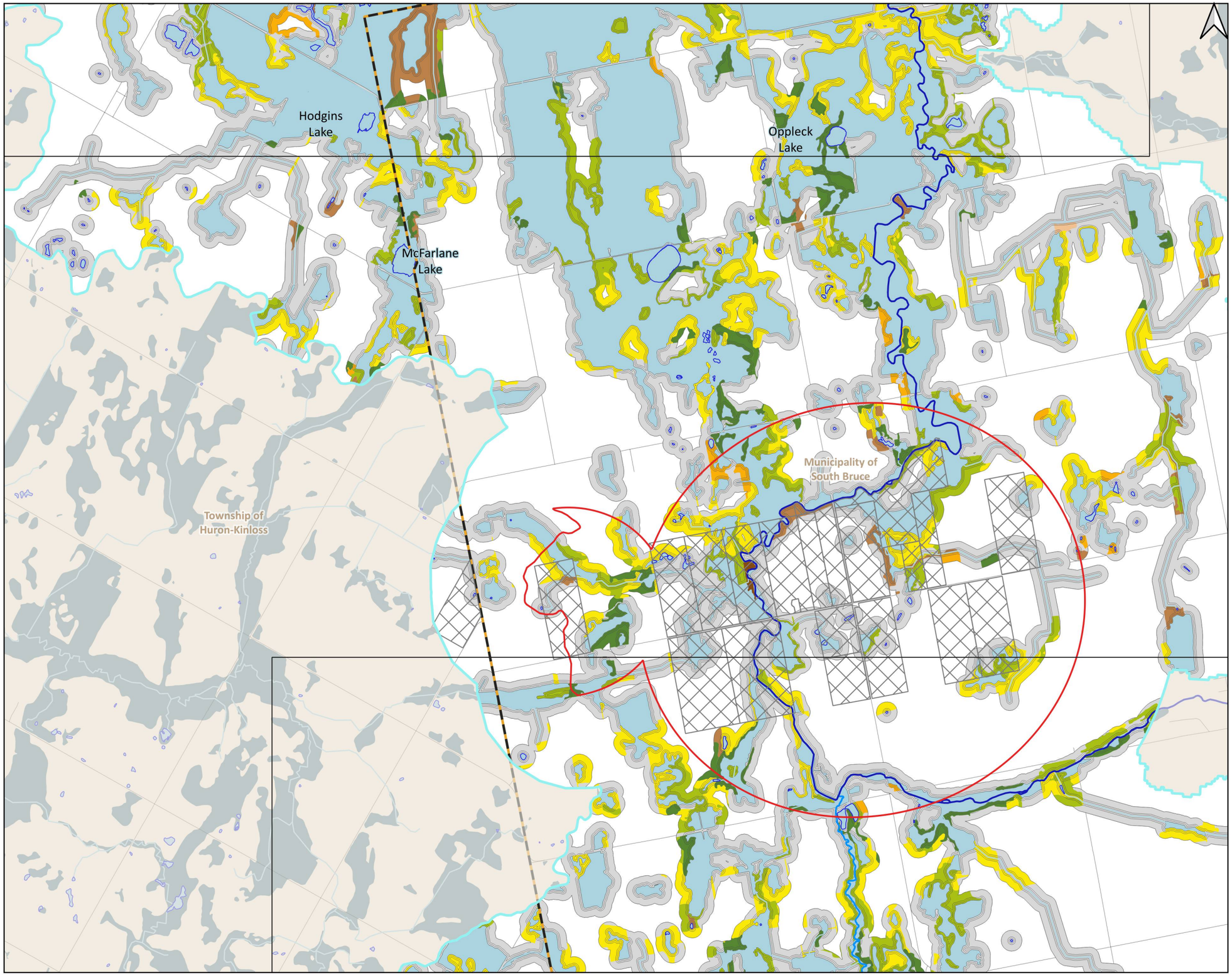
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NWMO — AOI; NWMO Purchased or Optioned Land; TerraNet Parcels
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

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NWMO Biodiversity Impact Studies

Ecosites within Riparian Buffers - Map 3

Figure D-4d

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Municipal Boundary
- South Bruce Boundary
- Local Road
- 15m, 30m, and 100m Buffers
- Teeswater River
- Alps Creek
- Other Watercourse
- Water Features
- Lake Shoreline
- Wetlands Outside LSA_{ECO}

Ecosite Group

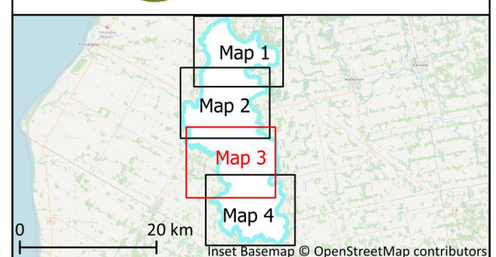
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Shrub
- Meadow
- Field
- *Unmapped*

Grey areas within the buffers represent areas that do not have ecosite mapping completed.

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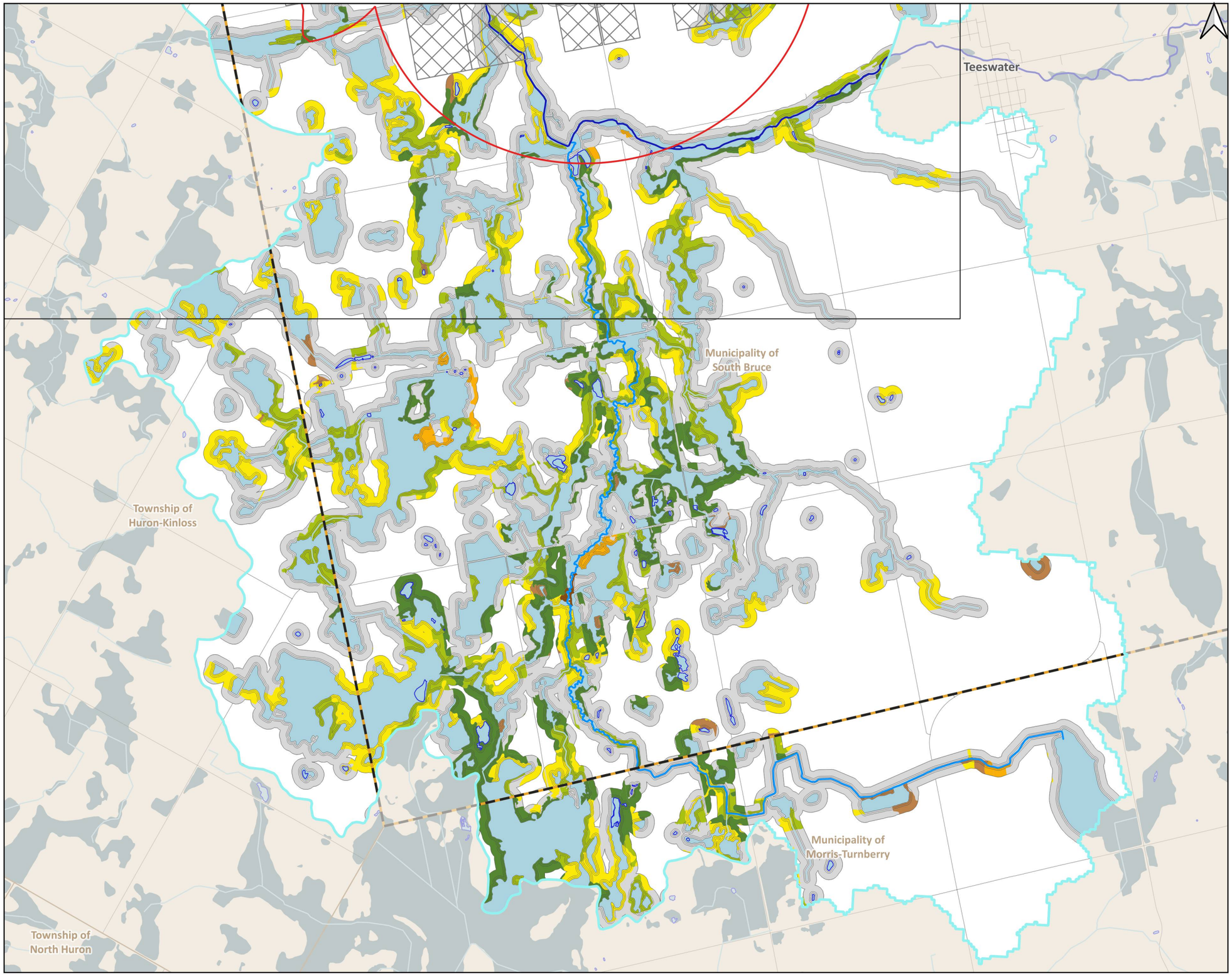
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NWMO — AOI; NWMO Purchased or Optioned Land; TerraNet Parcels
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NWMO Biodiversity Impact Studies

Ecosites within Riparian Buffers - Map 4

Figure D-4e

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- NWMO Purchased or Optioned Land
- Municipal Boundary
- South Bruce Boundary
- Local Road
- 15m, 30m, and 100m Buffers
- Teeswater River
- Alps Creek
- Other Watercourse
- Water Features
- Lake Shoreline
- Wetlands Outside LSA_{ECO}

Ecosite Group

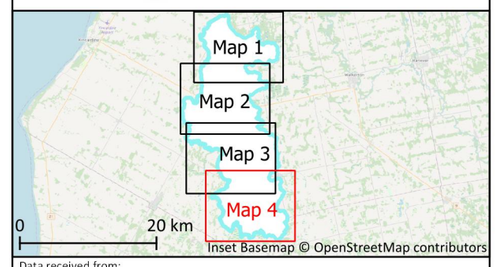
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Shrub
- Meadow
- Field
- *Unmapped*

Grey areas within the buffers represent areas that do not have ecosite mapping completed.

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Data received from:
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NWMO — AOI; NWMO Purchased or Optioned Land; TerraNet Parcels
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

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NWMO Biodiversity Impact Studies

Ecosites within PSW Buffers - Overview Map

Figure D-5a

Map 1
Map 2
Map 3
Map 4
Municipality of Kincardine
Township of Huron-Kinloss
Township of Ashfield-Colborne-Wawanosh
Municipality of Brockton
Municipality of South Bruce
Township of Howick
Municipality of Morris-Turnberry
Cargill Mill Pond
Schmidt Lake
Cunningham Lake
Silver Lake
Clam Lake
Hodgins Lake
McFarlane Lake
Teeswater
Teeswater River

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Watercourse
- Teeswater River
- Alps Creek
- Lake
- 0-120m Buffer
- Wetlands Outside LSA_{ECO}

Provincially Significant Wetland (PSW)

- Chepstow Swamp
- Greenock Swamp Wetland Complex
- Kinloss Creek
- Teeswater Wetland Complex
- Wingham Wetland Complex
- Other PSWs

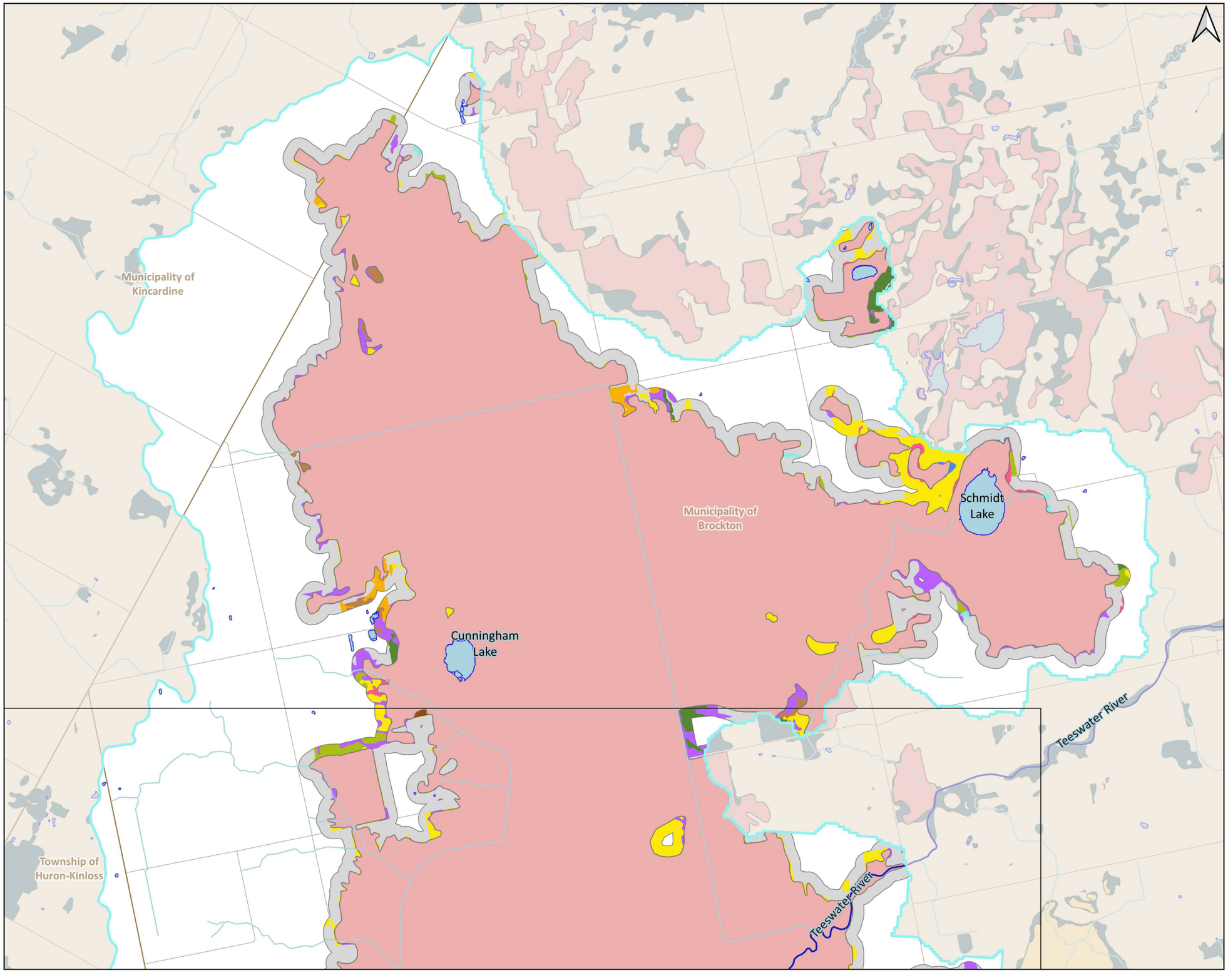
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ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
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NWMO — AOI; NWMO Purchased or Optioned Land; TerraNet Parcels
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NWMO Biodiversity Impact Studies

Ecosites within PSW Buffers - Map 1

Figure D-5b

- Local Study Area (LSA_{ECO})
- Municipal Boundary
- Local Road
- Teeswater River
- Other Watercourse
- Lake
- 0-120m Buffer
- Wetlands Outside LSA_{ECO}

Provincially Significant Wetland (PSW)

- Chepstow Swamp
- Greenock Swamp Wetland Complex

Ecosite Group

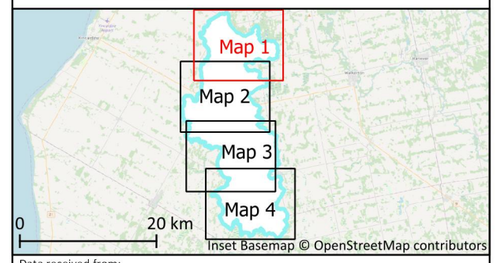
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field
- *Unmapped*

Grey areas within the buffer represent areas that do not have ecosite mapping completed.

1:40,000

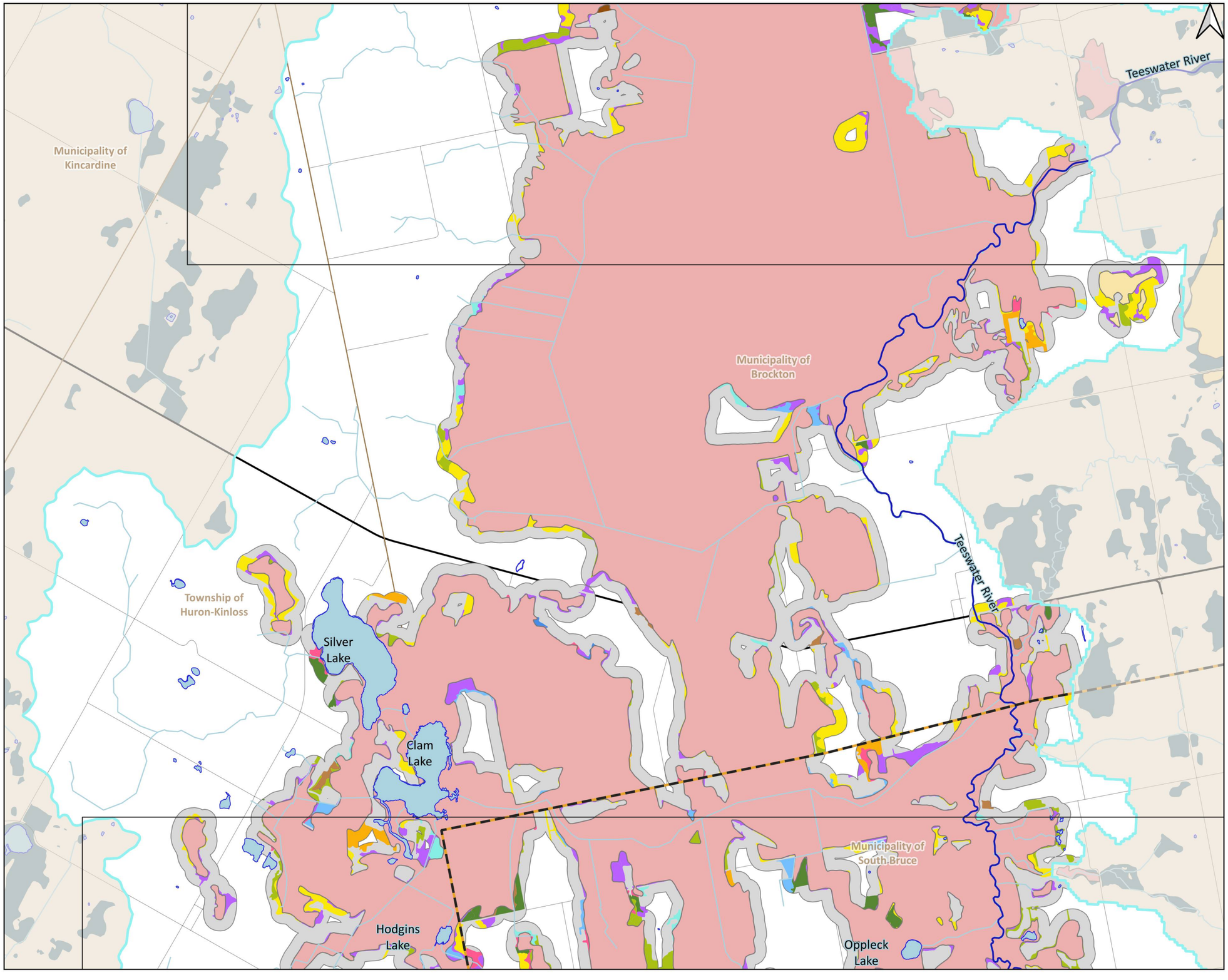
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NWMO — AOI; NWMO Purchased or Optioned Land; TerraNet Parcels
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NWMO Biodiversity Impact Studies

Ecosites within PSW Buffers - Map 2

Figure D-5c

- Local Study Area (LSA_{ECO})
- Municipal Boundary
- South Bruce Boundary
- Highway
- Local Road
- Teeswater River
- Other Watercourse
- Lake
- 0-120m Buffer
- Wetlands Outside LSA_{ECO}

Provincially Significant Wetland (PSW)

- Chepstow Swamp
- Greenock Swamp Wetland Complex

Ecosite Group

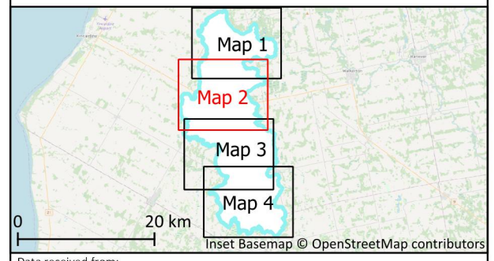
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field
- *Unmapped*

Grey areas within the buffer represent areas that do not have ecosite mapping completed.

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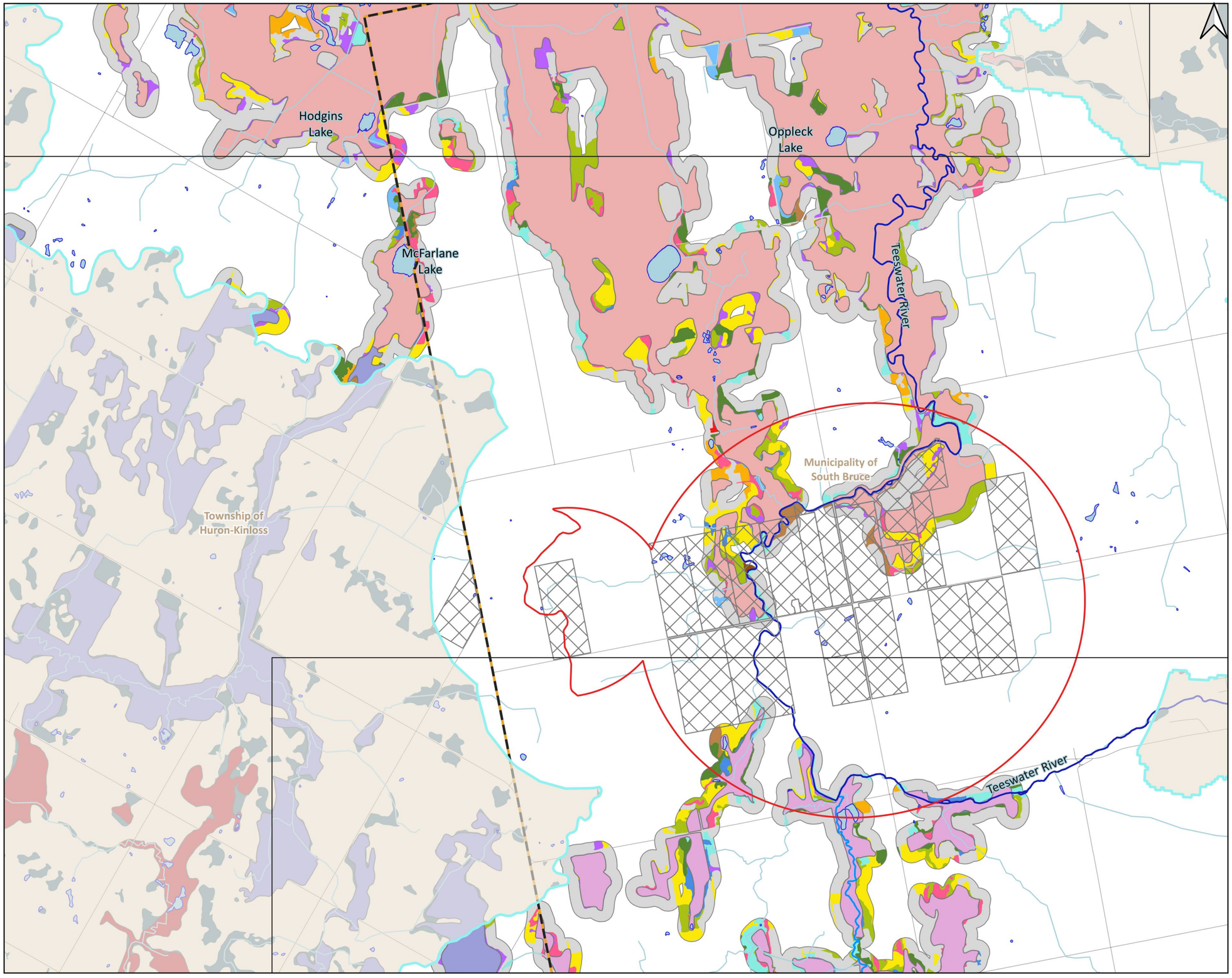
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NWMO — AOI; NWMO Purchased or Optioned Land; TerraNet Parcels
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

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NWMO Biodiversity Impact Studies

Ecosites within PSW Buffers - Map 3

Figure D-5d

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Municipal Boundary
- South Bruce Boundary
- NWMO Purchased or Optioned Land
- Local Road
- Teeswater River
- Alps Creek
- Other Watercourse
- Lake
- 0-120m Buffer
- Wetlands Outside LSA_{ECO}

Provincially Significant Wetland (PSW)

- Greenock Swamp Wetland Complex
- Kinloss Creek
- Teeswater Wetland Complex
- Other PSWs

Ecosite Group

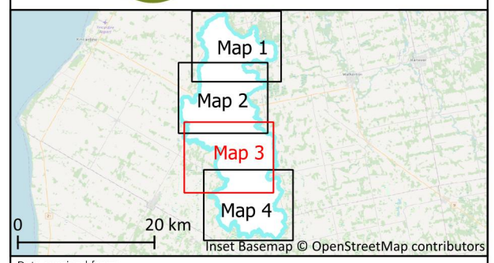
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field
- *Unmapped*

Grey areas within the buffer represent areas that do not have ecosite mapping completed.

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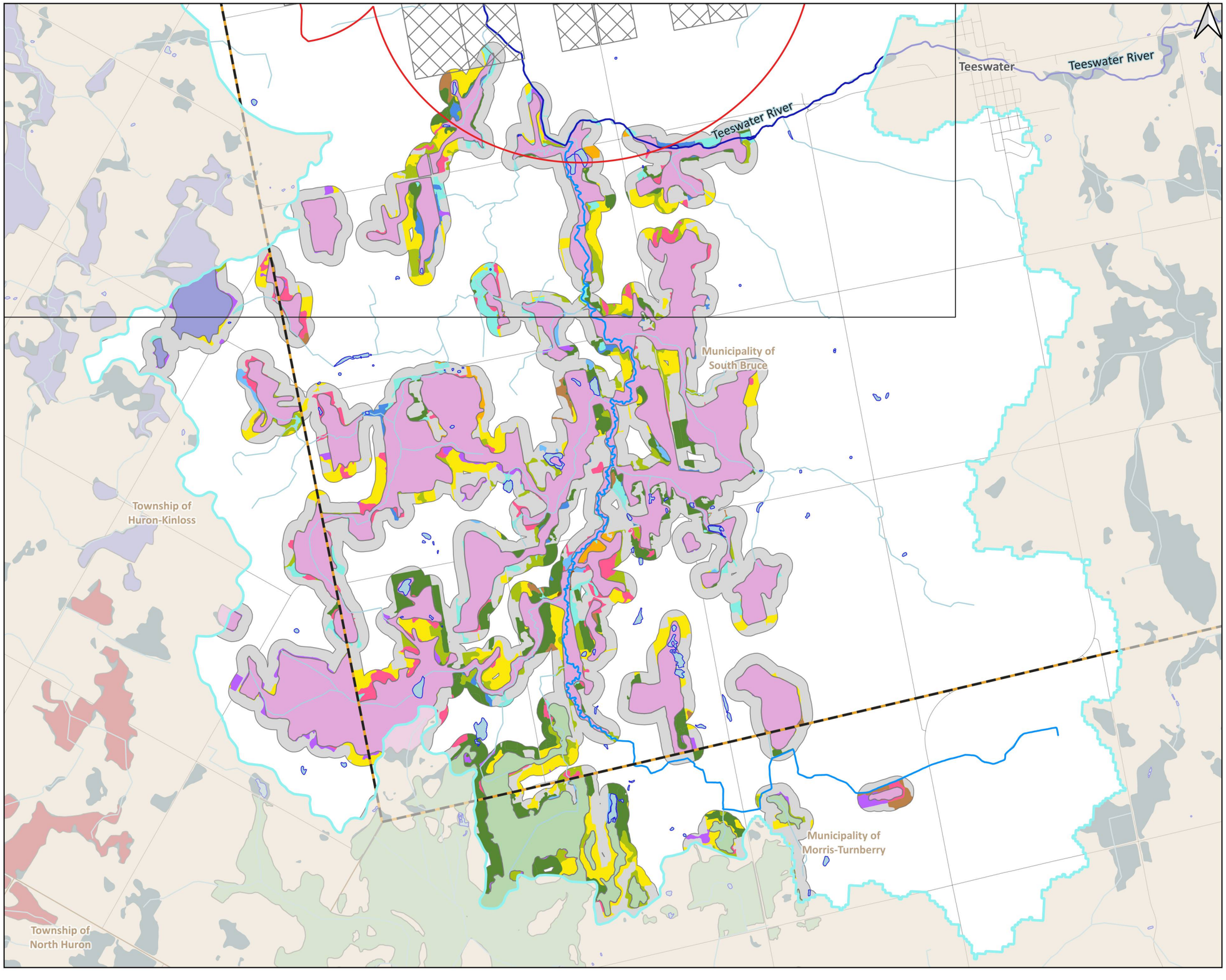
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NWMO — AOI; NWMO Purchased or Optioned Land; TerraNet Parcels
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NWMO Biodiversity Impact Studies

Ecosites within PSW Buffers - Map 4

Figure D-5e

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Municipal Boundary
- South Bruce Boundary
- NWMO Purchased or Optioned Land
- Local Road
- Teeswater River
- Alps Creek
- Other Watercourse
- Lake
- 0-120m Buffer
- Wetlands Outside LSA_{ECO}

Provincially Significant Wetland (PSW)

- Kinloss Creek
- Teeswater Wetland Complex
- Wingham Wetland Complex
- Other PSWs

Ecosite Group

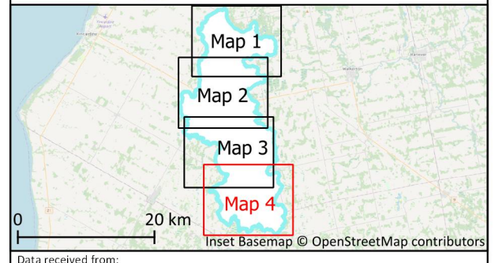
- Conifer
- Mixedwood
- Hardwood
- Plantation
- Conifer Swamp
- Mixedwood Swamp
- Hardwood Swamp
- Shrub Swamp
- Marsh
- Fen
- Shrub
- Meadow
- Field
- *Unmapped*

Grey areas within the buffer represent areas that do not have ecosite mapping completed.

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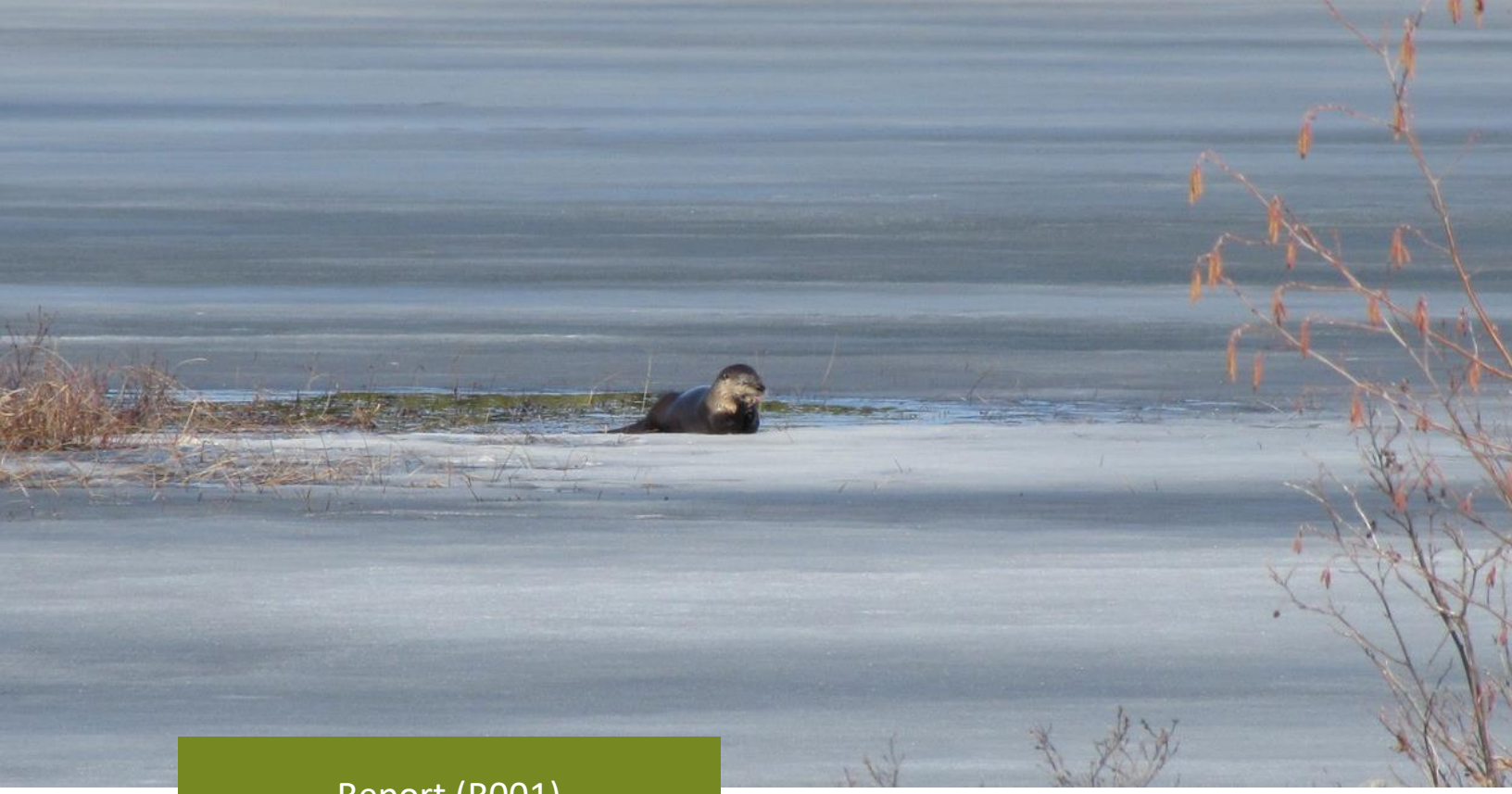
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NWMO — AOI; NWMO Purchased or Optioned Land; TerraNet Parcels
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December 12, 2023	Map ID: NWMO_BIS_D190	



Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 BASELINE REPORT (CHAPTER 4: MAMMALS)

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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GLOSSARY AND ABBREVIATIONS

Adaptive management	Adaptive management is defined consistent with the CNSC's definition of adaptive management (REGDOC-3.6): A planned and systematic process for continuously improving management practices [primarily environmental] by learning from their outcomes. [For an environmental assessment (EA),] it involves, among other things, the implementation of new or modified mitigation measures over the life of the project to address unanticipated environmental effects. Note: The need to implement adaptive management measures may be determined through an effective follow-up program.
AOI	Area of Interest
AHM	Aquatic Habitat Mapping
BIS	Biodiversity Impact Studies
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
BV	Biodiversity Value; The biotic environmental components that will be considered for study within the Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components.
Carnivore	An organism that mostly eats meat, or the flesh of animals
CNSC	Canadian Nuclear Safety Commission
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Critical habitat	Habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species (*Species at Risk Act*, S.C. 2002, c. 29). Identification of critical habitat is not a required component of a recovery strategy under the Ontario *Endangered Species Act*. However, the approach used to identify critical habitat, in conjunction with the best scientific information available, is recommended when developing a habitat regulation. A habitat regulation is a legal instrument under the *ESA* that prescribes an area that will be protected as the habitat of the species.
ECCC	Environment and Climate Change Canada
Ecodistrict	Third highest level of the ELC hierarchy (Crins et al. 2009). Subdivisions of an ecoregion, primarily identified by patterns of relief, geology, geomorphology, and substrate parent material.
Ecoregion	Second highest level of the ELC hierarchy (Crins et al. 2009). Large geographic areas primarily identified by sub-continental climatic regimes and bedrock geology.
Ecosite	Second lowest level of the ELC hierarchy (Crins et al. 2009). The land within an ecosite will generally contain similar substrate and vegetation.
Ecosystem services	Ecosystem services are the direct and indirect benefits to human well-being that the natural environment provides through healthy ecosystems. Ecosystem services include provisioning services such as the production of food and water, regulating services, such as the control of climate and disease, supporting services, such as nutrient cycles and oxygen production, and cultural services, such as spiritual and recreational benefits.

ECS	Ecoregional Criterion Schedule
eDNA	Environmental DNA (Deoxyribonucleic Acid)
ELC	Ecological Land Classification
EMBP	Environmental Media Baseline Program
ESA	Ontario *Endangered Species Act*
GBIF	Global Biodiversity Information Facility
GSWC	Greenock Swamp Wetland Complex
IA	Impact Assessment
LSA	Local Study Area
MECP	Ministry of the Environment, Conservation and Parks
MNRF	Ontario Ministry of Natural Resources and Forestry (formerly Ministry of Northern Development, Mines, Natural Resources and Forestry [NDMNRF])
NBCP	Toronto Zoo's Native Bat Conservation Program
NDMNRF	See entry for "MNRF"
NHIC	Ontario Natural Heritage Information Centre
NWMO	Nuclear Waste Management Organization
Restricted Species	Restricted species are commercially exploited or sensitive to disturbance; these species could be harmed if data are not stored and shared securely.
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose Traditional Territories include the Project location.
RSA	Regional Study Area
SAR	Species at Risk; For the purposes of the BIS, SAR include species listed under Schedule 1 of the federal *Species at Risk Act* (*SARA*), species designated as Species at Risk in Ontario (SARO) and listed under the provincial *Endangered Species Act, 2007* (*ESA*), and species assessed as Extirpated, Endangered, Threatened, or Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).
SARA	Federal *Species at Risk Act*
SARO	Species at Risk in Ontario
SON	Saugeen Ojibway Nation
SRANK	Subnational Conservation Rank; the conservation status of a species or vegetation community within a particular province, territory, or state. In Ontario, the NHIC assigns SRANKs using the best available information and considering factors such as abundance, distribution, population trends, and trends (NDMNRF 2021a). Species assigned S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), and SH (Possibly Extirpated) are considered provincially rare by the NHIC. See the NatureServe website for more information:

	https://www.natureserve.org/nsexplorer/about-the-data/statuses/conservation-status-categories
SWH	Significant Wildlife Habitat; Defined in the Ontario Provincial Policy Statement, 2020 as: *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. *Significant* – in regards to wildlife habitat, ecologically important in terms of features, functions, representation, or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Candidate SWH are areas that meet the ELC ecosite code(s) and/or habitat criteria outlined in the SWH ecoregional criterion schedule (ECS). Confirmed SWH are areas that meet the defining criteria outlined in the SWH ECS. Detailed field investigations are usually needed to confirm SWH.
TEM	Terrestrial Ecosystem Mapping
The Project	The Adaptive Phased Management Project is the Deep Geological Repository (DGR) and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines for Designated Projects Subject to the *Impact Assessment Act and the Nuclear Safety and Control Act*
Ungulate	The term roughly means "being hoofed" or "hoofed animal"
VC	Valued Component. For impact assessments of designated projects under the *Impact Assessment Act*, the Agency's Glossary of Terms defines VCs as "environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties. Valued components may be identified as having scientific, biological, social, health, cultural, traditional, economic, historical, archaeological and/or aesthetic importance."
WMU	Wildlife Management Unit

1.0 INTRODUCTION

Mammals play important roles in ecosystems and ecological communities. For example, mammals are integral to food webs as grazers, ecosystem engineers, and predators (Krebs et al. 2001, Baruzzi and Krofel 2017). Humans value mammals for various reasons, including for consumption as food, recreation (i.e., photographic tourism), and philosophical and spiritual reasons (Kellert et al. 1996, Boesch et al. 2017). Due to their importance to humans and ecosystems, it is important to consider the perspectives and values of First Nations, Métis, and local people when determining which values to study, and to ensure that impacts of proposed projects on mammal species and their habitats of importance do not contribute to further declines in species of conservation concern or those exhibiting population declines.

The Canadian Nuclear Safety Commission's (CNSC) Guidance on *Deep Geological Repository Site Characterization* includes wildlife, terrestrial habitat, and Species at Risk (SAR) as elements of terrestrial ecology that should be characterized in the Area of Interest (AOI (CNSC 2018)). In addition, the Tailored Impact Statement Guidelines Template (generic version, 'TISG Template[1]') identifies terrestrial wildlife and their habitat and SAR as elements of the biophysical environment that could be scoped into the Impact Assessment (IA) as Valued Components (VCs), which would require a detailed baseline description and project effects assessment in the impact statement (IAAC 2023). A full list of acts, regulations, and other biodiversity considerations is available in Appendix E of the *Biodiversity Impact Studies Southwestern Ontario Region: Best Practices and Preferred Approaches* (BPPA) Report (Zoetica 2021).

The main goal of this current Chapter 4 (Mammals) of the 2023 Biodiversity Impact Studies (BIS) Baseline Report is to provide information about the background context of mammals in the BIS study areas defined for the Saugeen Ojibway Nation (SON)-South Bruce siting area. This information will help to understand the "baseline" state of mammals in this region, as any future impacts or benefits from the Adaptive Phased Management Project (hereafter, 'the Project') evaluated in the IA would need to be considered as superimposed and contextualized within the scope of pre-existing trajectories and natural variability in population fluctuations. For the purposes of the Project's BIS, mammals are classified into five groups based on similar habitat requirements, function in the ecological community, or other aspects of ecology. These groups are:

1. Ungulates
2. Carnivores
3. Small Terrestrial Mammals
4. Semi-Aquatic Mammals
5. Bats

Common names and corresponding scientific names for animals mentioned in this report are included in Appendix A. Objectives and methods common to BIS studies for all mammal groups are included in Section 1.1 and 1.2. Sections 2.0 – 6.0 list additional objectives, methods, and results, if applicable, for the mammal groups under discussion within those sections.

1.1 General Objectives

The general objectives of mammal studies for the BIS are:

[1] Please see Chapter 1 for limitations of and planned updates to the TISG Template (IAAC 2023).

1. Determine the presence, distribution, and abundance of relevant Significant Wildlife Habitat (SWH) and other important habitat for select biodiversity values (BVs), with an emphasis on:
    a. Species of conservation concern, including SAR,
    b. Species of interest to stakeholders and rights-holders, and
    c. Indicator species.
2. Determine the potential presence and distribution of species of interest, including the select BVs listed in (1); and
3. Provide additional baseline data to help inform the Project's biodiversity IA and mitigation measures, and to assist in the potential development of monitoring program(s) to address environmental, regulatory, and stakeholder/rights-holder concerns.

The current Chapter 4 (Mammals) of the 2023 BIS Baseline Report begins to fulfil the requirements of the TISG Template required for mammals (see Appendix C in the BPPA Report (Zoetica 2021)).

While Zoetica™ has recommended the consideration of indicator species in the BPPA Report (Zoetica 2021), there are currently no candidate mammalian indicator species selected for the purposes of the 2023 BIS Baseline Report. Zoetica recommends that indicator species be determined after more information is gathered about potential Project impacts and species-habitat associations (e.g., through Tier 2 community composition studies) within the BIS study areas for mammals. See Section 4.2 of the BPPA Report for further discussion of indicator species (Zoetica 2021).

1.2 General Methods

Studies in 2021 and 2022 were directed at the collection of desk- and field- based Tier 1 data. This section addresses methods common to each mammal group. If BIS studies for a mammal group include additional methods, these are described within the mammal group-specific sections (Sections 2.0 - 6.0).

1.2.1 Study Areas

Descriptions and rationale for developing the BIS study areas for all BVs, including the mammal BVs, can be found in Section 3.0, Chapter 1 of the 2023 BIS Baseline Report, and Section 5.2 of the BPPA Report (Zoetica 2021). If the study area for a specific mammal group has additional notes, these are included within the group-specific sections of this report.

1.2.2 Collation of Species Observations and Habitat Data

Desk-based investigations of mammals began with identification of potential species of interest that may occur within the BIS study areas. Refer to Appendix D and Section 3.1 in the BPPA Report (Zoetica 2021) for a comprehensive list of SAR, including at-risk mammal species, and the methods used to compile this list[2]. Provincially rare species are indicated by their subnational rank (SRANK: S1, S2, S3, SH) and tracked by the Ontario Natural Heritage Information Centre (NHIC).

Zoetica proceeded with desk-based research and mapping by collating existing data from government, citizen science, and other biodiversity databases. For this 2023 BIS Baseline Report, data sources for

[2] For the purposes of the 2023 Baseline Report, conservation statuses described in text for at-risk species refer to their Species at Risk in Ontario (SARO) listings unless otherwise indicated. Conservation statuses are from the NHIC's Ontario species list, current to March 1, 2023, and updated for any discrepancies with provincial and federal SAR listings up to August 15, 2023. As such, species and status listings may differ from those presented in Zoetica's 2021 BPPA Report (Zoetica 2021).

verified species and habitat records included the NHIC; the Ontario Ministry of Natural Resources and Forestry (MNRF), and Global Biodiversity Information Facility (GBIF). As these datasets periodically pull observations from other biodiversity-related studies and programs (e.g., iNaturalist), they were deemed a good starting point to describe the biodiversity of mammal species and their habitats found or likely to be found in the study areas. In addition, Zoetica investigated findings from the previous preliminary environmental studies conducted for the SON-South Bruce siting area (Tulloch Environmental 2020, 2021). **Table 1-1** summarizes the datasets, data layers, and reports investigated for mammal species observations and habitat data for the 2023 BIS Baseline Report. The datasets listed were also analyzed for other BVs (discussed in other BIS chapters). Data reported on maps were limited to observations from 1970 onward as older observations were considered historic and not as reliable. See also Appendix A, Chapter 1 for data quality scoring.

Table 1-1 Spatial datasets analyzed and mapped (where available) for different mammal groups for the 2023 BIS baseline report.

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains Relevant[1] Data?
Tulloch Environmental *preliminary environmental studies for the Project*	July 2020 Site Reconnaissance (Tulloch Environmental 2020)	Report	10/2020	N
	October 2020 Natural Heritage Features (Tulloch Environmental 2021)	Report	04/2021	Y
Ontario Natural Heritage Information Centre (NHIC)	Species Occurrences	Shapefile	12/2020	N
	Wildlife Concentration Area Observation	Shapefile	12/2020	N
Ontario Ministry of Natural Resources and Forestry (MNRF)	Wildlife Activity Site	Shapefile	12/2020	N
	Wildlife Activity Area	Shapefile	12/2020	Y
	Karst	PDF Map	08/2022	N
	Abandoned Mines Information System	Geodatabase	03/2020	Y
	Beaver Dam - Discontinued	Shapefile	10/2021	Y
Global Biodiversity Information Facility (GBIF)	Species Occurrences	Comma Separated Values	10/2021	Y
Environment and Climate Change Canada (ECCC) and Ontario Ministry of the Environment, Conservation and Parks (MECP)[1]	Federal and Provincial SAR Recovery Strategies	Reports	Various	Y

Notes:
1. Zoetica determined dataset relevance based on geographic and temporal relevance, as well as relevance to mammals. For example, data that were not within the relevant BIS study areas, data that were too old to be considered relevant, or data that did not include records of mammal species were labelled "N" for not containing relevant data.
2. SAR recovery strategies are published by DFO and MNRF, but authors may differ. Refer to Appendix D of Zoetica's BPPA Report (Zoetica 2021) for a full list of potentially occurring SAR that had provincial and/or federal recovery strategies available at the time of writing the BPPA Report (note: new documents are continually posted on the SARO website and *SARA* Public Registry). The most updated version of the recovery strategies for relevant species was reviewed and cited in this report.

If additional datasets relevant to species in applicable study areas are identified, they will be investigated in future years of the BIS baseline program. Future data collection overlapping with the BIS study areas may also provide data or data sources that can be integrated into future iterations of baseline reports.

1.2.3 Tier 1 Studies

Field studies conducted in 2022 focused on collecting Tier 1 foundational habitat data and species detections through environmental DNA (eDNA) metabarcoding[3] studies. Each field team also collected incidental observations of biodiversity, including mammals. Detailed methods for the Tier 1 studies are available in the *Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design* (BPD) Report and associated Standard Operating Procedures (SOPs) (Zoetica 2022). In addition to the utility of each study for understanding mammals and mammal habitat in the BIS study areas, incidental mammal observations collected during the terrestrial and aquatic field studies are also informative in describing biodiversity. Field data, once quality checked by the field data collection contractor, were provided to Zoetica for data analysis and interpretation. Data reviewed by Zoetica were assumed to be cleaned following a Quality Assurance / Quality Control procedure undertaken by the field data collection contractor and error-free.

1.2.3.1 Terrestrial Ecosystem Mapping

Terrestrial Ecosystem Mapping (TEM) work completed to date is described in Appendix B, Chapter 1. The refined ecosite dataset resulting from desk-based TEM work was used for delineating various types of ecosites used in planning other Tier 1 studies (e.g., Aquatic Habitat Mapping (AHM) studies (see Appendix D, Chapter 1) and determining candidate SWH for various BVs (see Appendix C, Chapter 1)).

1.2.3.2 Identification of Candidate SWH

Desk- and field-based candidate SWH identification work completed to date is described in Appendix C, Chapter 1. SWH types of relevance to ungulates, carnivores, and bats are discussed in Sections 2.1, 3.1, and 6.1 of this report. The Province of Ontario has no specific SWH assignments for small terrestrial mammals and semi-aquatic mammals.

1.2.3.3 Aquatic Habitat Mapping

AHM work completed to date is described in Appendix D, Chapter 1. Although AHM is focused on characterization of fish habitat in watercourses, waterbodies (ponds, lakes), and wetlands in the relevant aquatic study areas (see Section 3.0, Chapter 1), these data will also help identify important habitat for animals, including mammals, with aquatic or semi-aquatic life history components.

1.2.3.4 Environmental DNA Metabarcoding

eDNA work completed to date is described in Appendix E, Chapter 1. The two vertebrate primers used for eDNA studies were primarily intended to capture aquatic and semi-aquatic species such as fish, amphibians, and turtles (see Section 2.4 of the BPD Report (Zoetica 2022)); however, the primer may also detect mammal species.

1.2.4 Mapping Considerations

To protect sensitive species and ecosystems, spatial data and 2022 field data pertaining to provincially tracked (at-risk and rare) species and wildlife concentration areas (e.g., bat roosts) follows NHIC sensitivity standards and is not detailed enough to allow for precise geolocation.

[3] In all sections of this 2023 BIS Baseline Report, where eDNA studies and results are noted, they refer to the use of eDNA in combination with metabarcoding for multi-species identification.

Field crews recorded incidental observations during Tier 1 baseline field programs and were noted on different data forms (Incidental Observation Form or noted in TEM, AHM, or eDNA survey forms). Incidental observations varied in method of observation (audio, visual, etc.) and life history stage of organisms, and may have been recorded in transit to a site and thus not associated with habitat data. Expertise in species identification may have varied among field contractors working on different field programs. Thus, all pertinent information may not have been available (e.g., observation type, activity, demographics) or collected in a directly comparable manner (e.g., quantity). For mapping and interpretation purposes, Zoetica defaulted to 'unspecified' observation type, count of one individual, and adult individuals unless otherwise indicated. Zoetica also assumed one individual when a singular observation (e.g., "coyote") was recorded in the field notes, and more than one individual if plural observations (e.g., "coyotes") were recorded.

2.0 UNGULATES

2.1 Introduction

Ungulates are often important in IAs because of their ecological, economic, and human importance. Ungulates are "ecosystem engineers" that can substantially alter the environment by modifying vegetation, soil, and aquatic ecosystems through their behaviours, such as wallowing, rooting, urinating, excreting, grazing, and trampling (summarized in Baruzzi and Krofel 2017). The SON-South Bruce siting area falls within Cervid Ecological Zone (CEZ) E3 and Wildlife Management Unit (WMU) 84. These management zones contain important sustaining areas for wildlife such as feeding, wintering and calving sites for deer. White-tailed deer is the only native species of ungulate known to occur in and around the SON-South Bruce siting area. White-tailed deer is not listed as at-risk under Species at Risk in Ontario (SARO) or the Federal *Species at Risk Act* (*SARA*), nor is it recommended for listing by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

White-tailed deer are part of Ontario's wildlife management program (MNRF 2019a) and are used as indicator species for the Southern Region of Ontario (including the Great Lakes-St. Lawrence Forest Region) for the purposes of forest management (Holloway et al. 2004, MNRF 2015). White-tailed deer populations have been increasing in Ontario since the 1980s due to several factors:

- institution of a selective harvest system that protected adult females and improved reproductive rates;
- prolonged milder winters associated with climate change that decreased winter mortality and increased fawn production and survival;
- changes in the agricultural industry that resulted in crop fields being a valuable source of winter food for deer;
- land restoration programs that have generally improved deer habitat throughout southwestern and southern Ontario;
- prohibition of hunting activities on an increasing number of private properties (thus creating deer refuge areas); and
- successful efforts to control illegal harvesting of deer (Government of Ontario 2007).

White-tailed deer provide social and economic benefits to Ontario, with millions of dollars generated annually through hunting, wildlife-viewing, and tourism (MNRF 2019b). However, in southwestern Ontario, human-deer conflicts occur and include vehicle collisions, damage to agricultural crops and farming infrastructure, damage to suburban and residential property, and over-browsing in protected areas that can alter ecological processes and degrade SAR habitat (MNRF 2019b). Hunting of white-tailed deer is permitted in hunting areas within WMU 84 (MNRF 2020) and deer hunting (for sport and food) is a popular activity in the region. White-tailed deer generally hold cultural, spiritual, and social significance for Indigenous communities in Ontario, and venison is described as a sacred food for local Indigenous people in Youngblood (2017). Further engagement with local stakeholders and rights-holders is needed to ascertain the importance of white-tailed deer in the SON-South Bruce siting area.

Several SWH types apply to ungulates. Upon investigation of the SWH Ecoregional Criterion Schedule for Ecoregion 6E (hereafter '6E ECS', there are five ungulate-related SWH types of potential relevance to the SON-South Bruce siting area:

- Deer Winter Congregation Areas
- Deer Yarding Areas
- Deer Movement Corridors
- Seeps and Springs
- Special Concern and Rare Wildlife Species (OMNRF 2015).

The latter is not relevant as there are no Special Concern or provincially rare ungulate species expected within the BIS study areas; however, should provincial conservation statuses or subnational ranks change in the future, habitats for these species will need to be considered. All other SWH habitat types listed above apply to white-tailed deer.

Further details about candidate SWH investigations conducted to date and rationale for inclusion (or exclusion) of SWH types listed in the 6E ECS are presented in Appendix C, Chapter 1.

2.1.1 Objectives

All General Objectives listed in Section 1.1 apply to ungulates.

2.2 Methods

2.2.1 Study Areas

The BIS study areas for ungulates include a Local Study Area (LSA) defined as the terrestrial LSA (LSA_{TER}), and a Regional Study Area (RSA) defined as the RSA_{UNG}. A description and rationale for developing ungulate study areas can be found in Section 3.0, Chapter 1 of the 2023 BIS Baseline Report, and Section 5.2.2.4 of the BPPA Report (Zoetica 2021).

2.2.2 Presence, Distribution, and Abundance of Important Habitat

Collation of both existing and Tier 1 habitat data for ungulates proceeded as described in Sections 1.2.2 and 1.2.3.

2.2.3 Presence and Distribution of Species of Interest

Collation of existing observations and Tier 1 incidental observations for ungulates proceeded as described in Sections 1.2.2 and 1.2.3.

2.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of the BIS study areas.

2.3 Results

2.3.1 Presence, Distribution, and Abundance of Important Habitat

2.3.1.1 General Habitat Associations

Future Tier 2 studies aim to determine ungulate habitat associations within the BIS study areas. Discussion of general habitat associations will be included in future BIS Baseline Reports after Tier 2 studies have been completed (if the SON-South Bruce siting area is selected for the Project).

2.3.1.2 Significant and Other Important Wildlife Habitats

The MNRF has identified five White-tailed Deer Wintering Areas within the LSA_{TER} and RSA_{UNG}, some of which are considered confirmed SWH (see Section 4.1.13 and Figure D-12 in Appendix C, Chapter 1). Based on ecosite analyses, Deer Winter Congregation Areas, Deer Winter Yarding Areas, and Seeps and Springs could occur throughout the AOI and LSA_{TER}. A detailed discussion of candidate SWH within the LSA_{TER} is available in Appendix C, Chapter 1.

2.3.2 Presence and Distribution of White-tailed Deer

There are no existing observation data from the NHIC and GBIF datasets for ungulates within the AOI, LSA_{TER}, or RSA_{UNG}. During 2022 fieldwork, crews reported incidental observations of white-tailed deer (**Table B-1**).

2.4 Discussion

To meet the requirements of the TISG Template and the general objectives outlined in Section 1.1, the BIS Baseline Report presents results of desk-based ungulate habitat and species observations and preliminary results from Tier 1 terrestrial habitat assessments and incidental observations.

White-tailed deer was brought up as a potential indicator species during engagement (see Appendix B in the 2021 BPPA Report (Zoetica 2021)). White-tailed deer were observed during field work in 2022, and candidate and Confirmed SWH for white-tailed deer has been identified, specifically winter habitat (see Appendix C, Chapter 1). Other ungulates in the area may include wild pigs, which were added as Restricted invasive species under the Ontario *Invasive Species Act* in January 2022 (MNRF 2023). While there have been no records of wild pigs within the AOI, LSA_{TER}, or $RSA_{UNG,}$ wild pigs are important to monitor because they threaten native ecosystems (NDMNRF 2021b) and alter the behaviour of other wildlife (Lewis 2021). eDNA results did indicate presence of pig species, but these detections may indicate the presence of domestic pigs in farms that may interact with aquatic systems and allow for the transport of eDNA; these potential explanations are undergoing further investigation (see Section 5.2 of Appendix E, Chapter 1).

If the SON-South Bruce siting area is selected for additional baseline investigations for the Project, Tier 2 studies will aim to characterize ungulate population health more thoroughly within the AOI, LSA_{TER}, and RSA_{UNG}. Tier 2 studies may be designed based on results and needs identified from Tier 1, and study methods may include spotlight counts, camera surveys, and pellet group counts.

3.0 CARNIVORES

3.1 Introduction

Carnivores that occur in the SON-South Bruce siting area may be of importance to communities for hunting, trapping, and predator-prey dynamics. Larger carnivores are often considered keystone species as well as umbrella species; they are essential in regulating and maintaining ecosystems by keeping down herbivore populations that could otherwise graze or browse too heavily on vegetation and destroy community assemblages upon which other biodiversity values rely (e.g., (Noss et al. 1996). Saugeen Valley Conservation Authority (SVCA) staff noted that hunting is a popular activity in the region, and game mammals include coyotes and coyote-wolf hybrids. Further engagement with local stakeholders and rights-holders is needed to ascertain the importance of carnivore species in the SON-South Bruce siting area.

There are 12 terrestrial carnivore species that potentially occur in and around the SON-South Bruce siting area (see Section 5.2.3 of the BPPA report for a list of potentially occurring carnivore species (Zoetica 2021)). North American river otter and American mink, while carnivores, are considered in Section 5.0, Semi-Aquatic Mammals, due to their specific habitat associations with water and riparian areas, and due to the need to study these species using differing methods. Of the terrestrial carnivore species, three are designated as provincially and federally at risk: American badger (Southwestern Ontario population), eastern wolf, and gray fox. Cougar is listed as Endangered in Ontario, but data deficiencies have precluded a formal assessment of this species by COSEWIC.

Although black bears are omnivorous, they are taxonomically part of the order Carnivora and are grouped with carnivores for the purposes of the BIS. The methodology used for biodiversity baseline data collection and impact studies for black bears, if needed, and other members of the order Carnivora (i.e., carnivores) will generally be the same.

Within Ecoregion 6E, there are two types of SWH relevant to carnivores. First is Mast Producing Areas (for black bear). However, this designation only applies to Ecodistrict 6E-14, the Bruce Peninsula, which is outside of the RSA for carnivores (RSA_{CAR}). Tallgrass Prairie is a rare vegetation community – which may support the Endangered American badger. To date, no desk- or field-based observations have indicated the presence of candidate Tallgrass Prairie SWH within the AOI or LSA_{TER} (see Appendix C, Chapter 1, and Section 1.3.2, Chapter 2).

3.1.1 Objectives

All general objectives listed in Section 1.1 apply to carnivores.

3.2 Methods

3.2.1 Study Areas

The BIS study areas for carnivores include a local study area defined as the terrestrial LSA (LSA_{TER}) and a regional study area defined as the RSA_{CAR}. A description and rationale for developing carnivore study areas can be found in Section 3.0, Chapter 1 of the 2023 BIS Baseline Report, and Section 5.2.3.4 of the BPPA Report (Zoetica 2021).

3.2.2 Presence, Distribution, and Abundance of Important Habitat

Collation of both existing and Tier 1 habitat data for carnivores proceeded as described in Sections 1.2.2 and 1.2.3.

3.2.3 Presence and Distribution of Species of Interest

Collation of existing observations and Tier 1 incidental observations for carnivores proceeded as described in Sections 1.2.2 and 1.2.3.

Some carnivore species are secretive and elusive, therefore are difficult to detect. For these species, community surveys or questionnaires are recommended as a cost-effective way to gather preliminary information on species presence (RIC 1998, RISC 2007). The NWMO distributed 112 questionnaires via mail to properties within the LSA_{TER} with a known civic address. Questionnaires were based on a template available in the 2022 BPD Report and asked specifically about American badger and cougar sightings (Zoetica 2022).

3.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of the BIS study areas.

3.3 Results

3.3.1 Presence, Distribution, and Abundance of Important Habitat

3.3.1.1 General Habitat Associations

Future Tier 2 studies aim to determine carnivore habitat associations within the BIS study areas. Discussion of general habitat associations will be included in future BIS Baseline Reports after Tier 2 studies have been completed (if the SON-South Bruce siting area is selected for the Project).

3.3.1.2 Significant Wildlife Habitat

To date, desk- or field-based observations do not indicate the presence of important carnivore habitat within the AOI, LSA_{TER}, or RSA_{CAR} (see Appendix C, Chapter 1, and Section 1.3.2, Chapter 2).

3.3.2 Presence and Distribution of Species of Interest

3.3.2.1 Species of Conservation Concern

There are no verified occurrences of carnivore species of conservation concern within the AOI, LSA_{TER}, or RSA_{CAR} in the NHIC dataset. No carnivore species of conservation concern were detected during fieldwork in 2022. The NWMO received 14 responses to the carnivore questionnaire. Based on results of the survey, sightings of cougar and American badger occur within the LSA_{TER}. Thus, parts of the LSA_{TER} warrant further investigation for both species.

3.3.2.2 Species of Interest to Stakeholders and Rights-Holders, and Species of Potential Socio-economic Importance

At the time of writing the 2023 BIS Baseline Report (September 2023), Zoetica does not have sufficient information to identify carnivore species of interest to stakeholders and rights-holders in the SON-South Bruce siting area. Future iterations of the BIS Baseline Report will include details of the presence and distribution of any species of interest identified from further engagement.

3.3.3 Additional Baseline Data to Inform the IA

3.3.3.1 Community Characterization

Desk-based research indicated Canada lynx, fisher, and red fox observations in the RSA_{CAR}. None of these species are SAR or known species of interest. The fisher detection occurred in the past ten years, within the Greenock Swamp Wetland Complex (GSWC). The other detections either occurred before 1970 or did not have a date recorded for the observation. During 2022 fieldwork, crews reported incidental observations of coyote and fisher (**Table B-1**). eDNA did not detect mammalian carnivore species, although the genus *Canis* – which includes coyotes, wolves, and domestic dogs – was detected (see Appendix E, Chapter 1).

3.4 Discussion

To meet the requirements of the TISG Template and the general objectives outlined in Section 1.1, the BIS Baseline Report presents the results of desk-based carnivore habitat and species observations and preliminary results from Tier 1 terrestrial habitat assessments and incidental observations.

Changes in populations and occurrence of carnivores was brought up during engagement, although specific species and concerns were not detailed (see Appendix B of the BPPA report (Zoetica 2021)). To date, Tier 1 studies indicate the presence of two carnivore species based on incidental observations - coyote and fisher. Neither of these species is provincially rare, and carnivore SWH is not known to occur within the AOI, LSA_{TER}, or RSA_{CAR}. However, questionnaires indicated areas of the LSA_{TER} that warrant further investigation for American badger and cougar. If the SON-South Bruce siting area is selected for additional baseline investigations for the Project, Tier 2 studies will aim to characterize carnivore community composition more thoroughly within the AOI, LSA_{TER}, and RSA_{CAR}. More species may be detected as the BIS baseline program progresses and with continuing improvements with eDNA laboratory methods and bioinformatic analyses.

Tier 2 studies will be designed based on results from Tier 1, and may include snow track surveys, camera surveys, hair snag surveys, and aerial surveys. Sightings reported in community questionnaires will also be used to develop Tier 2 studies. Additional Tier 2 studies proposed to commence after site selection will aim to detect a wider variety of carnivores that inhabit areas within the RSA_{CAR} to aid in the community characterization included as part of the TISG Template. These sections will be included in future iterations of the BIS Baseline Report after Tier 2 surveys have been completed, if the SON-South Bruce siting area is selected for the Project.

4.0 SMALL TERRESTRIAL MAMMALS

4.1 Introduction

Small terrestrial mammals, even if not listed or protected by particular Acts, may be economically, socially, or culturally important. Small mammals can play a major ecological role as both consumers of vegetation and invertebrates, and prey items for carnivorous/omnivorous mammals, reptiles, and birds. Small mammals are thus integral to food web relationships and maintaining population levels of other biodiversity values. Hence, it is important that scoping of biodiversity values considers perspectives and values of First Nation, Métis, and local people when determining which values to study.

Small game and furbearers provide social and economic benefits to Ontario residents and tourists (MNRF 2019c); however, the prevalence of hunting/trapping of these species in the SON-South Bruce siting area requires further investigation. Youngblood (2017) reports that rabbit is one of the most common meat sources for local Indigenous people, and squirrel may also be harvested. Further engagement with local stakeholders and rights-holders is needed to ascertain the importance of small terrestrial mammals in the SON-South Bruce siting area. Engagement activities for the environmental baseline programs to date have not revealed community concerns specifically related to small terrestrial mammals beyond the general concerns expressed regarding the protection of SAR and the maintenance/enhancement of ecosystem resiliency.

There are 29 small- to medium-sized terrestrial mammal species that potentially occur in and around the SON-South Bruce siting area (see Section 5.2.4 of the BPPA report for a list of potentially occurring small terrestrial mammals (Zoetica 2021)). Additional small- to medium-sized mammal species such as beaver, muskrat, American water shrew, and star-nosed mole are considered in Section 5.0, Semi-Aquatic Mammals. Two species are provincially and federally listed: eastern mole and woodland vole are considered as Special Concern.

Small terrestrial mammals that are typically used as indicator species in the Southern Region (including the Great Lakes-St. Lawrence Forest Regions) of Ontario for the purposes of forest management include northern flying squirrel, southern flying squirrel, deer mouse, and southern red-backed vole (Holloway et al. 2004, MNRF 2015). Flying squirrel is also recognized as a keystone species due to its symbiotic relationship with mycorrhizal fungi and mature forests. Ontario's wildlife management program also includes snowshoe hare and gray squirrel as small game species (MNRF 2019a).

4.1.1 Objectives

All general objectives listed in Section 1.1 apply to small terrestrial mammals.

4.2 Methods

4.2.1 Study Areas

The BIS study areas for small terrestrial mammals include a local study area defined as the terrestrial LSA (LSA_{TER}). A description and rationale for developing small terrestrial mammal study areas can be found in Section 3.0, Chapter 1 of the 2023 BIS Baseline Report, and Section 5.2.4.4 of the BPPA Report (Zoetica 2021).

4.2.2 Presence, Distribution, and Abundance of Important Habitat

As there are no SWH indicated for small terrestrial mammals in the Criteria Schedule for Ecoregion 6E (OMNRF 2015), habitat mapping of potential SWH will not be undertaken for this group of BVs. Collation of other existing and Tier 1 habitat data for small terrestrial mammals proceeded as described in Sections 1.2.2 and 1.2.3.

4.2.3 Presence and Distribution of Species of Interest

Collation of existing observations and Tier 1 incidental observations for small terrestrial mammals proceeded as described in Sections 1.2.2 and 1.2.3.

4.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of the AOI and LSA_{TER}.

4.3 Results

4.3.1 Presence, Distribution, and Abundance of Important Habitat

4.3.1.1 General Habitat Associations

Based on investigations of the NHIC and MNRF wildlife datasets, there are no areas identified as important small terrestrial mammal habitat within the AOI or LSA_{TER}.

Future Tier 2 studies aim to determine small terrestrial mammal habitat associations within the BIS study areas. Discussion of general habitat associations will be included in future BIS Baseline Reports after Tier 2 studies have been completed if the SON-South Bruce siting area is selected for the Project.

4.3.1.2 Significant Wildlife Habitat

There are no SWH indicated for small terrestrial mammals in the 6E ECS (OMNRF 2015) as noted in Section 4.2.2.

4.3.2 Presence and Distribution of Species of Interest

4.3.2.1 Species of Conservation Concern

Preliminary desktop investigations made by Zoetica indicate that no small terrestrial mammal species of conservation concern are likely to be present in the LSA_{TER} due to requirements for specialized habitats that do not occur in the SON-South Bruce siting area (based on NHIC records). However, further research is needed to increase the confidence of this interpretation of existing information (e.g., by evaluating survey effort, locations, dates).

4.3.2.2 Species of Interest to Stakeholders and Rights-Holders, and Species of Potential Socio-economic Importance

At the time of writing the 2023 BIS Baseline Report (September 2023), Zoetica does not have sufficient information to identify the small terrestrial mammal species of interest to stakeholders and rights-holders in the SON-South Bruce siting area. Future iterations of the BIS Baseline Report will include details of the presence and distribution of any species of interest identified from further engagement.

4.3.3 Additional Baseline Data to Inform the IA

4.3.3.1 Community Characterization

A search of the NHIC and GBIF datasets revealed that there are no existing observation data of small terrestrial mammals within the AOI or LSA_{TER}. During field work in 2022, crews reported incidental observations of eastern chipmunk, raccoon, and red squirrel (**Table B-1**). eDNA detected short-tailed shrew, meadow vole, and raccoon in 2022 (see Appendix E, Chapter 1). Meadow vole, which was detected at 15 sites across the AOI, LSA_{AQU}, and RSA_{AQU}, has a barcode gap, increasing confidence in the validity of this detection (see Appendix A to Appendix E, Chapter 1).

4.4 Discussion

To meet the requirements of the TISG Template and the general objectives outlined in Section 1.1, the BIS Baseline Report presents the results of desk-based small terrestrial mammal habitat and species observations and preliminary results from Tier 1 studies and incidental observations.

Engagement activities conducted to date have not indicated particular concerns regarding small terrestrial mammals (see Appendix B of the BPPA report (Zoetica 2021)), but further engagement with stakeholders and rights-holders may reveal species of importance in the SON-South Bruce siting area. To date, three small terrestrial mammal species were observed incidentally during 2022 field work, and three species were detected with eDNA (see Appendix C to Appendix E, Chapter 1). None of the detected small terrestrial mammal species are provincially rare, and no small terrestrial mammal SWH is known to occur within the AOI or LSA_{TER}. However, if the SON-South Bruce siting area is selected for additional baseline investigations for the Project, Tier 2 studies will aim to characterize the small terrestrial mammal community more thoroughly within the AOI and LSA_{TER}. More species may be detected as the BIS baseline program progresses and with continuing improvements to eDNA laboratory methods and bioinformatic analyses.

Future work may include collaboration with the Project's Environmental Media Baseline Program (EMBP), as tissue sample collection will involve non-targeted small mammal trapping, which may allow for determining community composition and estimates of relative abundance in the AOI and LSA_{TER}. Additional Tier 2 studies may be designed based on results and needs identified from Tier 1. These sections will be included in future iterations of the BIS Baseline Report after Tier 2 surveys have been completed, if the SON-South Bruce siting area is selected for the Project.

5.0 SEMI-AQUATIC MAMMALS

5.1 Introduction

Semi-aquatic mammals, such as beaver, may have ecological and economic impacts, and are important to humans. Beavers are "ecosystem engineers" that can change the physical structure of the environment and they are also recognized as a keystone species (Naiman et al. 1988, Simberloff 1998). Ontario's wildlife management program for small game and furbearer species includes beaver; beaver trapping is an important traditional and commercial activity that helps to manage human-wildlife conflicts, as beavers and beaver dams can affect hydrology and cause damage to infrastructure (MNRF 2019a).

Beaver and muskrat are harvested by trappers in the SON-South Bruce siting area, predominantly on private land (Golder Associates 2014). Beavers generally hold cultural, spiritual, and social significance for Indigenous communities in Ontario, and beaver may still be harvested by local Indigenous people (Youngblood 2017). However, further engagement with local stakeholders and rights-holders is needed to ascertain the importance of beavers and other semi-aquatic mammal species in the SON-South Bruce siting area. In addition, engagement with municipalities to gather knowledge of trappers collecting beavers through applications with the municipality to remove problematic beavers and their dams would be informative.

Other than beaver, there are five semi-aquatic mammal species that potentially occur in and around the SON-South Bruce siting area (see Section 5.2.5 of the BPPA report for a list of potentially occurring semi-aquatic mammals (Zoetica 2021)) based on their species ranges, none of which are provincially or federally listed as SAR.

5.1.1 Objectives

Several studies have been designed to collect baseline data to help inform the Project's biodiversity IA. The objectives of semi-aquatic mammal studies for the BIS are to:

1. Achieve the general objectives listed in Section 1.1;
2. Determine the abundance and health of local beaver populations in the AOI, LSA_{AQU} and RSA_{SAM} compared to known estimates and trends in nearby and similar regions.

5.2 Methods

5.2.1 Study Areas

The BIS study areas for semi-aquatic mammals include a local study area defined as the aquatic LSA (LSA_{AQU}) and a regional study area defined as the RSA_{SAM}. A description and rationale for developing semi-aquatic mammal study areas can be found in Section 3.0, Chapter 1 of the 2023 BIS Baseline Report, and Section 5.2.5.4 of the BPPA Report (Zoetica 2021).

5.2.2 Presence, Distribution, and Abundance of Important Habitat

As there are no SWH indicated for semi-aquatic mammals in the Criteria Schedule for Ecoregion 6E (OMNRF 2015), habitat mapping of potential SWH will not be undertaken for this group of biodiversity values. Collation of other existing and Tier 1 habitat data for semi-aquatic mammals proceeded as described in Sections 1.2.2 and 1.2.3.

5.2.3 Presence and Distribution of Species of Interest

Collation of existing observations and Tier 1 incidental observations for semi-aquatic mammals proceeded as described in Sections 1.2.2 and 1.2.3.

5.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of the BIS study areas.

5.3 Results

5.3.1 Presence, Distribution, and Abundance of Important Habitat

5.3.1.1 General Habitat Associations

Eight observations of beaver dams in the LSA_{AQU} were found within the MNRF's Beaver Dam dataset, which is discontinued and was last updated in July 2008. The records in the dataset thus have not been verified to ensure that they are still present or active. Nevertheless, Zoetica has included these records as a starting point, as beavers often return to suitable habitat areas previously occupied by the species. All eight beaver dams in the Beaver Dam dataset were recorded in the LSA_{AQU} (see Figure F-1 in Appendix D, Chapter 1), and none occurred in the AOI. Beaver dams in the LSA_{AQU} were primarily south of the AOI, with one reported in the GSWC (north of the AOI) south of Cunningham Lake (see Figure F-1 in Appendix D, Chapter 1).

During AHM field studies, five beaver dams and one beaver lodge were reported in the AOI on tributaries to the Teeswater River in the northwest portion of the AOI (see Figure F-1a in Appendix D, Chapter 1). In the LSA_{AQU} south (upstream) of the AOI, one beaver dam was reported on Alps Creek and four beaver lodges were on a small lake north of the Wingham Wetland Complex (see Figure F-1b in Appendix D, Chapter 1). Downstream of the AOI in the northern portion of the LSA_{AQU}, three beaver dams were located on Schmidt Creek, one beaver dam was reported on a wetland connected with Schmidt Creek, and three beaver dams and a beaver lodge were located on Kinlough Creek (see Figure F-1c in Appendix D, Chapter 1). In the RSA_{AQU}, one beaver dam was reported at the northern end of Cargill Mill Pond (see Figure F-1c in Appendix D, Chapter 1). Tier 2 studies may include revisiting beaver dams in the LSA_{AQU} – those detected during AHM field studies and those reported in the MNRF beaver dam database – to determine whether they are active, abandoned, or destroyed.

5.3.1.2 Significant Wildlife Habitat

To date, there are no SWH indicated for semi-aquatic mammals in the 6E ECS (OMNRF 2015) as noted in Section 5.2.2.

5.3.2 Presence and Distribution of Species of Interest

5.3.2.1 Species of Conservation Concern

There are no semi-aquatic mammal species of conservation concern that potentially occur within the AOI, LSA_{AQU}, or RSA_{SAM}.

5.3.2.2 Species of Interest to Stakeholders and Rights-Holders, and Species of Potential Socio-economic Importance

At the time of writing the 2023 BIS Baseline Report (September 2023), Zoetica does not have sufficient information to identify the semi-aquatic mammal species of interest to stakeholders and rights-holders in

the SON-South Bruce siting area. Future iterations of the BIS Baseline Report will include details of the presence and distribution of any species of interest identified from further engagement.

5.3.3 Additional Baseline Data to Inform the IA

5.3.3.1 Community Characterization

A search of the NHIC and GBIF datasets revealed that there are no existing observation data of semi-aquatic mammals within the AOI, LSA_{AQU}, or RSA_{SAM}. During field work in 2022, crews reported observations of American mink, beaver, muskrat, and North American river otter (**Table B-1**). Beaver, muskrat, star-nosed mole, and North American river otter were also detected with eDNA (see Appendix E, Chapter 1).

5.4 Discussion

To meet the requirements of the TISG Template, the general objectives outlined in Section 1.1, and the semi-aquatic mammal-specific objectives listed in Section 5.1.1, the BIS Baseline Report presents the results of desk-based semi-aquatic mammal habitat and species observations and preliminary results from Tier 1 habitat assessments and incidental observations.

Engagement activities conducted to date have not indicated particular concerns regarding semi-aquatic mammals (see Appendix B of the BPPA report (Zoetica 2021)), but further engagement with stakeholders and rights-holders may reveal species of importance in the SON-South Bruce siting area. To date, incidental observations by field crews and eDNA results indicate the presence of five semi-aquatic mammals. eDNA analysis showed evidence of widespread distribution of beaver and muskrat in the AOI, LSA_{AQU}, and reference sites, in all types of aquatic habitats (see Appendix C to Appendix E, Chapter 1). In addition, beaver has a barcode gap, strengthening evidence that these detections were true positives (see Appendix A to Appendix E, Chapter 1). None of the detected semi-aquatic mammal species are provincially rare, and no semi-aquatic mammal SWH is known to occur within the AOI, LSA_{AQU}, or RSA_{SAM}. However, if the SON-South Bruce siting area is selected for additional baseline investigations for the Project, Tier 2 studies will aim to characterize semi-aquatic mammal community composition more thoroughly within the AOI, LSA_{AQU}, or RSA_{SAM}. More species may be detected as the BIS baseline program progresses and with continuing improvements with eDNA laboratory methods and bioinformatic analyses.

Future work may include collaboration with the Project's EMBP, as tissue sample collection may involve non-targeted mammal trapping, which may allow for determining community composition and estimates of relative abundance in the AOI, LSA_{AQU}, and RSA_{SAM}. Tier 2 studies may also include verifying records of beaver dams noted in the MNRF Beaver Dam dataset, to determine if these structures still exist. Additional Tier 2 studies will be designed based on results and needs identified from Tier 1. These sections will be included in future iterations of the BIS Baseline Report after Tier 2 surveys have been completed, if the SON-South Bruce siting area is selected for the Project.

6.0 BATS

6.1 Introduction

Bats play an important role in ecological functions. As the primary predators of night-flying insects, bats provide important ecosystem services by controlling insect populations. Bat populations worldwide have undergone rapid declines; in North America, these declines have largely been attributed to White Nose Syndrome (WNS (Austin et al. 2010)), habitat loss and fragmentation (Duchamp and Swihart 2008), wind turbines (Arnett et al. 2008), and climate change (Adams 2010). It is important that new developments do not contribute to further declines in these species.

There are eight bat species that occur or potentially occur around the SON-South Bruce siting area (**Table 6-1**). Of these, three are designated as provincially and federally Endangered: little brown myotis, northern myotis, and tri-colored bat. Eastern small-footed myotis is listed as Endangered in Ontario but has not yet been assessed by COSEWIC. Silver-haired bat, eastern red bat, and hoary bat are designated as Endangered by COSEWIC (COSEWIC 2023), but at the time of this report (September 2023) have not been assigned a status in Ontario nor listed on Schedule 1 of *SARA*. Four of the eight bat species are restricted and cannot be mentioned by name when discussing methods or results.

For Ecoregion 6E, there are three potential SWHs for bats (OMNRF 2015):

- Bat Hibernaculum and
- Bat Maternity Colony
- Special Concern and Rare (S1, S2, S3) Animal Species.

Not all species listed in **Table 6-1** are necessarily relevant to the SON-South Bruce siting area. Although there are currently no Special Concern or not-at-risk but provincially rare (subnational rank S1, S2, S3, SH) bat species that potentially occur in the BIS study areas, the three species recently designated as Endangered by COSEWIC (silver-haired bat, eastern red bat, and hoary bat) may fall under one or both categories in the future.

Further details about candidate SWH investigations conducted to date and rationale for inclusion (or exclusion) of SWH types listed in the 6E ECS are presented in Appendix C, Chapter 1.

6.1.1 Objectives

All the general objectives listed in Section 1.1 apply to bats.

Table 6-1. Bat species that potentially occur in and around the SON-South Bruce siting area. Existing recovery strategies and the status of known critical habitat within the BIS study area(s) for bats are indicated for applicable species. Although none of the bat species have NHIC records within the BIS study area(s), there may be information from other databases, inventories, or studies (outside of NHIC records); these data sources need to be investigated further.

	Scientific Name	SARO	SRANK	*SARA*	COSEWIC	GRANK	Provincial Recovery Strategy	Provincial Government Response Statement	Federal Recovery Strategy	Known Critical Habitat[1] in Study Area?	Source(s)
Big Brown Bat	*Eptesicus fuscus*	-	S4	-	-	G5	-	-	-	-	-
Silver-haired Bat[2]	*Lasionycteris noctivagans*	-	S4	-	END	G3G4	-	No	No	Undefined[3]	-
Eastern Red Bat[2]	*Lasiurus borealis*	-	S4	-	END	G3G4	-	No	No	Undefined[3]	-
Hoary Bat[2]	*Lasiurus cinereus*	-	S4	-	END	G3G4	-	No	No	Undefined[3]	-
Eastern Small-footed Myotis	*Myotis leibii*	END	S2S3	-	-	G4	Yes	Yes	-	No	(Humphrey 2017)
Little Brown Myotis	*Myotis lucifugus*	END	S3	END	END	G3G4	Yes	Yes	Yes	No	(ECCC 2018, Humphrey and Fotherby 2019)
Northern Myotis	*Myotis septentrionalis*	END	S3	END	END	G2G3	Yes	Yes	Yes	No	(ECCC 2018, Humphrey and Fotherby 2019)
Tri-colored Bat	*Perimyotis subflavus*	END	S3?	END	END	G3G4	Yes	Yes	Yes	No	(ECCC 2018, Humphrey and Fotherby 2019)

Notes:
Abbreviations: SARO = Species at Risk in Ontario; *SARA* = Federal *Species at Risk Act*; COSEWIC = Committee on the Status of Endangered Wildlife in Canada; ECCC = Environment and Climate Change Canada
Conservation status ranks: END = Endangered; S1/G1 = Critically Imperiled, S2/G2 = Imperiled, S3/G3 = Vulnerable, S4/G4 = Apparently Secure, S5/G5 = Secure

1. Critical Habitat is defined as habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species (Species at Risk Act, S.C. 2002, c. 29).
2. Designated as Endangered by COSEWIC in May 2023.
3. Though Endangered, this species does not have a recovery strategy or action plan defining critical habitat at the time of writing the 2023 BIS Baseline Report (September 2023).

6.2 Methods

6.2.1 Study Areas

The BIS study areas for bats include a local study area defined as the terrestrial LSA (LSA_{TER}) and a regional study area defined as the RSA_{BAT}. A description and rationale for developing bat study areas can be found in Section 3.0, Chapter 1 of the 2023 BIS Baseline Report, and Section 5.2.6.4 of the BPPA Report (Zoetica 2021).

6.2.2 Presence, Distribution, and Abundance of Important Habitat

Collation of both existing and Tier 1 habitat data for bats proceeded as described in Sections 1.2.2 and 1.2.3.

As part of previous preliminary environmental work for the Project, reconnaissance for natural heritage features in support of ongoing borehole site exploration was conducted in 2020 (Tulloch Environmental 2020, 2021). This site exploration included visual searches for suitable habitat for several species, including bats.

The NWMO is in partnership with the Native Bat Conservation Program (NBCP) at the Toronto Zoo to gain a better understanding of bat ecology for species found in Ontario. Bat monitoring conducted by the NBCP in the SON-South Bruce siting area in 2020 and 2021 indicated that a maternity colony/roost for restricted species M1[4] likely occurs within the RSA_{BAT} (which includes the AOI) (Thorne et al. 2021). The federal and provincial recovery strategies for three species of Endangered bats include provisions for the protection of habitat (ECCC 2018, Humphrey and Fotherby 2019). The NWMO seeks to protect the habitats of listed species on NWMO-owned lands; therefore, the NWMO requested that suitable foraging habitat be identified in accordance with the provincial recovery strategy's recommendations for developing a habitat regulation (Humphrey and Fotherby 2019).

6.2.3 Presence and Distribution of Species of Interest

The NBCP's research included collecting and analysing acoustic data. Acoustic data analysis can indicate the potential for bat roosts and other types of habitat (Thorne et al. 2021). Three preliminary reports based on data analyzed by the NBCP researchers are included in this report (see Sections 6.3.2.1 and 6.3.3.1).

6.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of the BIS study areas.

[4] Due to their sensitive nature, detections of restricted species are not described in detail nor made discernable on maps.

6.3 Results

6.3.1 Presence, Distribution, and Abundance of Important Habitat

6.3.1.1 General Habitat Associations

Tulloch Environmental identified potential for bats of restricted species M1 to be inhabiting a vacant homestead inside the RSA_{BAT}, although field staff did not venture inside the homestead in compliance with health and safety planning (Tulloch Environmental 2021).

The NBCP researchers radio-tracked one adult female of restricted species M1 in 2021 (see Section 6.3.2.1). From radiotelemetry, NBCP researchers determined that the bat was roosting in a building in the RSA_{BAT} during the day, and it is possible that the building hosted a maternity colony (Sparrow-Scinocca et al. 2022).

Figure C-1 displays foraging habitat for restricted species M1. Suitable foraging habitat includes all forests, wetlands, waterbodies, and watercourses buffered by 40 m to include edge habitats. The provincial recovery strategy recommends the inclusion of meadows, thickets, savannahs, and old fields within 40 m of forests for foraging habitat (Humphrey and Fotherby 2019). The Teeswater River system, active farms, and other lands in the surrounding area could provide foraging value for bats, which may be investigated in future years.

6.3.1.1 Significant Wildlife Habitat

Based on ecosite analyses, Bat Maternity Colonies could potentially occur throughout the RSA_{BAT}. A detailed discussion of candidate SWH within the LSA_{TER} is available in Appendix C, Chapter 1. Bat species of conservation concern are also discussed in Section 6.3.2.1 below.

6.3.2 Presence and Distribution of Species of Interest

6.3.2.1 Species of Conservation Concern

The NHIC and GBIF datasets do not include any bat observations within the RSA_{BAT}. However, in studies conducted by NBCP researchers from 2020 – 2022, acoustic monitoring northwest of the community of Teeswater detected eastern red bat, silver-haired bat, hoary bat, and restricted species M1 across multiple sampling locations, including inside and outside of the RSA_{BAT} (Thorne et al. 2021, Sparrow-Scinocca et al. 2022, Thorne 2023). Eastern red bat, silver-haired bat, and hoary bat were all detected within the AOI. Restricted species M2 and M3 were also detected at one location each in 2021 (Sparrow-Scinocca et al. 2022).

In 2020, restricted bat species M1 was observed by NBCP researchers in the greatest numbers at a location inside the RSA_{BAT}, and the location also exhibited the most consistent nightly activity. Nightly activity peaked in late August and early September (Thorne et al. 2021). In addition, as the first observations of restricted species M1 consistently occurred 30 min after sunset in July, Thorne et al. (2021) suggested that a maternity colony may be present nearby (see Section 6.3.1 for more information). Also in 2020, there were a high number of detections of hoary bat (Thorne et al. 2021). Hoary bats were most active in July, while eastern red bat and silver-haired bat activity was higher in August and September.

In 2021 and 2022, NBCP researchers monitored three locations in the RSA_{BAT}. NBCP researchers detected eastern red bat, hoary bat, silver-haired bat, and restricted species M1 at all three locations monitored. Like the results in 2020, detections of restricted species M1 in 2021 consistently occurred 30 min after

sunset, suggesting a maternity colony may be nearby. In 2021, a single recording of restricted species M3 occurred at two locations in the RSA_{BAT}, and restricted species M2 was detected at one site. Preliminarily, these recordings appear to be of sufficient quality to be reliable (Sparrow-Scinocca et al. 2022).

NBCP researchers used the acoustic monitoring information from 2020 and 2021 to guide selection of areas for trap and release in 2021. Based on this information, NBCP researchers successfully caught and affixed a radio transmitter to one adult female of restricted species M1. Information on habitat data collected from tracking this individual is included in Section 6.3.1.1. In addition to the radio-tracked adult female, NBCP researchers captured (but did not track) one adult male, seven additional adult females, and one juvenile female of restricted species M1 at a site inside the RSA_{BAT}. The presence of juveniles in July is evidence that restricted species M1 is reproducing in the area (Sparrow-Scinocca et al. 2022).

6.3.2.2 Species of Interest to Stakeholders and Rights-Holders, and Species of Potential Socio-economic Importance

At the time of writing the 2023 BIS Baseline Report (September 2023), Zoetica does not have sufficient information to identify the bat species of interest to stakeholders and rights-holders in the SON-South Bruce siting area. Future iterations of the BIS Baseline Report will include details of the presence and distribution of any species of interest identified from further engagement.

6.3.3 Additional Baseline Data to Inform the IA

6.3.3.1 Community Characterization

In addition to the species listed in Section 6.3.2.1, NBCP acoustic surveys in 2020 – 2022 detected big brown bat across the three sampling locations in the RSA_{BAT} (Thorne et al. 2021, Sparrow-Scinocca et al. 2022). In 2021, NBCP researchers captured and released a total of 35 big brown bats across three netting locations in the RSA_{BAT} (Sparrow-Scinocca et al. 2022). Some of the big brown bats captured in June were more heavily pregnant than expected for that time of year. In the 2021 Bat Activities Report, Sparrow-Scinocca et al. (2022) speculate that bats emerged earlier in the area compared to other parts of their range. Five of the captured big brown bats were juveniles, providing evidence that bats were reproducing in the area (Sparrow-Scinocca et al. 2022). Bat species were not detected incidentally during field studies in 2022, nor were bats species detected with eDNA.

6.4 Discussion

To meet the requirements of the TISG Template and the general objectives outlined in Section 1.1, the BIS Baseline Report presents the results of desk-based bat habitat and species observations and preliminary results from Tier 1 habitat assessments and incidental observations. To date, seven bat species have been detected within the RSA_{BAT}, including six species of conservation concern (see Section 6.3.2.1). At the time of writing the 2023 BIS Baseline Report (September 2023), one additional restricted bat species was identified as potentially occurring in the SON-South Bruce siting area but was not detected in the NBCP programs within the BIS study areas.

Bat monitoring conducted by the NBCP provided data regarding bat presence from acoustic monitoring, radiotracking, and mist netting (Thorne et al. 2021, Sparrow-Scinocca et al. 2022). NBCP acoustic surveys detected several bat species, including SAR (Sparrow-Scinocca et al. 2022). In addition, NBCP researchers concluded that it is highly possible that the tagged individual of restricted species M1 is roosting in a maternity colony located in a building (Sparrow-Scinocca et al. 2022). Although bat maternity colonies inside buildings are not considered to be SWH (OMNRF 2015), the habitat of Threatened or Endangered

bat species would be protected under the Ontario *Endangered Species Act (ESA)*. Reproductive adult females of restricted species M1 are known to both have high fidelity to maternity roosting sites as well as use multiple roosts during one maternity season (Humphrey and Fotherby 2019). To date, candidate SWH has been identified for Bat Maternity Colony in the AOI, LSA_{TER}, and RSA_{BAT}. A detailed discussion of SWH is available in Appendix C, Chapter 1.

If the SON-South Bruce siting area is selected for additional baseline investigations for the Project, Tier 2 studies will aim to characterize bat community composition more thoroughly within the AOI, LSA_{TER}, and RSA_{BAT}, and may include visual observations and acoustic monitoring. Additional datasets, such as the North American Bat Monitoring Program (NABat) and the Québec Centre for Biodiversity Science's (QCBS) Neighbourhood Bat Watch, will be investigated and incorporated into baseline data maps in future years of the BIS baseline program, where possible. Additional Tier 2 studies may be designed based on results and needs identified from Tier 1; for example, information about candidate SWH may be used to help design Tier 2 field surveys to evaluate candidate maternity colony and roost sites.

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APPENDIX A – SCIENTIFIC NAMES

Table A-1. Scientific names for species mentioned in this current Chapter 4 (Mammals).

Common Name	Scientific Name
Ungulates	
White-tailed Deer	*Odocoileus virginianus*
Pig (domestic and feral)	*Sus scrofa*
Carnivores	
Coyote	*Canis latrans*
Eastern Wolf	*Canis lupus lycaon*
Fisher	*Pekania pennanti*
Canada lynx	*Lynx canadensis*
Cougar (Eastern population)	*Puma concolor couguar*
American Badger (*jacksoni* subspecies)	*Taxidea taxus jacksoni*
Gray Fox	*Urocyon cinereoargenteus*
Black Bear	*Ursus americanus*
Red Fox	*Vulpes vulpes*
Small Terrestrial Mammals	
Short-tailed Shrew	*Blarina brevicauda*
Northern Flying Squirrel	*Glaucomys sabrinus*
Southern Flying Squirrel	*Glaucomys volans*
Snowshoe Hare	*Lepus americanus*
Meadow Vole	*Microtus pennsylvanicus*
Woodland Vole	*Microtus pinetorum*
Southern Red-backed Vole	*Myodes gapperi*
Deer Mouse	*Peromyscus maniculatus*
Raccoon	*Procyon lotor*
Eastern Mole	*Scalopus aquaticus*
Eastern Gray Squirrel	*Sciurus carolinensis*
Eastern Chipmunk	*Tamias striatus*
American Red Squirrel	*Tamiasciurus hudsonicus*
Semi-Aquatic Mammals	
American Beaver	*Castor canadensis*
Star-nosed Mole	*Condylura cristata*
North American River Otter	*Lontra canadensis*
American Mink	*Neogale vison*
Muskrat	*Ondatra zibethicus*
American Water Shrew	*Sorex palustris*
Bats	
Big Brown Bat	*Eptesicus fuscus*
Silver-haired Bat	*Lasionycteris noctivagans*
Eastern Red Bat	*Lasiurus borealis*
Hoary Bat	*Lasiurus cinereus*
Eastern Small-footed Myotis	*Myotis leibii*
Little Brown Myotis	*Myotis lucifugus*
Northern Myotis	*Myotis septentrionalis*
Tri-colored Bat	*Perimyotis subflavus*

APPENDIX B – INCIDENTAL OBSERVATIONS AND DETECTIONS OF MAMMAL SPECIES

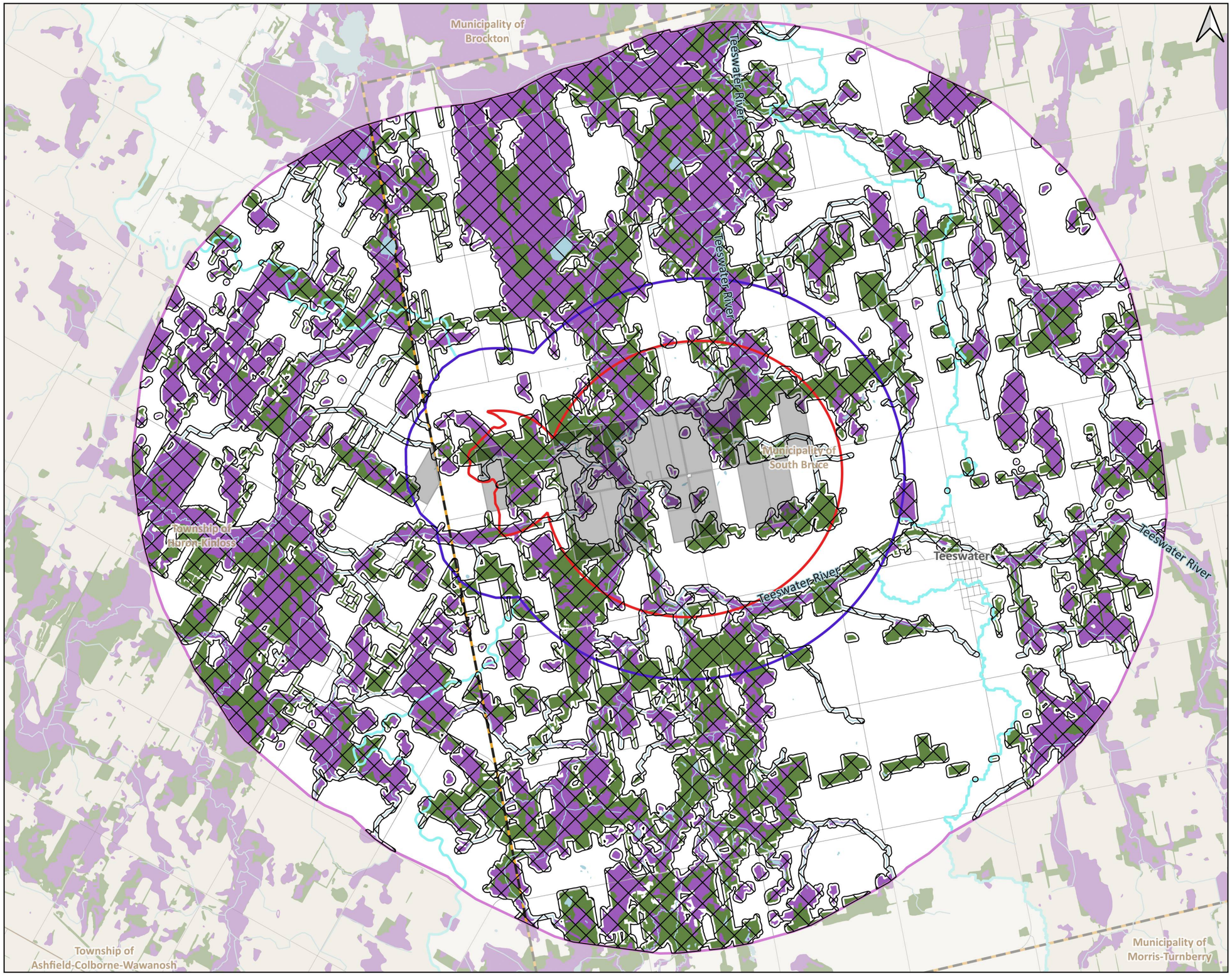
Table B-1. Incidental observations of mammals during TEM, AHM, and eDNA field surveys in 2022, and detections of mammals with eDNA in 2022.

Common Name	Scientific Name	Species of Interest			Method of Detection		eDNA Study Area of Detection[1, 2]		
		SAR	Rare	Introduced or Invasive	Incidental Observation	eDNA	AOI	LSA_{AQU}	Outside LSA_{AQU}
Ungulates									
White-tailed Deer	*Odocoileus virginianus*	N	N	N	Y	N	--	--	--
Carnivores									
Coyote	*Canis latrans*	N	N	N	Y	N	--	--	--
Fisher	*Pekania pennanti*	N	N	N	Y	N	--	--	--
Small Terrestrial Mammals									
Northern Short-tailed Shrew	*Blarina brevicauda*	N	N	N	N	Y	Y	ND	ND
Meadow Vole	*Microtus pennsylvanicus*	N	N	N	N	Y	Y	Y	ND
Raccoon	*Procyon lotor*	N	N	N	Y	Y	Y	Y	Y
Eastern Chipmunk	*Tamias striatus*	N	N	N	Y	N	--	--	--
Red Squirrel	*Tamiasciurus hudsonicus*	N	N	N	Y	Y	ND	ND	Y
Semi-Aquatic Mammals									
Beaver	*Castor canadensis*	N	N	N	Y	Y	Y	Y	Y
Star-Nosed Mole	*Condylura cristata*	N	N	N	N	Y	Y	Y	ND
North American River Otter	*Lontra canadensis*	N	N	N	Y	Y	ND	Y	ND
American Mink	*Neogale vison*	N	N	N	Y	N	--	--	--
Muskrat	*Ondatra zibethicus*	N	N	N	Y	Y	Y	Y	Y

Notes:

1. Study area of detection is included if the species was detected with eDNA; eDNA cannot verify absence, therefore non-detections are specified with "ND". See Appendix E, Chapter 1 for details about eDNA sampling protocols, study areas, and results.
2. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed within its boundaries.

APPENDIX C – MAP OF BAT FORAGING HABITAT



NWMO Biodiversity Impact Studies

Bat Forage Habitat

Figure C-1

- NWMO Purchased or Optioned Properties
- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{BAT})
- Lake
- Watercourse copy
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Bat Forage Habitat

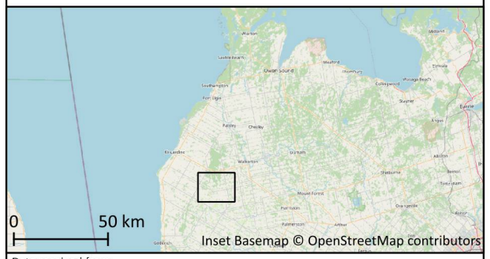
Bat Forage Habitat Type

- Forest
- Wetland

1:60,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — Municipal Boundary - Lower and Upper Tiers (MMAH); OHN Waterbody (MNRF); OHN Watercourse (MNRF); ORN Road Element (MNRF); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: HB	Approved by: HB
December 11, 2023	Map ID: NWMO_BIS_D185c	



Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 BASELINE REPORT (CHAPTER 5: HERPETOFAUNA)

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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GLOSSARY AND ABBREVIATIONS

AHM	Aquatic Habitat Mapping
ANSI	Area of Natural and Scientific Interest
AOI	Area of Interest
BIS	Biodiversity Impact Studies
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
BV	Biodiversity Value. The biotic environmental components that will be considered for study within the Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the biodiversity Impact Assessment as Valued Components.
CNSC	Canadian Nuclear Safety Commission
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Critical habitat	Habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species (*Species at Risk Act*, S.C. 2002, c. 29). Identification of critical habitat is not a required component of a recovery strategy under the Ontario *Endangered Species Act*. However, the approach used to identify critical habitat, in conjunction with the best scientific information available, is recommended when developing a habitat regulation. A habitat regulation is a legal instrument under the *ESA* that prescribes an area that will be protected as the habitat of the species.
ECCC	Environment and Climate Change Canada
Ecoregion	Second highest level of the ELC hierarchy (Crins et al. 2009). Large geographic areas primarily identified by sub-continental climatic regimes and bedrock geology.
Ecosite	Second lowest level of the ELC hierarchy (Crins et al. 2009). The land within an ecosite will generally contain similar substrate and vegetation.
Ecosite classification dataset	The dataset of ecosite classification created for the BIS using South Western Ontario Orthophotography Project (SWOOP) 2020 imagery.
ECS	Ecoregional Criterion Schedule
eDNA	Environmental DNA
ELC	Ecological Land Classification
Environmentally significant area	With respect to habitat for terrestrial wildlife, the TISG Template requires a description of environmentally significant areas, which include National Parks, Areas of Natural and Scientific Interest, National Wildlife Areas, World Biosphere Reserves or UNESCO Natural World Heritage Sites (IAAC 2020, NDMNRF 2021).
EO	Element Occurrence. An EO is an area of land and/or water where a species or vegetation community is or was present. EOs represent areas important to the conservation of a species or vegetation community. In Ontario, the NHIC generates each EO from one or

	more observations, based on international EO specifications developed by NatureServe (NDMNRF 2021).
ESA	Ontario *Endangered Species Act*
GBIF	Global Biodiversity Information Facility
GIS	Geographic Information System
GSWC	Greenock Swamp Wetland Complex
Herpetofauna	The reptiles and amphibians of a particular region, habitat, or geological period.
IA	Impact Assessment
LSA	Local Study Area LSA_{TER} = Terrestrial Local Study Area LSA_{AQU} = Aquatic Local Study Area LSA_{ECO} = Local Study Area for Ecosystem Function and Services
MECP	Ontario Ministry of the Environment, Conservation and Parks
MNRF	Ontario Ministry of Natural Resources and Forestry
NHIC	Ontario Natural Heritage Information Centre
NWMO	Nuclear Waste Management Organization
ORAA	Ontario Reptile and Amphibian Atlas
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose traditional territories include the project location.
Restricted species/element	Restricted species are commercially exploited or sensitive to disturbance; these species could be harmed if data are not stored and shared securely.
RSA	Regional Study Area RSA_{HRP} = Regional Study Area for Terrestrial Herpetofauna $RSA_{HRP\text{-}AQU}$ = Regional Study Area for Aquatic or Semi-aquatic Herpetofauna
SAR	Species at Risk. For the purposes of the BIS, SAR include species listed under Schedule 1 of the federal *Species at Risk Act* (*SARA*), species designated as Species at Risk in Ontario (SARO) and listed under the provincial *Endangered Species Act, 2007* (*ESA*), and species assessed as Extirpated, Endangered, Threatened, or Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).
SARA	Federal *Species at Risk Act*
SARO	Species at Risk in Ontario
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SOP	Standard Operating Procedure

Species of conservation concern	Includes provincially and/or federally listed SAR (Extirpated, Endangered, Threatened, Special Concern) and provincially rare (SRANK S1, S2, S3, SH) species. Regionally rare species may also be scoped in if identified by stakeholders and/or rights-holders as VCs.
Species of interest	Includes species of conservation concern, culturally important species, indicator species, and invasive species (where applicable).
SRANK	Subnational Rank. SRANK is the conservation status of a species or vegetation community within a particular province, territory, or state. In Ontario, the NHIC assigns SRANKs using the best available information and considering factors such as abundance, distribution, population trends, and trends (NDMNRF 2021). Species assigned S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), and SH (Possibly Extirpated) are considered provincially rare by the NHIC. See the NatureServe website for more information: https://www.natureserve.org/nsexplorer/about-the-data/statuses/conservation-status-categories
SWH	Significant Wildlife Habitat. Defined in the Ontario Provincial Policy Statement, 2020 as: *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. *Significant* – in regard to wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Candidate SWH are areas that meet the ELC ecosite code(s) and/or habitat criteria outlined in the SWH ecoregional criterion schedule (ECS). Confirmed SWH are areas that meet the defining criteria outlined in the SWH ECS. Detailed field investigations are usually needed to confirm SWH.
TEM	Terrestrial Ecosystem Mapping
The Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines. 'TISG Template' refers to the Tailored Impact Statement Guidelines Template (generic version) (IAAC 2023).
UNESCO	United Nations Educational, Scientific and Cultural Organization
VC	Valued Component. For impact assessments of designated projects under the *Impact Assessment Act*, the Agency's Glossary of Terms defines VCs as "environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties. Valued components may be identified as having scientific, biological, social, health, cultural, traditional, economic, historical, archaeological and/or aesthetic importance."

1.0 INTRODUCTION

Herpetofauna consist of amphibians (e.g., frogs, toads, salamanders, newts) and reptiles (e.g., turtles, snakes, lizards). Ontario is home to 63 species of herpetofauna, with the largest portion of species occupying the southern-most parts of the province. Amphibians and reptiles are recognized as especially sensitive to environmental changes and as species that largely utilize both terrestrial and aquatic habitats to complete their life cycles. This, in turn, makes them good candidates for indicator species of well-managed, clean, and functional wildlife habitat.

The Canadian Nuclear Safety Commission's (CNSC) *Guidance on Deep Geological Repository Site Characterization* includes wildlife, terrestrial habitat, and species at risk (SAR) as elements of terrestrial ecology that should be characterized in the Area of Interest (AOI) (CNSC 2018b). In addition, the Tailored Impact Statement Guidelines Template (generic version) ('TISG Template')[1] identifies terrestrial wildlife and their habitat and SAR as elements of the biophysical environment that could be scoped into the Impact Assessment (IA) as Valued Components (VCs), which would require a detailed baseline description and project effects assessment in the impact statement (IAAC 2023). With respect to the aquatic habitat of semi-aquatic species (such as amphibians, turtles, and gartersnakes), the characterization of fish habitat (see Chapter 8) will also serve to describe the baseline conditions for these herpetofauna. A full list of regulatory requirements pertaining to biodiversity is available in Appendix E of the *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach* (BPPA) Report (Zoetica 2021).

Herpetofauna that are considered biodiversity values (BVs) for the Adaptive Phased Management Project's (hereafter, 'the Project') Biodiversity Impact Studies (BIS) include: species that are indicators of ecosystem health, species of conservation concern (including SAR and provincially rare species), and species of interest to stakeholders and rights-holders. Species of conservation concern, along with culturally important and invasive species (where applicable), are currently included as "species of interest" for all BVs for the purposes of the BIS. For the current Chapter 5 (Herpetofauna) of this 2023 BIS Baseline Report, mapping is limited to SAR and provincially rare species. Although herpetofauna were mentioned during engagement, the cultural importance of species cannot be ascertained by Zoetica™ at this time, as this task requires further coordination with other disciplines studying the potential impacts of the Project. A review of engagement conducted to date that is of relevance to the BIS is presented in Appendix B of the BPPA Report (Zoetica 2021). There are currently no herpetofauna species classified as invasive in Ontario. The scope of species of interest for BIS baseline reporting will be expanded in future years to include culturally important and indicator species when more information is gathered through Tier 2 studies and engagement.

1.1 General Objectives

The general objectives of herpetofauna studies for the BIS are to:

1. Determine the presence, distribution, and abundance of relevant Significant Wildlife Habitat (SWH) and other important habitat for select BVs, with an emphasis on:
    a. Species of conservation concern, including SAR,
    b. Species of interest and potential importance to local stakeholders and rights-holders,

[1] Please see Chapter 1 for limitations of and planned updates to the TISG Template.

   c. Indicator species;
2. Determine the potential presence and distribution of species of interest, including the select BVs listed in (1); and,
3. Provide additional baseline data to help inform the Project's biodiversity IA and mitigation measures, and to assist in the potential development of monitoring program(s) to address environmental, regulatory, and stakeholder/rights-holder concerns.

The current Chapter 5 (Herpetofauna) begins to fulfill the requirements of the TISG Template required for herpetofauna (as components of terrestrial wildlife) and their habitat (see Appendix C in the BPPA Report (Zoetica 2021)).

1.2 General Methods

1.2.1 Study Areas

The BIS study areas for herpetofauna include the AOI, terrestrial local study area (LSA_{TER}), and two regional study areas (RSA_{HRP} and $RSA_{HRP-AQU}$). Different RSAs are used depending on the life history requirements of the species or species grouping (i.e., needing terrestrial habitat only or terrestrial and aquatic). The $RSA_{HRP-AQU}$ is comprised of the outer boundaries of the RSA_{HRP} and the aquatic LSA (LSA_{AQU}). See Section 3.0 in Chapter 1 of the 2023 BIS Baseline Report and Section 5.2.8.5 of the BPPA Report (Zoetica 2021) for more details on study area descriptions and rationale.

For the Tier 1 baseline studies, desk-based ecosite classification and subsequent field verification were completed as part of Terrestrial Ecosystem Mapping (TEM) (see Appendix B, Chapter 1), and only covered the LSA for ecosystem functions and services (LSA_{ECO}). The LSA_{ECO} encompasses both the LSA_{TER} and portions of the RSA_{HRP} and $RSA_{HRP-AQU}$. Analyses involving ecosite data (e.g., to identify candidate SWH for amphibians and reptiles) were thus limited to the LSA_{ECO}; however, mapping of species and important wildlife habitat records extended into the RSAs.

1.2.2 Collation of Species Observations and Habitat Data

Zoetica began desk-based investigations of herpetofauna by identifying species of interest that could potentially occur within the BIS study areas. Refer to Appendix D and Section 3.1 of the BPPA Report (Zoetica 2021) for a comprehensive list of SAR, including at-risk herpetofauna species, and the methods used to compile this list. Provincially rare species are indicated by their subnational rank (SRANK; S1, S2, S3, SH) and tracked by the Ontario Natural Heritage Information Centre (NHIC).[2]

Zoetica proceeded with desk-based research and mapping by collating existing data from government, citizen science, and other biodiversity databases. For this 2023 BIS Baseline Report, data sources for verified species and habitat records included the NHIC, Ontario Ministry of Natural Resources and Forestry (MNRF), and the Global Biodiversity Information Facility (GBIF). As these datasets periodically pull observations from other biodiversity-related projects and programs (e.g., iNaturalist, Canadian Museum of Nature Amphibian and Reptile Collection), they were deemed to be a good starting point to describe

[2] For the purposes of this BIS Baseline Report chapter, conservation statuses described in text for at-risk species refer to their Species at Risk in Ontario (SARO) listings unless otherwise indicated. Conservation statuses are from the NHIC's Ontario species list, current to March 1, 2023, and updated for any discrepancies with provincial and federal SAR listings up to August 15, 2023. As such, species and status listings may differ from those presented in Zoetica's 2021 BPPA Report (Zoetica 2021).

the biodiversity of herpetofauna species and their habitats that are found or are likely to be found in the BIS study areas.

In addition, Zoetica investigated findings from the previous preliminary environmental studies conducted for the Project in the Saugeen Ojibway Nation (SON)-South Bruce siting area (Tulloch Environmental 2020, 2021). Spatial data collected for these environmental studies were not incorporated into Zoetica's baseline maps; however, Tulloch Environmental's 2020 and 2021 reports and maps are available upon request from the NWMO. **Table 1-1** summarizes the datasets, data layers, and reports investigated and analyzed for herpetofauna species observations and habitat data for the 2023 BIS Baseline Report.

Table 1-1. Spatial datasets and reports analyzed for herpetofauna for the 2023 BIS Baseline Report.

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains relevant[1] data?
Tulloch Environmental *Preliminary environmental studies for Project*	July 2020 Site Reconnaissance (Tulloch Environmental 2020)	Unpublished Report	10/2020	Y
	October 2020 Natural Heritage Features (Tulloch Environmental 2021)	Unpublished Report	04/2021	Y
Ontario Natural Heritage Information Centre (NHIC)	Species Occurrences	Shapefile	12/2020	Y
	Wildlife Concentration Area Observation	Shapefile	12/2020	N
Ontario Ministry of Natural Resources and Forestry (MNRF)	Wildlife Activity Site	Shapefile	12/2020	N
	Wildlife Activity Area	Shapefile	12/2020	N
	Greenock Swamp ANSI Report (Johnson 1994a, 1994b)	Reports	10/2020	Y
Global Biodiversity Information Facility (GBIF)	Species Occurrences	Comma Separated Values	10/2021	Y
Environment and Climate Change Canada (ECCC) and Ontario Ministry of the Environment, Conservation and Parks (MECP)[2]	Federal and Provincial SAR Recovery Strategies	Reports	Various	Y

Notes:

1. Zoetica determined dataset relevance based on geographic and temporal relevance, as well as relevance to herpetofauna. For example, data that were not within the relevant BIS study areas, data that were too old to be considered relevant, or data that did not include records of amphibian or reptile species were labelled "N" for not containing relevant data.
2. SAR recovery strategies are published by the ECCC and MECP but authors may differ. Refer to Appendix D of the BPPA Report (Zoetica 2021) for a full list of potentially occurring SAR that had provincial and/or federal recovery strategies available at the time of writing the BPPA Report (note: new documents are continually posted on the SARO website and *SARA* Public Registry). The most updated versions of the recovery strategies for relevant species were reviewed and cited in this 2023 Baseline Report.

A full list of the species mentioned in this report, including common and scientific names, is available in **Table A-1** in Appendix A. All map figures are presented in Appendix B.

Additional datasets, such as the Ontario Reptile and Amphibian Atlas (ORAA)[3], will be investigated and incorporated into baseline data maps in future years of the BIS baseline program, where possible.

1.2.3 Tier 1 Studies

Field studies conducted in 2022 focused on collecting Tier 1 foundational habitat data and species detections through environmental DNA (eDNA) metabarcoding studies and incidental observations. Detailed methods for the Tier 1 studies are available in the *Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design* (BPD) Report and associated Standard Operating Procedures (SOPs) (Zoetica 2022). In addition to the utility of each Tier 1 study outlined below for understanding herpetofauna and herpetofauna habitat in the BIS study areas, incidental observations collected during the terrestrial and aquatic field studies are also informative in describing biodiversity.

1.2.3.1 Terrestrial Ecosystem Mapping

TEM work completed to date is described in Appendix B, Chapter 1. The ecosite classification dataset resulting from TEM work was used for desk-based identification of candidate SWH.

1.2.3.2 Identification of Candidate SWH

Desk- and field-based candidate SWH identification work completed to date is described in Appendix C, Chapter 1. SWH types of relevance to herpetofauna are outlined in Sections 2.0 and 3.0 of this report.

1.2.3.3 Aquatic Habitat Mapping

Aquatic Habitat Mapping (AHM) work completed to date is described in Appendix D, Chapter 1. Although AHM is focused on characterization of fish habitat, these data will also help identify important aquatic habitats for turtles and amphibians.

1.2.3.4 Environmental DNA Metabarcoding

eDNA metabarcoding studies completed to date are described in Appendix E, Chapter 1. The two vertebrate primers used for eDNA metabarcoding studies were primarily intended to capture aquatic and semi-aquatic species such as fish, amphibians, and turtles (see Section 2.6 of the BPD Report (Zoetica 2022)).

1.2.4 Mapping Considerations

To protect sensitive species and ecosystems, NHIC spatial data and 2022 field data pertaining to provincially tracked (at-risk and rare) species are represented by a 1 km grid, rather than a point or polygon, as per the NHIC's Sensitive Data Location Standards (NHIC n.d.). Descriptive reporting also follows sensitivity standards and is not detailed enough to allow for precise geolocation.

GBIF data were limited to observations from 1970 onward as older observations were considered historic and not as reliable. See also Appendix A, Chapter 1 for data quality scoring. When there were multiple entries with a count of one at the same location, Zoetica assumed the entries were all the same individual to avoid double-counting and erroneously reporting that multiple individuals were present.

[3] Zoetica explored the publicly available ORAA webmap to help identify herpetofauna species potentially occurring in the SON-South Bruce siting area; however, the full spatial dataset was not available for use in baseline data analyses or reporting.

Incidental observations were recorded during various Tier 1 baseline field programs and were noted on different data forms (Incidental Observation Form or noted in TEM, AHM, or eDNA survey forms). Incidental observations varied in method of observation (audio, visual, etc.) and life history stage of organisms, and may have been recorded in transit to a site and thus not associated with habitat data. As well, expertise in species identification may have varied among field contractors working on different field programs. Thus, not all pertinent information may have been available (e.g., observation type, activity, demographics) or collected in a directly comparable manner (e.g., quantity). For mapping and interpretation purposes, Zoetica defaulted to 'unspecified' observation type, count of one individual, and adult individuals unless otherwise indicated. Zoetica also assumed one individual when a singular observation (e.g., "frog") was recorded in the field notes, and more than one individual if plural observations (e.g., "frogs") were recorded.

For both desk- and field-based species observation data, only the species and locations (masked for sensitive data, where needed) are presented on the maps in Appendix B. Additional information about count, observation type, and source type (i.e., which Tier 1 program the incidental observation came from) is presented in the supplemental table for each map in Appendix B.

2.0 AMPHIBIANS

2.1 Introduction

Amphibians include frogs, toads, salamanders, and newts. Amphibian species potentially occurring in the SON-South Bruce siting area, based on range maps and existing observations, are presented in Table 5-26 of the BPPA Report (Zoetica 2021). This list includes three at-risk species (western chorus frog, Jefferson salamander, unisexual *Ambystoma* [Jefferson salamander dependent population]) and four species that could be used as indicators of forest and/or wetland health (McLaren et al. 1998) and carried forward to the Project's IA (eastern newt, blue-spotted salamander, gray treefrog, and eastern red-backed salamander; see Table 5-27 in the BPPA Report (Zoetica 2021)).

Several SWH types apply to amphibians. Based on the SWH Ecoregional Criterion Schedule for Ecoregion 6E (hereafter '6E ECS') (OMNRF 2015), there are five amphibian-related SWH types of potential relevance to the SON-South Bruce siting area:

- Amphibian Breeding Habitat (Woodland)
- Amphibian Breeding Habitat (Wetland)
- Amphibian Movement Corridors
- Seeps and Springs
- Special Concern and Rare Species

However, there are currently no Special Concern or provincially rare amphibian species expected within the BIS study areas for amphibians. Therefore, this SWH type will not be discussed further for amphibians unless species conservation statuses change over the course of the BIS baseline program. Further details about candidate SWH investigations conducted to date and rationale for inclusion (or exclusion) of SWH types listed in the 6E ECS are presented in Appendix C, Chapter 1.

2.1.1 Objectives

All general objectives listed in Section 1.1 apply to amphibians.

2.2 Methods

2.2.1 Study Areas

The BIS study areas for amphibians include the AOI, LSA_{TER}, and $RSA_{HRP\text{-}AQU}$ (see figures and descriptions in Section 3.0, Chapter 1).

2.2.2 Presence, Distribution, and Abundance of Important Habitat

Collation of both existing and Tier 1 habitat data for amphibians proceeded as described in Sections 1.2.2 and 1.2.3.

2.2.3 Presence and Distribution of Species of Interest

Collation of existing observations and Tier 1 incidental observations for amphibian species of interest proceeded as described in Sections 1.2.2 and 1.2.3. Amphibians may also be detected through eDNA metabarcoding studies (see Appendix E, Chapter 1).

2.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of amphibians in the BIS study areas.

2.3 Results

2.3.1 Presence, Distribution, and Abundance of Important Habitat

2.3.1.1 General Habitat Associations

Future Tier 2 studies aim to determine amphibian-habitat associations within the BIS study areas. Discussion of general habitat associations will be included in future BIS Baseline Reports after Tier 2 studies have been completed (if the SON-South Bruce siting area is selected for the Project).

2.3.1.2 Significant Wildlife Habitat

Various candidate SWH types of relevance to amphibians have been found throughout the AOI, LSA_{TER}, and $RSA_{HRP\text{-}AQU}$ based on ecosite matches, some or all habitat criteria being met, or records of species and/or habitat features. Of note, there is strong evidence from both TEM/SWH and AHM surveys to support confirmed SWH for Seeps and Springs, which are important feeding and drinking areas for a variety of wildlife species, including salamanders. A detailed discussion of confirmed and candidate SWH is available in Appendix C, Chapter 1.

Tier 1 AHM field studies will help identify important aquatic habitats for amphibians and refine the locations of candidate Amphibian Breeding Habitat SWH by providing ground-truthed information about wetland/waterbody size, types and abundance of cover (e.g., vegetation, logs), and incidental observations. AHM work completed to date discussed in Appendix D, Chapter 1.

2.3.1.3 Environmentally Significant Areas

Based on existing information, there are no National Parks, National Wildlife Areas, World Biosphere Reserves, or United Nations Educational, Scientific and Cultural Organization (UNESCO) Natural World Heritage Sites that may be impacted by the Project (see Section 1.3.1 in Chapter 9). However, the provincially significant Greenock Swamp Area of Natural and Scientific Interest (ANSI) and regionally significant Turnberry Swamp ANSI overlap with the BIS study areas for herpetofauna (**Figure B-1**). Amphibians and reptiles observed during the Greenock Swamp ANSI Life Science Inventory are included in **Table C-1** and **Table C-2**, respectively; and any species of interest found are presented in Sections 2.3.2 (Amphibians) and 3.3.2 (Reptiles). At the time of writing this 2023 BIS Baseline Report (September 2023), an ANSI report for Turnberry Swamp had not been made available to Zoetica.

2.3.2 Presence and Distribution of Species of Interest

2.3.2.1 Species of Conservation Concern

To date, only one amphibian species of conservation concern has been observed within the BIS study areas (**Figure B-2**; **Table B-1**). Western chorus frog (Great Lakes - St. Lawrence - Canadian Shield population) is not listed as a Species at Risk in Ontario (SARO) under the Ontario *Endangered Species Act* (*ESA*) but is considered Threatened under the federal *SARA* and has a federal recovery strategy available (EC 2015). From the GBIF dataset, western chorus frog was detected within the Greenock Swamp Wetland Complex (GSWC) in the $RSA_{HRP\text{-}AQU}$ (outside the AOI and LSA_{TER}) in late April 2018. As western chorus frogs breed in the early spring, with the peak of calling activity in April (Ontario Nature 2022), this observation may indicate the presence of breeding habitat in the area and further investigation is needed. Western

chorus frog was also recorded within the Greenock Swamp ANSI, which overlaps the $RSA_{HRP-AQU}$ and northern parts of the LSA_{TER}, as part of the ANSI Life Science Inventory (Johnson 1994a).

2.3.2.2 Species of Interest to Stakeholders and Rights-Holders, and Species of Potential Socio-economic Importance

No specific amphibian species have been mentioned by stakeholders or rights-holders to date. However, certain frog species may be preferred for harvesting, as Youngblood (2017) reports that frog's legs are a meat source for local Indigenous communities in the Grey and Bruce counties. It was noted during engagement conducted for the Project that there used to be lots of frogs in the SON-South Bruce siting area, but they seem to be disappearing (see Appendix B in the BPPA Report (Zoetica 2021)). The socio-economic or socio-ecological importance of amphibian species to local communities and/or Indigenous communities will be sought through future engagement.

2.3.2.3 Indicator Species

To date, all four amphibian species used as forest indicators by the MNRF (see Section 2.1 in Chapter 5 and Table 5-27 in the BPPA Report (Zoetica 2021)) have been observed within the AOI, LSA_{TER} and/or $RSA_{HRP-AQU}$ (**Table C-1**). However, Zoetica recommends that indicator species for the purposes of the BIS be determined after more information is gathered about potential project impacts and species-habitat associations (e.g., through Tier 2 community composition studies) within the BIS study areas for herpetofauna. See Sections 4.2 and 5.2.7.1 of the BPPA Report (Zoetica 2021) for further discussion of indicator species.

2.3.3 Additional Baseline Data to Inform the IA

2.3.3.1 Community Characterization

A total of 14 amphibian species have been detected within the BIS study areas based on desk- and field-based investigations conducted to date (**Table C-1**). None of the existing GBIF observations occurred within the AOI. However, eight amphibian species were detected within the AOI through 2022 field observations and/or eDNA metabarcoding analyses: American bullfrog, American toad, eastern newt, gray treefrog, green frog, northern leopard frog, spring peeper, and wood frog. In addition, pickerel frog is a new detection for the BIS study areas; this species was observed once in the Teeswater Wetland Complex in the $RSA_{HRP-AQU}$ during 2022 field studies.

2.4 Discussion

Section 2.0 of Chapter 5 (Herpetofauna) of the 2023 BIS Baseline Report focused on desk-based analyses of amphibian habitat and species observations and preliminary results from Tier 1 terrestrial and aquatic habitat assessments and incidental observations. To date, 14 amphibian species have been detected within the AOI, LSA_{TER}, or $RSA_{HRP-AQU}$, including one at-risk species (**Table C-1**). Four species that could potentially be used as indicators of forest and/or wetland health (McLaren et al. 1998) – eastern newt, eastern red-backed salamander, gray treefrog, blue-spotted salamander – have been detected within the BIS study areas. Only two of these species, eastern newt and gray treefrog, have been observed within the AOI; however, Zoetica recommends selecting indicator species after more baseline data are collected.

Although 2022 field data for amphibians were limited to incidental observations and eDNA metabarcoding analyses (i.e., rather than targeted amphibian surveys), 10 of the 13 species known to be present in the BIS study areas through desk-based research have already been observed. Eight of these amphibian

species were observed within the AOI; pickerel frog and eastern red-backed salamander were only detected within the $RSA_{HRP-AQU}$ during 2022 field studies. Only two salamanders (blue-spotted salamander and spotted salamander) and the federally at-risk western chorus frog have not been detected through these initial Tier 1 BIS field studies. Where a species has only been detected using desk-based data, caution should be taken as those data could be as old as 1970, and the conditions supporting the species' presence in the area may have changed.

Baseline data for amphibian species of conservation concern are currently limited to an existing GBIF observation from 2018 (**Figure B-2**) and the Greenock Swamp ANSI Life Science Inventory (Johnson 1994a) record of western chorus frog (Great Lakes – St. Lawrence – Canadian Shield population). Critical habitat for western chorus frog has been identified in southwestern Ontario in the federal recovery strategy; however, the nearest 10 x 10 km square is located east of Goderich, outside the $RSA_{HRP-AQU}$ (see Figure A-7 in (EC 2015)).

Candidate SWH have been identified for Amphibian Breeding Habitats (Woodland and Wetlands), Amphibian Movement Corridors, and Seeps and Springs within the AOI, LSA_{TER}, and $RSA_{HRP-AQU}$. Of note, there are likely confirmed Seeps and Springs SWH within the AOI and LSA_{TER}. Large groups of green frogs and wood frogs were observed during 2022 field studies, especially in the northern portion of the GSWC, which may suggest nearby breeding ponds and/or migration routes. A detailed discussion of SWH is available in Appendix C, Chapter 1.

2.4.1 Next Steps

If the SON-South Bruce siting area is selected for the Project, Tier 2 studies will aim to characterize amphibian biodiversity more thoroughly within the BIS study areas. Refer to Section 5.2.8 of the BPPA Report (Zoetica 2021) for more information. Study methods may include ground- and aquatic-based visual encounter surveys (the latter of which includes egg mass surveys), supplemented with drift fences, auditory surveys, and aquatic traps, as needed. Autonomous song meters continuously deployed for bird studies in wetland habitats will also capture calling amphibians. Confirmation of candidate SWH (described in Appendix C, Chapter 1) will focus on areas within the extent of direct and indirect project impacts (i.e., AOI and LSA_{TER}).[4] In addition, further discussions with knowledgeable stakeholders and rights-holders will help determine the locations of sensitive habitats for amphibians. However, access limitations will continue to be a factor in determining which areas can be surveyed. The NWMO continues to engage with local landowners to gain permission to access their properties. Zoetica is providing input to the NWMO regarding priority locations within which they should seek access based on the baseline information collected to date.

[4] As described in Zoetica's BPPA Report (Zoetica 2021), the NWMO defined the AOI as the area within which the Project footprint will be located, and Zoetica designed the LSA_{TER} as a 1 km buffer around the AOI to capture potential indirect impacts of the Project on the terrestrial environment. The focal areas for Tier 2 studies may change depending on the Project Description (which is not yet available) and further information about potential project effects.

3.0 REPTILES

3.1 Introduction

Reptiles include snakes, lizards, and turtles. Reptile species potentially occurring in the SON-South Bruce siting area, based on range maps and existing observations, are presented in Table 5-26 of the BPPA Report (Zoetica 2021). This list includes 13 at-risk reptiles (seven turtles and six snakes) and one species that could be used as an indicator of forest health (McLaren et al. 1998) and carried forward to the Project's IA (northern ring-necked snake; see Table 5-27 in the BPPA Report (Zoetica 2021)). There are currently no provincially rare reptile species expected within the BIS study areas for reptiles.

Several SWH types apply to reptiles. Based on the 6E ECS (OMNRF 2015), there are four reptile-related SWH types of potential relevance to the SON-South Bruce siting area:

- Turtle Wintering Areas
- Turtle Nesting Areas
- Reptile Hibernaculum
- Special Concern and Rare Species

Further details about candidate SWH investigations conducted to date and rationale for inclusion (or exclusion) of SWH types listed in the 6E ECS are presented in Appendix C, Chapter 1.

3.1.1 Objectives

All general objectives listed in Section 1.1 apply to reptiles.

3.2 Methods

3.2.1 Study Areas

The BIS study areas for reptiles include the AOI, LSA_{TER}, the RSA_{HRP} for terrestrial species, and the $RSA_{HRP\text{-}AQU}$ for species that have aquatic life history stages, such as turtles and gartersnakes (see figures and descriptions in Section 3.0, Chapter 1).

3.2.2 Presence, Distribution, and Abundance of Important Habitat

Collation of existing habitat data and collection of Tier 1 habitat data for reptiles proceeded as described in Sections 1.2.2 and 1.2.3.

3.2.3 Presence and Distribution of Species of Interest

Collation of existing observations and Tier 1 incidental observations for reptile species of interest proceeded as described in Sections 1.2.2 and 1.2.3.

3.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of reptiles in the BIS study areas.

3.3 Results

3.3.1 Presence, Distribution, and Abundance of Important Habitat

3.3.1.1 General Habitat Associations

Future Tier 2 studies aim to determine reptile-habitat associations within the BIS study areas. Discussion of general habitat associations will be included in future BIS Baseline Reports after Tier 2 studies have been completed (if the SON-South Bruce siting area is selected for the Project).

3.3.1.2 Significant Wildlife Habitat

Various candidate SWH types of relevance to reptiles have been found throughout the AOI, LSA_{TER}, and RSA_{HRP} or $RSA_{HRP\text{-}AQU}$ based on ecosite matches, some or all habitat criteria being met, or records of species and/or habitat features. Of note, the NHIC has mapped habitat for snapping turtle (Special Concern) within the BIS study areas, and Turtle Nesting Areas may be present along the Teeswater River within the AOI. A detailed discussion of candidate SWH is available in Appendix C, Chapter 1. Special Concern reptile species are also discussed in Section 3.3.2.1.

During previous preliminary environmental studies conducted for the Project, Tulloch Environmental suggested that abandoned farmsteads/homesteads within the AOI could support common snake species but are unlikely to support SAR (Tulloch Environmental 2020, 2021). The field ecologists also assessed a farmstead as being "satisfactory" as a snake hibernaculum; however, as the structure was only recently vacated at the time of their survey, they did not believe the habitat would qualify as candidate SWH (Tulloch Environmental 2020, 2021).

Tier 1 AHM field studies may also help identify important aquatic habitats for turtles. For example, AHM data could help refine the locations of candidate Turtle Wintering Area SWH by providing ground-truthed habitat information (e.g., wetland/waterbody/watercourse size, depth, flow, substrate, dissolved oxygen) and incidental observations. AHM work completed to date discussed in Appendix D, Chapter 1.

3.3.1.3 Critical Habitat and Environmentally Significant Areas

Two Endangered turtle species, the spotted turtle and wood turtle, have critical habitat squares that overlap the entirety of the AOI, LSA_{TER}, and $RSA_{HRP\text{-}AQU}$ (see **Figure B-1**). Whether critical habitat for spotted turtle or wood turtle occurs within the BIS study areas needs to be determined through discussions with Environment and Climate Change Canada (ECCC) and/or the Ontario Ministry of Environment, Conservation and Parks (MECP). Both spotted turtle and wood turtle have federal recovery strategies available (wherein critical habitat is identified) (ECCC 2018, 2020), as well as provincial recovery strategies (OWTRT 2010, MECP 2019) and government response statements (MECP 2010, 2020). There is also a habitat regulation (O. Reg. 242/08) under the Ontario *ESA* for the wood turtle; however, it does not currently apply to areas within the County of Bruce.

3.3.2 Presence and Distribution of Species of Interest

3.3.2.1 Species of Conservation Concern

To date, four reptile species of conservation concern have been observed within the AOI, LSA_{TER}, RSA_{HRP} and/or $RSA_{HRP\text{-}AQU}$ (**Table 3-1**), all of which are SAR. No provincially rare reptiles have been observed within the BIS study areas.

Table 3-1. Summary list of reptile species of interest recorded within the AOI, LSA_{TER}, and RSA_{HRP} or $RSA_{HRP-AQU}$.

Common Name	Species of Interest[1]			Method of Detection			BIS Study Area[2]		
	SAR	Prov. Rare	Engage.	Desk-based	2020 Studies[3]	2022 Field Incidental	AOI	LSA_{TER}	RSA_{HRP} / $RSA_{HRP-AQU}$
Eastern Milksnake	Y	-	-	Y	-	Y	**Y**	-	Y
Eastern Ribbonsnake	Y	-	-	Y	-	Y	-	-	Y
Midland Painted Turtle	Y	-	-	Y	-	Y	**Y**	Y	Y
Snapping Turtle	Y	-	-	Y	-	Y	Y	Y	Y

Notes:
1. Species of conservation concern (at-risk and provincially rare) and species mentioned during engagement are noted, where applicable.
2. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed within its boundaries. Cells shaded grey and with bold font indicate new detections in the study area based on 2022 field studies (i.e., not previously detected in the study area through desk-based research). For species of conservation concern, the study area(s) of field observations and NHIC records are based on overlap with the 1 km grid square, not the actual point or polygon location.
3. Data were collated from the previous preliminary environmental field studies conducted in July and October 2020 by Tulloch Environmental at boreholes 1 and 2 within the AOI (Tulloch Environmental 2020, 2021).

During 2022 field studies, midland painted turtle, eastern milksnake, and potentially snapping turtle were observed within the AOI (**Figure B-3**; **Table B-2**); the latter two species had not been previously reported in the AOI based on existing datasets. Midland painted turtle and eastern milksnake are not SARO-listed but these species are considered Special Concern under the federal *SARA*. The incidental field observations of snapping turtle, including remnants of suspected snapping turtle eggs (discussed further as candidate SWH in Section 4.3.4 of Appendix C, Chapter 1), corroborate important habitat for snapping turtle known from existing datasets: the NHIC has designated a large area encompassing five Provincially Significant Wetlands – Kinloss Creek and Greenock Swamp, Teeswater, Dickies Creek, and Wingham Wetland Complexes – and other wetlands as a "Verified extant (viability not assessed)" Element Occurrence (EO) for snapping turtle (**Figure B-4**). The NHIC 1 km grids for snapping turtle habitat overlap almost the entire AOI and LSA_{TER}, and the majority of the $RSA_{HRP-AQU}$. This species was not observed outside the AOI during 2022 field studies; however, existing GBIF records show the presence of snapping turtle in various parts of the $RSA_{HRP-AQU}$ outside the LSA_{TER} (**Figure B-4**; **Table B-3**).

The GBIF dataset includes reports of eastern milksnake at various locations throughout the RSA_{HRP}. In addition, eastern ribbonsnake (Great Lakes population; Special Concern) has been recorded near the Wingham Wetland Complex in the southern part of the RSA_{HRP} (GBIF observation; **Figure B-4**) and in the central part of the GSWC (2022 field observation; **Figure B-3**). Finally, midland painted turtle was observed at Meyer Lake near the northern boundary of the $RSA_{HRP-AQU}$ during 2022 field studies (**Figure B-3**).

Zoetica's previous investigations of NHIC observation (not occurrence) data for development of the BPPA Report (Zoetica 2021)[5] found that midland painted turtle has been documented within the LSA_{TER} (Teeswater River) and $RSA_{HRP-AQU}$ (McGlinn Lake and Wraith's Lake). The three records range from

[5] At the time of writing the BPPA Report (Zoetica 2021), both NHIC observation and occurrence data were investigated. Zoetica has since received an updated version of the NHIC occurrence dataset for baseline reporting, and has requested but not yet received an updated NHIC observation dataset. Once received by Zoetica, NHIC observations will be included in future iterations of the BIS Baseline Report.

observations of "many" turtles in 1977, approximately 50 turtles in 1997, and a single individual last observed in 2017. The NHIC has designated all three records as EO Candidates. Midland painted turtle was also recorded within the Greenock Swamp ANSI during the ANSI Life Science Inventory (Johnson 1994a).

Although there are critical habitat squares indicated for spotted turtle and wood turtle that overlap with the AOI, LSA_{TER}, and $RSA_{HRP\text{-}AQU}$ (see Section 3.3.1.3 and **Figure B-1**), there were no EOs for either SAR in the NHIC dataset made available to Zoetica. However, spotted turtle and wood turtle are considered restricted species/elements in terms of sharing and presenting spatial data, and it could be that these highly sensitive data are obscured to avoid increasing the risk of illegal collection, which has been identified as a significant threat to both species in Ontario (OWTRT 2010, MECP 2019). Nonetheless, since critical habitat identified by ECCC overlaps the BIS study areas, future Tier 2 studies (if the SON-South Bruce siting area is selected for the Project) will include surveys for these species.

3.3.2.1 Species of Interest to Stakeholders and Rights-Holders, and Species of Potential Socio-economic Importance

A number of herpetofauna species in southern Ontario are of conservation concern, including the wood turtle and spotted turtle (both Endangered) for which illegal collection has been identified as a significant threat; these and other reptiles may also be of concern to stakeholders and rights-holders. A few reptile species were mentioned during engagement conducted for the Project (see Appendix B in the BPPA Report (Zoetica 2021)). Eastern hog-nosed snake (Threatened) was mentioned as a unique species that tends to inhabit riparian habitats near new developments, and queensnake (Endangered) was also noted as having been observed within the Maitland Valley Conservation Authority's jurisdiction. Based on desk-based research and 2022 field data, neither species has been reported within the BIS study areas to date.

Engagement participants also noted that there used to be many reptiles in the SON-South Bruce siting area, but they seem to be disappearing. The socio-economic or socio-ecological importance of additional reptile species to local communities and/or Indigenous communities will be sought through future engagement. Local information on SAR presence and distribution would be invaluable for the Project's IA.

3.3.2.1 Indicator Species

To date, the northern ring-necked snake, a species used as a forest indicator by the MNRF (see Section 3.1 in Chapter 5 and Table 5-27 in the BPPA Report (Zoetica 2021)), has not been observed in the BIS study areas. Zoetica recommends that indicator species, if needed, be determined after more information is gathered about potential project impacts and species-habitat associations (e.g., through Tier 2 community composition studies) within the BIS study areas for herpetofauna. See Sections 4.2 and 5.2.7.1 of the BPPA Report (Zoetica 2021) for further discussion of indicator species.

3.3.3 Additional Baseline Data to Inform the IA

3.3.3.1 Community Characterization

Seven reptile species have been detected within the BIS study areas based on desk-based investigations conducted to date (**Table C-2**). None of the existing GBIF observations occurred within the AOI (though the extensive NHIC EO for snapping turtle overlaps the AOI). However, four reptile species – snapping turtle, midland painted turtle, eastern milksnake, and northern watersnake – were detected within the AOI through 2022 field observations.

3.4 Discussion

Chapter 5 (Herpetofauna), Section 3.0 of the 2023 BIS Baseline Report focused on desk-based analyses of reptile habitat and species observations and preliminary results from Tier 1 terrestrial and aquatic habitat assessments and incidental observations. To date, seven reptile species, including four at-risk species, have been detected within the AOI, LSA_{TER}, RSA_{HRP}, or $RSA_{HRP\text{-}AQU}$ (**Table C-2**). Critical habitats for spotted turtle and wood turtle overlap the BIS study areas (and the greater SON-South Bruce siting area); however, spatial data for these species are highly sensitive/restricted and may not have been shared with Zoetica.

Although 2022 field data for reptiles were limited to incidental observations (there were no reptile detections through eDNA metabarcoding analyses), six of the seven species known to be present in the BIS study areas through desk-based research have already been observed. Four of these reptile species, including three SAR (eastern milksnake, snapping turtle, and midland painted turtle), were observed within the AOI during 2022 field studies. Only the northern red-bellied snake, with one GBIF record in the RSA_{HRP} from 2021, has not been detected through these initial Tier 1 BIS field studies.

The NHIC has mapped an extensive EO for snapping turtle overlapping the SON-South Bruce siting area **Figure B-4**, which indicates candidate SWH for Special Concern and Rare Wildlife Species. This "Verified Extant" EO includes 169 observations of snapping turtle from 1981 to 2004. The NHIC data are supported by more recent observations from the GBIF dataset (2018-2021) and the 2022 Tier 1 BIS field studies **Figure B-3**. Of note, field surveyors found remnants of suspected snapping turtle eggs along the Teeswater River within the AOI. These findings and other incidental observations of unidentified turtle nests/eggs provide supporting evidence for Turtle Nesting Areas SWH. Turtle Wintering Areas SWH also likely exists within the NHIC EO for snapping turtle. However, details regarding known or potential overwintering or nesting areas are not indicated in the EO record and further field studies and/or discussions with NHIC are needed. Furthermore, candidate SWH for Reptile Hibernaculum has been identified within the AOI, LSA_{TER}, RSA_{HRP}, and $RSA_{HRP\text{-}AQU}$. A detailed discussion of SWH is available in Appendix C, Chapter 1.

3.4.1 Next Steps

If the SON-South Bruce siting area is selected for the Project, Tier 2 studies will aim to characterize reptile biodiversity more thoroughly within the BIS study areas. Refer to Section 5.2.8 of the BPPA Report (Zoetica 2021) for more information. Study methods may include visual encounter surveys, supplemented with drift fences and pit and funnel traps, as needed. Confirmation of candidate SWH (described in Appendix C, Chapter 1), including habitats for Special Concern and provincially rare species, will focus on areas within the extent of direct and indirect project impacts (i.e., AOI and LSA_{TER}).[4] In addition, further discussions with knowledgeable stakeholders and rights-holders will help determine the locations of sensitive habitats for reptiles. However, access limitations will continue to be a factor in determining which areas can be surveyed. The NWMO continues to engage with local landowners to gain permission to access their properties. Zoetica is providing input to the NWMO regarding priority locations within which they should seek access based on the baseline information collected to date.

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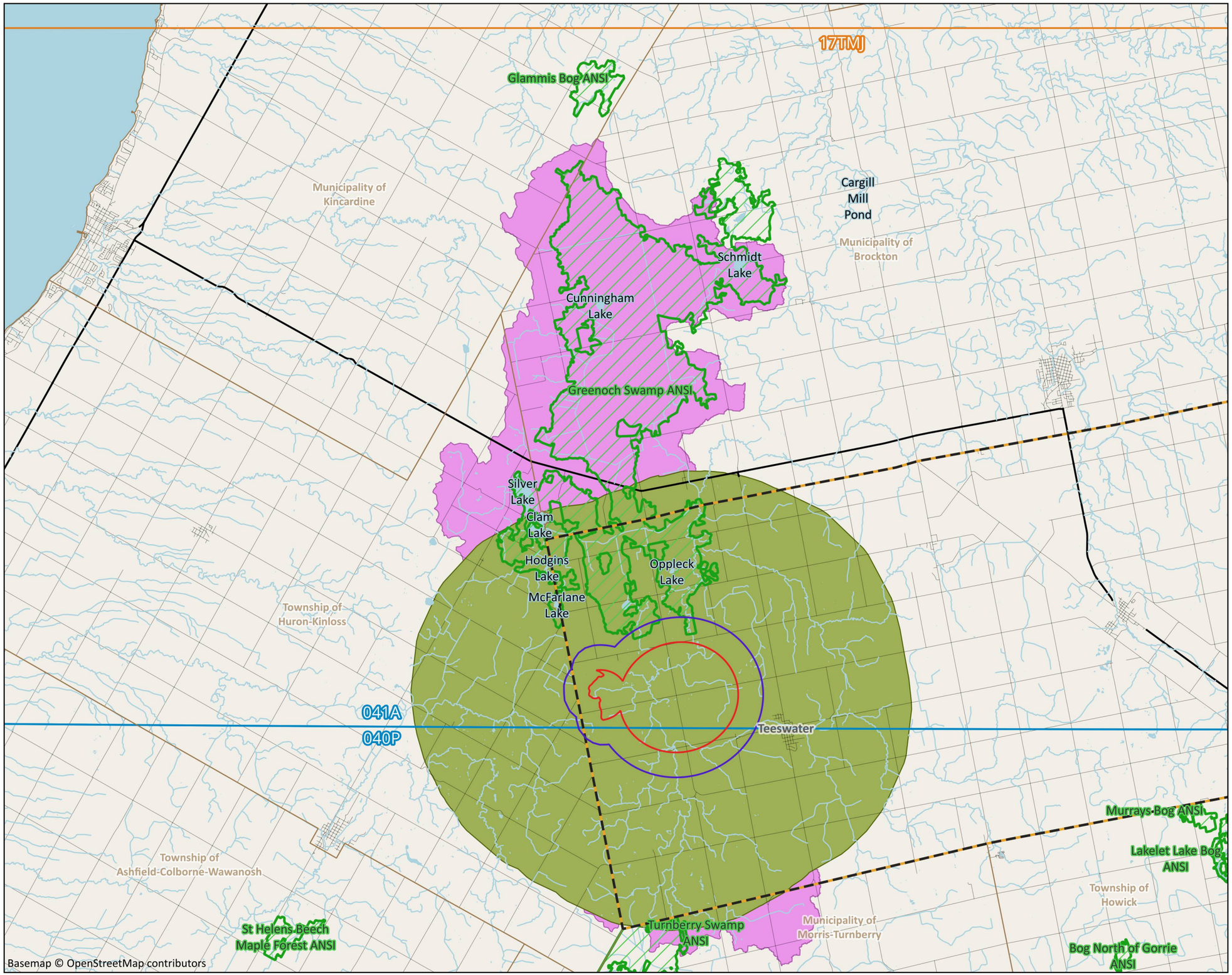
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APPENDIX A – SPECIES LIST

Table A-1. Common and scientific names for species mentioned in this report. Species names follow the NHIC's Ontario species lists, current to March 1, 2023.

Common Name	Scientific Name
AMPHIBIANS	
Unisexual Ambystoma (Jefferson Salamander dependent population)	*Ambystoma hybrid* pop. 1
Jefferson Salamander	*Ambystoma jeffersonianum*
Blue-spotted Salamander	*Ambystoma laterale*
Spotted Salamander	*Ambystoma maculatum*
American Toad	*Anaxyrus americanus*
Gray Treefrog	*Dryophytes versicolor*
Four-toed Salamander	*Hemidactylium scutatum*
American Bullfrog	*Lithobates catesbeianus*
Green Frog	*Lithobates clamitans*
Pickerel Frog	*Lithobates palustris*
Northern Leopard Frog	*Lithobates pipiens*
Wood Frog	*Lithobates sylvaticus*
Eastern Newt	*Notophthalmus viridescens*
Eastern Red-backed Salamander	*Plethodon cinereus*
Spring Peeper	*Pseudacris crucifer*
Western Chorus Frog (Great Lakes - St. Lawrence - Canadian Shield population)	*Pseudacris maculata* pop. 1
REPTILES	
Snapping Turtle	*Chelydra serpentina*
Midland Painted Turtle	*Chrysemys picta marginata*
Spotted Turtle	*Clemmys guttata*
Northern Ring-necked Snake	*Diadophis punctatus edwardsii*
Wood Turtle	*Glyptemys insculpta*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Eastern Milksnake	*Lampropeltis triangulum*
Northern Watersnake	*Nerodia sipedon sipedon*
Queensnake	*Regina septemvittata*
Northern Red-bellied Snake	*Storeria occipitomaculata occipitomaculata*
Eastern Ribbonsnake	*Thamnophis saurita*
Eastern Gartersnake	*Thamnophis sirtalis sirtalis*

APPENDIX B – MAP FIGURES AND SUPPLEMENTAL DATA TABLES



NWMO Biodiversity Impact Studies

Critical Habitat and Environmentally Significant Areas for Herpetofauna

Figure B-1

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Watercourse
- Lake
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- Life Science Areas of Natural and Scientific Interest (ANSI)
- 100 x 100 km standardized UTM grid squares within which critical habitat for Spotted Turtle is found
- 1:250 000 standardized NTS map sheets within which critical habitat for Wood Turtle is found

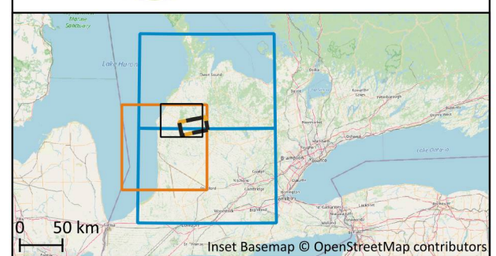
This map shows the extent of known critical habitat for Wood Turtle and Spotted Turtle. Mapping is limited to the squares/map sheet that overlap with the $RSA_{HRP-AQU}$.

The $RSA_{HRP-AQU}$ includes the area covered by the RSA_{HRP} (green area) plus the area encompassed by the LSA used for aquatic biodiversity values (pink area).

1:150,000

0 2 4 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment (NDMNRF); UTM (Universal Transverse Mercator) 100 KM Grid (MNRF)
NWMO — AOI
Canada Open Data Portal — Indexes of the National Topographic System of Canada (Natural Resources Canada)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: CC	Approved by: HB
September 28, 2023	Map ID: NWMO_BIS_D189	

NWMO Biodiversity Impact Studies

Species of Interest Desk-based Observations: Amphibians

Figure B-2

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary

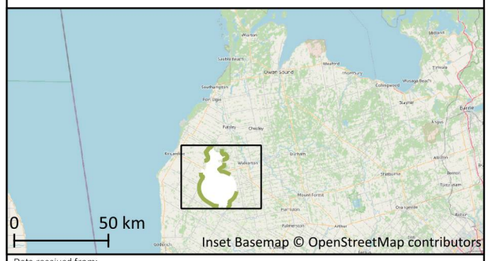
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:130,000

0 2 4 km

ZOETICA



Observation Location

1km x 1km grid square with observations

GBIF Observations

Western Chorus Frog - Great Lakes - St. Lawrence - Canadian Shield pop. (SAR) [1]

SAR = Species at Risk

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI
GBIF.org — GBIF Occurrence Download - Accessed Oct., 2021
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A080	

Table B-1. Supplemental data for desk-based observations of amphibian species of interest within the BIS study areas.[1,2]

Grid	Source	Species	Count[3]	AOI	LSA_{TER}	$RSA_{HRP-AQU}$
7081	GBIF	Western Chorus Frog - Great Lakes - St. Lawrence - Canadian Shield population	U	0	0	1

Notes:
1. Refer to Figure B-2 for the grid location. Coordinates are not provided due to the sensitive nature of SAR.
2. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected
3. Count of "U" = unspecified

NWMO Biodiversity Impact Studies

Species of Interest Field Observations: Reptiles - North $RSA_{HRP-AQU}$

Figure B-3a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Regional Study Area (RSA_{HRP})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary

Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A118a	

Municipality of Kincardine
Bruce Road 15
7493
Greenock Swamp Wetland Complex
Schmidt Lake
Bruce Road 3
Chepstow Road
Bruce Road 20
Concession 6
Cunningham Lake
Bruce Road 1
Municipality of Brockton
Chepstow Swamp
6983
Teeswater River
Highway 9
Silver Lake
Township of Huron-Kinloss
Clam Lake
Municipality of South Bruce
Bruce Road 4

Species Observed

- Snapping Turtle (SAR)
- Eastern Milksnake (SAR)
- Midland Painted Turtle (SAR)
- Eastern Ribbonsnake (SAR)

SAR = Species at Risk

SAR and Provincially Rare species were masked with a 1km grid and may occur anywhere within that grid square. Circle colour(s) within the grid represent the species observed incidentally. Species may have been observed more than once within a grid square.

NWMO Biodiversity Impact Studies

Species of Interest Field Observations: Reptiles - South $RSA_{HRP-AQU}$

Figure B-3b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Regional Study Area (RSA_{HRP})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

See Figure B-3a for Full Legend

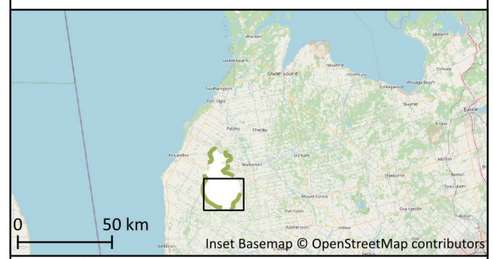
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A118b	

NWMO Biodiversity Impact Studies

Species of Interest Field Observations: Reptiles - AOI

Figure B-3c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Regional Study Area (RSA_{HRP})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

See Figure B-3a for Full Legend

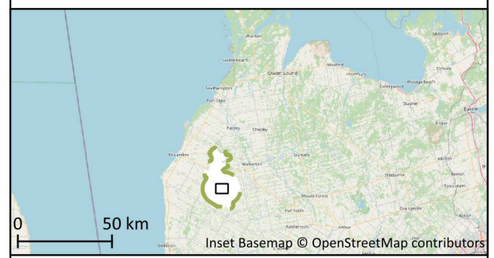
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A118c	

Table B-2. Supplemental data for 2022 field-based observations of reptile species of interest within the BIS study areas.[1,2]

Grid	Species	Observation Type[3]	Count	Source Type[4]	AOI	LSA_{TER}	RSA_{HRP} / $RSA_{HRP-AQU}$
6983	Eastern Ribbonsnake	Visual (juv)	1	Incidental	0	0	1
7066	Midland Painted Turtle	Visual	1	AHM	0	0	1
7164	Midland Painted Turtle	Visual	1	AHM	0	0	1
7168	Midland Painted Turtle	Visual	>1	eDNA	0	0	1
7168	Midland Painted Turtle	Visual	>1	eDNA	0	0	1
7168	Midland Painted Turtle	Visual	>1	eDNA	0	0	1
7173	Snapping Turtle	Eggs	>1	Incidental	1	1	1
7173	Eastern Milksnake	Visual (juv)	1	Incidental	1	1	1
7274	Midland Painted Turtle	Visual	1	AHM	1	1	1
7275	Snapping Turtle	Visual	1	Incidental	1	1	1
7275	Snapping Turtle	Unspecified	1	eDNA	1	1	1
7493	Midland Painted Turtle	Visual (juv)	1	Incidental	0	0	1
7493	Midland Painted Turtle	Visual	1	SWH	0	0	1

Notes:

1. Refer to Figure B-3 for the grid locations of masked observations. Coordinates are not provided due to the sensitive nature of SAR.
2. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected
3. Abbreviations for observation types: juv = juvenile
4. All 2022 field species observations are considered incidental; however, the source type is presented to allow interpretation of field effort and visited locations. “eDNA” refers to field observations and not the results of metabarcoding analyses.

NWMO Biodiversity Impact Studies

Species of Interest Desk-based Observations: Reptiles

Figure B-4

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Regional Study Area (RSA_{HRP})
- Regional Study Area ($RSA_{HRP-AQU}$)
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- Municipal Boundary
- South Bruce Boundary

Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:130,000

0 2 4 km

ZOETICA



- Observation Location
- 1km x 1km grid square with observations

GBIF Observations

- Eastern Milksnake (SAR) [3]
- Eastern Ribbonsnake (SAR) [1]
- Snapping Turtle (SAR) [4]

NHIC Occurrences

- Snapping Turtle (SAR)

SAR = Species at Risk

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NHIC Species Occurrences (MNRF)
GBIF.org — GBIF Occurrence Download - Accessed Oct., 2021
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A081	

Table B-3. Supplemental data for desk-based observations of reptile species of interest within the BIS study areas.[1,2]

Grid	Source	Species	Count[3]	AOI	LSA_{TER}	RSA_{HRP} / $RSA_{HRP-AQU}$
6772	GBIF	Eastern Milksnake	U	0	0	1
6777	GBIF	Eastern Milksnake	U	0	0	1
6994	GBIF	Snapping Turtle	U	0	0	1
7063	GBIF	Snapping Turtle	U	0	0	1
7164	GBIF	Eastern Milksnake	U	0	0	1
7264	GBIF	Eastern Ribbonsnake	U	0	0	1
7591	GBIF	Snapping Turtle	U	0	0	1
7671	GBIF	Snapping Turtle	U	0	0	1

Notes:
1. Refer to Figure B-4 for the grid location. Coordinates are not provided due to the sensitive nature of SAR.
2. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected
3. Count of "U" = unspecified

APPENDIX C – HERPETOFAUNA DETECTED IN THE BIS STUDY AREAS

The following tables present the amphibian and reptile species detected within the applicable BIS study areas. Explanatory notes and common abbreviations are provided below:

- The first column of each table denotes the Species of Interest (SOI) for the purposes of the BIS; specifically, whether the species is Endangered, Threatened, or Special Concern ("SAR"); provincially rare ("Rare"); and/or mentioned during engagement ("Engage."). Additional details about the species' subnational rank (SRANK) and provincial (SARO) and federal (COSEWIC and SARA) SAR listings are provided in the right-most columns.

- The method(s) of detection are presented for each species, including desktop studies of existing biodiversity databases (e.g., GBIF, NHIC), previous preliminary environmental studies conducted in July and October 2020 by Tulloch Environmental at boreholes 1 and 2 within the AOI (Tulloch Environmental 2020, 2021), 2022 field incidental observations, and Tier 1 eDNA metabarcoding analysis results (the latter for amphibians only; no reptiles have been detected to date).

- For the purposes of these tables, the indicated study area (i.e., AOI, LSA_{TER}, RSA_{HRP} or $RSA_{HRP\text{-}AQU}$) excludes overlap with other study area(s) that may be encompassed within its boundaries. Cells shaded grey and with **bold** font indicate new detections in the study area based on 2022 field studies (i.e., not previously detected in the study area through desk-based research). For species of conservation concern, the study area(s) of field observations and NHIC records are based on overlap with the 1 km grid square, not the actual point or polygon location.

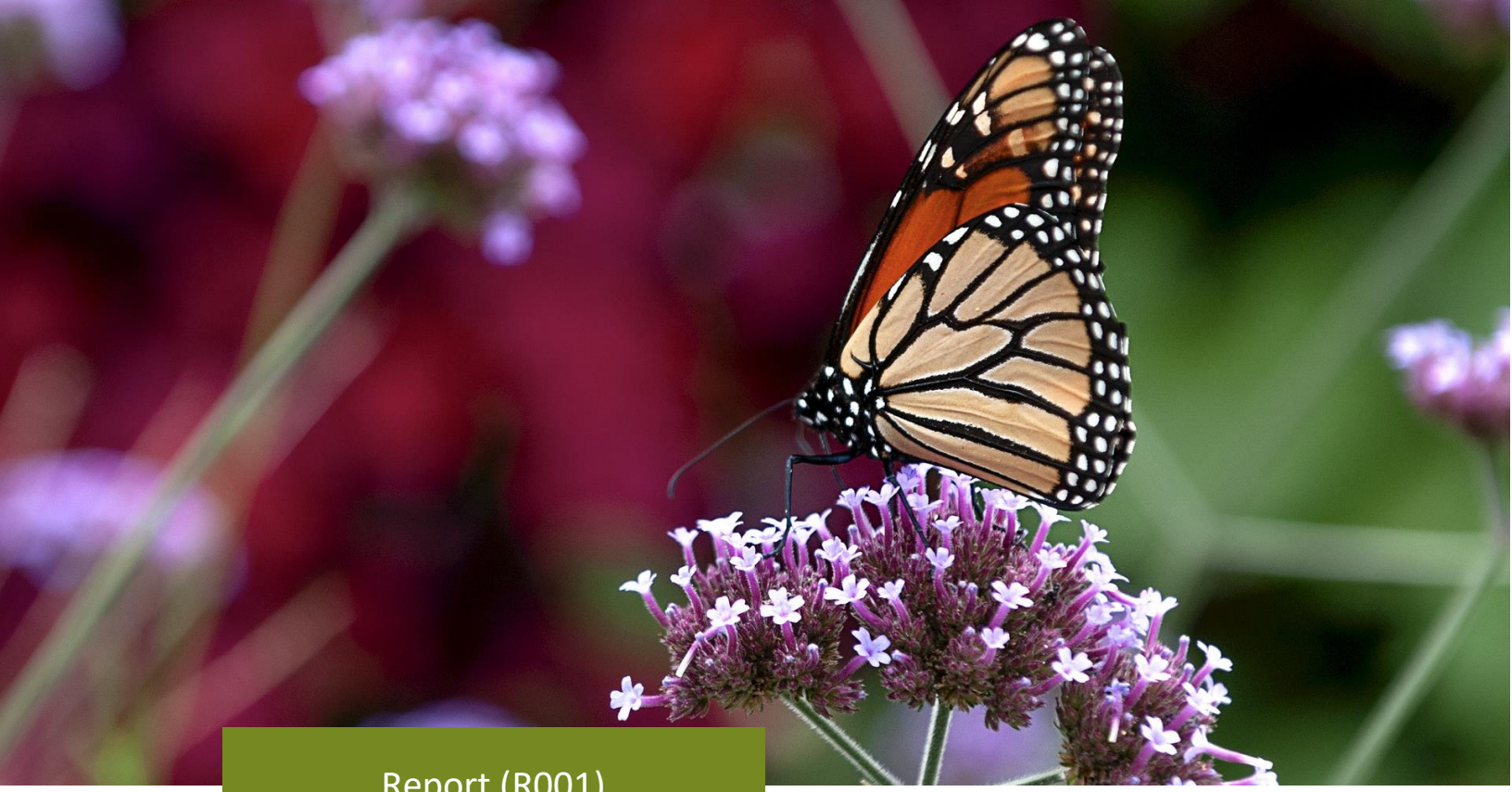
- Conservation status ranks: THR = Threatened, SC = Special Concern, NAR = Not at Risk; S4 = Apparently Secure, S5 = Secure.

Table C-1. List of amphibian species recorded within the AOI, LSA_{TER}, and $RSA_{HRP-AQU}$. See definitions and other explanatory notes on page C-1.

SOI?	Common Name	Desk-based	2020 Studies	2022 Field Incidental	Tier 1 eDNA	AOI	LSA_{TER}	$RSA_{HRP-AQU}$	SRANK	SARO	COSEWIC	SARA
-	American Bullfrog	Y	-	Y	-	**Y**	-	Y	S4	-	-	-
-	American Toad	Y	-	Y	-	**Y**	-	Y	S5	-	-	-
-	Blue-spotted Salamander	Y	-	-	-	-	-	Y	S4	-	-	-
-	Eastern Newt	Y	-	Y	Y	**Y**	-	Y	S5	-	-	-
-	Eastern Red-backed Salamander	Y	-	Y	Y	-	Y	Y	S5	-	-	-
-	Four-toed Salamander	Y	-	-	Y	-	-	Y	S4	NAR	NAR	-
-	Gray Treefrog	Y	-	Y	-	**Y**	-	Y	S5	-	-	-
-	Green Frog	Y	-	Y	-	**Y**	Y	Y	S5	-	-	-
-	Northern Leopard Frog	Y	-	Y	-	**Y**	-	Y	S5	NAR	NAR	-
-	**Pickerel Frog**	**-**	**-**	**Y**	**-**	**-**	**-**	**Y**	**S4**	**NAR**	**NAR**	**-**
-	Spotted Salamander	Y	-	-	-	-	-	Y	S4	-	-	-
-	Spring Peeper	Y	-	Y	-	**Y**	-	Y	S5	-	-	-
SAR	Western Chorus Frog - Great Lakes - St. Lawrence - Canadian Shield population	Y	-	-	-	-	-	Y	S4	NAR	THR	THR
-	Wood Frog	Y	-	Y	Y	**Y**	**Y**	Y	S5	-	-	-

Table C-2. List of reptile species recorded within the AOI, LSA_{TER}, RSA_{HRP}, and $RSA_{HRP-AQU}$. See definitions and other explanatory notes on page C-1.

SOI?	Common Name	Desk-based	2020 Studies	2022 Field Incidental	AOI	LSA_{TER}	RSA_{HRP} / $RSA_{HRP-AQU}$	SRANK	SARO	COSEWIC	SARA
-	Eastern Gartersnake	Y	-	Y	-	-	Y	S5	-	-	-
SAR	Eastern Milksnake	Y	-	Y	**Y**	-	Y	S4	NAR	SC	SC
SAR	Eastern Ribbonsnake	Y	-	Y	-	-	Y	S4	SC	SC	-
SAR	Midland Painted Turtle	Y	-	Y	**Y**	Y	Y	S4	-	SC	SC
-	Northern Red-bellied Snake	Y	-	-	-	-	Y	S5	-	-	-
-	Northern Watersnake	Y	-	Y	**Y**	-	Y	S5	NAR	NAR	-
SAR	Snapping Turtle	Y	-	Y	Y	Y	Y	S4	SC	SC	SC



Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 BASELINE REPORT (CHAPTER 6: TERRESTRIAL INVERTEBRATES)

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PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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GLOSSARY AND ABBREVIATIONS

AHM	Aquatic Habitat Mapping
AOI	Area of Interest
ANSI	Area of Natural and Scientific Interest
BIS	Biodiversity Impact Studies
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
BV	Biodiversity Value. The biotic environmental components that will be considered for study within the Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the biodiversity Impact Assessment as Valued Components.
CNC	Canadian National Collection of Insects, Arachnids, and Nematodes
CNSC	Canadian Nuclear Safety Commission
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EAB	Emerald ash borer
ECCC	Environment and Climate Change Canada
Ecoregion	Second highest level of the ELC hierarchy (Crins et al. 2009). Large geographic areas primarily identified by sub-continental climatic regimes and bedrock geology.
Ecosite	Second lowest level of the ELC hierarchy (Crins et al. 2009). The land within an ecosite will generally contain similar substrate and vegetation.
Ecosite classification dataset	The dataset of ecosite classification created for the BIS using South Western Ontario Orthophotography Project (SWOOP) 2020 imagery.
ECS	Ecoregional Criterion Schedule
EDDMapS	Early Detection and Distribution Mapping System
eDNA	Environmental DNA
ELC	Ecological Land Classification
GBIF	Global Biodiversity Information Facility
IA	Impact Assessment
LSA	Local Study Area LSA_{TER} = Terrestrial Local Study Area LSA_{AQU} = Aquatic Local Study Area LSA_{ECO} = Local Study Area for ecosystem function and services
MECP	Ontario Ministry of the Environment, Conservation and Parks
MNRF	Ontario Ministry of Natural Resources and Forestry

NHIC	Ontario Natural Heritage Information Centre
NWMO	Nuclear Waste Management Organization
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose traditional territories include the project location.
SAR	Species at Risk. For the purposes of the BIS, SAR include species listed under Schedule 1 of the federal *Species at Risk Act* (*SARA*), species designated as Species at Risk in Ontario (SARO) and listed under the provincial *Endangered Species Act, 2007* (*ESA*), and species assessed as Extirpated, Endangered, Threatened, or Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).
SARA	Federal *Species at Risk Act*
SARO	Species at Risk in Ontario
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SOP	Standard Operating Procedure
Species of conservation concern	Includes provincially and/or federally listed SAR (Extirpated, Endangered, Threatened, Special Concern) and provincially rare (SRANK S1, S2, S3, SH) species. Regionally rare species may also be scoped in if identified by stakeholders and/or rights-holders as VCs.
Species of interest	Includes species of conservation concern, culturally important species, indicator species, and invasive species (where applicable).
SRANK	Subnational Rank. SRANK is the conservation status of a species or vegetation community within a particular province, territory, or state. In Ontario, the NHIC assigns SRANKs using the best available information and considering factors such as abundance, distribution, population trends, and trends (NDMNRF 2021). Species assigned S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), and SH (Possibly Extirpated) are considered provincially rare by the NHIC. See the NatureServe website for more information: https://www.natureserve.org/nsexplorer/about-the-data/statuses/conservation-status-categories
SWH	Significant Wildlife Habitat. Defined in the Ontario Provincial Policy Statement, 2020 as: *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. *Significant* – in regard to wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Candidate SWH are areas that meet the ELC ecosite code(s) and/or habitat criteria outlined in the SWH ecoregional criterion schedule (ECS). Confirmed SWH are areas that

	meet the defining criteria outlined in the SWH ECS. Detailed field investigations are usually needed to confirm SWH.
TEM	Terrestrial Ecosystem Mapping
The Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines. 'TISG Template' refers to the Tailored Impact Statement Guidelines Template (generic version) (IAAC 2022).
VC	Valued Component. For impact assessments of designated projects under the *Impact Assessment Act*, the Agency's Glossary of Terms defines VCs as "environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties. Valued components may be identified as having scientific, biological, social, health, cultural, traditional, economic, historical, archaeological and/or aesthetic importance."

1.0 TERRESTRIAL INVERTEBRATES

1.1 Introduction

Terrestrial invertebrates perform important ecosystem functions as decomposers, predators, prey, parasites, herbivores, and pollinators. Some terrestrial invertebrates are categorized as invasive and/or pest species, which can be capable of damaging large tracts of forests (e.g., budworm species) and/or negatively affecting the health of wildlife and humans (e.g., ticks). Invertebrates often respond to environmental changes more rapidly than species higher up the food chain, thus, they can be indicators of ecological sustainability for forest management (Taylor and Doran 2001) and umbrella species for conservation and management purposes (Roberge and Angelstam 2004).

Neither the Canadian Nuclear Safety Commission's (CNSC) *Guidance on Deep Geological Repository Site Characterization* (CNSC 2018) nor the Tailored Impact Statement Guidelines Template (generic version) ('TISG Template'[1]; (IAAC 2022)) explicitly identifies terrestrial invertebrates as important elements to characterize, except for species at risk (SAR). However, as the selection of valued components (VCs) must consider social, cultural, health, and economic values, terrestrial invertebrate species and/or communities may be scoped into the impact assessment (IA) as VCs, requiring a baseline description. A full list of regulatory requirements pertaining to biodiversity is available in Appendix E of the *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approaches* (BPPA) Report (Zoetica 2021).

Terrestrial invertebrates that are considered biodiversity values (BVs) for the Adaptive Phased Management Project's (hereafter, 'the Project') Biodiversity Impact Studies (BIS) include: species that are indicators of ecosystem health, invasive species, species of conservation concern (including SAR and provincially rare species), and species of interest to stakeholders and rights-holders. Species of conservation concern, along with culturally important and invasive species (where applicable), are currently included as "species of interest" for all BVs in the BIS. Although terrestrial invertebrates were mentioned during engagement, the cultural importance of species cannot be ascertained by Zoetica™ at this time, as this task requires further coordination with other disciplines studying the potential impacts of the Project. A review of engagement conducted to date that is of relevance to the BIS is presented in Appendix B of the BPPA Report (Zoetica 2021). The scope of species of interest for BIS baseline reporting will be expanded in future years of the BIS baseline program to include culturally important and indicator species when more information is gathered through Tier 2 studies and engagement.

For the purposes of the BIS, terrestrial invertebrates are defined as species that are wholly or predominantly dependent on terrestrial environments. Semi-aquatic invertebrates (e.g., dragonflies, damselflies, crayfish) and aquatic invertebrates are discussed in Chapter 8 of the 2023 BIS Baseline Report. Digger crayfish and Great Plains mudbug are both terrestrial crayfish; as such, they are addressed in Chapter 8. Detections of terrestrial invertebrates that are forest pests, including spongy moth, beech scale, European elm bark beetle, and emerald ash borer (EAB), are addressed in Chapter 9.

1.1.1 Objectives

The objectives of terrestrial invertebrate studies for the BIS are to:

[1] Please see Chapter 1 for limitations of and planned updates to the TISG Template.

1. Determine the presence, distribution, and abundance of relevant Significant Wildlife Habitat (SWH) and other important habitat for select BVs, with an emphasis on:
    a. Species of conservation concern, including SAR,
    b. Species of interest and potential importance to local stakeholders and rights-holders,
    c. Indicator species
2. Determine the potential presence and distribution of species of interest, including the select BVs listed in (1) and invasive species; and,
3. Provide additional baseline data to inform the Project's biodiversity IA and mitigation measures, and to assist in the potential development of monitoring program(s) to address environmental, regulatory, and stakeholder/rights-holder concerns.

The current Chapter 6 (Terrestrial Invertebrates) begins to fulfill the requirements of the TISG Template required for terrestrial invertebrates and their habitat (see Appendix C in the BPPA Report (Zoetica 2021)).

1.2 Methods

1.2.1 Study Areas

The BIS study areas for terrestrial invertebrates include the Area of Interest (AOI) and terrestrial local study area (LSA_{TER}). See Section 3.0 in Chapter 1 of the 2023 BIS Baseline Report and Section 5.2.9.4 of Zoetica's BPPA Report (Zoetica 2021) for more details on study area descriptions and rationale.

1.2.2 Collation of Species Observations and Habitat Data

Desk-based investigations of terrestrial invertebrates began with identification of species of interest that could potentially occur within the BIS study areas. Refer to Appendix D and Section 3.1 in the BPPA Report (Zoetica 2021) for a comprehensive list of SAR, including at-risk terrestrial invertebrate species, and the methods used to compile this list. Provincially rare species are indicated by their subnational rank (SRANK; S1, S2, S3, SH) and tracked by the Ontario Natural Heritage Information Centre (NHIC)[2]. Zoetica also compiled a list of regulated and non-regulated invasive terrestrial invertebrate species in Ontario to help direct the BIS program (see **Table A-3**).

Zoetica collated existing data from government, citizen science, and other biodiversity databases. For this 2023 BIS Baseline Report, data sources for verified species and habitat records included the NHIC; Ontario Ministry of Natural Resources and Forestry (MNRF), Global Biodiversity Information Facility (GBIF), and Early Detection and Distribution Mapping System (EDDMapS) Ontario. As these datasets periodically pull observations from other biodiversity-related projects and programs (e.g., iNaturalist, Bumble Bees of North America), Zoetica deemed them a good starting point to investigate terrestrial invertebrate species of interest and biodiversity that are found or are likely to be found in the BIS study areas. In addition, Zoetica investigated findings from the previous environmental studies conducted for the Project in the Saugeen Ojibway Nation (SON)-South Bruce siting area (Tulloch Environmental 2020, 2021). **Table 1-1**

[2] For the purposes of the 2023 BIS Baseline Report, conservation statuses described in text for at-risk species refer to their Species at Risk in Ontario (SARO) listings unless otherwise indicated. Conservation statuses are from the NHIC's Ontario species list, current to March 1, 2023, and updated for any discrepancies with provincial and federal SAR listings up to August 15, 2023. As such, species and status listings may differ from those presented in Zoetica's 2021 BPPA Report (Zoetica 2021).

summarizes the datasets, data layers, and reports investigated and analyzed for terrestrial invertebrate species observations and habitat data for the 2023 BIS Baseline Report. Data reported on maps were limited to observations from 1970 onward as older observations were considered historic and not as reliable. See also Appendix A, Chapter 1 for data quality scoring.

Table 1-1. Spatial datasets and reports analyzed for terrestrial invertebrates for the 2023 BIS Baseline Report.

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains relevant[1] data?
Tulloch Environmental *Phase 2 preliminary environmental studies for APM Project*	July 2020 Site Reconnaissance (Tulloch Environmental 2020)	Report	10/2020	N
	October 2020 Natural Heritage Features (Tulloch Environmental 2021)	Report	04/2021	N
Ontario Natural Heritage Information Centre (NHIC)	Species Occurrences	Shapefile	12/2020	N
Ontario Ministry of Natural Resources and Forestry (MNRF)	Wildlife Activity Site	Shapefile	12/2020	N
	Wildlife Activity Area	Shapefile	12/2020	N
	Greenock Swamp ANSI Report (Johnson 1994a, 1994b)	Reports	10/2020	Y
Global Biodiversity Information Facility (GBIF)	Species Occurrences	CSV	09/2021	Y
Early Detection and Distribution Mapping System (EDDMapS) Ontario	Invasive Species Observations	Shapefile	01/2022	Y
Environment and Climate Change Canada (ECCC) and Ontario Ministry of the Environment, Conservation and Parks (MECP)[2]	Federal and Provincial SAR Recovery Strategies	Reports	Various	N

Notes:
1. Zoetica determined dataset relevance based on geographic and temporal relevance as well as relevance to terrestrial invertebrates. For example, data that were not within the relevant BIS study areas, data that were too old to be considered relevant, or data that did not include records of terrestrial invertebrate species were labelled "N" for not containing relevant data.
2. SAR recovery strategies are published by the ECCC and MECP but authors may differ. Refer to Appendix D of the BPPA Report (Zoetica 2021) for a full list of potentially occurring SAR that had provincial and/or federal recovery strategies available at the time of writing the BPPA Report (note: new documents are continually posted on the SARO website and *SARA* Public Registry). The most updated version of Recovery Strategies for relevant species were reviewed and cited in the 2023 BIS Baseline Report.

A full list of the species mentioned in this report, including common and scientific names, is available in **Table A-1** in Appendix A.

For this 2023 iteration of the BIS Baseline Report, Zoetica searched additional datasets for species of interest, including the Ontario Butterfly Atlas, Bumble Bee Watch, and the Canadian National Collection of Insects, Arachnids, and Nematodes (CNC). In August 2023, Zoetica searched the eight 10 km^2 tiles that overlapped with the LSA_{ECO} (local study area for ecosystem function and services) in the Ontario Butterfly Atlas and found three potential species of interest: monarch (Special Concern), and cabbage white and European skipper (both introduced). However, none of the individual records fell within the AOI or LSA_{TER}.

On September 11, 2023, Zoetica searched the Bumble Bee Watch for five potential SAR in the LSA_{ECO} area: rusty-patched (Endangered), Ashton cuckoo (Endangered), American (Special Concern), Suckley's cuckoo (Endangered), and yellow-banded (Special Concern) bumblebees. There were no observations of these at-risk species in the AOI or LSA_{TER}. Zoetica searched the CNC for records of monarch, rusty-patched bumblebee, Ashton cuckoo bumblebee, American bumblebee, Suckley's cuckoo bumblebee, yellow-banded bumblebee, emerald ash borer (EAB; invasive), spongy moth (previously called LDD moth; invasive), juniper seed moth (provincially rare), black-legged tick (mentioned in engagement), beech scale (invasive), cabbage white, and European skipper on August 8, 2023, and found no records of any species in the AOI or LSA_{TER}. Additional investigations in future years will continue to focus on species of interest, as described in Section 1.1.

1.2.3 Tier 1 Studies

Field work for Tier 1 studies began in the summer of 2022, and Zoetica has received data from this season of field work for incorporation into the 2023 BIS Baseline Report. Field studies conducted in 2022 focused on collecting Tier 1 foundational habitat data and species detections through eDNA metabarcoding studies and incidental observations. Detailed methods for the Tier 1 studies outlined below are available in the *Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design* (BPD) Report and associated Standard Operating Procedures (SOPs) (Zoetica 2022). Terrestrial and aquatic field studies will improve understanding of terrestrial invertebrates and their habitat in the BIS study areas, and incidental observations collected during these studies will help to describe biodiversity.

1.2.3.1 Terrestrial Ecosystem Mapping

Terrestrial Ecosystem Mapping (TEM) work completed to date is described in Appendix B, Chapter 1. The ecosite classification dataset resulting from TEM work was used for desk-based identification of candidate SWH. The ecosites and presence of SWH were updated or confirmed by field teams in 2022.

1.2.3.2 Identification of Candidate SWH

Upon investigation of the SWH Ecoregional Criterion Schedule for Ecoregion 6E (hereafter '6E ECS') (OMNRF 2015), there is one terrestrial invertebrate-related SWH types of potential relevance to the SON-South Bruce siting area: Special Concern and Rare Species. Further details about candidate SWH investigations conducted to date and rationale for inclusion (or exclusion) of SWH types listed in the 6E ECS are presented in Appendix C, Chapter 1.

1.2.3.3 Aquatic Habitat Mapping

Aquatic Habitat Mapping (AHM) completed to date is described in Appendix D, Chapter 1. AHM studies focus on the characterization of watercourses, waterbodies (ponds, lakes), and wetlands in the relevant aquatic study areas. While not targeting terrestrial invertebrates, field contractors may incidentally observe and record the presence of terrestrial invertebrates.

1.2.3.4 Environmental DNA

Environmental DNA (eDNA) studies completed to date are described in Appendix E, Chapter 1. One set of primers used for eDNA studies was intended to capture invertebrate species.

1.2.4 Mapping Considerations

Incidental observations were recorded during various Tier 1 baseline field programs and were noted on different data forms (Incidental Observation Form or noted in TEM, AHM, or eDNA survey forms).

Incidental observations varied in method of observation (audio, visual, etc.) and life history stage of organisms, and may have been recorded in transit to a site and thus not associated with habitat data. As well, expertise in species identification may have varied among field contractors working on different field programs. Thus, not all pertinent information may have been available (e.g., observation type, activity, demographics) or collected in a directly comparable manner (e.g., quantity). Additionally, field-based observations of provincially tracked species (at-risk and/or rare) are represented by a 1 km grid, rather than a point, on maps to align with the NHIC's Sensitive Data Location Standards (NHIC n.d.). Data associated with mapped incidentals are included in Appendix B.

1.3 Results

1.3.1 Presence, Distribution, and Abundance of Important Habitat

1.3.1.1 General Habitat Associations

This section will be included in future BIS Baseline Reports after Tier 2 and Tier 3 studies have been completed.

1.3.1.2 Significant Wildlife Habitat

Field surveys detected candidate SWH for one Special Concern and Rare Wildlife Species, monarch, within the AOI. Monarchs were observed 17 times at 15 different locations in the AOI (**Figure B-1**), including egg, larva, and adult life history stages, and feeding, travelling, and resting behaviours. To be considered SWH for monarchs, there need to be enduring migration aggregations with enough individuals. Thus, further discussions with NHIC and/or targeted field surveys are planned for Tier 2 Studies (if SON-South Bruce is selected and the project interacts with these habitats) to confirm this candidate SWH. A more detailed discussion of candidate SWH within the LSA_{TER} is available in Appendix C, Chapter 1.

1.3.2 Presence and Distribution of Species of Interest

1.3.2.1 Species of Conservation Concern

eDNA metabarcoding detected juniper seed moth (S3) at two sites in the northeastern AOI in the fall (see Figure I-1 in Appendix E, Chapter 1).

Incidental observations during 2022 field surveys included monarch within the AOI (at four grid cells that are encompassed fully within the AOI; **Figure B-1**). See **Table B-2** for information on incidental observations (count, observation type, and Tier 1 survey source). Incidental observations of monarch were mostly concentrated in five grid cells in the southwestern region of the AOI / LSA_{TER}, with additional observations in two grid cells the northeastern AOI / LSA_{TER} (**Figure B-1**). As monarch caterpillars rely heavily on milkweed plants for feeding, Zoetica cross-checked the 2022 TEM vegetation survey data for presence of milkweed within the AOI and LSA_{TER}. Field contractors recorded milkweed species at four plots in the AOI: three with common milkweed and one with both common and swamp milkweeds. Two of the plots in the southwestern AOI were within grid cells that contained incidental observations of monarch, and another was just outside two grid cells containing monarch (**Figure B-1**).

1.3.2.2 Species of Interest to Stakeholders and Rights-Holders, and Species of Potential Socio-economic Importance

Emerald ash borer and Dutch elm disease (caused by fungi carried by elm bark beetles) were mentioned as environmental concerns for forest health and diversity in the SON-South Bruce siting area during engagement conducted for the Project (see Appendix B of the BPPA Report (Zoetica 2021)). However, these species will be addressed in Chapter 9 (Ecosystem Function and Services). Human health concerns regarding ticks in the SON-South Bruce siting area were also mentioned during engagement. The socio-economic or socio-ecological importance of additional terrestrial invertebrate species to local communities and/or Indigenous communities will be sought through future engagement.

Of these species mentioned by stakeholders and/or rights-holders, EAB was recorded in incidental observations from 2022 field surveys. A more detailed discussion about forest pests like EAB is presented in Section 1.3.2.3 below and Section 1.3.3.1 in Chapter 9.

1.3.2.3 Indicator Species

Based on forest health monitoring results collected between 2017 and 2022 for the MNRF Midhurst District (NDMNRF 2022, MNRF 2023), where the AOI and LSA_{TER} are located, forests in the BIS study areas may have potential infestation issues with several terrestrial invertebrates: spongy moth, cedar and basswood leafminers, forest tent caterpillar, beech scale, spruce gall adelgids, and fall webworm. Spongy moth and beech scale are invasive species. The other forest pests are native to Ontario and could be used as indicators of forest and ecosystem health for the purposes of the BIS. eDNA metabarcoding detected another terrestrial invertebrate forest pest in the AOI, spruce budworm (*Choristoneura fumiferana*), but this species has not caused moderate to severe defoliation in the Midhurst district for at least the past ten seasons (MNRF 2018, 2023). A more detailed discussion of these insects and other forest disturbances is presented in Section 1.3.3.1 in Chapter 9.

1.3.2.4 Invasive Species

Invasive terrestrial invertebrates were identified through eDNA metabarcoding and TEM forest health surveys, and incidentally while in the field for various surveys. eDNA surveys detected the following invasive terrestrial invertebrates that are not considered forest pests: common earthworm at four sites in the northeastern AOI in the fall, and red earthworm at four sites in the northern AOI and five sites in the LSA_{AQU} in summer and fall (see Figure I-2 in Appendix E, Chapter 1).

1.3.3 Additional Baseline Data to Inform the IA

1.3.3.1 Community Characterization

Tier 1 eDNA metabarcoding studies conducted in 2022 provided some insight into terrestrial, semi-aquatic, and aquatic invertebrate communities within the AOI and aquatic LSA (LSA_{AQU}) (see Appendix E, Chapter 1). There were 80 invertebrate species detected in the AOI and 168 in the LSA_{AQU}. Detections included species of conservation concern, interest to stakeholders and rightsholders, and introduced or invasive species, as discussed in Section 1.3.2.

The Greenock Swamp Area of Natural and Scientific Interest (ANSI) Life Science Inventory report may provide some insight into butterfly diversity in the SON-South Bruce siting area, as the ANSI overlaps with the LSA_{AQU} and northern parts of the LSA_{TER} (see Section 1.3.1.2, Chapter 9). Twelve species and three genera of butterflies, including the at-risk monarch, were identified within the ANSI; however, the author

notes that "no doubt many more are present" (Johnson 1994a). A list of butterflies recorded in the Greenock Swamp ANSI is provided in **Table A-2**.

If the SON-South Bruce siting area is selected for additional baseline investigations for the Project, Tier 2 studies will aim to characterize terrestrial invertebrate communities more thoroughly within the BIS study areas.

1.4 Discussion

The current Chapter 6 of the 2023 BIS Baseline Report focused on analyzing desk-based data and one season of field data on terrestrial invertebrate-related SWH and species of interest observations. Complete results from additional years of Tier 1 terrestrial habitat assessments and incidental observations, along with the results of any Tier 2 studies that may be conducted, will be reported in future iterations of the BIS Baseline Report.

Candidate SWH in the BIS study areas for Special Concern and Rare Wildlife Species included the monarch. Field teams observed monarchs in various life stages and exhibiting several behaviours in agricultural fields and meadow marshes in the AOI in 2022. Additional years of data are required to determine whether these observations persist as "enduring migration aggregations" which would confirm the presence of monarch SWH. Monarch caterpillars predominantly feed on milkweed plants, and swamp milkweed and common milkweed were both detected in the herb layer of TEM plots within the AOI (see Table D-4 in Appendix B, Chapter 1; **Figure B-1**).

Of the six invasive terrestrial invertebrates detected in desk- and field-based data thus far, four are addressed in Chapter 9. Common earthworm and red earthworm, both detected via eDNA surveys in 2022, can alter forests by consuming the leaf-litter layer and exposing mineral soils, thereby threatening the health of forests (Ontario Invading Species Awareness Program 2021).

Future Tier 2 field studies for terrestrial invertebrates are to be determined if the SON-South Bruce siting area is selected. Study methods may include: 1) general community composition surveys using traditional sampling techniques and soil eDNA metabarcoding, and 2) targeted surveys for species of interest pending the complete results of Tier 1 studies. Further discussions with local people, Indigenous community members, the regulator, and other provincial and federal agencies are needed to inform the preferred study approach(es) for Tier 2 and/or Tier 3 studies. Refer to Section 5.2.9 of the BPPA Report (Zoetica 2021) for more information.

A more complete discussion of terrestrial invertebrates will be included in future iterations of the BIS Baseline Report after Tier 1 field data collection has been completed and analyzed. Tier 2 studies will be completed if the SON-South Bruce siting area is selected for additional baseline investigations for the Project.

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APPENDIX A – SUPPORTING INFORMATION FOR TERRESTRIAL INVERTEBRATES

Table A-1. Common and scientific names for species mentioned in this report. Species names follow the NHIC's Ontario species lists (current to March 1, 2023) or NatureServe Explorer if the species does not exist in the NHIC dataset.

Common Name (Species)	Scientific Name	Notes
TERRESTRIAL INVERTEBRATES		
Spruce gall adelgids	*Adelges* spp.	
Emerald ash borer	*Agrilus planipennis*	
Juniper seed moth	*Argyresthia alternatella*	
Basswood leafminer	*Baliosus nervosus*	
Rusty-patched bumblebee	*Bombus affinis*	
Ashton cuckoo bumblebee	*Bombus bohemicus*	
American bumblebee	*Bombus pensylvanicus*	
Suckley's cuckoo bumblebee	*Bombus suckleyi*	
Yellow-banded bumblebee	*Bombus terricola*	
Spruce budworm	*Choristoneura fumiferana*	
Beech scale	*Cryptococcus fagisuga*	
Monarch	*Danaus plexippus*	
Rusty crayfish	*Faxonius rusticus*	
Fall webworm	*Hyphantria cunea*	
Red earthworm	*Lumbricus rubellus*	
Common earthworm	*Lumbricus terrestris*	
Spongy moth	*Lymantria dispar dispar*	Previously called LDD moth / gypsy moth
Forest tent caterpillar	*Malacosoma disstria*	
Dutch elm disease	*Ophiostoma ulmi*	
Cabbage white	*Pieris rapae*	
European skipper	*Thymelicus lineola*	
-	*Argyresthia aureoargentella*	Cedar leafminers
-	*Argyresthia canadensis*	
Arborvitae leafminer moth	*Argyresthia thuiella*	
Brown Cedar leafminer moth	*Coleotechnites thujaella*	
Native elm bark beetle	*Hylurgopinus rufipes*	Elm bark beetles
European elm bark beetle	*Scolytus multistriatus*	
Digger crayfish	*Creaserinus fodiens*	Terrestrial crayfish
Great Plains mudbug	*Lacunicambarus nebrascensis*	
American dog tick / Wood tick	*Dermacentor variabilis*	Ticks reported in Grey Bruce & Huron Perth public health units that readily bite humans (Public Health Ontario 2023)
Black-legged tick / Deer tick	*Ixodes scapularis*	
Brown dog tick	*Rhipicephalus sanguineus*	
OTHER SPECIES		
Spruce trees	*Picea* spp.	
Elm trees	*Ulmus* spp.	
Common milkweed	*Asclepias syriaca*	
Swamp milkweed	*Asclepias incarnata*	

Table A-2. Butterflies recorded in the Greenock Swamp ANSI (Johnson 1994a).

Common Name	Scientific Name
Lesser Fritillary	*Boloria* sp.
Common Wood-Nymph	*Cercyonis pegala*
Monarch	*Danaus plexippus*
Viceroy	*Limenitis archippus*
Mourning Cloak	*Nymphalis antiopa*
Eastern Tiger Swallowtail	*Papilio glaucus*
Black Swallowtail	*Papilio polyxenes*
Pearl Crescent	*Phyciodes tharos*
Mustard White	*Pieris oleracea*
Cabbage White	*Pieris rapae*
Long Dash Skipper	*Polites mystic*
Angle Wing	*Polygonia* sp.
Greater Fritillary	*Speyeria* sp.
European Skipper	*Thymelicus lineola*
Red Admiral	*Vanessa atalanta*

Table A-3. List of regulated and non-regulated invasive terrestrial invertebrate species of concern in Ontario. This list does not imply potential occurrence in the SON-South Bruce siting area, as several invasive species "on the radar" have not yet been found in Ontario or even Canada; however, these species are known to have significant ecological, social, health, and/or economic impacts in other areas of North America and worldwide, where they have been introduced.

Common Name	Scientific Name	Ont. ISAP[1]	ISC[2]
European Fire Ant	*Myrmica rubra*		X
Jumping worm spp.	(Family Megascolecidae)	X	X
Jumping worm spp.	*Amynthas* spp.		X
Jumping worm spp.	*Metaphire* spp.		X
Jumping worm spp.	*Pheretima* spp.		X
baldfaced hornet	*Dolichovespula maculata*		
European hornet	*Vespa crabro*		
Box Tree Moth	*Cydalima perspectalis*		X
Northern Giant Hornet	*Vespa mandarinia*		X
European Hornet	*Vespa crabro germana*		

Notes:
1. Ontario's Invading Species Awareness Program (ISAP) is a partnership between the MNRF and the Ontario Federation of Anglers and Hunters. The webpages for Invasive Invertebrates and Invasive Forest Pests and Pathogens were accessed on September 25, 2023: http://www.invadingspecies.com/invaders/
2. The Invasive Species Centre (ISC) is a resource for Ontario and the rest of Canada. Based in Sault Ste. Marie, Ontario, the Board of Directors Organizations include the Great Lakes Fishery Commission, Grand Council Treaty #3, City of Ottawa, International Joint Commission, Wildlife Habitat Canada, University of Waterloo, BioForest, Nature Conservancy of Canada, Natural Resources Canada, Fisheries and Oceans Canada, and the CFIA. The webpage for Invasive Insects was accessed on September 25, 2023: https://www.invasivespeciescentre.ca/invasive-species/

APPENDIX B – INCIDENTAL OBSERVATIONS IN THE FIELD

Table B-1. Incidental observations of terrestrial invertebrates during TEM, AHM, and eDNA field surveys in the AOI or LSA_{TER} in 2022.

Common Name	Scientific Name	SAR	Rare	Invasive	Notes
Emerald ash borer (EAB)	*Agrilus planipennis*	N	N	Y	Addressed in Chapter 9
Giant swallowtail	*Heraclides cresphontes*	N	N	N	
Monarch	*Danaus plexippus*	Y	Y	N	SC in Ontario, END in Canada, S2N/S4B
Spongy moth	*Lymantria dispar dispar*	N	N	Y	Addressed in Chapter 9

Notes:
END = Endangered; SC = Special Concern
NHIC SRANKs: N = non-breeding population, B = breeding population.

Table B-2. Supplemental information for 2022 field-based incidental observations of terrestrial invertebrate species of interest in the BIS study areas.

Grid	Species	Observation Type	Count	Source Type	AOI	LSA_{TER}
7072	Monarch	Visual (juv)	1	Incidental	1	1
7072	Monarch	Visual	1	Incidental	1	1
7072	Monarch	Visual	7	Incidental	1	1
7072	Monarch	Visual	1	Incidental	1	1
7072	Monarch	Visual	1	Incidental	1	1
7171	Monarch	Visual	5	Incidental	1	1
7172	Monarch	Visual	1	Incidental	1	1
7172	Monarch	Visual	1	Incidental	1	1
7172	Monarch	Visual	2	Incidental	1	1
7172	Monarch	Visual	5	Incidental	1	1
7172	Monarch	Visual	1	Incidental	1	1
7173	Monarch	Visual	2	Incidental	1	1
7272	Monarch	Visual (juv)	1	Incidental	1	1
7272	Monarch	Visual (juv)	1	Incidental	1	1
7272	Monarch	Visual (juv)	1	Incidental	1	1
7274	Monarch	Visual	1	Incidental	1	1
7473	Monarch	Visual	1	AHM	1	1

Notes:
See **Figure B-1** for Grid locations of masked observations. Coordinates are not provided due to the sensitive nature of the at-risk monarch.
For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries.

NWMO Biodiversity Impact Studies

Terrestrial Invertebrate Species of Interest Field Observations & Habitat Data

Figure B-1

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:27,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A115	

Walkers Line
Sideroad 32
Greenock Swamp Wetland Complex
Concession 10
Teeswater River
Sideroad 20b
Bruce Road 4
Statters Lake Avenue
Kinloss Culross
Sideroad 25 North
Concession 8
7274
7173
7473
7072
7172
7272
7171
Langside Street
Township of Huron-Kinloss
Andrew Street
Teeswater River
Bruce Road 6
Teeswater Wetland Complex
Wolfe Street

Species Observed

- Monarch (SAR)

Habitat Data

2022 TEM Location with Milkweed

- Common milkweed [3]
- Common milkweed & Swamp milkweed [1]

SAR = Species at Risk



Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 BASELINE REPORT (CHAPTER 7: AVIFAUNA)

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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GLOSSARY AND ABBREVIATIONS

AHM	Aquatic Habitat Mapping
ANSI	Area of Natural and Scientific Interest
AOI	Area of Interest
BCR	Bird Conservation Region
BIS	Biodiversity Impact Studies
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
BV	Biodiversity Value. The biotic environmental components that will be considered for study within the Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components.
CA	Conservation Authority
CNSC	Canadian Nuclear Safety Commission
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Critical habitat	Habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species (*Species at Risk Act*, S.C. 2002, c. 29). Identification of critical habitat is not a required component of a recovery strategy under the Ontario *Endangered Species Act*. However, the approach used to identify critical habitat, in conjunction with the best scientific information available, is recommended when developing a habitat regulation. A habitat regulation is a legal instrument under the *ESA* that prescribes an area that will be protected as the habitat of the species.
ECCC	Environment and Climate Change Canada
Ecoregion	Second highest level of the ELC hierarchy (Crins et al. 2009). Large geographic areas primarily identified by sub-continental climatic regimes and bedrock geology.
Ecosite	Second lowest level of the ELC hierarchy (Crins et al. 2009). The land within an ecosite will generally contain similar substrate and vegetation.
Ecosite classification dataset	The dataset of ecosite classification created for the BIS using South Western Ontario Orthophotography Project (SWOOP) 2020 imagery.
ECS	Ecoregional Criterion Schedule
eDNA	Environmental DNA
ELC	Ecological Land Classification
Environmentally significant area	With respect to bird habitat, the TISG Template requires identification of environmentally significant areas, which include National Parks, Areas of Natural or Scientific Interest, Migratory Bird Sanctuaries or other priority areas or sanctuaries for birds, National Wildlife Areas or World Biosphere Reserves, offshore Marine Protected Areas and Ecologically and Biologically Significant Marine Areas (IAAC 2023).
EO	Element Occurrence. An EO is an area of land and/or water where a species or vegetation community is or was present. EOs represent areas important to the conservation of a species or vegetation community. In Ontario, the NHIC generates each EO from one or

	more observations, based on international standard EO specifications developed by NatureServe (NDMNRF 2021).
ESA	Ontario *Endangered Species Act*
FWCA	Ontario *Fish and Wildlife Conservation Act*
GBIF	Global Biodiversity Information Facility
GIS	Geographic Information System
GSWC	Greenock Swamp Wetland Complex
Habitat suitability / suitable habitat	The ability of the habitat, in its current condition, to provide the life requisites of a species.
IA	Impact Assessment
Landbird	Bird species that primarily use terrestrial habitats. This group includes a wide variety of tree-dwelling birds, perching birds or songbirds, raptors, and ground-feeding birds. For the purposes of the BIS, upland breeding birds include all landbirds except for raptors.
Lek	A communal area where animals congregate during the breeding season and males engage in competitive displays and courtship rituals to attract females. A variety of species use a lek mating system; grouse are amongst the most well-known examples.
LSA	Local Study Area LSA_{TER} = Terrestrial Local Study Area LSA_{AQU} = Aquatic Local Study Area LSA_{ECO} = Local Study Area for Ecosystem Function and Services
MBCA	Federal *Migratory Birds Convention Act, 1994*
MECP	Ontario Ministry of the Environment, Conservation and Parks
MNRF	Ontario Ministry of Natural Resources and Forestry
NHIC	Ontario Natural Heritage Information Centre
NWMO	Nuclear Waste Management Organization
OBBA	Ontario Breeding Bird Atlas
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose traditional territories include the project location.
RSA	Regional Study Area RSA_{AVI} = Regional Study Area for Terrestrial Avifauna $RSA_{AVI-AQU}$ = Regional Study Area for Aquatic or Semi-aquatic Avifauna
SAR	Species at Risk. For the purposes of the BIS, SAR include species listed under Schedule 1 of the federal *Species at Risk Act* (*SARA*), species designated as Species at Risk in Ontario (SARO) and listed under the provincial *Endangered Species Act, 2007* (*ESA*), and species assessed as Extirpated, Endangered, Threatened, or Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).
SARA	Federal *Species at Risk Act*
SARO	Species at Risk in Ontario
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the

	Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SOP	Standard Operating Procedure
Species of conservation concern	Includes provincially and/or federally listed SAR (Extirpated, Endangered, Threatened, Special Concern) and provincially rare (SRANK S1, S2, S3, SH) species. Regionally rare species may also be scoped in if identified by stakeholders and/or rights-holders as VCs.
Species of interest	Includes species of conservation concern, culturally important species, indicator species, and invasive species (where applicable).
SRANK	Subnational Rank. SRANK is the conservation status of a species or vegetation community within a particular province, territory, or state. In Ontario, the NHIC assigns SRANKs using the best available information and considering factors such as abundance, distribution, population trends, and trends (NDMNRF 2021). Species assigned S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), and SH (Possibly Extirpated) are considered provincially rare by the NHIC. See the NatureServe website for more information: https://www.natureserve.org/nsexplorer/about-the-data/statuses/conservation-status-categories
SWH	Significant Wildlife Habitat. Defined in the Ontario Provincial Policy Statement, 2020 as: *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. *Significant* – in regard to wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Candidate SWH are areas that meet the ELC ecosite code(s) and/or habitat criteria outlined in the SWH ecoregional criterion schedule (ECS). Confirmed SWH are areas that meet the defining criteria outlined in the SWH ECS. Detailed field investigations are usually needed to confirm SWH.
TEM	Terrestrial Ecosystem Mapping
The Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines. 'TISG Template' refers to the Tailored Impact Statement Guidelines Template (generic version) (IAAC 2023).
UBB	Upland Breeding Bird
UTM	Universal Transverse Mercator
VC	Valued Component. For impact assessments of designated projects under the *Impact Assessment Act*, the Agency's Glossary of Terms defines VCs as "environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties. Valued components may be identified as having scientific, biological, social, health, cultural, traditional, economic, historical, archaeological and/or aesthetic importance."

1.0 INTRODUCTION

Birds are important components of ecosystems, serving as pollinators, seed dispersers, insect controllers, and game for hunting. Birds provide a component of well-being for various community members, including spiritual connections for Indigenous peoples. Birds can also act as biological indicators of healthy ecosystems because methods for gathering information on diversity, abundance, and distribution of birds are well established, and data on many bird species can be gathered simultaneously using various protocols. In Canada, numbers of aerial insectivores, grassland birds, and shorebirds are generally declining; waterfowl and birds of prey are generally recovering; and a quarter of all bird species are not well monitored so population statuses and trends are unknown (NABCI-Canada 2019). For the purposes of the Adaptive Phased Management Project's (hereafter, 'the Project') Biodiversity Impact Studies (BIS), Zoetica™ has grouped the wide array of potential bird species into four functional groups, based on similar life-history attributes and survey methods for determining their presence and/or abundance. These groups will henceforth be referred to as: Upland Breeding Birds[1], Shorebirds, Waterbirds, and Raptors.

The importance of birds provincially, nationally, and internationally, is reflected in the many Acts and regulations put in place by the various levels of government, including the federal *Migratory Birds Convention Act, 1994* (*MBCA*) and *Species at Risk Act* (*SARA*), and the Ontario *Endangered Species Act* (*ESA*) and *Fish and Wildlife Conservation Act* (*FWCA*). Most migratory birds are protected under the *MBCA*, which protects individual birds, their eggs, and their nests from any form of hunting, trafficking, commercialization, or substance harm, unless holding a permit. All wild birds (that are not considered game birds) are protected under the *FWCA* from trapping or hunting. A full list of Acts, regulations, and other biodiversity considerations is available in Appendix E of the *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approaches* (BPPA) Report (Zoetica 2021).

The Canadian Nuclear Safety Commission's (CNSC) *Guidance on Deep Geological Repository Site Characterization* includes wildlife, terrestrial habitat, and species at risk (SAR) as elements of terrestrial ecology that should be characterized in the Area of Interest (AOI) (CNSC 2018). In addition, the Tailored Impact Statement Guidelines Template (generic version) ('TISG Template')[2] identifies birds, migratory birds and their habitat, and SAR as elements of the biophysical environment that could be scoped into the Impact Assessment (IA) as Valued Components (VCs), which would require a detailed baseline description and project effects assessment in the impact statement (IAAC 2023).

The Saugeen Ojibway Nation (SON)-South Bruce siting area is located within Bird Conservation Region (BCR) 13: Lower Great Lakes/St. Lawrence Plain (EC 2014a). Environment and Climate Change Canada (ECCC) developed a series of bird conservation strategies in each of Canada's BCRs, including for the Ontario portion of BCR 13 (EC 2014a). These strategies form a basis for which specific implementation

[1] Zoetica's *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approaches* (BPPA) Report (Zoetica 2021) distinguished five functional groups of birds based on likeness of survey methods for determining their presence and/or abundance. For the 2023 BIS Baseline Report, Upland Breeding Birds and Game Birds are discussed together because of their similar habitat requirements. However, Zoetica recognizes that Game Birds and Waterfowl are important for hunting and traditional land use practices. If the Saugeen Ojibway Nation (SON)-South Bruce siting area is selected for the Project, future reporting of Tier 2 BIS baseline studies may present Game Birds and Waterfowl separately such that potential Project impacts on these species can be considered by the NWMO's social, economic, and health impact assessment team.

[2] Please see Chapter 1 for limitations of and planned updates to the TISG Template.

plans can be developed. Each plan includes a priority species assessment, habitats important to priority species, population objectives, threat assessment for priority species, conservation objectives, and recommended actions.

Priority species identified in the BCR 13 strategy include federal and provincial SAR and species of concern or stewardship[3] at both regional/subregional and national/continental scales. Priority species that are not at risk and not provincially rare (i.e., those without legal implications) may be selected as potential indicator species to carry forward to the IA (see Section 5.2.7 and Tables 5-17 and 5-18 of the BPPA Report (Zoetica 2021)). However, not all 97 priority species described in the BCR 13 strategy will apply to the SON-South Bruce siting area, as the BCR 13 region also includes Great Lakes shorelines and portions of southeastern Ontario (see Figure 1 in (EC 2014a), whereas the BIS study areas for birds include a smaller, inland location in southern Bruce County (see Section 3.0, Chapter 1).

Birds considered biodiversity values (BVs) for the BIS include: species that are indicators of ecosystem health, species of conservation concern (including SAR and rare species), and species of interest to stakeholders and rights-holders. Priority species identified in the BCR 13 strategy, along with culturally important and invasive species (where applicable)[4], are currently included as "species of interest" for the purposes of the BIS. For the current Chapter 7 (Avifauna) of the 2023 BIS Baseline Report, all priority species observations are discussed but mapping is limited to SAR and provincially rare species. Although some birds were mentioned during engagement, the cultural importance of species cannot be ascertained by Zoetica at this time, as this task requires further coordination with other disciplines studying the potential impacts of the Project. A review of engagement conducted to date that is of relevance to the BIS is presented in Appendix B of the BPPA Report (Zoetica 2021). The scope of species of interest for BIS baseline reporting will be expanded in future years of the BIS baseline program to include culturally important and other priority/indicator species when more information is gathered through Tier 2 studies and engagement.

1.1 General Objectives

The general objectives of bird studies for the BIS are to:

1. Determine the presence, distribution, and abundance of relevant Significant Wildlife Habitat (SWH) and other important habitat for select BVs, with an emphasis on:
    a. Species of conservation concern, including SAR,
    b. Species of interest and potential importance to local stakeholders and rights-holders,
    c. Indicator species;

[3] In addition to SAR and rare species, ECCC has identified other bird species of conservation concern if they "are vulnerable due to population size, distribution, population trend, abundance and threats" (EC 2014a). Stewardship species are widely distributed and abundant species that typify national and regional bird communities. Some species also have a large portion of their range and/or population within the BCR, warranting their inclusion as stewardship species (EC 2014a).

[4] There are currently no birds designated as invasive species in Ontario (i.e., listed under the Ontario *Invasive Species Act* or by Ontario's Invading Species Awareness Program). While there are likely introduced/exotic bird species in the SON-South Bruce siting area, such as rock pigeon, European starling, and house sparrow, these are not typically considered invasive species. Introduced/exotic birds will not be included as species of interest for the purposes of the BIS unless management concerns are raised in the future through ongoing engagement with local stakeholders and/or rights-holders.

2. Determine the potential presence and distribution of species of interest, including the select BVs listed in (1); and,
3. Provide additional baseline data to help inform the Project's biodiversity IA and mitigation measures, and to assist in the potential development of monitoring program(s) to address environmental, regulatory, and stakeholder/rights-holder concerns.

The current Chapter 7 (Avifauna) begins to fulfill the requirements of the TISG Template required for birds, migratory birds, and their habitat (see Appendix C in the BPPA Report (Zoetica 2021)).

1.2 General Methods

ECCC has provided a framework for the scientific assessment of potential project impacts on birds (Hanson et al. 2009). This framework helps interweave BCR strategies, regulations, methods, and existing datasets into scientifically- based conclusions about potential project impacts on birds, ensuring that baseline data will adequately inform the IA. These concepts, sources, and guidelines helped shape the BIS baseline data collection for birds. If the SON-South Bruce siting area is selected for the Project, Zoetica will implement any additional guidance provided by ECCC regarding future planned baseline studies (i.e., Tiers 2 and 3) and the IA for migratory birds and SAR.

1.2.1 Study Areas

The BIS study areas for birds include the AOI, terrestrial local study area (LSA_{TER}), and two regional study areas (RSA_{AVI} and $RSA_{AVI\text{-}AQU}$). Different RSAs are used depending on the life history requirements of the species or species grouping (i.e., needing terrestrial habitat only or terrestrial and aquatic). The $RSA_{AVI\text{-}AQU}$ is comprised of the outer boundaries of the RSA_{AVI} and the aquatic LSA (LSA_{AQU}). See Section 3.0 in Chapter 1 and Section 5.2.7.5 of the BPPA Report (Zoetica 2021) for more details on study area descriptions and rationale.

For the Tier 1 baseline studies, desk-based ecosite classifications and subsequent field verifications were completed as part of Terrestrial Ecosystem Mapping (TEM) (see Appendix B, Chapter 1), and only covered the LSA for ecosystem functions and services (LSA_{ECO}). The LSA_{ECO} encompasses both the LSA_{TER} and portions of the RSA_{AVI} and $RSA_{AVI\text{-}AQU}$. Analyses involving ecosite data (e.g., to identify candidate SWH for birds) were thus limited to the LSA_{ECO}; however, mapping of species and important wildlife habitat from both desk- and field-based data extended into the RSAs.

1.2.2 Collation of Species Observations and Habitat Data

Zoetica began desk-based investigations of birds by identifying species of interest that could potentially occur within the BIS study areas. Refer to Appendix D and Section 3.1 in the BPPA Report (Zoetica 2021) for a comprehensive list of SAR, including at-risk bird species, and methods used to compile this list. Provincially rare species are indicated by their subnational rank (SRANK; S1, S2, S3, SH) and tracked by the Ontario Natural Heritage Information Centre (NHIC).[5]

[5] For the purposes of the 2023 BIS Baseline Report, conservation statuses described in text for at-risk species refer to their Species at Risk in Ontario (SARO) listings unless otherwise indicated. Conservation statuses are from the NHIC's Ontario species list, current to March 1, 2023, and updated for any discrepancies with provincial and federal SAR listings up to August 15, 2023. As such, species and status listings may differ from those presented in Zoetica's 2021 BPPA Report (Zoetica 2021).

Zoetica proceeded with desk-based research and mapping by collating existing data from government, citizen science, and other biodiversity databases. For this 2023 BIS Baseline Report, data sources for verified species and habitat records included the NHIC, Ontario Ministry of Natural Resources and Forestry (MNRF), and the Global Biodiversity Information Facility (GBIF). As these datasets periodically pull observations from other bird-related projects and programs (e.g., eBird, Ontario Bird Breeding Atlas [OBBA]), they were deemed to be a good starting point to describe the biodiversity of bird species and their habitats that are found or are likely to be found in the RSA_{AVI} and $RSA_{AVI\text{-}AQU}$.

In addition, Zoetica investigated findings from previous 2020 preliminary environmental studies conducted for the Project in the SON-South Bruce siting area (Tulloch Environmental 2020, 2021). Spatial data collected for these environmental studies were not incorporated into Zoetica's baseline maps; however, Tulloch Environmental's 2020 and 2021 reports and maps are available upon request from the NWMO. **Table 1-1** summarizes the datasets, data layers, and reports investigated and analyzed for bird species observations and habitat data for the 2023 BIS Baseline Report.

Table 1-1. Spatial datasets and reports analyzed for birds for the 2023 BIS Baseline Report.

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains relevant[1] data?
Tulloch Environmental *Preliminary environmental studies for the Project*	July 2020 Site Reconnaissance (Tulloch Environmental 2020)	Unpublished Report	10/2020	Y
	October 2020 Natural Heritage Features (Tulloch Environmental 2021)	Unpublished Report	04/2021	Y
Ontario Natural Heritage Information Centre (NHIC)	Species Occurrences	Shapefile	12/2020	Y
	Wildlife Concentration Area Observation	Shapefile	12/2020	Y
Ontario Ministry of Natural Resources and Forestry (MNRF)	Wildlife Activity Site	Shapefile	12/2020	N
	Wildlife Activity Area	Shapefile	12/2020	N
	Greenock Swamp ANSI Report (Johnson 1994a, 1994b)	Reports	10/2020	Y
Global Biodiversity Information Facility (GBIF)	Species Occurrences	Comma Separated Values	10/2021	Y
Environment and Climate Change Canada (ECCC) and Ontario Ministry of the Environment, Conservation and Parks (MECP)[2]	Federal and Provincial SAR Recovery Strategies	Reports	Various	Y

Notes:

1. Zoetica determined dataset relevance based on geographic and temporal relevance, as well as relevance to birds. For example, data that were not within the relevant BIS study areas, data that were too old to be considered relevant, or data that did not include records of bird species were labelled "N" for not containing relevant data.
2. SAR recovery strategies are published by the ECCC and MECP but authors may differ. Refer to Appendix D of the BPPA Report (Zoetica 2021) for a full list of potentially occurring SAR that had provincial and/or federal recovery strategies available at the time of writing the BPPA Report (note: new documents are continually posted on the SARO website and *SARA* Public Registry). The most updated versions of the recovery strategies for relevant species were reviewed and cited in this 2023 BIS Baseline Report.

A full list of the species mentioned in this report, including common and scientific names, is available in **Table A-1** in Appendix A. All map figures are presented in Appendix B.

Additional datasets will be investigated in future years of the BIS baseline program. For example, data collection is currently underway for the OBBA Atlas-3, a project conducted in partnership between Birds Canada, Canadian Wildlife Service (ECCC), MNRF, Ontario Field Ornithologists, and Ontario Nature. Data collected within atlas squares overlapping the RSA_{AVI} and $RSA_{AVI\text{-}AQU}$ will be sought in the future to complement the BIS baseline studies and to gather a larger regional picture of bird biodiversity.

1.2.3 Tier 1 Studies

Field studies conducted in 2022 focused on collecting Tier 1 foundational habitat data and species detections through environmental DNA (eDNA) metabarcoding studies. Each field team also collected incidental observations of biodiversity, including birds. Detailed methods for the Tier 1 studies are available in the *Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design* (BPD) Report and associated Standard Operating Procedures (SOPs) (Zoetica 2022). In addition to the utility of each Tier 1 study outlined below for understanding birds and bird habitat in the BIS study areas, incidental bird observations collected during the terrestrial and aquatic field studies may be informative in describing biodiversity.

1.2.3.1 Terrestrial Ecosystem Mapping

TEM work completed to date is described in Appendix B, Chapter 1. The ecosite classification dataset resulting from TEM work was used for desk-based identification of candidate SWH.

1.2.3.2 Identification of Candidate SWH

Desk- and field-based candidate SWH identification work completed to date is described in Appendix C, Chapter 1. SWH types of relevance to birds are outlined in Sections 2.0, 3.0, 4.0, and 5.0 of this report.

1.2.3.3 Aquatic Habitat Mapping

Aquatic Habitat Mapping (AHM) work completed to date is described in Appendix D, Chapter 1. The results of AHM may help identify important foraging habitats for piscivorous (fish-eating) bird species.

1.2.3.4 Environmental DNA Metabarcoding

eDNA metabarcoding studies completed to date are described in Appendix E, Chapter 1. The two vertebrate primers used for eDNA metabarcoding studies are primarily intended to capture aquatic and semi-aquatic species such as fish, amphibians, and turtles (see Section 2.4 of the BPD Report (Zoetica 2022)); however, the primers may also detect bird species.

1.2.4 Mapping Considerations

To protect sensitive species and ecosystems, NHIC spatial data and 2022 field data pertaining to provincially tracked (at-risk and rare) species and wildlife concentration areas (e.g., nest colonies) are represented by a 1 km grid, rather than a point or polygon, as per the NHIC's Sensitive Data Location Standards (NHIC n.d.). Descriptive reporting also follows sensitivity standards and is not detailed enough to allow for precise geolocation.

GBIF data were limited to observations from 1970 onward as older observations were considered historic and not as reliable. See also Appendix A, Chapter 1 for data quality scoring. When there were multiple

entries with a count of one at the same location, Zoetica assumed the entries were all the same individual to avoid double-counting and erroneously reporting that multiple individuals were present.

Incidental observations were recorded during various Tier 1 baseline field programs and were noted on different data forms (Incidental Observation Form or noted in TEM, AHM, or eDNA survey forms). Incidental observations varied in method of observation (audio, visual, etc.) and life history stage of organisms, and may have been recorded in transit to a site and thus not associated with habitat data. As well, expertise in species identification may have varied among field contractors working on different field programs. Thus, not all pertinent information may have been available (e.g., observation type, activity, demographics) or collected in a directly comparable manner (e.g., quantity). For mapping and interpretation purposes, Zoetica defaulted to 'unspecified' observation type, count of one individual, and adult individuals unless otherwise indicated. Zoetica also assumed one individual when a singular observation (e.g., "barn swallow") was recorded in the field notes, and more than one individual if plural observations (e.g., "barn swallows") were recorded.

For both desk- and field-based species observation data, only the species and locations (masked for sensitive data, where needed) are presented on the maps in Appendix B. Additional information about count, observation type, and source type (i.e., which Tier 1 program the incidental observation came from) is presented in the supplemental table for each map in Appendix B.

2.0 UPLAND BREEDING BIRDS

2.1 Introduction

This section of the 2023 BIS Baseline Report focuses on upland breeding birds. This group refers to landbirds, aside from raptors (Section 5.0), and includes the following orders:

- Columbiformes – Pigeons and Doves
- Cuculiformes – Cuckoos
- Caprimulgiformes – Nightjars, Swifts, Hummingbirds, and Allies
- Coraciiformes – Kingfishers
- Piciformes – Woodpeckers
- Passeriformes – Flycatchers, Shrikes, Crows, Jays, Tits, Chickadees, Larks, Swallows, Warblers, Treecreepers, Wrens, Dippers, Thrushes, Waxwings, Old World Sparrows, Finches, Wagtails, Cardinals, and Allies
- Galliformes – Grouse, Pheasants, and Allies ('Game Birds' as discussed in the BPPA Report (Zoetica 2021))

A general introduction about the inclusion of birds for the BIS and background information about BCR 13 is included in Section 1.0. Out of 97 priority species identified in the BCR 13 strategy (EC 2014a), 39 are upland breeding birds. Most upland breeding birds are migratory species that are expected to be present in the BIS study areas only during the breeding season (Mitch Waite Group 2018). BCR 13 corresponds to nesting zone C2, where the regional nesting period is between early April to late August (ECCC 2018a). Baseline studies of upland breeding birds will, therefore, generally be conducted during this timeframe.

Several SWH types apply to upland breeding birds. Based on the SWH Ecoregional Criterion Schedule for Ecoregion 6E (hereafter '6E ECS') (OMNRF 2015), there are 11 upland breeding bird-related SWH types of potential relevance to the SON-South Bruce siting area:

- Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)
- Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs) – *primarily of relevance to waterbirds but also indicated for chimney swift (Threatened)* (MNRF 2014)
- Colonially-Nesting Bird Breeding Habitat (Ground) – *primarily of relevance to waterbirds but also indicated for Brewer's blackbird* (OMNRF 2015)
- Seeps and Springs
- Woodland Area-Sensitive Bird Breeding Habitat
- Marsh Bird Breeding Habitat – *primarily of relevance to waterbirds but also indicated for marsh wren and sedge wren* (OMNRF 2015)
- Open Country Bird Breeding Habitat
- Shrub/Early Successional Bird Breeding Habitat
- Alvar – *may support loggerhead shrike (Endangered)* (MNRF 2014)
- Tallgrass Prairie – *may support Henslow's sparrow (Endangered)* (MNRF 2014)
- Special Concern and Rare Species

Further details about candidate SWH investigations conducted to date and rationale for inclusion (or exclusion) of SWH types listed in the 6E ECS are presented in Appendix C, Chapter 1.

2.1.1 Objectives

All general objectives listed in Section 1.1 apply to upland breeding birds.

2.2 Methods

2.2.1 Study Areas

The BIS study areas for upland breeding birds include the AOI, LSA_{TER}, and RSA_{AVI} (see figures and descriptions in Section 3.0, Chapter 1).

2.2.2 Presence, Distribution, and Abundance of Important Habitat

Collation of both existing and Tier 1 habitat data for upland breeding birds proceeded as described in Sections 1.2.2 and 1.2.3.

2.2.3 Presence and Distribution of Species of Interest

Collation of existing observations and Tier 1 incidental observations for upland breeding bird species of interest proceeded as described in Sections 1.2.2 and 1.2.3.

2.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of upland breeding birds in the BIS study areas.

2.3 Results

2.3.1 Presence, Distribution, and Abundance of Important Habitat

2.3.1.1 General Habitat Associations

Future Tier 2 studies aim to determine upland breeding bird-habitat associations within the BIS study areas. Discussion of general habitat associations will be included in future BIS Baseline Reports after Tier 2 studies have been completed (if the SON-South Bruce siting area is selected for the Project).

2.3.1.2 Significant and Other Important Wildlife Habitats

Two confirmed SWH types and various candidate SWH types of relevance to upland breeding birds have been found within the AOI, LSA_{TER}, and/or RSA_{AVI} based on ecosite matches, some or all habitat criteria being met, or records of species and/or habitat features. Of note, there is strong evidence from both TEM/SWH and AHM surveys to support confirmed SWH for Seeps and Springs, which are important feeding and drinking areas for a variety of wildlife species, including wild turkey and ruffed grouse. Barn swallow (Special Concern) nest sites should also be confirmed SWH; observations of barn swallow nesting are described further below in this Section 2.3.1.2. Of the 11 SWH types listed in Section 2.1, candidate SWH was identified for all except Tallgrass Prairie (which may support the Endangered Henslow's sparrow). There are no data to support candidate Tallgrass Prairie SWH within the BIS study areas for birds to date. A detailed discussion of confirmed and candidate SWH is available in Appendix C, Chapter 1.

In addition (or supplementary) to SWH, Zoetica investigated whether other important wildlife habitat data (e.g., nests, territories, snags/wildlife trees, important foraging/perching/roosting sites) were noted in existing datasets and reports (see **Table 1-1**) or found during the Tier 1 BIS baseline field programs. As part of previous preliminary environmental work for the Project, a reconnaissance for natural heritage features was conducted in July 2020 for borehole BH-01 (Tulloch Environmental 2020) and in October 2020 for borehole BH-02 (Tulloch Environmental 2021) within the AOI. At BH-01, the following breeding

habitats for SAR were observed: nesting barn swallows within farmstead out-buildings on site, and suitable habitat for eastern meadowlark (Threatened) and bobolink (Threatened) within adjacent properties, but not at the BH-01 site. At BH-02, no active or recently active barn swallow nests were found, but suitable habitat exists within/around the buildings on site, and suitable habitat for eastern meadowlark and bobolink potentially exists on adjacent agricultural fields (depending on crop rotation). Suitable nesting habitat for migratory birds is available in treed/shrub/riparian habitats nearby; however, few birds were observed during the October 2020 survey, as would be expected (Tulloch Environmental 2021).

During 2022 field studies, upland breeding bird nesting activity was recorded within the AOI and/or LSA_{TER}: barn swallows were reported nesting in an old barn. Incidental observations of barn swallow and other species of conservation concern are further described in Section 2.3.2.1. Although nesting activity was rarely directly observed, field surveyors assessed TEM plots for their suitability as breeding habitat for a variety of upland breeding birds (i.e., candidate SWH), and recorded incidental observations of species of interest or their habitat whenever they were encountered. For example, field surveyors identified eroding banks that could be suitable breeding habitat for bank swallows (Threatened) along the Teeswater River within the AOI. These findings are also related to candidate SWH for Colonially-Nesting Bird Breeding Habitat (Bank and Cliff). Relevant incidental observations and field results showing which TEM plots were identified as candidate SWH are presented in Appendix C, Chapter 1.

2.3.1.3 Critical Habitat and Environmentally Significant Areas

As of September 2023, eight at-risk bird species have the potential to be found in the SON-South Bruce siting area (see Table 5-19 in the BPPA Report (Zoetica 2021)) with federal recovery strategies, where critical habitat (represented by 10 x 10 km squares) has been identified near BIS study areas for birds (**Table 2-1**). As shown in **Figure B-1**, there is a known critical habitat square for bobolink that overlaps with the AOI, LSA_{TER}, and RSA_{AVI}. Further discussions with ECCC and/or the Ontario Ministry of the Environment, Conservation and Parks (MECP) are needed to determine whether critical habitat for bobolink occurs within the BIS study areas. In addition, it is possible that new critical habitat will be identified by ECCC recovery practitioners during the timeline of the BIS baseline program and Project IA; should this occur, relevant critical habitat will be discussed in this section in future BIS baseline reports.

Table 2-1. Bird species at risk with critical habitat identified in or near the BIS study areas for birds.

Species	Overlaps RSA_{AVI} / $RSA_{AVI-AQU}$[1]	Distance from RSA (km)	Recovery Strategy Reference
Bobolink	Yes	-	(ECCC 2022a) – *proposed*
Bank Swallow	No	3.6	(ECCC 2022b)
Red-headed Woodpecker	No	6.8	(ECCC 2021)
Eastern Meadowlark	No	12.4	(ECCC 2022c) – *proposed*
Least Bittern[1]	No	23.8	(EC 2014b)
Eastern Whip-poor-will	No	31.0	(ECCC 2018b)
Chimney Swift	No	37.0	(ECCC 2023a)
Louisiana Waterthrush	No	67.6	(ECCC 2023b) – *proposed*

Notes:
1. The $RSA_{AVI-AQU}$ only applies to least bittern. This species is a waterbird and will be discussed in Section 4.0. However, for baseline reporting purposes, critical habitat and environmentally sensitive areas for all birds is discussed in Section 2.3.1.3.

Based on existing information, there are no National Parks, Migratory Bird Sanctuaries or other priority areas or sanctuaries for birds, National Wildlife Areas, or World Biosphere Reserves that may be impacted by the Project (see Section 1.3.1 in Chapter 9). However, the RSA_{AVI} (and $RSA_{AVI-AQU}$) and northern parts of the LSA_{TER} overlap with an Area of Natural and Scientific Interest (ANSI), Life Science – the Greenock Swamp (**Figure B-1**). The Greenock Swamp ANSI has been designated as provincially significant; the 1994 ANSI Life Science Inventory report states that between 90 and 100 bird species likely breed within the Greenock Swamp (Johnson 1994a). A full list of these breeding bird species, along with their current conservation statuses, is available in **Table C-1**. However, as more precise spatial information was not available in the Greenock Swamp ANSI Life Science Inventory report, these bird records could not be incorporated into Zoetica's baseline maps. In addition, the Turnberry Swamp ANSI, Life Science, overlaps a southern part of the $RSA_{AVI-AQU}$. The Turnberry Swamp ANSI is considered regionally significant; however, at the time of writing this 2023 BIS Baseline Report (September 2023), an ANSI Life Science Inventory report had not been made available to Zoetica.

2.3.2 Presence and Distribution of Species of Interest

2.3.2.1 Species of Conservation Concern

To date, 29 upland breeding bird species of conservation concern have been observed within the AOI, LSA_{TER}, and/or RSA_{AVI} (**Table 2-2**), including 14 SAR and two provincially rare species (**Figure B-2** and **Figure B-3**), and 13 other priority species identified by the BCR 13 strategy (EC 2014a). Thus, of the 26 upland breeding bird SAR identified by Zoetica as potentially occurring in the SON-South Bruce siting area (see Appendix D of the BPPA Report (Zoetica 2021)), approximately half (14) have now been confirmed within the BIS study areas.

Table 2-2. Summary list of upland breeding bird species of interest recorded within the AOI, LSA_{TER}, and RSA_{AVI}.

Common Name	Species of Interest[1]				Method of Detection			BIS Study Area[2]		
	SAR	Prov. Rare	BCR 13	Engage.	Desk-based	2020 Studies[3]	2022 Field[4]	AOI	LSA_{TER}	RSA_{AVI}
Baltimore Oriole	-	-	Y	-	Y	-	-	Y	Y	Y
Bank Swallow	Y	-	Y	-	Y	-	Y	Y	-	Y
Barn Swallow	Y	-	Y	-	Y	Y	Y	Y	Y	Y
Belted Kingfisher	-	-	Y	-	Y	-	-	Y	Y	Y
Black-billed Cuckoo	-	-	Y	-	Y	-	-	-	-	Y
Blue-winged Warbler	-	-	Y	-	Y	-	-	-	-	Y
Bobolink	Y	-	Y	-	Y	-	Y	Y	**Y**	Y
Brown Thrasher	-	-	Y	-	Y	-	-	-	Y	Y
Brown-headed Cowbird	-	-	-	Y	Y	-	-	Y	Y	Y
Canada Warbler	Y	-	Y	-	Y	-	-	-	-	Y
Common Nighthawk	Y	-	Y	Y	Y	-	-	-	-	Y
Eastern Kingbird	-	-	Y	-	Y	-	Y	Y	Y	Y
Eastern Meadowlark	Y	-	Y	-	Y	-	Y	Y	Y	Y
Eastern Towhee	-	-	Y	-	Y	-	-	Y	Y	Y
Eastern Whip-poor-will	Y	-	Y	-	Y	-	-	-	-	Y
Eastern Wood-pewee	Y	-	Y	-	Y	-	Y	**Y**	Y	Y
Evening Grosbeak	Y	-	-	-	Y	-	-	-	-	Y

Common Name	Species of Interest[1]				Method of Detection			BIS Study Area[2]		
	SAR	Prov. Rare	BCR 13	Engage.	Desk-based	2020 Studies[3]	2022 Field[4]	AOI	LSA_{TER}	RSA_{AVI}
Field Sparrow	-	-	Y	-	Y	-	-	Y	-	Y
Fox Sparrow	-	Y	-	-	Y	-	-	-	-	Y
Grasshopper Sparrow	Y	-	Y	-	Y	-	-	-	-	Y
Louisiana Waterthrush	Y	-	Y	-	Y	-	-	-	Y	-
Northern Flicker	-	-	Y	-	Y	-	Y	Y	Y	Y
Northern Rough-winged Swallow	-	-	Y	-	Y	-	-	Y	-	Y
Red-headed Woodpecker	Y	-	Y	-	Y	-	-	-	Y	-
Rose-breasted Grosbeak	-	-	Y	-	Y	-	-	Y	Y	Y
Rusty Blackbird	Y	-	-	-	Y	-	-	-	-	Y
Savannah Sparrow	-	-	Y	-	Y	Y	*	Y	Y	Y
Vesper Sparrow	-	-	Y	-	Y	-	-	-	Y	Y
White-crowned Sparrow	-	Y	-	-	Y	Y	-	Y	-	Y
Wood Thrush	Y	-	Y	-	Y	-	Y*	**Y**	Y	Y

Notes:

1. Species of conservation concern (at-risk and provincially rare), other priority species as identified by the BCR 13 strategy (EC 2014a), and species mentioned during engagement are noted, where applicable.
2. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed within its boundaries. Cells shaded grey and with bold font indicate new detections in the study area based on 2022 field studies (i.e., not previously detected in the study area through desk-based research). For species of conservation concern, the study area(s) of field observations and NHIC records are based on overlap with the 1 km grid square, not the actual point or polygon location.
3. Data were collated from the previous preliminary environmental field studies conducted in July and October 2020 by Tulloch Environmental at boreholes 1 and 2 within the AOI (Tulloch Environmental 2020, 2021).
4. 2022 Field results include both incidental observations and eDNA metabarcoding analysis results. Species detected through eDNA metabarcoding analyses are indicated by an asterisk (*).

To date, six upland breeding bird SAR have been detected within the AOI (**Table 2-2**). Eastern wood-pewee (Special Concern) was the most observed bird species of interest in the field, with 43 records throughout the AOI, LSA_{TER}, and RSA_{AVI}, often in hardwood and mixedwood forests and swamps adjacent to agricultural fields (**Figure B-2**; **Table B-1**). Although no eastern wood-pewee nests or other indicators of confirmed or probable breeding were noted by surveyors, most observations were of birds vocalizing during the nesting season, sometimes in pairs, which may indicate important breeding habitat/territories in the area. Eastern wood-pewee had not been previously reported within the AOI, based on existing datasets. Field crews also observed barn swallows (Special Concern) at nine locations throughout the AOI and LSA_{TER}, often in groups of up to 25 individuals (**Figure B-2**; **Table B-1**). Based on the GBIF dataset, barn swallow is the most frequently and widely reported SAR, with 30 unique observations at 18 different locations within all three BIS study areas for upland breeding birds (**Figure B-3**; **Table B-2**). Additional SAR with only a few observations potentially within the AOI included bobolink (Threatened), eastern meadowlark (Threatened), bank swallow (Threatened), and wood thrush (Special Concern). Wood thrush was detected once as an incidental observation and once through eDNA metabarcoding analyses (see Section 4.1.4 in Appendix E, Chapter 1). Wood thrush had not been previously reported within the AOI;

however, there are records of the other three SAR from both fieldwork (**Figure B-2**) and existing datasets (**Figure B-3**). All GBIF records in the AOI are recent observations (between 2017-2020) made during the breeding season (May-June). Of the six SAR detected within the AOI, bobolink, eastern meadowlark, bank swallow, and barn swallow have provincial recovery strategies (McCracken et al. 2013, Heagy et al. 2014, Falconer et al. 2016) and government response statements available (MECP 2015, 2017, 2019). Three of these species also have federal recovery strategies and critical habitat squares identified near the SON-South Bruce siting area, as discussed in Section 2.3.1.3.

As shown in **Table 2-2**, five of the six upland breeding bird SAR observed within the AOI have also been found in the LSA_{TER}. To date, only one additional SAR has been detected within the LSA_{TER} (outside the AOI): there is a single GBIF record of Louisiana waterthrush (Threatened) from May 2008, which is also the only record of this species within the BIS study areas (**Figure B-3**). Except for one barn swallow observation from 2020, GBIF records in the LSA_{TER} (outside the AOI) are older observations (between 2001-2008), also made during the breeding season (May-June). In addition to 2022 fieldwork and GBIF data, there are NHIC 1 km grids (sensitive data obscured) for bobolink and eastern meadowlark that overlap with the LSA_{TER} and RSA_{AVI} (**Figure B-3**). These species observations of bobolink and eastern meadowlark were made between 2001-2004, with the element occurrence (EO) rankings made in 2011-2012 and designated by the NHIC as "Verified extant (viability not assessed)". Furthermore, Zoetica's previous investigations of NHIC observation (not occurrence) data for development of the BPPA Report (Zoetica 2021)[6] found that the red-headed woodpecker (Endangered) has been recorded within the LSA_{TER} (outside the AOI). This observation, designated as an EO Candidate by the NHIC, was from the OBBA Atlas-2 where a singing male or breeding calls were heard in suitable nesting habitat during the breeding season. Of the SAR detected within the LSA_{TER} (outside the AOI), only red-headed woodpecker has a recovery strategy available (ECCC 2021, MECP 2022). As discussed in Section 2.3.1.3, critical habitat squares for red-headed woodpecker have been identified near the SON-South Bruce siting area but not overlapping the BIS study areas.

All upland breeding bird SAR previously mentioned, except Louisiana waterthrush and red-headed woodpecker, have also been detected within the RSA_{AVI} (outside the AOI and LSA_{TER}) (**Table 2-2**). Eastern wood-pewee and eastern meadowlark were the only two upland breeding bird species of conservation concern observed within the RSA_{AVI} during 2022 field studies (**Figure B-2**; **Table B-1**). Six additional species have only been observed within the RSA_{AVI} but not the AOI or LSA_{TER}: eastern whip-poor-will (Threatened), Canada warbler (Special Concern), common nighthawk (Special Concern), evening grosbeak (Special Concern), grasshopper sparrow (Special Concern), and rusty blackbird (Special Concern) were all detected within the Teeswater Wetland Complex in the RSA_{AVI} (**Figure B-3**; **Table B-2**). Of note, rusty blackbirds were observed congregating in a flock of 100-300 individuals in April, with only 1-2 individuals detected in early May. This species is expected to be a migrant through southwestern Ontario (Cornell Lab of Ornithology 2019a). See Appendix D of the BPPA Report (Zoetica 2021) for a full list of potentially occurring SAR that had provincial and/or federal recovery strategies available at the time of writing the BPPA Report.

[6] At the time of writing the BPPA Report (Zoetica 2021), both NHIC observation and occurrence data were investigated. Zoetica has since received an updated version of the NHIC occurrence dataset for baseline reporting, and has requested but not yet received an updated NHIC observation dataset. Once received by Zoetica, NHIC observations will be included in future iterations of the BIS Baseline Report.

The two provincially rare species, fox sparrow and white-crowned sparrow, both have an SRANK of S3N, meaning that non-breeding populations are considered Vulnerable. Based on species range maps, both species are typically migrants through the SON-South Bruce siting area but could potentially winter in the area (Cornell Lab of Ornithology 2019b, 2019c). To date, fox sparrow has only been detected within the RSA_{AVI} (outside the AOI and LSA_{TER}) in early to mid-April. White-crowned sparrow was incidentally observed within the AOI by Tulloch Environmental during previous preliminary environmental studies in October 2020 (Tulloch Environmental 2021); there are also GBIF records of this species within the RSA_{AVI} (outside the AOI and LSA_{TER}) in early May (**Figure B-3**).

2.3.2.2 Species of Interest to Stakeholders and Rights-holders, and Species of Potential Socio-economic Importance

During engagement conducted with South Bruce residents and local Conservation Authorities (CAs) in August through November 2020, focused on identifying existing environmental concerns, birds were noted for their potential use as indicator species of ecosystem health. It was mentioned during engagement that there has been a noticeable decrease in the number of birds in the SON-South Bruce siting area and it is thought that pollution may be affecting bird habitat. In addition, an understanding of wildlife community complexity in general and of interior bird communities in particular was brought up during engagement. Effects of noise were also mentioned as a stressor to birds and other wildlife.

With respect to specific upland breeding birds, kettle lakes were noted as potentially important for supporting biodiversity, including nighthawks and black swift. Brown-headed cowbirds were noted as a 'nuisance' bird species that is increasing as the landscape becomes more fragmented. Upland breeding bird species mentioned during engagement and detected within the BIS study areas are included in **Table 2-2**; to date, only common nighthawk and brown-headed cowbird have been reported (from existing records). The socio-economic or socio-ecological importance of additional upland breeding bird species to local communities and/or Indigenous communities will be sought through future engagement. Zoetica's proposed Tier 2 studies include community-level surveys that will detect a wide variety of upland breeding birds. Therefore, future data collection will enable retrospective analysis of newly identified species of interest, if needed.

2.3.2.3 Indicator Species

To date, 10 of the 12 upland breeding bird species used as stewardship species for BCR 13 or Great Lakes St. Lawrence forest indicators by the MNRF (all except Acadian flycatcher and hooded warbler; see Tables 5-17 and 5-18 in the BPPA Report (Zoetica 2021)) have been observed within the AOI, LSA_{TER}, and/or RSA_{AVI}. Some of the 13 other BCR 13 priority species detected within the BIS study areas (see Section 2.3.2.1 and **Table 2-2**) could also be considered indicator species after more baseline data are collected. Zoetica recommends that indicator species for the purposes of the BIS be determined after more information is gathered about potential project impacts and species-habitat associations (e.g., through Tier 2 community composition studies) within the BIS study areas for birds. See Sections 4.2 and 5.2.7.1 of the BPPA Report (Zoetica 2021) for further discussion of indicator species.

2.3.1 Additional Baseline Data to Inform the IA

2.3.1.1 Community Characterization

A total of 114 upland breeding bird species have been detected within the BIS study areas based on desk- and field-based investigations conducted to date (**Table D-1**). Of these, 58 species (50.9%) have been

documented within the AOI. In 2022, field teams observed 32 upland breeding bird species in the AOI, nine of which had not been previously reported in the AOI based on existing datasets. The Greenock Swamp ANSI Life Science Inventory report identified additional upland breeding bird species in the SON-South Bruce siting area (see **Table C-1**), including chimney swift, marsh wren, cerulean warbler, and golden-winged warbler – all of which are SAR except for marsh wren. However, as there are no spatial data associated with the Greenock Swamp ANSI report to determine which species were observed within or outside the RSA_{AVI}, these additional species were not included in **Table 2-2** (which is limited to species detected within the BIS study areas).

2.4 Discussion

Section 2.0 of Chapter 7 (Avifauna) of the 2023 BIS Baseline Report focused on desk-based analyses of upland breeding bird habitat and species observations and preliminary results from Tier 1 terrestrial habitat assessments and incidental observations. To date, a total of 114 upland breeding bird species have been detected within the AOI, LSA_{TER}, or RSA_{AVI}, including 14 at-risk, two provincially rare, and 13 other priority species identified by the BCR 13 strategy (EC 2014a) (**Table D-1**). However, where a species has only been detected using desk-based data, caution should be taken as those data could be as old as 1970, and the conditions supporting the species' presence in the area may have changed. Of note, nine upland breeding bird species, including two SAR, had not been previously reported within the AOI but were observed in the AOI during 2022 field studies. In addition, the Greenock Swamp ANSI is known to provide breeding habitat for 76 upland breeding bird species (**Table C-1**); however, it is unclear if these observations occurred within the RSA_{AVI} portion of the ANSI.

Habitats for Endangered and Threatened species are protected under the Ontario *ESA*. The NHIC has mapped EOs for bobolink and eastern meadowlark that overlap with the LSA_{TER} and RSA_{AVI} (**Figure B-2**); critical habitat for bobolink (under the federal *SARA*) has also been identified overlapping the western portion of the BIS study areas (**Figure B-1**). The presence of suitable habitat for, or direct observations of, these two Threatened species within the BIS study areas is corroborated by recent fieldwork completed for the Project. During 2022 Tier 1 field studies, bobolink and eastern meadowlark were incidentally observed in agricultural fields within the AOI; and a bobolink was also heard west of the AOI in a heavily vegetated meadow within the LSA_{TER} (**Figure B-3**). During previous preliminary environmental studies in 2020, Tulloch Environmental identified potentially suitable habitat for bobolink and eastern meadowlark on agricultural lands adjacent to the NWMO's borehole sites (Tulloch Environmental 2020, 2021). Field surveyors in 2022 also identified two locations along the Teeswater River within the AOI with eroding banks that could be suitable breeding habitat for bank swallows. As habitats for upland breeding bird SAR are often applicable to other not-at-risk species, further discussion of suitable habitats (as candidate SWH) observed in the field is presented in Appendix C, Chapter 1. Finally, there are existing records of three Endangered or Threatened upland breeding bird species within the BIS study areas that have not yet been observed during field studies: red-headed woodpecker, Louisiana waterthrush, and eastern whip-poor-will (**Figure B-2**).

Habitats for Special Concern and Rare species are considered SWH and protected by the Ontario Provincial Policy Statement (MMAH 2020) under the *Planning Act*. The 2022 field crews identified nesting barn swallows and potential eastern wood-pewee breeding territories within the AOI (**Figure B-3**). Furthermore, although barn swallows were recently downlisted from Threatened to Special Concern under the Ontario *ESA* in January 2023, this species is currently still listed as Threatened under the federal

SARA (though it is under consideration for a status change). As a Threatened species, occupied barn swallow nests are protected under s.33 of the *SARA*, which prohibits damaging or destroying the residence of a listed Threatened, Endangered, or Extirpated species on federal lands (Government of Canada 2019). Furthermore, as a migratory species, active barn swallow nests are protected on non-federal lands under the *MBCA*. The attendant Migratory Birds Regulations, 2022, s.5, prohibits damaging destroying, disturbing, or removing migratory bird nests when they contain a live bird or viable egg.

Additional Special Concern and provincially rare upland breeding species have been collated from GBIF records and observed incidentally in the field (**Figure B-2**). However, details regarding habitat use and bird activity are lacking for these records; thus, it is unclear if the observations are associated with important habitats for these species. In addition to habitats for Special Concern and Rare species, candidate SWH has been identified within the AOI, LSA_{TER}, and RSA_{AVI} for Colonially-Nesting Bird Breeding Habitat (Bank and Cliff, Tree/Shrubs, and Ground); Seeps and Springs; Woodland Area-Sensitive, Marsh, Open Country, and Shrub/Early Successional Bird Breeding Habitats; and Alvar (which may support the Endangered loggerhead shrike). Of note, there are confirmed Seeps and Springs SWH within the BIS study areas. A detailed discussion of SWH is available In Appendix C, Chapter 1.

2.4.1 Next Steps

If the SON-South Bruce siting area is selected for the Project, Tier 2 studies will aim to characterize upland breeding bird communities more thoroughly within the BIS study areas. Refer to Section 5.2.7 of the BPPA Report (Zoetica 2021) for more information. Community-level studies will enable estimates of relative abundance and seasonal habitat use and provide insight into food webs and trophic linkages. Study methods for upland breeding birds may include point count surveys, the deployment of, and analysis of data from, autonomous song meters. Confirmation of candidate SWH (described in Appendix C, Chapter 1), including habitats for Special Concern and provincially rare species, and specific SAR surveys for the Threatened eastern meadowlark (OMNR 2013), bobolink (MNR 2011), and eastern whip-poor-will (OMNRF 2014) will focus on areas within the extent of direct and indirect project impacts (i.e., AOI and LSA_{TER}).[7] In addition, further discussions with knowledgeable stakeholders and rights-holders will help determine the locations of sensitive habitats for upland breeding birds. However, access limitations will continue to be a factor in determining which areas can be surveyed. The NWMO continues to engage with local landowners to gain permission to access their properties. Zoetica is providing input to the NWMO regarding priority locations within which they should seek access based on the baseline information collected to date.

[7] As described in Zoetica's BPPA Report (Zoetica 2021), the NWMO defined the AOI as the area within which the Project footprint will be located, and Zoetica designed the LSA_{TER} as a 1 km buffer around the AOI to capture potential indirect impacts of the Project on the terrestrial environment. The focal areas for Tier 2 studies may change depending on the Project Description (which is not yet available) and further information about potential project effects.

3.0 SHOREBIRDS

3.1 Introduction

This section of the 2023 BIS Baseline Report focuses on shorebirds. This group refers to sandpipers and allies of the Order Charadriiformes, and excludes gulls, terns, and allies, which are considered waterbirds (Section 4.0) for the purposes of the BIS.

A general introduction about the inclusion of birds for the BIS and background information about BCR 13 is included in Section 1.0. Out of 97 priority species identified in the BCR 13 strategy (EC 2014a), 11 are shorebirds. Most shorebirds are long-distance migratory species that breed in northern temperate, sub-Arctic, or Arctic regions, and are expected to only be present in the BIS study areas during spring and/or fall migration (Mitch Waite Group 2018). However, some shorebird species may breed in the area, such as American woodcock, killdeer, spotted sandpiper, upland sandpiper, and Wilson's snipe.

Several SWH types apply to shorebirds. Based on the 6E ECS (OMNRF 2015), there are five shorebird-related SWH types of potential relevance to the SON-South Bruce siting area:

- Shorebird Migratory Stopover Area
- Colonially-Nesting Bird Breeding Habitat (Ground) – *primarily of relevance to waterbirds but also indicated for Wilson's phalarope (provincially rare)* (MNRF 2014)
- Marsh Bird Breeding Habitat – *primarily of relevance to waterbirds but also indicated for Wilson's phalarope* (MNRF 2014)
- Open Country Bird Breeding Habitat – *primarily of relevance to upland breeding birds but also indicated for upland sandpiper* (OMNRF 2015)
- Special Concern and Rare Species

Further details about candidate SWH investigations conducted to date and rationale for inclusion (or exclusion) of SWH types listed in the 6E ECS are presented in Appendix C, Chapter 1.

3.1.1 Objectives

All general objectives listed in Section 1.1 apply to shorebirds.

3.2 Methods

3.2.1 Study Areas

The BIS study areas for shorebirds include the AOI, LSA_{TER}, and $RSA_{AVI-AQU}$ (see figures and descriptions in Section 3.0, Chapter 1).

3.2.2 Presence, Distribution, and Abundance of Important Habitat

Collation of both existing and Tier 1 habitat data for shorebirds proceeded as described in Sections 1.2.2 and 1.2.3.

3.2.3 Presence and Distribution of Species of Interest

Collation of existing observations and Tier 1 incidental observations for shorebird species of interest proceeded as described in Sections 1.2.2 and 1.2.3.

3.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of shorebirds in the BIS study areas.

3.3 Results

3.3.1 Presence, Distribution, and Abundance of Important Habitat

3.3.1.1 General Habitat Associations

Future Tier 2 studies aim to determine shorebird-habitat associations within the BIS study areas. Discussion of general habitat associations will be included in future BIS Baseline Reports after Tier 2 studies have been completed (if the SON-South Bruce siting area is selected for the Project).

3.3.1.2 Significant and Other Important Wildlife Habitats

Various candidate SWH of relevance to shorebirds have been found throughout the AOI, LSA_{TER}, and $RSA_{AVI-AQU}$ based on ecosite analyses, some or all habitat criteria being met, or records of species and/or habitat features. Of the five SWH types listed in Section 3.1, candidate SWH was identified for all except Colonially-Nesting Bird Breeding Habitat (Ground) for shorebirds. Ecosite matches and TEM plots identified as candidate Colonially-Nesting Bird Breeding Habitat (Ground) SWH in the field apply only to Brewer's blackbird, an upland breeding bird species. A detailed discussion of candidate SWH is available in Appendix C, Chapter 1. Special Concern and provincially rare shorebird species are also discussed in Section 3.3.2.1.

In addition (or supplementary) to SWH, Zoetica investigated whether other important wildlife habitat data (e.g., nests, territories, important foraging sites) were contained within the datasets analyzed (see **Table 1-1**) or found during the Tier 1 BIS baseline field programs. No further information was available for shorebirds.

3.3.2 Presence and Distribution of Species of Interest

3.3.2.1 Species of Conservation Concern

To date, seven shorebird species of conservation concern have been observed within the AOI, LSA_{TER}, and/or $RSA_{AVI-AQU}$ (**Table 3-1**), including one SAR and one provincially rare species (**Figure B-4**), and five other priority species identified by the BCR 13 strategy (EC 2014a). Only one shorebird species – killdeer, a BCR 13 priority species – was observed within the BIS study areas during 2022 field studies.

Table 3-1. Summary list of shorebird species of interest recorded within the AOI, LSA_{TER}, and $RSA_{AVI-AQU}$.

Common Name	Species of Interest[1]				Method of Detection			BIS Study Area[2]		
	SAR	Prov. Rare	BCR 13	Engage.	Desk-based	2020 Studies[3]	2022 Field	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
Lesser Yellowlegs	Y	-	-	-	Y	-	-	Y	-	Y
Upland Sandpiper	-	Y	Y	-	Y	-	-	Y	-	Y
American Woodcock	-	-	Y	-	Y	-	-	-	Y	Y
Killdeer	-	-	Y	-	Y	-	Y	Y	Y	Y
Semipalmated Sandpiper	-	-	Y	-	Y	-	-	Y	-	Y
Spotted Sandpiper	-	-	Y	-	Y	-	-	Y	-	Y
Wilson's Snipe	-	-	Y	-	Y	-	-	-	-	Y

Notes:
1. Species of conservation concern (at-risk and provincially rare), other priority species as identified by the BCR 13 strategy (EC 2014a), and species mentioned during engagement are noted, where applicable.
2. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed within its boundaries.
3. Data were collated from the previous preliminary environmental field studies conducted in July and October 2020 by Tulloch Environmental at boreholes 1 and 2 within the AOI (Tulloch Environmental 2020, 2021).

Lesser yellowlegs is not currently listed on *Species at Risk in Ontario* (SARO) but was assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Threatened in November 2020 and is under consideration for a status change on Schedule 1 of *SARA*. This species is expected to be a migrant through southwestern Ontario (Cornell Lab of Ornithology 2019d); thus, there is no nesting calendar information for lesser yellowlegs in nesting zone C2 (where the SON-South Bruce siting area is located). From the GBIF dataset, lesser yellowlegs was observed within the AOI at the same pond off Concession Rd 8 in late May in 2018 and in early May in 2020 (**Figure B-4**; **Table B-3**). Within the $RSA_{AVI-AQU}$ (outside the AOI and LSA_{TER}), there are 15 records of lesser yellowlegs at eight different locations in late April to early May (spring migration) and late August to mid-September (fall migration) between 2012 and 2021.

Based on species range maps, upland sandpiper is expected to breed in southwestern Ontario (Cornell Lab of Ornithology 2019e) and is thus considered provincially rare (S2B). One GBIF observation of upland sandpiper was noted within the AOI at the same Concession Rd 8 pond as the lesser yellowlegs observations (**Figure B-4**), also in late May 2018. There were five additional observations of upland sandpiper within the $RSA_{AVI-AQU}$ (outside the AOI and LSA_{TER}) in June and July over a wide range of years (1983-2020). Further field studies are needed to determine whether there is important breeding habitat for this provincially rare shorebird species within the BIS study areas.

Although there are records of other shorebird species with SRANKs of S1B, S2B, or S3B (which apply to the breeding populations), such as pectoral sandpiper, semipalmated sandpiper, and stilt sandpiper, these species are only expected to migrate through southwestern Ontario, and they are not considered Critically Imperiled, Imperiled, or Vulnerable during migration. Further desk- and field-based studies will be conducted to determine whether large congregations of these species occur in the BIS study areas, which may suggest locally important migratory stopover areas for shorebirds (see discussion and maps of candidate SWH in Appendix C, Chapter 1).

3.3.2.2 Species of Interest to Stakeholders and Rights-holders, and Species of Potential Socio-economic Importance

See Section 2.3.2.2 for a general discussion about what Zoetica has heard from engagement regarding birds and bird communities. No specific shorebird species have been mentioned by stakeholders or rights-holders to date.

3.3.2.1 Indicator Species

Although there are no shorebird species used as forest indicators by the MNRF (see Table 5-18 in the BPPA Report (Zoetica 2021)), some of the five other BCR 13 priority species detected within the BIS study areas (see Section 3.3.2.1 and **Table 3-1**) could also be considered indicator species after more baseline data are collected. Zoetica recommends that indicator species for the purposes of the BIS be determined after more information is gathered about potential project impacts and species-habitat associations (e.g.,

through Tier 2 community composition studies) within the BIS study areas for birds. See Sections 4.2 and 5.2.7.1 of the BPPA Report (Zoetica 2021) for further discussion of indicator species.

3.3.3 Additional Baseline Data to Inform the IA

3.3.3.1 Community Characterization

A total of 14 shorebird species have been detected within the BIS study areas based on desk- and field-based investigations conducted to date (**Table D-2**). Of these, 10 species were documented within the AOI, including three of the five shorebird species whose breeding ranges overlap with the SON-South Bruce siting area: killdeer (the only shorebird species observed during 2022 field studies), spotted sandpiper, and upland sandpiper. In addition, the Greenock Swamp ANSI Life Science Inventory report includes confirmed and probable breeding records for American woodcock and Wilson's snipe, respectively (see **Table C-1**), within an area encompassed by the $RSA_{AVI-AQU}$ (see Section 2.3.1.3).

3.4 Discussion

Section 3.0 of Chapter 7 (Avifauna) of the 2023 BIS Baseline Report focused on desk-based analyses of shorebird habitat and species observations and preliminary results from Tier 1 terrestrial and aquatic habitat assessments and incidental observations. To date, 14 shorebird species have been detected within the AOI, LSA_{TER}, or $RSA_{AVI-AQU}$, including one at-risk, one provincially rare, and five other priority species as identified by the BCR 13 strategy (EC 2014a) (**Table D-2**). However, where a species has only been detected using desk-based data, caution should be taken as those data could be as old as 1970, and the conditions supporting the species' presence in the area may have changed.

Baseline data for shorebird species of conservation concern are currently limited to existing GBIF observations of lesser yellowlegs and upland sandpiper within the AOI and $RSA_{AVI-AQU}$ (**Figure B-4**). As these records do not contain additional information about habitat use or bird activity, it is unclear if the observations are associated with important habitats for these species. However, candidate SWH has been identified within the AOI, LSA_{TER}, and $RSA_{AVI-AQU}$ for Shorebird Migratory Stopover Area, Marsh Bird Breeding Habitat (relevant to solitary sandpiper), and Open Country Bird Breeding Habitat (relevant to upland sandpiper). A detailed discussion of SWH is available in Appendix C, Chapter 1. In addition, the Greenock Swamp ANSI overlaps with the $RSA_{AVI-AQU}$ and is known to provide breeding habitat for two shorebird species (**Table C-1**).

3.4.1 Next Steps

If the SON-South Bruce siting area is selected for the Project, Tier 2 studies will aim to characterize shorebird communities more thoroughly within the BIS study areas. Refer to Section 5.2.7 of the BPPA Report (Zoetica 2021) for more information. Community-level studies will enable estimates of relative abundance and seasonal habitat use and provide insight into food webs and trophic linkages. Study methods may include point count surveys during the breeding season and observation stations during spring migration, breeding period, and fall migration. Confirmation of candidate SWH (described in Appendix C, Chapter 1), including habitats for Special Concern and provincially rare species, will focus on areas within the extent of direct and indirect project impacts (i.e., AOI and LSA_{TER}).[7] In addition, further discussions with knowledgeable stakeholders and rights-holders will help determine the locations of sensitive habitats for shorebirds. However, access limitations will continue to be a factor in determining which areas can be surveyed. The NWMO continues to engage with local landowners to gain permission

to access their properties. Zoetica is providing input to the NWMO regarding priority locations within which they should seek access based on the baseline information collected to date.

4.0 WATERBIRDS

4.1 Introduction

This section of the 2023 BIS Baseline Report focuses on waterbirds. This group refers to a wide variety of species that depend on aquatic environments, aside from shorebirds (Section 3.0), and includes the following orders:

- Anseriformes – Ducks, Geese, and Waterfowl
- Podicipediformes – Grebes
- Gruiformes – Rails, Limpkins, Cranes
- Charadriiformes – Gulls, Terns, and Allies
- Gaviiformes – Loons
- Suliformes – Cormorants and Allies
- Pelecaniformes – Pelicans, Herons, Bitterns, and Allies

A general introduction about the inclusion of birds for the BIS and background information about BCR 13 is included in Section 1.0. Out of 97 priority species identified in the BCR 13 strategy (EC 2014a), 40 are waterbirds. Both breeding and migrating populations of waterbirds are expected in the BIS study areas. These seasonal habitat uses are reflected in the seven waterbird-related SWH types outlined in the 6E ECS (OMNRF 2015) of potential relevance to the SON-South Bruce siting area:

- Waterfowl Stopover and Staging Area (Terrestrial)
- Waterfowl Stopover and Staging Area (Aquatic)
- Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)
- Colonially-Nesting Bird Breeding Habitat (Ground)
- Waterfowl Nesting Area
- Marsh Bird Breeding Habitat
- Special Concern and Rare Species

Further details about candidate SWH investigations conducted to date and rationale for inclusion (or exclusion) of SWH types listed in the 6E ECS are presented in Appendix C, Chapter 1.

4.1.1 Objectives

All general objectives listed in Section 1.1 apply to waterbirds.

4.2 Methods

4.2.1 Study Areas

The BIS study areas for waterbirds include the AOI, LSA_{TER}, and $RSA_{AVI\text{-}AQU}$ (see figures and descriptions in Section 3.0, Chapter 1).

4.2.2 Presence, Distribution, and Abundance of Important Habitat

Collation of both existing and Tier 1 habitat data for waterbirds proceeded as described in Sections 1.2.2 and 1.2.3.

4.2.3 Presence and Distribution of Species of Interest

Collation of existing observations and Tier 1 incidental observations for waterbird species of interest proceeded as described in Sections 1.2.2 and 1.2.3.

4.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of waterbirds in the BIS study areas.

4.3 Results

4.3.1 Presence, Distribution, and Abundance of Important Habitat

4.3.1.1 General Habitat Associations

Future Tier 2 studies aim to determine waterbird-habitat associations within the BIS study areas. Discussion of general habitat associations will be included in future BIS Baseline Reports after Tier 2 studies have been completed (if the SON-South Bruce siting area is selected for the Project).

4.3.1.2 Significant and Other Important Wildlife Habitats

Various candidate SWH of relevance to waterbirds have been found throughout the AOI, LSA_{TER}, and $RSA_{AVI\text{-}AQU}$ based on ecosite analyses, some or all habitat criteria being met, or records of species and/or habitat features. Of the seven SWH types listed in Section 4.1, only Colonially-Nesting Bird Breeding Habitat (Ground) for waterbirds does not have any supporting evidence to date. Ecosite matches and TEM plots identified as candidate SWH in the field apply only to Brewer's blackbird, an upland breeding bird species. While there are GBIF observations for gulls and terns, information about potential nesting was not available in these records. A detailed discussion of candidate SWH within the LSA_{TER} is available in Appendix C, Chapter 1. Special Concern and provincially rare waterbird species are also discussed in Section 4.3.2.1 below.

In addition (or supplementary) to SWH, Zoetica investigated whether other important wildlife habitat data (e.g., nests, territories, important foraging sites) were contained within the datasets analyzed (see **Table 1-1**) or found during the Tier 1 BIS baseline field programs. Based on the NHIC Wildlife Concentration Areas Observation dataset, there are two great blue heron nesting sites/colonies within or overlapping the BIS study areas (**Figure B-5**). One colony of 22 nests is located east of the AOI near the community of Teeswater; however, the colony nesting site has been considered "extinct" by the NHIC since 1991. The other colony in the northwestern portion of the Greenock Swamp Wetland Complex (GSWC) was noted as having been active for at least four years; however, it is unclear when this information was provided, and if the colony is still active. These NHIC data are described in more detail as candidate SWH for Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs) in Appendix C, Chapter 1.

4.3.2 Presence and Distribution of Species of Interest

4.3.2.1 Species of Conservation Concern

To date, 33 waterbird species of conservation concern have been observed within the AOI, LSA_{TER}, and/or $RSA_{AVI\text{-}AQU}$, including three SAR and 10 provincially rare species, and 20 other priority species identified by the BCR 13 strategy (EC 2014a) (**Table 4-1**). Seven waterbird species, all of which are BCR 13 priority species but not at-risk or provincially rare, were observed within the BIS study areas during 2022 field studies.

Table 4-1. Summary list of waterbird species of interest recorded within the AOI, LSA_{TER}, and $RSA_{AVI-AQU}$.

Common Name	Species of Interest[1]				Method of Detection			BIS Study Area[2]		
	SAR	Prov. Rare	BCR 13	Engage.	Desk-based	2020 Studies[3]	2022 Field[4]	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
American Bittern	-	-	Y	-	Y	-	-	-	-	Y
American Black Duck	-	-	Y	-	Y	-	-	-	Y	Y
American Coot	-	Y	Y	-	Y	-	-	-	-	Y
Black Tern	Y	-	Y	-	Y	-	-	-	-	Y
Blue-winged Teal	-	Y	Y	-	Y	-	-	-	-	Y
Bonaparte's Gull	-	-	Y	-	Y	-	-	-	-	Y
Canada Goose	-	-	Y	Y	Y	Y	Y	Y	Y	Y
Canvasback	-	Y	Y	-	Y	-	-	-	-	Y
Caspian Tern	-	Y	Y	-	Y	-	-	-	-	Y
Common Gallinule	-	Y	Y	-	Y	-	-	-	-	Y
Common Goldeneye	-	-	Y	-	Y	-	-	-	Y	Y
Common Loon	-	-	Y	-	Y	-	-	-	-	Y
Common Merganser	-	-	Y	-	Y	-	-	Y	Y	Y
Great Black-backed Gull	-	Y	Y	-	Y	-	-	-	-	Y
Great Blue Heron	-	-	Y	Y	Y	-	Y	Y	**Y**	Y
Great Egret	-	Y	Y	-	Y	-	-	-	-	Y
Greater White-fronted Goose	-	Y	-	-	Y	-	-	-	Y	Y
Green Heron	-	-	Y	-	Y	-	Y	**Y**	-	Y
Green-winged Teal	-	-	Y	-	Y	-	-	-	Y	Y
Horned Grebe	Y	-	Y	-	Y	-	-	-	-	Y
Least Bittern	Y	-	Y	-	Y	-	-	-	-	Y
Lesser Scaup	-	-	Y	-	Y	-	-	-	-	Y
Long-tailed Duck	-	-	Y	-	Y	-	-	-	-	Y
Mallard	-	-	Y	-	Y	-	Y*	Y	Y	Y
Mute Swan	-	-	Y	-	Y	-	-	-	-	Y
Pied-billed Grebe	-	-	Y	-	Y	-	-	-	-	Y
Red-necked Grebe	-	Y	Y	-	Y	-	-	-	-	Y
Ring-necked Duck	-	-	Y	-	Y	-	-	-	Y	Y
Sandhill Crane	-	-	Y	Y	Y	-	Y	Y	-	Y
Sora	-	-	Y	-	Y	-	-	-	-	Y
Tundra Swan	-	Y	Y	Y	Y	-	-	-	Y	Y
Virginia Rail	-	-	Y	-	Y	-	Y*	-	-	Y
Wood Duck	-	-	Y	-	Y	-	Y*	**Y**	-	Y

Notes:

1. Species of conservation concern (at-risk and provincially rare), other priority species as identified by the BCR 13 strategy (EC 2014a), and species mentioned during engagement are noted, where applicable.
2. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed within its boundaries. Cells shaded grey and with bold font indicate new detections in the study area based on 2022 field studies (i.e., not previously detected in the study area through desk-based research).

3. Data were collated from the previous preliminary environmental field studies conducted in July and October 2020 by Tulloch Environmental at boreholes 1 and 2 within the AOI (Tulloch Environmental 2020, 2021).
4. 2022 Field results include both incidental observations and eDNA metabarcoding analysis results. Species detected through eDNA metabarcoding analyses are indicated by an asterisk (*).

Based on existing datasets, there have been no observations of at-risk or provincially rare waterbird species within the AOI. Of the waterbird SAR detected outside the AOI, least bittern (Threatened) and black tern (Special Concern) were both observed in the general vicinity of Clam Lake in the $RSA_{AVI-AQU}$ (**Figure B-5**; **Table B-4**). The least bittern record has been designated as a "Historical" EO by the NHIC; the last observation of this species was in 1980. The black tern is a more recent observation during the breeding season (July) in 2019. Horned grebe (Special Concern) has been recorded in two locations within the GSWC in the northern portion of the $RSA_{AVI-AQU}$, including a recent observation (2016) in a relatively remote, central area of the swamp, and an older observation (1978) at Schmidt Lake (**Figure B-5**). Horned grebe is expected to be a migrant throughout most of Ontario, including the southwestern region (Cornell Lab of Ornithology 2019f). Both GBIF records of horned grebe occurred during spring migration in mid-April; in nesting zone C2 (where the SON-South Bruce siting area is located), this species is expected to nest in mid-May (Rousseu and Drolet 2015).

Of the provincially rare waterbird species detected, tundra swan (S2B,S4N,S3M)[8] has been recorded throughout the BIS study areas, often in large numbers, during spring migration. The two GBIF records within the LSA_{TER} (outside the AOI) included counts of 30 and 45 tundra swans; records within the $RSA_{AVI-AQU}$ (outside the AOI and LSA_{TER}) ranged from two to 250 individuals (**Table B-4**). Other rare waterbird observations appear to be more localized (**Figure B-5**). Of note, greater white-fronted goose (S3M) has only been recorded within the western portion of the LSA_{TER} adjacent to the AOI boundary and within the $RSA_{AVI-AQU}$ north of the LSA_{TER}. Both GBIF records were made during spring migration in March 2018, with 11 and 15 individuals observed, respectively (**Table B-4**). Further field studies will be needed to determine whether areas potentially impacted by the Project may have local importance as a staging area for greater white-fronted goose. Two provincially rare waterbirds – American coot (S3B,S4N) and common gallinule (S3B) – were only recorded during the Greenock Swamp ANSI Life Science Inventory (Johnson 1994a). Spatial data were not available from this report; however, Zoetica assumed these species were observed within the extent of the BIS study areas for waterbirds (i.e., $RSA_{AVI-AQU}$).

4.3.2.2 Species of Interest to Stakeholders and Rights-holders, and Species of Potential Socio-economic Importance

See Section 2.3.2.2 for a general discussion about what Zoetica has heard from engagement regarding birds and bird communities. With respect to specific waterbirds, the Teeswater River system was mentioned as a potentially important migratory staging and overwintering area for waterfowl, including tundra swans, great blue herons, and Canada geese, as this system was noted to retain open water areas when surrounding waterbodies are frozen. Kettle lakes, typically identified as Provincially Significant Wetlands, were also noted as potentially important for supporting biodiversity with mention of various

[8] Tundra swan is expected to be a migrant through the SON-South Bruce siting area in southwestern Ontario (Cornell Lab of Ornithology 2019j). Thus, among the species' SRANK breeding status modifiers, the S3M (Vulnerable) ranking is relevant to the Project and tundra swan should be considered a provincially rare species.

species using these areas, including gulls. Observations from a member of the local community included sandhill cranes nesting on farmland.

Specific waterbird species mentioned during engagement and detected within the BIS study areas are included in **Table 4-1**. To date, tundra swan, sandhill crane, Canada goose, and great blue heron have been reported (from existing records); of these four species, all but tundra swan were also observed during 2022 field studies. Of note, three sandhill cranes were incidentally observed flying overhead at a tributary of Alps Creek south of the AOI. The field crew noted the wetland as a possible sandhill crane nesting area. The socio-economic or socio-ecological importance of additional waterbird species to local communities and/or Indigenous communities will be sought through future engagement. Zoetica's proposed Tier 2 studies include community-level surveys that will detect a wide variety of waterbirds. Therefore, future data collection will enable retrospective analysis of newly identified species of interest, if needed.

4.3.2.3 Indicator Species

Wood duck has been observed within the $RSA_{AVI-AQU}$ (outside the AOI and LSA_{TER}) and is the only waterbird species used as a forest indicator by MNRF (see Table 5-18 in the BPPA Report (Zoetica 2021)). Some of the 20 other BCR 13 priority species detected within the BIS study areas (see Section 4.3.2.1 and **Table 4-1**) could also be considered indicator species after more baseline data are collected. Zoetica recommends that indicator species for the purposes of the BIS be determined after more information is gathered about potential project impacts and species-habitat associations (e.g., through Tier 2 community composition studies) within the BIS study areas for birds. See Sections 4.2 and 5.2.7.1 of the BPPA Report (Zoetica 2021) for further discussion of indicator species.

4.3.3 Additional Baseline Data to Inform the IA

4.3.3.1 Community Characterization

A total of 46 waterbird species have been detected within the BIS study areas based on desk- and field-based investigations conducted to date (**Table D-3**). Of these, 10 species were documented within the AOI. In 2022, field teams observed five waterbird species in the AOI, two of which had not been previously reported in the AOI based on existing datasets. The Greenock Swamp ANSI Life Science Inventory report identified 14 waterbird species that likely breed within an area encompassed by the $RSA_{AVI-AQU}$ (see Section 2.3.1.3 and **Table C-1**).

4.4 Discussion

Section 4.0 of Chapter 7 (Avifauna) of the 2023 BIS Baseline Report focused on desk-based analyses of waterbird habitat and species observations and preliminary results from Tier 1 terrestrial and aquatic habitat assessments and incidental observations. To date, a total of 46 waterbird species have been detected within the AOI, LSA_{TER}, or $RSA_{AVI-AQU}$, including three at-risk, 10 provincially rare, and 20 other priority species as identified by the BCR 13 strategy (EC 2014a) (**Table D-3**). However, where a species has only been detected using desk-based data, caution should be taken as those data could be as old as 1970, and the conditions supporting the species' presence in the area may have changed.

Baseline data for waterbird species of conservation concern are currently limited to a historical NHIC EO for least bittern and existing GBIF observations of two SAR (black tern and horned grebe) and 10 provincially rare species (tundra swan, greater white-fronted goose, blue-winged teal, canvasback, red-necked grebe, common gallinule, American coot, Caspian tern, great black-backed gull, and great egret) (**Figure B-5**). Based on the timing of observations and individual counts, there may be important waterfowl

migration habitat within the LSA_{TER} and $RSA_{AVI-AQU}$. Indeed, candidate SWH has been identified within the AOI, LSA_{TER}, and $RSA_{AVI-AQU}$ for Waterfowl Stopover and Staging Area (Terrestrial and Aquatic), as well as Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs), Waterfowl Nesting Area, and Marsh Bird Breeding Habitat. In addition, the Greenock Swamp ANSI overlaps with the $RSA_{AVI-AQU}$ and is known to provide breeding habitat for 14 waterbirds, including three provincially rare species: American coot, common gallinule, and blue-winged teal (**Table C-1**). A detailed discussion of SWH is available in Appendix C, Chapter 1.

4.4.1 Next Steps

If the SON-South Bruce siting area is selected for the Project, Tier 2 studies will aim to characterize waterbird communities more thoroughly within the BIS study areas. Refer to Section 5.2.7 of the BPPA Report (Zoetica 2021) for more information. Community-level studies will enable estimates of relative abundance and seasonal habitat use and provide insight into food webs and trophic linkages. Study methods may include call playback surveys for secretive marsh birds during the breeding season, and observation stations during spring migration, breeding period, and fall migration. Confirmation of candidate SWH (described in Appendix C, Chapter 1), including habitats for Special Concern and provincially rare species and wildlife concentration areas (e.g., nesting colonies), will focus on areas within the extent of direct and indirect project impacts (i.e., AOI and LSA_{TER}).[7] In addition, further discussions with knowledgeable stakeholders and rights-holders will help determine the locations of sensitive habitats for waterbirds. However, access limitations will continue to be a factor in determining which areas can be surveyed. The NWMO continues to engage with local landowners to gain permission to access their properties. Zoetica is providing input to the NWMO regarding priority locations within which they should seek access based on the baseline information collected to date.

5.0 RAPTORS

5.1 Introduction

This section of the 2023 BIS Baseline Report focuses on raptors. This group refers to birds of prey from the following orders:

- Cathartiformes – New World Vultures
- Accipitriformes – Hawks, Eagles, Osprey
- Strigiformes – Owls
- Falconiformes – Falcons

A general introduction about the inclusion of birds for the BIS and background information about BCR 13 is included in Section 1.0. Among the 46 landbirds identified as priority species (out of 97 total species) in the BCR 13 strategy (EC 2014a), seven are raptors. Most raptors are expected to be present in the SON-South Bruce siting area year-round or during the breeding season (Mitch Waite Group 2018). However, a few raptor species may winter in the area (e.g., snowy owl, rough-legged hawk) or only pass through during migration (e.g., golden eagle).

Several SWH types apply to raptors. Based on the 6E ECS (OMNRF 2015), there are six raptor-related SWH types of potential relevance to the SON-South Bruce siting area:

- Raptor Wintering Area
- Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat
- Woodland Raptor Nesting Habitat
- Open Country Bird Breeding Habitat
- Shrub/Early Successional Bird Breeding Habitat – *primarily of relevance to upland breeding birds but also indicated for eastern screech-owl* (MNRF 2014)
- Special Concern and Rare Species

Further details about candidate SWH investigations conducted to date and rationale for inclusion (or exclusion) of SWH types listed in the 6E ECS are presented in Appendix C, Chapter 1.

5.1.1 Objectives

All general objectives listed in Section 1.1 apply to raptors.

5.2 Methods

5.2.1 Study Areas

The BIS study areas for raptors include the AOI, LSA_{TER}, the RSA_{AVI} for terrestrial species, and the $RSA_{AVI-AQU}$ for species strongly associated with aquatic environments, such as bald eagle and osprey that feed primarily on fish (see figures and descriptions in Section 3.0, Chapter 1).

5.2.2 Presence, Distribution, and Abundance of Important Habitat

Collation of both existing and Tier 1 habitat data for raptors proceeded as described in Sections 1.2.2 and 1.2.3.

5.2.3 Presence and Distribution of Species of Interest

Collation of existing observations and Tier 1 incidental observations for raptor species of interest proceeded as described in Sections 1.2.2 and 1.2.3.

5.2.4 Additional Baseline Data to Inform the IA

Species lists were compiled from desk- and field-based studies (as per Section 1.2.2 and 1.2.3) as an initial investigation into the biodiversity of raptors in the BIS study areas.

5.3 Results

5.3.1 Presence, Distribution, and Abundance of Important Habitat

5.3.1.1 General Habitat Associations

Future Tier 2 studies aim to determine raptor-habitat associations within the BIS study areas. Discussion of general habitat associations will be included in future BIS Baseline Reports after Tier 2 studies have been completed (if the SON-South Bruce siting area is selected for the Project).

5.3.1.2 Significant and Other Important Wildlife Habitats

Various candidate SWH of relevance to raptors have been found throughout the AOI, LSA_{TER}, RSA_{AVI}, and $RSA_{AVI-AQU}$ based on ecosite analyses, some or all habitat criteria being met, or records of species and/or habitat features. There is supporting evidence for all six SWH types listed in Section 5.1. A detailed discussion of candidate SWH within the LSA_{TER} is available in Appendix C, Chapter 1. Special Concern and provincially rare raptor species are also discussed in Section 5.3.2.1 below.

In addition to SWH, Zoetica investigated whether other important wildlife habitat data (e.g., nests, territories, snags/wildlife trees, important foraging/perching/roosting sites) were contained within the datasets analyzed (see **Table 1-1**) or found during the Tier 1 BIS baseline field programs. No further information was available for raptors.

5.3.2 Presence and Distribution of Species of Interest

5.3.2.1 Species of Conservation Concern

To date, four raptor species of conservation concern have been observed within the AOI, LSA_{TER}, RSA_{AVI} and/or $RSA_{AVI-AQU}$ (**Table 5-1**), including two SAR and two other priority species as identified by the BCR 13 strategy (EC 2014a). Only two raptor (or functional raptor) species – bald eagle (Special Concern) and common raven – were observed within the BIS study areas during 2022 field studies.

Table 5-1. Summary list of raptor species of interest recorded within the AOI, LSA_{TER}, and RSA_{AVI} or $RSA_{AVI-AQU}$.

Common Name	Species of Interest[1]				Method of Detection			BIS Study Area[2]		
	SAR	Prov. Rare	BCR 13	Engage.	Desk-based	2020 Studies[3]	2022 Field	AOI	LSA_{TER}	RSA_{AVI} / $RSA_{AVI-AQU}$
Golden Eagle	Y	-	-	-	Y	-	-	-	-	Y
Bald Eagle	Y	-	Y	Y	Y	-	Y	Y	Y	Y
American Kestrel	-	-	Y	-	Y	-	-	-	-	Y
Northern Harrier	-	-	Y	-	Y	-	-	-	-	Y

Notes:
1. Species of conservation concern (at-risk and provincially rare), other priority species as identified by the BCR 13 strategy (EC 2014a), and species mentioned during engagement are noted, where applicable.

2. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed within its boundaries.
3. Data were collated from the previous preliminary environmental field studies conducted in July and October 2020 by Tulloch Environmental at boreholes 1 and 2 within the AOI (Tulloch Environmental 2020, 2021).

Bald eagle has been widely observed throughout the $RSA_{AVI-AQU}$, as indicated by the GBIF dataset (**Figure B-6**; **Table B-5**). To date, there is only one GBIF record within the AOI – four individual bald eagles were observed in February 2018 along the Teeswater River close to the southern boundary of the AOI. Further field studies are needed to determine whether this location may have local importance as a raptor wintering area (see discussion and maps of candidate SWH in Appendix C, Chapter 1). Additionally, bald eagle was observed in the winter (January and February 2010) and in the spring (March 2018) at two locations within the LSA_{TER}. During Tier 1 field studies, bald eagles were incidentally observed once, in the northern portion of the GSWC in mid-October 2022 (data not mapped).

Golden eagle (Endangered) has a provincial recovery strategy (Wyshynski and Pulfer 2015) and a government response statement available (MECP 2016). There are two GBIF records of this species within the $RSA_{AVI-AQU}$ south and southwest of the LSA_{TER} (**Figure B-6**). Based on species range maps, golden eagle is expected to be a migrant through southwestern Ontario (Cornell Lab of Ornithology 2019g); however, these two observations were made in the winter (late December and January) of 2017 and 2019. It has been documented that small numbers of golden eagle overwinter in southern Ontario, often near large deer wintering areas where carcasses might be found (MECP 2021). Further investigation of the potential for golden eagle to be using the BIS study areas for overwintering is needed.

No provincially rare raptors have been observed within the BIS study areas (**Table 5-1**). Although rough-legged hawk and turkey vulture have SRANKS of S1 and S3 during the breeding and non-breeding periods, respectively, only wintering populations of rough-legged hawk and breeding populations of turkey vulture are expected in southwestern Ontario (Cornell Lab of Ornithology 2019h, 2019i). Therefore, these species are not of regulatory concern for the BIS.

5.3.2.1 Species of Interest to Stakeholders and Rights-holders, and Species of Potential Socio-economic Importance

See Section 2.3.2.2 for a general discussion about what Zoetica has heard from engagement regarding birds and bird communities. With respect to raptors, observations from a member of the local community included bald eagles nesting along the river west of Teeswater. While the community of Teeswater is located within the RSA_{AVI}, it is outside the LSA_{ECO} where 2022 field studies were conducted; therefore, no incidental observations of bald eagles or their nests were collected in this area. The socio-economic or socio-ecological importance of additional raptor species to local communities and/or Indigenous communities will be sought through future engagement. Zoetica's proposed Tier 2 studies include community-level surveys that will detect a variety of raptors. Therefore, future data collection will also enable retrospective analysis of newly identified species of interest, if needed.

5.3.2.1 Indicator Species

To date, only one of the three raptor species used as forest indicators by the MNRF (northern goshawk; see Table 5-18 in the BPPA Report (Zoetica 2021)) has been observed within the BIS study areas. The three other BCR 13 priority species detected within the BIS study areas (see Section 5.3.2.1 and **Table 5-1**) could also be considered as indicator species after more baseline data are collected. Zoetica recommends that

indicator species for the purposes of the BIS be determined after more information is gathered about potential project impacts and species-habitat associations (e.g., through Tier 2 community composition studies) within the BIS study areas for birds. See Sections 4.2 and 5.2.7.1 of the BPPA Report (Zoetica 2021) for further discussion of indicator species.

5.3.3 Additional Baseline Data to Inform the IA

5.3.3.1 Community Characterization

A total of 17 raptor species have been detected within the BIS study areas based on desk- and field-based investigations conducted to date (**Table D-4**). Of these, six species were documented within the AOI in existing datasets; none were observed in the AOI during 2022 field studies. The Greenock Swamp ANSI Life Science Inventory report identified additional raptor species in the SON-South Bruce siting area (see **Table C-1**), including barred owl, long-eared owl, and red-shouldered hawk. However, as there are no spatial data associated with the Greenock Swamp ANSI report to determine which species were observed within or outside the RSA_{AVI}, these additional species were not included in **Table 5-1** (which is limited to raptor species detected within the BIS study areas).

5.4 Discussion

Section 5.0 of Chapter 7 (Avifauna) of the 2023 BIS Baseline Report focused on desk-based analyses of raptor habitat and species observations and preliminary results from Tier 1 terrestrial and aquatic habitat assessments and incidental observations. To date, 17 raptor species have been detected within the AOI, LSA_{TER}, RSA_{AVI}, or $RSA_{AVI-AQU}$, including two SAR and two other priority species as identified by the BCR 13 strategy (EC 2014a) (**Table D-4**). However, where a species has only been detected using desk-based data, caution should be taken as those data could be as old as 1970, and the conditions supporting the species' presence in the area may have changed.

Baseline spatial data for raptor species of conservation concern are currently limited to existing GBIF observations and one incidental field observation of bald eagle, and two GBIF observations of golden eagle (**Figure B-6**). Most observations occurred within the $RSA_{AVI-AQU}$ outside the AOI and LSA_{TER}. As these records do not contain additional information about habitat use or bird activity, it is unclear if the observations are associated with important habitats for these species. However, a local community member noted that bald eagles nest along the Teeswater River west of the community of Teeswater; this area falls within the BIS study areas and should be ground-truthed during future field studies if it occurs within the AOI or LSA_{TER}. If confirmed active, the bald eagle nest and surrounding habitat would constitute Bald Eagle and Osprey Nesting, Foraging and Perching Habitat SWH (OMNRF 2015).

Additional candidate SWH has been identified within the AOI, LSA_{TER}, RSA_{AVI}, and $RSA_{AVI-AQU}$ for Raptor Wintering Area, Woodland Raptor Nesting Habitat, Open Country Bird Breeding Habitat, and Shrub/Early Successional Bird Breeding Habitat. A detailed discussion of SWH is available in Appendix C, Chapter 1. In addition, the Greenock Swamp ANSI is known to provide breeding habitat for 11 raptor species (**Table C-1**); however, it is unclear if these observations occurred within the RSA_{AVI} portion of the ANSI.

5.4.1 Next Steps

If the SON-South Bruce siting area is selected for the Project, Tier 2 studies will aim to characterize raptor communities more thoroughly within the BIS study areas. Refer to Section 5.2.7 of the BPPA Report (Zoetica 2021) for more information. Community-level studies will enable estimates of relative abundance

and seasonal habitat use and provide insight into food webs and trophic linkages. Study methods may include call playback surveys for woodland raptors, road transect surveys for open habitat raptors, and autonomous song meters to detect owls and other species. Based on these initial field studies, call playback for owls and ground nest searches may be conducted to identify breeding territories and/or nests. These targeted breeding/nest surveys and confirmation of candidate SWH (described in Appendix C, Chapter 1), including habitats for Special Concern and provincially rare species, will focus on areas within the extent of direct and indirect project impacts (i.e., AOI and LSA_{TER}).[7] In addition, further discussions with knowledgeable stakeholders and rights-holders will help determine the locations of sensitive habitats for raptors. However, access limitations will continue to be a factor in determining which areas can be surveyed. The NWMO continues to engage with local landowners to gain permission to access their properties. Zoetica is providing input to the NWMO regarding priority locations within which they should seek access based on the baseline information collected to date.

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APPENDIX A – SPECIES LIST

Table A-1. Common and scientific names for species mentioned in this report. Species names follow the NHIC's Ontario species lists, current to March 1, 2023.

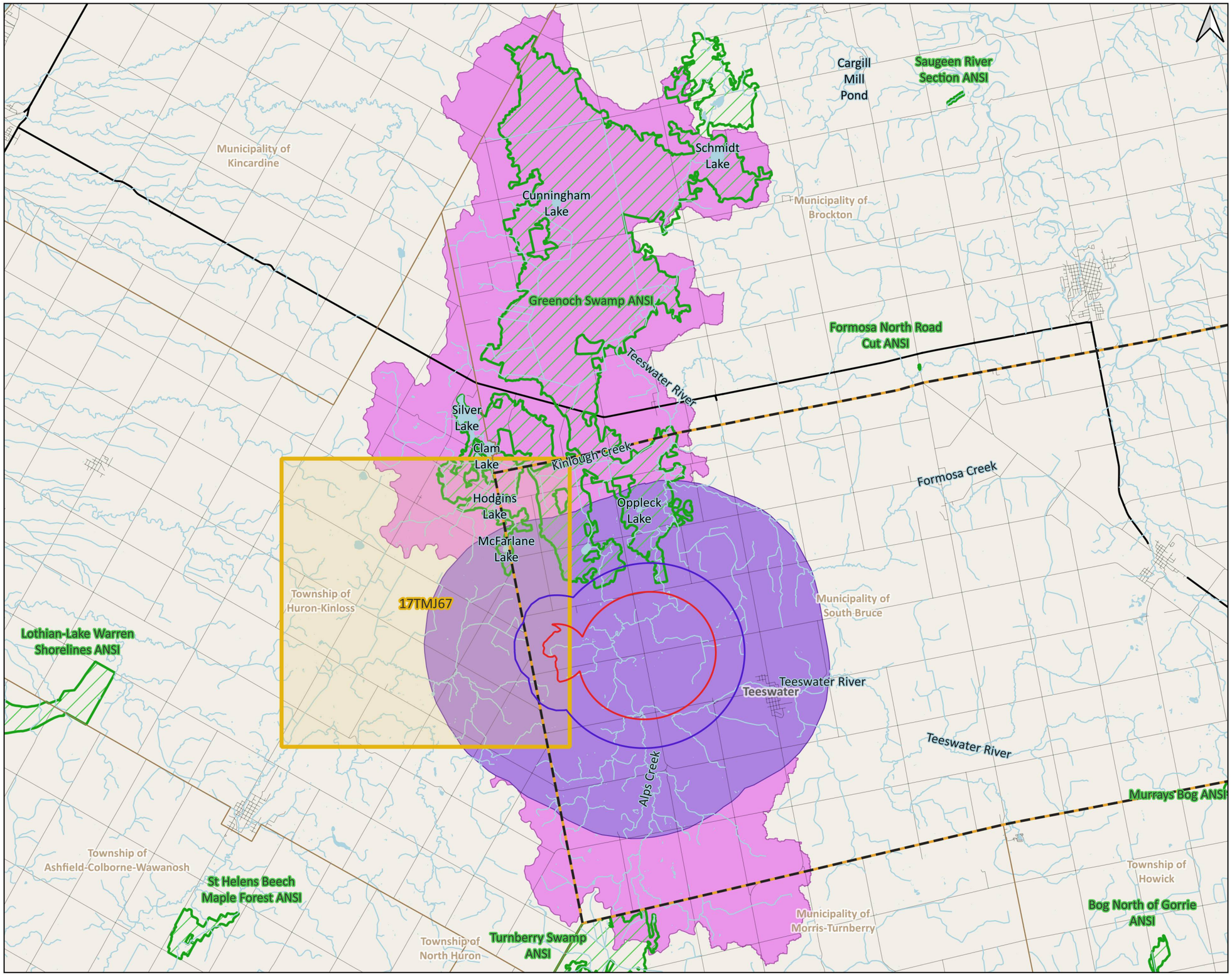
Common Name	Scientific Name
UPLAND BREEDING BIRDS	
Acadian Flycatcher	*Empidonax virescens*
Alder Flycatcher	*Empidonax alnorum*
American Crow	*Corvus brachyrhynchos*
American Goldfinch	*Spinus tristis*
American Redstart	*Setophaga ruticilla*
American Robin	*Turdus migratorius*
American Tree Sparrow	*Spizelloides arborea*
Baltimore Oriole	*Icterus galbula*
Bank Swallow	*Riparia riparia*
Barn Swallow	*Hirundo rustica*
Bay-breasted Warbler	*Setophaga castanea*
Belted Kingfisher	*Megaceryle alcyon*
Black Swift	*Cypseloides niger*
Black-and-white Warbler	*Mniotilta varia*
Black-billed Cuckoo	*Coccyzus erythropthalmus*
Blackburnian Warbler	*Setophaga fusca*
Black-capped Chickadee	*Poecile atricapillus*
Black-throated Blue Warbler	*Setophaga caerulescens*
Black-throated Green Warbler	*Setophaga virens*
Blue Jay	*Cyanocitta cristata*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Blue-headed Vireo	*Vireo solitarius*
Blue-winged Warbler	*Vermivora cyanoptera*
Bobolink	*Dolichonyx oryzivorus*
Bohemian Waxwing	*Bombycilla garrulus*
Brewer's Blackbird	*Euphagus cyanocephalus*
Brown Creeper	*Certhia americana*
Brown Thrasher	*Toxostoma rufum*
Brown-headed Cowbird	*Molothrus ater*
Canada Warbler	*Cardellina canadensis*
Cape May Warbler	*Setophaga tigrina*
Cedar Waxwing	*Bombycilla cedrorum*
Cerulean Warbler	*Setophaga cerulea*
Chestnut-sided Warbler	*Setophaga pensylvanica*
Chimney Swift	*Chaetura pelagica*
Chipping Sparrow	*Spizella passerina*
Clay-colored Sparrow	*Spizella pallida*
Cliff Swallow	*Petrochelidon pyrrhonota*
Common Grackle	*Quiscalus quiscula*
Common Nighthawk	*Chordeiles minor*
Common Redpoll	*Acanthis flammea*
Common Yellowthroat	*Geothlypis trichas*
Dark-eyed Junco	*Junco hyemalis*
Downy Woodpecker	*Dryobates pubescens*
Eastern Bluebird	*Sialia sialis*
Eastern Kingbird	*Tyrannus tyrannus*
Eastern Meadowlark	*Sturnella magna*
Eastern Phoebe	*Sayornis phoebe*
Eastern Towhee	*Pipilo erythrophthalmus*
Eastern Whip-poor-will	*Antrostomus vociferus*

Common Name	Scientific Name
Eastern Wood-pewee	*Contopus virens*
European Starling	*Sturnus vulgaris*
Evening Grosbeak	*Coccothraustes vespertinus*
Field Sparrow	*Spizella pusilla*
Fox Sparrow	*Passerella iliaca*
Golden-crowned Kinglet	*Regulus satrapa*
Golden-winged Warbler	*Vermivora chrysoptera*
Grasshopper Sparrow	*Ammodramus savannarum*
Gray Catbird	*Dumetella carolinensis*
Great Crested Flycatcher	*Myiarchus crinitus*
Hairy Woodpecker	*Dryobates villosus*
Henslow's Sparrow	*Centronyx henslowii*
Hermit Thrush	*Catharus guttatus*
Hooded Warbler	*Setophaga citrina*
Horned Lark	*Eremophila alpestris*
House Finch	*Haemorhous mexicanus*
House Sparrow	*Passer domesticus*
House Wren	*Troglodytes aedon*
Indigo Bunting	*Passerina cyanea*
Least Flycatcher	*Empidonax minimus*
Loggerhead Shrike	*Lanius ludovicianus*
Louisiana Waterthrush	*Parkesia motacilla*
Magnolia Warbler	*Setophaga magnolia*
Marsh Wren	*Cistothorus palustris*
Mourning Dove	*Zenaida macroura*
Mourning Warbler	*Geothlypis philadelphia*
Nashville Warbler	*Leiothlypis ruficapilla*
Northern Cardinal	*Cardinalis cardinalis*
Northern Flicker	*Colaptes auratus*
Northern Parula	*Setophaga americana*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Northern Shrike	*Lanius borealis*
Northern Waterthrush	*Parkesia noveboracensis*
Ovenbird	*Seiurus aurocapilla*
Palm Warbler	*Setophaga palmarum*
Pileated Woodpecker	*Dryocopus pileatus*
Pine Grosbeak	*Pinicola enucleator*
Pine Siskin	*Spinus pinus*
Pine Warbler	*Setophaga pinus*
Purple Finch	*Haemorhous purpureus*
Red-bellied Woodpecker	*Melanerpes carolinus*
Red-breasted Nuthatch	*Sitta canadensis*
Red-eyed Vireo	*Vireo olivaceus*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-winged Blackbird	*Agelaius phoeniceus*
Rock Pigeon	*Columba livia*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Ruby-crowned Kinglet	*Corthylio calendula*
Ruby-throated Hummingbird	*Archilochus colubris*
Ruffed Grouse	*Bonasa umbellus*
Rusty Blackbird	*Euphagus carolinus*
Savannah Sparrow	*Passerculus sandwichensis*
Scarlet Tanager	*Piranga olivacea*
Sedge Wren	*Cistothorus stellaris*
Snow Bunting	*Plectrophenax nivalis*

Common Name	Scientific Name
Song Sparrow	*Melospiza melodia*
Swainson's Thrush	*Catharus ustulatus*
Swamp Sparrow	*Melospiza georgiana*
Tree Swallow	*Tachycineta bicolor*
Veery	*Catharus fuscescens*
Vesper Sparrow	*Pooecetes gramineus*
Warbling Vireo	*Vireo gilvus*
White-breasted Nuthatch	*Sitta carolinensis*
White-crowned Sparrow	*Zonotrichia leucophrys*
White-throated Sparrow	*Zonotrichia albicollis*
Wild Turkey	*Meleagris gallopavo*
Willow Flycatcher	*Empidonax traillii*
Winter Wren	*Troglodytes hiemalis*
Wood Thrush	*Hylocichla mustelina*
Yellow Warbler	*Setophaga petechia*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Yellow-billed Cuckoo	*Coccyzus americanus*
Yellow-rumped Warbler	*Setophaga coronata*
Yellow-throated Vireo	*Vireo flavifrons*
SHOREBIRDS	
American Woodcock	*Scolopax minor*
Dunlin	*Calidris alpina*
Greater Yellowlegs	*Tringa melanoleuca*
Killdeer	*Charadrius vociferus*
Least Sandpiper	*Calidris minutilla*
Lesser Yellowlegs	*Tringa flavipes*
Pectoral Sandpiper	*Calidris melanotos*
Semipalmated Plover	*Charadrius semipalmatus*
Semipalmated Sandpiper	*Calidris pusilla*
Solitary Sandpiper	*Tringa solitaria*
Spotted Sandpiper	*Actitis macularius*
Stilt Sandpiper	*Calidris himantopus*
Upland Sandpiper	*Bartramia longicauda*
Wilson’s Phalarope	*Phalaropus tricolor*
Wilson's Snipe	*Gallinago delicata*
WATERBIRDS	
American Bittern	*Botaurus lentiginosus*
American Black Duck	*Anas rubripes*
American Coot	*Fulica americana*
American Wigeon	*Mareca americana*
Black Tern	*Chlidonias niger*
Blue-winged Teal	*Spatula discors*
Bonaparte's Gull	*Chroicocephalus philadelphia*
Bufflehead	*Bucephala albeola*
Cackling Goose	*Branta hutchinsii*
Canada Goose	*Branta canadensis*
Canvasback	*Aythya valisineria*
Caspian Tern	*Hydroprogne caspia*
Common Gallinule	*Gallinula galeata*
Common Goldeneye	*Bucephala clangula*
Common Loon	*Gavia immer*
Common Merganser	*Mergus merganser*
Double-crested Cormorant	*Nannopterum auritum*
Gadwall	*Mareca strepera*
Great Black-backed Gull	*Larus marinus*

Common Name	Scientific Name
Great Blue Heron	*Ardea herodias*
Great Egret	*Ardea alba*
Greater White-fronted Goose	*Anser albifrons*
Green Heron	*Butorides virescens*
Green-winged Teal	*Anas crecca*
Herring Gull	*Larus argentatus*
Hooded Merganser	*Lophodytes cucullatus*
Horned Grebe	*Podiceps auritus*
Least Bittern	*Ixobrychus exilis*
Lesser Scaup	*Aythya affinis*
Long-tailed Duck	*Clangula hyemalis*
Mallard	*Anas platyrhynchos*
Mute Swan	*Cygnus olor*
Northern Pintail	*Anas acuta*
Northern Shoveler	*Spatula clypeata*
Pied-billed Grebe	*Podilymbus podiceps*
Red-breasted Merganser	*Mergus serrator*
Red-necked Grebe	*Podiceps grisegena*
Ring-billed Gull	*Larus delawarensis*
Ring-necked Duck	*Aythya collaris*
Sandhill Crane	*Antigone canadensis*
Snow Goose	*Anser caerulescens*
Sora	*Porzana carolina*
Tundra Swan	*Cygnus columbianus*
Virginia Rail	*Rallus limicola*
White-winged Scoter	*Melanitta deglandi*
Wood Duck	*Aix sponsa*
RAPTORS	
American Kestrel	*Falco sparverius*
Bald Eagle	*Haliaeetus leucocephalus*
Barred Owl	*Strix varia*
Broad-winged Hawk	*Buteo platypterus*
Common Raven	*Corvus corax*
Cooper's Hawk	*Accipiter cooperii*
Eastern Screech-Owl	*Megascops asio*
Golden Eagle	*Aquila chrysaetos*
Great Horned Owl	*Bubo virginianus*
Long-eared Owl	*Asio otus*
Merlin	*Falco columbarius*
Northern Goshawk	*Accipiter gentilis*
Northern Harrier	*Circus hudsonius*
Osprey	*Pandion haliaetus*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Rough-legged Hawk	*Buteo lagopus*
Sharp-shinned Hawk	*Accipiter striatus*
Snowy Owl	*Bubo scandiacus*
Turkey Vulture	*Cathartes aura*

APPENDIX B – MAP FIGURES AND SUPPLEMENTAL DATA



NWMO Biodiversity Impact Studies

Critical Habitat and Environmentally Significant Areas for Birds

Figure B-1

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Regional Study Area (RSA_{AVI})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Watercourse
- Lake
- South Bruce Boundary
- Municipal Boundary
- Highway
- Local Road
- 10 x 10 km standardized UTM grid square within which critical habitat for bobolink is found*
- Areas of Natural and Scientific Interest (ANSI)

*Mapping is limited to the UTM grid squares that overlap with the RSA_{AVI}

The $RSA_{AVI-AQU}$ includes the area covered by the RSA_{AVI} (purple area) plus the area encompassed by the LSA used for aquatic biodiversity values (pink area).

1:130,000

0 2 4 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); MNRF Road Segments (NDMNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: HB	Approved by: HB
September 22, 2023	Map ID: NWMO_BIS_D186c	

NWMO Biodiversity Impact Studies

Species of Interest Field Observations: Upland Breeding Birds

Figure B-2

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Regional Study Area (RSA_{AVI})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

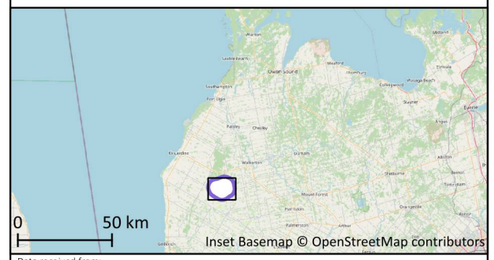
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:45,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
December 11, 2023	Map ID: NWMO_BIS_A117	

Species Observed

- Bank Swallow (SAR)
- Barn Swallow (SAR)
- Bobolink (SAR)
- Eastern Meadowlark (SAR)
- Eastern Wood-pewee (SAR)
- Wood Thrush (SAR)

SAR = Species at Risk

SAR and Provincially Rare species were masked with a 1km grid and may occur anywhere within that grid square. Circle colour(s) within the grid represent the species observed incidentally. Species may have been observed more than once within a grid square.

Table B-1. Supplemental data for 2022 field-based incidental observations of upland breeding bird species of interest within the BIS study areas.[1,2]

Grid	Species	Observation Type[3]	Count	Source Type[4]	AOI	LSA_{TER}	RSA_{AVI}
6872	Eastern Wood-pewee	Vocal	1	Incidental	0	1	1
6972	Bobolink	Vocal	1	Incidental	1	1	1
6977	Eastern Wood-pewee	Vocal	2	Incidental	0	0	1
6977	Eastern Wood-pewee	Vocal	1	Incidental	0	0	1
7068	Eastern Meadowlark	Visual	1	Incidental	0	0	1
7071	Eastern Wood-pewee	Vocal	2	Incidental	1	1	1
7072	Barn Swallow	Visual (ad, juv)	10	Incidental	1	1	1
7072	Eastern Meadowlark	Visual	1	Incidental	1	1	1
7073	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7073	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7167	Eastern Wood-pewee	Vocal	2	Incidental	0	0	1
7168	Eastern Wood-pewee	Vocal	1	Incidental	0	0	1
7171	Barn Swallow	Nesting activity	>1	AHM	1	1	1
7171	Barn Swallow	Visual (ad, juv)	20	Incidental	1	1	1
7172	Barn Swallow	Visual	25	Incidental	1	1	1
7172	Barn Swallow	Visual	25	Incidental	1	1	1
7172	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7172	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7172	Eastern Wood-pewee	Vocal	2	Incidental	1	1	1
7173	Barn Swallow	Visual	1	AHM	1	1	1
7173	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7173	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7173	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7173	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7173	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7173	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7173	Eastern Wood-pewee	Unspecified	1	SWH	1	1	1
7174	Barn Swallow	Vocal, Visual	3	Incidental	1	1	1
7174	Barn Swallow	Unspecified	>1	SWH	1	1	1
7271	Barn Swallow	Nesting activity	"many"	eDNA	1	1	1
7272	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7272	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7272	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7272	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7272	Eastern Wood-pewee	Vocal	1	eDNA	1	1	1
7273	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7274	Bank Swallow	Visual	1	Incidental	1	1	1
7274	Bobolink	Vocal, Visual	1	Incidental	1	1	1
7277	Eastern Wood-pewee	Vocal	1	Incidental	0	0	1
7277	Eastern Wood-pewee	Vocal	1	Incidental	0	0	1

Grid	Species	Observation Type[3]	Count	Source Type[4]	AOI	LSA_{TER}	RSA_{AVI}
7277	Eastern Wood-pewee	Vocal	1	Incidental	0	0	1
7370	Eastern Wood-pewee	Vocal	2	Incidental	1	1	1
7370	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7370	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7373	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7373	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7374	Barn Swallow	Visual	1	Incidental	1	1	1
7374	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7374	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7374	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7374	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7472	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7472	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7472	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7472	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7472	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7472	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7472	Eastern Wood-pewee	Unspecified	1	AHM	1	1	1
7472	Wood Thrush	Unspecified	1	AHM	1	1	1
7474	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7474	Eastern Wood-pewee	Vocal	1	Incidental	1	1	1
7474	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7474	Eastern Wood-pewee	Vocal	1	SWH	1	1	1
7476	Eastern Wood-pewee	Vocal	1	Incidental	0	1	1
7476	Eastern Wood-pewee	Vocal	3	Incidental	0	1	1
7477	Eastern Wood-pewee	Vocal, Visual	2	Incidental	0	0	1
7571	Eastern Wood-pewee	Vocal	1	Incidental	0	1	1
7571	Eastern Wood-pewee	Vocal	1	SWH	0	1	1
7571	Eastern Wood-pewee	Unspecified	1	SWH	0	1	1
7577	Eastern Wood-pewee	Vocal	1	Incidental	0	0	1

Notes:

1. Refer to Figure B-2 for the grid locations of masked observations. Coordinates are not provided due to the sensitive nature of SAR and provincially rare species. The indicated study area(s) is based on overlap with the 1 km grid square, not the actual point or polygon location.
2. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected
3. Abbreviations for observation types: ad = adult, juv = juvenile
4. All 2022 field species observations are considered incidental; however, the source type is presented to allow interpretation of field effort and visited locations. “eDNA” refers to field observations and not the results of metabarcoding analyses.

NWMO Biodiversity Impact Studies

Species of Interest Desk-based Observations: Upland Breeding Birds

Figure B-3

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Regional Study Area (RSA_{AVI})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

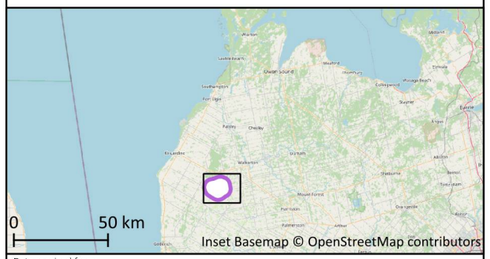
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:60,000

0 1 2 km

ZOETICA



- Observation Location
- 1km x 1km grid square with observations

GBIF Observations

- Bank Swallow (SAR) [5]
- Barn Swallow (SAR) [18]
- Bobolink [4]
- Canada Warbler (SAR) [1]
- Common Nighthawk (SAR) [1]
- Eastern Meadowlark (SAR) [6]
- Eastern Whip-poor-will (SAR) [1]
- Eastern Wood-pewee (SAR) [4]
- Evening Grosbeak (SAR) [1]
- Fox Sparrow (R) [1]
- Grasshopper Sparrow (SAR) [1]
- Louisiana Waterthrush (SAR & R) [1]
- Rusty Blackbird [2]
- White-crowned Sparrow (R) [1]
- Wood Thrush (SAR) [10]

NHIC Occurrences

- Bobolink (SAR)
- Eastern Meadowlark (SAR)

SAR = Species at Risk R = Provincially Rare

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NHIC Species Occurrences (MNRF)
GBIF.org — GBIF Occurrence Download - Accessed Oct., 2021
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
January 19, 2024	Map ID: NWMO_BIS_A067	

Table B-2. Supplemental data for desk-based observations of upland breeding bird species of interest within the BIS study areas.[1,2]

Grid	Source	Species	Count[3]	AOI	LSA_{TER}	RSA_{AVI}
6572	GBIF	Wood Thrush	2	0	0	1
6573	GBIF	Bobolink	1	0	0	1
6775	GBIF	Bobolink	2	0	0	1
6775	GBIF	Bobolink	2	0	0	1
6869	GBIF	Barn Swallow	3	0	0	1
6869	GBIF	Barn Swallow	3	0	0	1
6869	GBIF	Wood Thrush	1	0	0	1
6871	GBIF	Barn Swallow	8	0	1	1
6871	GBIF	Barn Swallow	8	0	1	1
6871	GBIF	Barn Swallow	8	0	1	1
6871	GBIF	Eastern Meadowlark	1	0	1	1
6871	GBIF	Eastern Meadowlark	1	0	1	1
6872	GBIF	Barn Swallow	5	0	1	1
6874	GBIF	Eastern Meadowlark	1	0	1	1
6874	GBIF	Eastern Meadowlark	1	0	1	1
6968	GBIF	Eastern Wood-pewee	1	0	0	1
6968	GBIF	Wood Thrush	1	0	0	1
6970	GBIF	Bank Swallow	U	0	0	1
6970	GBIF	Barn Swallow	U	0	0	1
6970	GBIF	Bobolink	U	0	0	1
6970	GBIF	Canada Warbler	U	0	0	1
6970	GBIF	Eastern Meadowlark	U	0	0	1
6970	GBIF	Eastern Wood-pewee	U	0	0	1
6970	GBIF	Wood Thrush	U	0	0	1
7071	GBIF	Eastern Wood-pewee	1	0	1	1
7173	GBIF	Barn Swallow	2	1	1	1
7178	GBIF	Bank Swallow	3	0	0	1
7271	GBIF	Barn Swallow	15	1	1	1
7271	GBIF	Bobolink	1	1	1	1
7271	GBIF	Eastern Meadowlark	1	1	1	1
7272	GBIF	Barn Swallow	6	1	1	1
7272	GBIF	Eastern Meadowlark	1	1	1	1
7273	GBIF	Bank Swallow	2	1	1	1
7273	GBIF	Barn Swallow	10	1	1	1
7273	GBIF	Barn Swallow	4	1	1	1
7273	GBIF	Barn Swallow	4	1	1	1
7369	GBIF	Bank Swallow	1	0	0	1
7369	GBIF	Barn Swallow	20	0	0	1
7369	GBIF	Barn Swallow	1	0	0	1
7369	GBIF	Barn Swallow	2	0	0	1

Grid	Source	Species	Count[3]	AOI	LSA_{TER}	RSA_{AVI}
7369	GBIF	Barn Swallow	4	0	0	1
7369	GBIF	Barn Swallow	1	0	0	1
7369	GBIF	Barn Swallow	1	0	0	1
7369	GBIF	Barn Swallow	8	0	0	1
7369	GBIF	Barn Swallow	5	0	0	1
7369	GBIF	Bobolink	1	0	0	1
7369	GBIF	Bobolink	1	0	0	1
7369	GBIF	Bobolink	1	0	0	1
7369	GBIF	Bobolink	4	0	0	1
7369	GBIF	Common Nighthawk	1	0	0	1
7369	GBIF	Eastern Meadowlark	2	0	0	1
7369	GBIF	Eastern Meadowlark	1	0	0	1
7369	GBIF	Eastern Whip-poor-will	1	0	0	1
7369	GBIF	Eastern Wood-pewee	2	0	0	1
7369	GBIF	Eastern Wood-pewee	1	0	0	1
7369	GBIF	Eastern Wood-pewee	1	0	0	1
7369	GBIF	Eastern Wood-pewee	2	0	0	1
7369	GBIF	Eastern Wood-pewee	1	0	0	1
7369	GBIF	Eastern Wood-pewee	2	0	0	1
7369	GBIF	Eastern Wood-pewee	1	0	0	1
7369	GBIF	Eastern Wood-pewee	3	0	0	1
7369	GBIF	Eastern Wood-pewee	1	0	0	1
7369	GBIF	Eastern Wood-pewee	1	0	0	1
7369	GBIF	Eastern Wood-pewee	1	0	0	1
7369	GBIF	Evening Grosbeak	20	0	0	1
7369	GBIF	Fox Sparrow	1	0	0	1
7369	GBIF	Fox Sparrow	5	0	0	1
7369	GBIF	Fox Sparrow	2	0	0	1
7369	GBIF	Fox Sparrow	1	0	0	1
7369	GBIF	Fox Sparrow	1	0	0	1
7369	GBIF	Fox Sparrow	1	0	0	1
7369	GBIF	Fox Sparrow	1	0	0	1
7369	GBIF	Grasshopper Sparrow	1	0	0	1
7369	GBIF	Rusty Blackbird	300	0	0	1
7369	GBIF	Rusty Blackbird	100	0	0	1
7369	GBIF	Rusty Blackbird	1	0	0	1
7369	GBIF	Rusty Blackbird	2	0	0	1
7369	GBIF	Rusty Blackbird	250	0	0	1
7369	GBIF	White-crowned Sparrow	1	0	0	1
7369	GBIF	White-crowned Sparrow	2	0	0	1
7369	GBIF	Wood Thrush	1	0	0	1
7369	GBIF	Wood Thrush	1	0	0	1

Grid	Source	Species	Count[3]	AOI	LSA_{TER}	RSA_{AVI}
7369	GBIF	Wood Thrush	1	0	0	1
7369	GBIF	Wood Thrush	3	0	0	1
7369	GBIF	Wood Thrush	1	0	0	1
7369	GBIF	Wood Thrush	1	0	0	1
7369	GBIF	Wood Thrush	2	0	0	1
7369	GBIF	Wood Thrush	1	0	0	1
7370	GBIF	Louisiana Waterthrush	1	0	1	1
7377	GBIF	Eastern Meadowlark	1	0	0	1
7377	GBIF	Wood Thrush	1	0	0	1
7471	GBIF	Barn Swallow	1	0	1	1
7476	GBIF	Wood Thrush	2	0	0	1
7573	GBIF	Wood Thrush	1	0	1	1
7671	GBIF	Barn Swallow	8	0	0	1
7676	GBIF	Barn Swallow	2	0	0	1
7678	GBIF	Barn Swallow	3	0	0	1
7771	GBIF	Barn Swallow	4	0	0	1
7772	GBIF	Bank Swallow	4	0	0	1
7772	GBIF	Wood Thrush	1	0	0	1
7776	GBIF	Barn Swallow	1	0	0	1
7776	GBIF	Barn Swallow	2	0	0	1
7870	GBIF	Barn Swallow	4	0	0	1
7872	GBIF	Barn Swallow	2	0	0	1

Notes:

1. Refer to Figure B-3 for the grid locations. Coordinates are not provided due to the sensitive nature of SAR and provincially rare species.
2. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected
3. Count of "U" = unspecified.

NWMO Biodiversity Impact Studies

Species of Interest Desk-based Observations: Shorebirds

Figure B-4

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

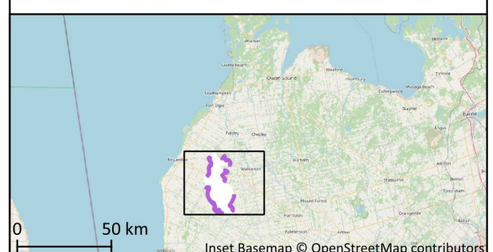
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:130,000

0 2 4 km

ZOETICA



Observation Location

1km x 1km grid square with observations

GBIF Observations

- Lesser Yellowlegs (SAR) [9]
- Upland Sandpiper (R) [5]

SAR = Species at Risk R = Provincially Rare

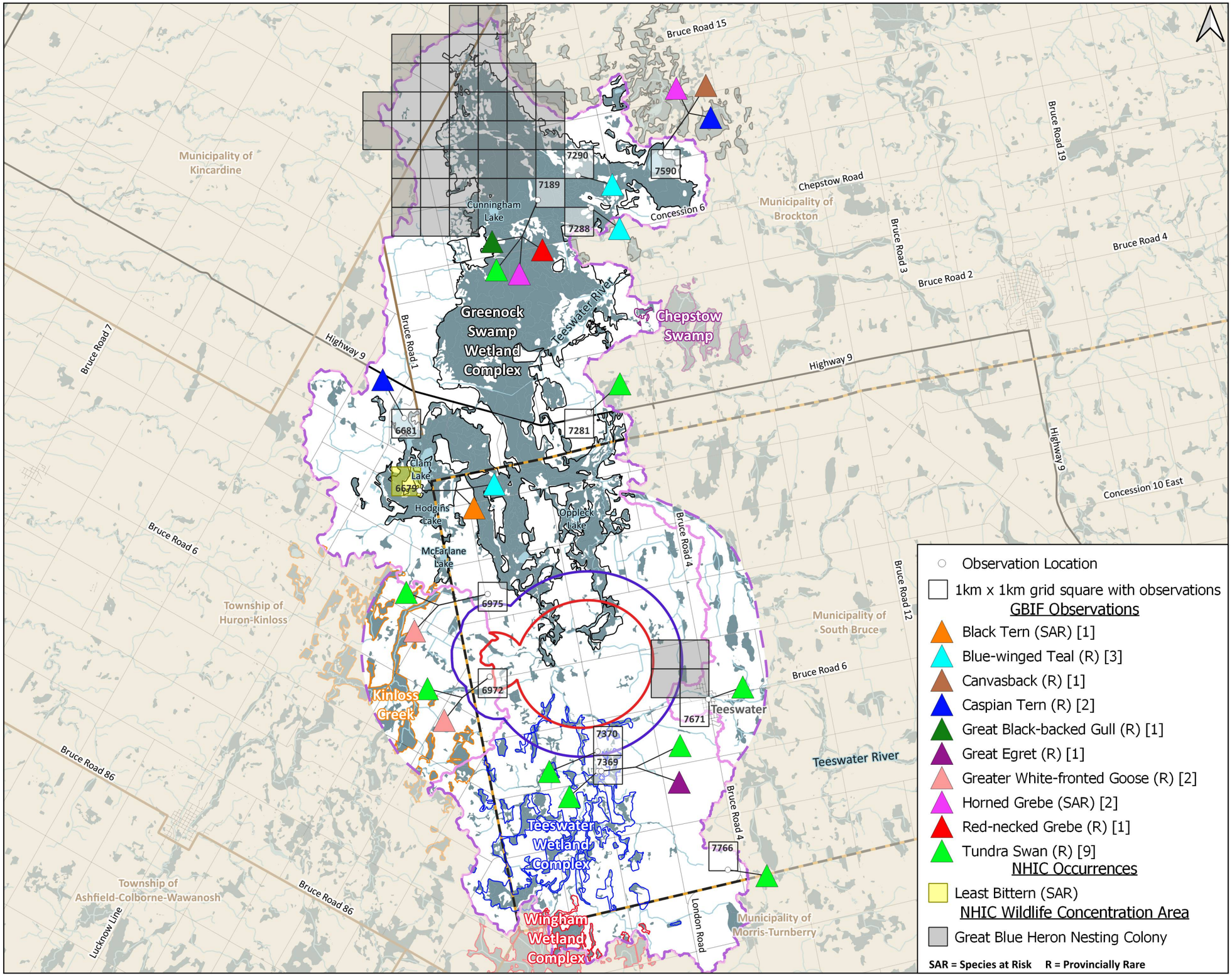
Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI
GBIF.org — GBIF Occurrence Download Accessed Oct., 2021
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
December 18, 2023	Map ID: NWMO_BIS_A083	

Table B-3. Supplemental data for desk-based observations of shorebird species of interest within the BIS study areas.[1,2]

Grid	Source	Species	Count[3]	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6478	GBIF	Lesser Yellowlegs	5	0	0	1
6478	GBIF	Lesser Yellowlegs	3	0	0	1
6478	GBIF	Lesser Yellowlegs	1	0	0	1
6478	GBIF	Lesser Yellowlegs	5	0	0	1
6478	GBIF	Lesser Yellowlegs	1	0	0	1
6478	GBIF	Lesser Yellowlegs	5	0	0	1
6478	GBIF	Lesser Yellowlegs	3	0	0	1
6478	GBIF	Lesser Yellowlegs	3	0	0	1
6478	GBIF	Upland Sandpiper	U	0	0	1
6478	GBIF	Upland Sandpiper	U	0	0	1
6685	GBIF	Upland Sandpiper	2	0	0	1
6782	GBIF	Upland Sandpiper	1	0	0	1
6889	GBIF	Lesser Yellowlegs	U	0	0	1
7087	GBIF	Lesser Yellowlegs	U	0	0	1
7179	GBIF	Lesser Yellowlegs	U	0	0	1
7187	GBIF	Upland Sandpiper	1	0	0	1
7189	GBIF	Lesser Yellowlegs	1	0	0	1
7189	GBIF	Lesser Yellowlegs	2	0	0	1
7273	GBIF	Lesser Yellowlegs	3	1	1	1
7273	GBIF	Lesser Yellowlegs	3	1	1	1
7273	GBIF	Lesser Yellowlegs	3	1	1	1
7273	GBIF	Upland Sandpiper	1	1	1	1
7379	GBIF	Lesser Yellowlegs	4	0	0	1
7382	GBIF	Lesser Yellowlegs	5	0	0	1

Notes:
1. Refer to Figure B-4 for the grid locations. Coordinates are not provided due to the sensitive nature of SAR and provincially rare species.
2. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected.
3. Count of "U" = unspecified.



Observation Location

1km x 1km grid square with observations

GBIF Observations

- Black Tern (SAR) [1]
- Blue-winged Teal (R) [3]
- Canvasback (R) [1]
- Caspian Tern (R) [2]
- Great Black-backed Gull (R) [1]
- Great Egret (R) [1]
- Greater White-fronted Goose (R) [2]
- Horned Grebe (SAR) [2]
- Red-necked Grebe (R) [1]
- Tundra Swan (R) [9]

NHIC Occurrences

- Least Bittern (SAR)

NHIC Wildlife Concentration Area

- Great Blue Heron Nesting Colony

SAR = Species at Risk R = Provincially Rare

NWMO Biodiversity Impact Studies

Species of Interest Desk-based Observations and Habitat Data: Waterbirds

Figure B-5

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

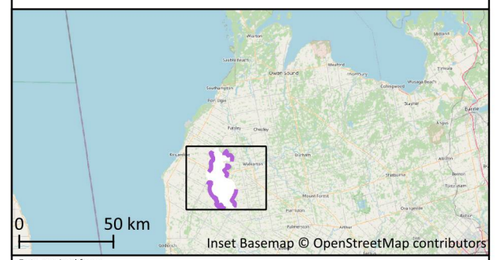
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:130,000

0 2 4 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NHIC WCA Observations (MNRF); NHIC Species Occurrences (MNRF)
GBIF.org — GBIF Occurrence Download - Accessed Oct., 2021
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A082	

Table B-4. Supplemental data for desk-based observations of waterbird species of interest within the BIS study areas.[1,2]

Grid	Source	Species	Count	AOI	LSA_{TER}	$RSA_{AVI-AQU}$
6679	GBIF	Black Tern	1	0	0	1
6679	GBIF	Blue-winged Teal	1	0	0	1
6679	GBIF	Blue-winged Teal	1	0	0	1
6681	GBIF	Caspian Tern	1	0	0	1
6681	GBIF	Caspian Tern	1	0	0	1
6972	GBIF	Greater White-fronted Goose	11	0	1	1
6972	GBIF	Tundra Swan	45	0	1	1
6975	GBIF	Greater White-fronted Goose	15	0	0	1
6975	GBIF	Tundra Swan	115	0	0	1
7189	GBIF	Great Black-backed Gull	1	0	0	1
7189	GBIF	Horned Grebe	3	0	0	1
7189	GBIF	Red-necked Grebe	1	0	0	1
7189	GBIF	Tundra Swan	2	0	0	1
7281	GBIF	Tundra Swan	60	0	0	1
7281	GBIF	Tundra Swan	60	0	0	1
7281	GBIF	Tundra Swan	60	0	0	1
7288	GBIF	Blue-winged Teal	10	0	0	1
7290	GBIF	Blue-winged Teal	15	0	0	1
7369	GBIF	Great Egret	1	0	0	1
7369	GBIF	Tundra Swan	50	0	0	1
7369	GBIF	Tundra Swan	2	0	0	1
7370	GBIF	Tundra Swan	30	0	1	1
7590	GBIF	Canvasback	3	0	0	1
7590	GBIF	Caspian Tern	1	0	0	1
7590	GBIF	Horned Grebe	2	0	0	1
7671	GBIF	Tundra Swan	50	0	0	1
7671	GBIF	Tundra Swan	25	0	0	1
7671	GBIF	Tundra Swan	35	0	0	1
7766	GBIF	Tundra Swan	250	0	0	1

Notes:
1. Refer to Figure B-5 for the grid locations. Coordinates are not provided due to the sensitive nature of SAR and provincially rare species.
2. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected.

NWMO Biodiversity Impact Studies

Species of Interest Desk-based Observations: Raptors

Figure B-6

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Regional Study Area (RSA_{AVI})
- Regional Study Area ($RSA_{AVI-AQU}$)
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

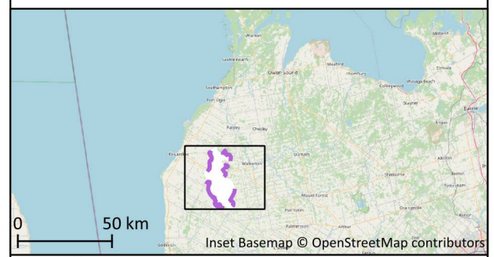
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:130,000

0 2 4 km

ZOETICA



- Observation Location
- 1km x 1km grid square with observations

GBIF Observations

- Bald Eagle (SAR) [28]
- Golden Eagle (SAR) [2]

SAR = Species at Risk

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI
GBIF.org — GBIF Occurrence Download - Accessed Oct., 2021
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
December 12, 2023	Map ID: NWMO_BIS_A059	

Table B-5. Supplemental data for desk-based observations of raptor species of interest within the BIS study areas.[1,2]

Grid	Source	Species	Count[3]	AOI	LSA_{TER}	RSA_{AVI} / $RSA_{AVI-AQU}$
6381	GBIF	Bald Eagle	1	0	0	1
6481	GBIF	Bald Eagle	1	0	0	1
6481	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	2	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	2	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1
6679	GBIF	Bald Eagle	1	0	0	1

Grid	Source	Species	Count[3]	AOI	LSA_{TER}	RSA_{AVI} / $RSA_{AVI-AQU}$
6681	GBIF	Bald Eagle	2	0	0	1
6681	GBIF	Bald Eagle	1	0	0	1
6681	GBIF	Bald Eagle	2	0	0	1
6682	GBIF	Bald Eagle	1	0	0	1
6682	GBIF	Bald Eagle	1	0	0	1
6865	GBIF	Bald Eagle	1	0	0	1
6882	GBIF	Bald Eagle	4	0	0	1
6894	GBIF	Bald Eagle	1	0	0	1
6894	GBIF	Bald Eagle	5	0	0	1
6894	GBIF	Bald Eagle	5	0	0	1
6894	GBIF	Bald Eagle	5	0	0	1
6970	GBIF	Golden Eagle	1	0	0	1
6972	GBIF	Bald Eagle	1	0	1	1
6975	GBIF	Bald Eagle	6	0	0	1
6975	GBIF	Bald Eagle	6	0	0	1
6975	GBIF	Bald Eagle	6	0	0	1
7087	GBIF	Bald Eagle	U	0	0	1
7189	GBIF	Bald Eagle	2	0	0	1
7189	GBIF	Bald Eagle	3	0	0	1
7271	GBIF	Bald Eagle	4	1	1	1
7281	GBIF	Bald Eagle	1	0	0	1
7281	GBIF	Bald Eagle	1	0	0	1
7281	GBIF	Bald Eagle	1	0	0	1
7281	GBIF	Bald Eagle	1	0	0	1
7281	GBIF	Bald Eagle	1	0	0	1
7281	GBIF	Bald Eagle	1	0	0	1
7292	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	2	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Golden Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7369	GBIF	Bald Eagle	1	0	0	1
7370	GBIF	Bald Eagle	2	0	1	1

Grid	Source	Species	Count[3]	AOI	LSA_{TER}	RSA_{AVI} / $RSA_{AVI-AQU}$
7370	GBIF	Bald Eagle	1	0	1	1
7370	GBIF	Bald Eagle	1	0	1	1
7381	GBIF	Bald Eagle	1	0	0	1
7381	GBIF	Bald Eagle	2	0	0	1
7381	GBIF	Bald Eagle	2	0	0	1
7465	GBIF	Bald Eagle	3	0	0	1
7590	GBIF	Bald Eagle	1	0	0	1
7590	GBIF	Bald Eagle	3	0	0	1
7590	GBIF	Bald Eagle	1	0	0	1
7590	GBIF	Bald Eagle	3	0	0	1
7671	GBIF	Bald Eagle	1	0	0	1
7672	GBIF	Bald Eagle	2	0	0	1

Notes:

1. Refer to Figure B-6 for the grid locations. Coordinates are not provided due to the sensitive nature of SAR and provincially rare species.
2. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected.
3. Count of "U" = unspecified.

APPENDIX C – LIST OF BIRDS FROM THE GREENOCK SWAMP ANSI REPORT

Table C-1. Breeding birds of the Greenock Swamp ANSI (Johnson 1994a). Conservation statuses come from the NHIC's Ontario species list, current to March 1, 2023. Species of Interest (SOI) for the purposes of the BIS are indicated: SAR = species at risk, Rare = provincially rare (S1-S3), BCR 13 = other BCR 13 priority species (EC 2014a), Engage. = species mentioned during engagement.

SOI?	Common Name	Scientific Name	SRANK	SARO	COSEWIC	*SARA*
UPLAND BREEDING BIRDS						
-	Alder Flycatcher	*Empidonax alnorum*	S5B	-	-	-
-	American Crow	*Corvus brachyrhynchos*	S5	-	-	-
-	American Goldfinch	*Spinus tristis*	S5	-	-	-
-	American Redstart	*Setophaga ruticilla*	S5B	-	-	-
-	American Robin	*Turdus migratorius*	S5	-	-	-
BCR 13	Baltimore Oriole[2]	*Icterus galbula*	S4B	-	-	-
SAR	Bank Swallow	*Riparia riparia*	S4B	THR	THR	THR
SAR	Barn Swallow	*Hirundo rustica*	S4B	SC	SC	THR
BCR 13	Belted Kingfisher	*Megaceryle alcyon*	S5B,S4N	-	-	-
-	Black-and-white Warbler	*Mniotilta varia*	S5B	-	-	-
BCR 13	Black-billed Cuckoo	*Coccyzus erythropthalmus*	S4S5B	-	-	-
-	Black-capped Chickadee	*Poecile atricapillus*	S5	-	-	-
-	Black-throated Green Warbler	*Setophaga virens*	S5B	-	-	-
-	Blue Jay	*Cyanocitta cristata*	S5	-	-	-
BCR 13	Blue-winged Warbler	*Vermivora cyanoptera*	S4B	-	-	-
-	Brown Creeper	*Certhia americana*	S5	-	-	-
BCR 13	Brown Thrasher	*Toxostoma rufum*	S4B	-	-	-
Engage.	Brown-headed Cowbird	*Molothrus ater*	S5	-	-	-
SAR	Canada Warbler	*Cardellina canadensis*	S5B	SC	SC	THR
-	Cedar Waxwing	*Bombycilla cedrorum*	S5	-	-	-
SAR	Cerulean Warbler	*Setophaga cerulea*	S2B	THR	END	END
-	Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B	-	-	-
SAR	Chimney Swift	*Chaetura pelagica*	S3B	THR	THR	THR
-	Chipping Sparrow[1]	*Spizella passerina*	S5B,S3N	-	-	-
-	Common Grackle	*Quiscalus quiscula*	S5	-	-	-
-	Common Yellowthroat[1]	*Geothlypis trichas*	S5B,S3N	-	-	-
-	Downy Woodpecker	*Dryobates pubescens*	S5	-	-	-
-	Eastern Bluebird	*Sialia sialis*	S5B,S4N	NAR	NAR	-
BCR 13	Eastern Kingbird	*Tyrannus tyrannus*	S4B	-	-	-
BCR 13	Eastern Towhee[1,2]	*Pipilo erythrophthalmus*	S4B,S3N	-	-	-
SAR	Eastern Whip-poor-will	*Antrostomus vociferus*	S4B	THR	SC	THR
SAR	Eastern Wood-Pewee	*Contopus virens*	S4B	SC	SC	SC
-	European Starling	*Sturnus vulgaris*	SNA	-	-	-

BCR 13	Field Sparrow[1]	*Spizella pusilla*	S4B,S3N	-	-	-
-	Golden-crowned Kinglet	*Regulus satrapa*	S5	-	-	-
SAR	Golden-winged Warbler	*Vermivora chrysoptera*	S3B	SC	THR	THR
-	Gray Catbird[1]	*Dumetella carolinensis*	S5B,S3N	-	-	-
-	Great Crested Flycatcher	*Myiarchus crinitus*	S5B	-	-	-
-	Hairy Woodpecker	*Dryobates villosus*	S5	-	-	-
-	Hermit Thrush	*Catharus guttatus*	S5B,S4N	-	-	-
-	House Wren	*Troglodytes aedon*	S5B	-	-	-
-	Indigo Bunting	*Passerina cyanea*	S5B	-	-	-
-	Least Flycatcher	*Empidonax minimus*	S5B	-	-	-
-	Marsh Wren[1]	*Cistothorus palustris*	S4B,S3N	-	-	-
-	Mourning Dove	*Zenaida macroura*	S5	-	-	-
-	Mourning Warbler	*Geothlypis philadelphia*	S5B	-	-	-
-	Nashville Warbler	*Leiothlypis ruficapilla*	S5B	-	-	-
-	Northern Cardinal	*Cardinalis cardinalis*	S5	-	-	-
BCR 13	Northern Flicker	*Colaptes auratus*	S5	-	-	-
-	Northern Waterthrush	*Parkesia noveboracensis*	S5B	-	-	-
-	Ovenbird	*Seiurus aurocapilla*	S5B	-	-	-
-	Pileated Woodpecker	*Dryocopus pileatus*	S5	-	-	-
-	Purple Finch	*Haemorhous purpureus*	S5	-	-	-
-	Red-breasted Nuthatch	*Sitta canadensis*	S5	-	-	-
-	Red-eyed Vireo	*Vireo olivaceus*	S5B	-	-	-
SAR	Red-headed Woodpecker	*Melanerpes erythrocephalus*	S3	END	END	END
-	Red-winged Blackbird	*Agelaius phoeniceus*	S5	-	-	-
BCR 13	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S5B	-	-	-
-	Ruby-throated Hummingbird	*Archilochus colubris*	S5B	-	-	-
-	Ruffed Grouse	*Bonasa umbellus*	S5	-	-	-
-	Scarlet Tanager	*Piranga olivacea*	S5B	-	-	-
-	Sedge Wren	*Cistothorus stellaris*	S4B	NAR	NAR	-
-	Song Sparrow	*Melospiza melodia*	S5	-	-	-
-	Swainson's Thrush	*Catharus ustulatus*	S5B	-	-	-
-	Swamp Sparrow	*Melospiza georgiana*	S5B,S4N	-	-	-
-	Tree Swallow	*Tachycineta bicolor*	S4S5B	-	-	-
-	Veery	*Catharus fuscescens*	S5B	-	-	-
-	White-breasted Nuthatch	*Sitta carolinensis*	S5	-	-	-
-	White-throated Sparrow	*Zonotrichia albicollis*	S5	-	-	-
-	Winter Wren	*Troglodytes hiemalis*	S5B,S4N	-	-	-
SAR	Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	THR
-	Yellow Warbler	*Setophaga petechia*	S5B	-	-	-
-	Yellow-bellied Sapsucker[1]	*Sphyrapicus varius*	S5B,S3N	-	-	-

-	Yellow-billed Cuckoo	*Coccyzus americanus*	S4B	-	-	-
-	Yellow-rumped Warbler	*Setophaga coronata*	S5B,S4N	-	-	-
-	Yellow-throated Vireo	*Vireo flavifrons*	S4B	-	-	-
SHOREBIRDS						
BCR 13	American Woodcock	*Scolopax minor*	S4B	-	-	-
BCR 13	Wilson's Snipe[2]	*Gallinago delicata*	S5B	-	-	-
WATERBIRDS						
BCR 13	American Bittern	*Botaurus lentiginosus*	S5B	-	-	-
Rare	American Coot	*Fulica americana*	S3B,S4N	NAR	NAR	-
Rare	Blue-winged Teal	*Spatula discors*	S3B,S4M	-	-	-
BCR 13, Engage.	Canada Goose	*Branta canadensis*	S5	-	-	-
Rare	Common Gallinule[2]	*Gallinula galeata*	S3B	-	-	-
BCR 13	Common Loon	*Gavia immer*	S5	NAR	NAR	-
BCR 13	Common Merganser	*Mergus merganser*	S5	-	-	-
BCR 13, Engage.	Great Blue Heron	*Ardea herodias*	S4	-	-	-
BCR 13	Green Heron[2]	*Butorides virescens*	S4B	-	-	-
BCR 13	Mallard	*Anas platyrhynchos*	S5	-	-	-
BCR 13	Pied-billed Grebe[1]	*Podilymbus podiceps*	S4B,S2N	-	-	-
BCR 13	Sora	*Porzana carolina*	S5B	-	-	-
BCR 13	Virginia Rail	*Rallus limicola*	S4S5B	-	-	-
BCR 13	Wood Duck[1]	*Aix sponsa*	S5B,S3N	-	-	-
RAPTORS						
BCR 13	American Kestrel	*Falco sparverius*	S4	-	-	-
-	Barred Owl	*Strix varia*	S5	-	-	-
-	Broad-winged Hawk	*Buteo platypterus*	S5B	-	-	-
-	Cooper's Hawk	*Accipiter cooperii*	S4	NAR	NAR	-
-	Eastern Screech-Owl	*Megascops asio*	S4	NAR	NAR	-
-	Great Horned Owl	*Bubo virginianus*	S4	-	-	-
-	Long-eared Owl	*Asio otus*	S4	-	-	-
BCR 13	Northern Harrier	*Circus hudsonius*	S5B,S4N	NAR	NAR	-
BCR 13	Red-shouldered Hawk[1]	*Buteo lineatus*	S4B,S2N	NAR	NAR	-
-	Red-tailed Hawk	*Buteo jamaicensis*	S5	NAR	NAR	-
-	Turkey Vulture[1]	*Cathartes aura*	S5B,S3N	-	-	-

Notes:

Conservation status ranks: END = Endangered, THR = Threatened, SC = Special Concern, NAR = Not at Risk; S2 = Imperiled, S3 = Vulnerable, S4 = Apparently Secure, S5 = Secure, SNA = Not Applicable. B (Breeding), N (Non-breeding), and M (migrant) are breeding status modifiers.

1. Non-breeding populations of these species are ranked as Imperiled (S2N) or Vulnerable (S3N). However, only breeding populations are expected in the SON-South Bruce siting area based on known species ranges. Thus, these species are not considered provincially rare for the purposes of the BIS.
2. Common names for these species have been updated from those listed in the Greenock Swamp ANSI Life Science Inventory report to reflect taxonomic changes and follow the NHIC's Ontario species list.

APPENDIX D – BIRDS DETECTED IN THE BIS STUDY AREAS

The following tables present the bird species (by BV) detected within the applicable BIS study areas. Explanatory notes and common abbreviations are provided below:

- The first column of each table denotes the Species of Interest (SOI) for the purposes of the BIS; specifically, whether the species is Endangered, Threatened, or Special Concern ("SAR"); provincially rare ("Rare"); another priority species as identified in the BCR 13 strategy (EC 2014a) ("BCR 13"); and/or mentioned during engagement ("Engage.").
- The method(s) of detection are presented for each species, including desktop studies of existing biodiversity databases (e.g., GBIF, NHIC), previous preliminary environmental studies conducted in July and October 2020 by Tulloch Environmental at boreholes 1 and 2 within the AOI (Tulloch Environmental 2020, 2021), and 2022 Tier 1 BIS field studies (including incidental observations from all programs and eDNA metabarcoding analysis results). Species detected through eDNA metabarcoding analyses are indicated by an asterisk (*).
- For the purposes of these tables, the indicated study area (i.e., AOI, LSA_{TER}, RSA_{AVI} or $RSA_{AVI-AQU}$) excludes overlap with other study area(s) that may be encompassed within its boundaries. Cells shaded grey and with **bold** font indicate new detections in the study area based on 2022 field studies (i.e., not previously detected in the study area through desk-based research). For species of conservation concern, the study area(s) of field observations and NHIC records are based on overlap with the 1 km grid square, not the actual point or polygon location.
- Additional details about the species' subnational rank (SRANK), provincial (SARO) and federal (COSEWIC and SARA) SAR listings, and other BCR 13 priority (R/S = Regional/Subregional Concern or Stewardship; N/C = National/Continental Concern or Stewardship) are presented in the eight columns on the right.
- Conservation status ranks: END = Endangered, THR = Threatened, SC = Special Concern, NAR = Not at Risk; S1 = Critically Imperiled, S2 = Imperiled, S3 = Vulnerable, S4 = Apparently Secure, S5 = Secure, SNA = Not Applicable, SU = Unrankable. B (Breeding), N (Non-breeding), and M (migrant) are breeding status modifiers.

D.1 Upland Breeding Birds

Table D-1. List of upland breeding bird species recorded within the AOI, LSA_{TER}, and RSA_{AVI}. See definitions and other explanatory notes on page D-1.

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	RSA_{AVI}	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
-	Alder Flycatcher	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	American Crow	Y	Y	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
-	American Goldfinch	Y	-	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
-	American Redstart	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	American Robin	Y	-	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
-	American Tree Sparrow	Y	-	-	-	Y	Y	S5	-	-	-	-	-	-	-
BCR 13	Baltimore Oriole	Y	-	-	Y	Y	Y	S4B	-	-	-	Y	-	-	-
SAR	Bank Swallow	Y	-	Y	Y	-	Y	S4B	THR	THR	THR	-	Y	-	-
SAR	Barn Swallow	Y	Y	Y	Y	Y	Y	S4B	SC	SC	THR	Y	-	-	-
-	Bay-breasted Warbler	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
BCR 13	Belted Kingfisher	Y	-	-	Y	Y	Y	S5B,S4N	-	-	-	Y	-	-	-
-	Black-and-white Warbler	Y	-	-	-	Y	Y	S5B	-	-	-	-	-	-	-
BCR 13	Black-billed Cuckoo	Y	-	-	-	-	Y	S4S5B	-	-	-	Y	Y	-	-
-	Blackburnian Warbler	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	Black-capped Chickadee	Y	-	Y	Y	Y	Y	S5	-	-	-	-	-	-	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	RSA_{AVI}	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
-	Black-throated Blue Warbler	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	Black-throated Green Warbler	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	Blue Jay	Y	Y	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
-	Blue-gray Gnatcatcher	Y	-	-	Y	-	Y	S4B	-	-	-	-	-	-	-
-	Blue-headed Vireo	Y	-	Y	-	**Y**	Y	S5B	-	-	-	-	-	-	-
BCR 13	Blue-winged Warbler	Y	-	-	-	-	Y	S4B	-	-	-	Y	-	Y	-
SAR	Bobolink	Y	-	Y	Y	**Y**	Y	S4B	THR	SC	THR	Y	Y	Y	-
-	Bohemian Waxwing	Y	-	-	-	-	Y	S4B,S5N	-	-	-	-	-	-	-
-	Brown Creeper	Y	-	Y*	-	Y	Y	S5	-	-	-	-	-	-	-
BCR 13	Brown Thrasher	Y	-	-	-	Y	Y	S4B	-	-	-	Y	-	-	Y
Engage.	Brown-headed Cowbird	Y	-	-	Y	Y	Y	S5	-	-	-	-	-	-	-
SAR	Canada Warbler	Y	-	-	-	-	Y	S5B	SC	SC	THR	Y	-	Y	-
-	Cape May Warbler	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	Cedar Waxwing	Y	Y	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
-	Chestnut-sided Warbler	Y	-	-	-	Y	Y	S5B	-	-	-	-	-	-	-
-	Chipping Sparrow[1]	Y	Y	-	Y	Y	Y	S5B,S3N	-	-	-	-	-	-	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	RSA_{AVI}	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
-	Clay-colored Sparrow	Y	-	-	-	-	Y	S4B	-	-	-	-	-	-	-
-	Cliff Swallow	Y	-	-	Y	-	Y	S4S5B	-	-	-	-	-	-	-
-	Common Grackle	Y	-	-	Y	Y	Y	S5	-	-	-	-	-	-	-
SAR, Engage.	Common Nighthawk	Y	-	-	-	-	Y	S4B	SC	SC	THR	Y	-	Y	-
-	Common Redpoll	Y	-	-	-	-	Y	S5	-	-	-	-	-	-	-
-	Common Yellowthroat[1]	Y	-	-	Y	Y	Y	S5B,S3N	-	-	-	-	-	-	-
-	Dark-eyed Junco	Y	-	-	-	Y	Y	S5	-	-	-	-	-	-	-
-	Downy Woodpecker	Y	Y	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
-	Eastern Bluebird	Y	-	-	-	Y	Y	S5B,S4N	NAR	NAR	-	-	-	-	-
BCR 13	Eastern Kingbird	Y	-	Y	Y	Y	Y	S4B	-	-	-	Y	-	-	-
SAR	Eastern Meadowlark	Y	-	Y	Y	Y	Y	S4B,S3N	THR	THR	THR	Y	-	-	-
-	Eastern Phoebe	Y	Y	-	Y	Y	Y	S5B	-	-	-	-	-	-	-
BCR 13	Eastern Towhee[1]	Y	-	-	Y	Y	Y	S4B,S3N	-	-	-	Y	-	Y	Y
SAR	Eastern Whip-poor-will	Y	-	-	-	-	Y	S4B	THR	SC	THR	Y	-	Y	-
SAR	Eastern Wood-pewee	Y	-	Y	**Y**	Y	Y	S4B	SC	SC	SC	Y	-	-	-
-	European Starling	Y	Y	-	Y	Y	Y	SNA	-	-	-	-	-	-	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	RSA_{AVI}	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
SAR	Evening Grosbeak	Y	-	-	-	-	Y	S4	SC	SC	SC	-	-	-	-
BCR 13	Field Sparrow[1]	Y	-	-	Y	-	Y	S4B,S3N	-	-	-	Y	-	-	-
Rare	Fox Sparrow	Y	-	-	-	-	Y	S5B,S3N	-	-	-	-	-	-	-
-	Golden-crowned Kinglet	Y	-	Y	**Y**	Y	Y	S5	-	-	-	-	-	-	-
SAR	Grasshopper Sparrow	Y	-	-	-	-	Y	S4B	SC	SC	-	Y	-	Y	Y
-	Gray Catbird[1]	Y	-	Y	Y	Y	Y	S5B,S3N	-	-	-	-	-	-	-
-	Great Crested Flycatcher	Y	-	Y	Y	Y	Y	S5B	-	-	-	-	-	-	-
-	Hairy Woodpecker	Y	-	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
-	Hermit Thrush	Y	-	-	-	-	Y	S5B,S4N	-	-	-	-	-	-	-
-	Horned Lark	Y	-	-	Y	Y	Y	S4	-	-	-	-	-	-	-
-	House Finch	Y	-	-	-	Y	-	SNA	-	-	-	-	-	-	-
-	House Sparrow	Y	Y	-	Y	Y	Y	SNA	-	-	-	-	-	-	-
-	House Wren	Y	-	Y	Y	**Y**	Y	S5B	-	-	-	-	-	-	-
-	Indigo Bunting	Y	-	-	Y	Y	Y	S5B	-	-	-	-	-	-	-
-	Least Flycatcher	Y	-	-	-	Y	Y	S5B	-	-	-	-	-	-	-
SAR	Louisiana Waterthrush	Y	-	-	-	Y	-	S2B	THR	THR	THR	Y	-	Y	Y

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	RSA_{AVI}	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
-	Magnolia Warbler	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	Mourning Dove	Y	-	-	Y	Y	Y	S5	-	-	-	-	-	-	-
-	Mourning Warbler	Y	-	Y	**Y**	-	Y	S5B	-	-	-	-	-	-	-
-	Nashville Warbler	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	Northern Cardinal	Y	Y	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
BCR 13	Northern Flicker	Y	-	Y	Y	Y	Y	S5	-	-	-	Y	-	-	-
-	Northern Parula	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
BCR 13	Northern Rough-winged Swallow	Y	-	-	Y	-	Y	S4B	-	-	-	Y	-	-	-
-	Northern Shrike	Y	-	-	-	Y	Y	S4B,S5N	-	-	-	-	-	-	-
-	Northern Waterthrush	Y	-	Y	**Y**	Y	Y	S5B	-	-	-	-	-	-	-
-	Ovenbird	Y	-	-	-	Y	Y	S5B	-	-	-	-	-	-	-
-	Palm Warbler	Y	-	-	Y	-	Y	S5B	-	-	-	-	-	-	-
-	Pileated Woodpecker	Y	-	Y	**Y**	Y	Y	S5	-	-	-	-	-	-	-
-	Pine Grosbeak	Y	-	-	-	-	Y	S4B,S5N	-	-	-	-	-	-	-
-	Pine Siskin	Y	-	-	-	Y	Y	S5	-	-	-	-	-	-	-
-	Pine Warbler[1]	Y	-	-	-	-	Y	S5B,S3N	-	-	-	-	-	-	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	RSA_{AVI}	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
-	Purple Finch	Y	-	-	-	Y	Y	S5	-	-	-	-	-	-	-
-	Red-bellied Woodpecker	Y	-	-	-	-	Y	S5	-	-	-	-	-	-	-
-	Red-breasted Nuthatch	Y	-	Y*	Y	-	Y	S5	-	-	-	-	-	-	-
-	Red-eyed Vireo	Y	-	Y	Y	Y	Y	S5B	-	-	-	-	-	-	-
SAR	Red-headed Woodpecker	Y	-	-	-	Y	-	S3	END	END	END	Y	-	Y	-
-	Red-winged Blackbird	Y	Y	-	Y	Y	Y	S5	-	-	-	-	-	-	-
-	Rock Pigeon	Y	-	-	-	Y	Y	SNA	-	-	-	-	-	-	-
BCR 13	Rose-breasted Grosbeak	Y	-	-	Y	Y	Y	S5B	-	-	-	-	Y	-	-
-	Ruby-crowned Kinglet[1]	Y	-	-	-	-	Y	S5B,S3N	-	-	-	-	-	-	-
-	Ruby-throated Hummingbird	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	Ruffed Grouse	Y	-	-	-	Y	Y	S5	-	-	-	-	-	-	-
SAR	Rusty Blackbird	Y	-	-	-	-	Y	S4B,S3N	SC	SC	SC	-	-	-	-
BCR 13	Savannah Sparrow[1]	Y	Y	*	Y	Y	Y	S5B,S3N	-	-	-	Y	-	-	-
-	Scarlet Tanager	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	Sedge Wren	Y	-	-	-	-	Y	S4B	NAR	NAR	-	-	-	-	-
-	Snow Bunting	Y	-	-	-	Y	Y	S4N	-	-	-	-	-	-	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	RSA_{AVI}	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
-	Song Sparrow	Y	Y	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
-	Swainson's Thrush	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	Swamp Sparrow	Y	-	-	-	-	Y	S5B,S4N	-	-	-	-	-	-	-
-	Tree Swallow	Y	Y	-	Y	Y	Y	S4S5B	-	-	-	-	-	-	-
-	Veery	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
BCR 13	Vesper Sparrow	Y	-	-	-	Y	Y	S4B	-	-	-	Y	-	-	-
-	Warbling Vireo	Y	-	-	Y	Y	Y	S5B	-	-	-	-	-	-	-
-	White-breasted Nuthatch	Y	-	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
Rare	White-crowned Sparrow	Y	Y	-	Y	-	Y	S5B,S3N	-	-	-	-	-	-	-
-	White-throated Sparrow	Y	-	Y	**Y**	Y	Y	S5	-	-	-	-	-	-	-
-	Wild Turkey	Y	-	Y	**Y**	Y	Y	S5	-	-	-	-	-	-	-
-	Willow Flycatcher	Y	-	-	-	-	Y	S4B	-	-	-	-	-	-	-
-	Winter Wren	Y	-	Y	**Y**	-	Y	S5B,S4N	-	-	-	-	-	-	-
SAR	Wood Thrush	Y	-	Y*	**Y**	Y	Y	S4B	SC	THR	THR	Y	-	Y	-
-	Yellow Warbler	Y	-	-	Y	Y	Y	S5B	-	-	-	-	-	-	-
-	Yellow-bellied Sapsucker[1]	Y	-	Y	Y	-	Y	S5B,S3N	-	-	-	-	-	-	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	RSA_{AVI}	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
-	Yellow-billed Cuckoo	Y	-	-	-	-	Y	S4B	-	-	-	-	-	-	-
-	Yellow-rumped Warbler	Y	-	-	Y	-	Y	S5B,S4N	-	-	-	-	-	-	-
-	Yellow-throated Vireo	Y	-	-	-	-	Y	S4B	-	-	-	-	-	-	-

Notes:
1. Non-breeding populations of these species are ranked as Vulnerable (S3N). However, only breeding populations (and migration, in the case of ruby-crowned kinglets) are expected in the SON-South Bruce siting area based on known species ranges. Thus, these species are not considered provincially rare for the purposes of the BIS.

D.2 Shorebirds

Table D-2. List of shorebird species recorded within the AOI, LSA_{TER}, and $RSA_{AVI-AQU}$. See definitions and other explanatory notes on page D-1.

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	$RSA_{AVI-AQU}$	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
BCR 13	American Woodcock	Y	-	-	-	Y	Y	S4B	-	-	-	Y	-	Y	-
-	Dunlin	Y	-	-	Y	-	Y	S4B,S5M	-	-	-	-	-	-	-
-	Greater Yellowlegs	Y	-	-	-	-	Y	S4B,S5M	-	-	-	-	-	-	-
BCR 13	Killdeer	Y	-	Y	Y	Y	Y	S4B	-	-	-	Y	-	Y	-
-	Least Sandpiper	Y	-	-	Y	-	Y	S4B,S5M	-	-	-	-	-	-	-
SAR	Lesser Yellowlegs	Y	-	-	Y	-	Y	S3S4B,S5M	THR	THR	-	-	-	-	-
-	Pectoral Sandpiper[1]	Y	-	-	Y	-	Y	S1B,S4M	-	-	-	-	-	-	-
-	Semipalmated Plover	Y	-	-	Y	-	-	S4B,S5M	-	-	-	-	-	-	-
BCR 13	Semipalmated Sandpiper[1]	Y	-	-	Y	-	Y	S2B,S4M	-	-	-	Y	-	Y	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	$RSA_{AVI-AQU}$	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
-	Solitary Sandpiper	Y	-	-	-	-	Y	S4B,S5M	-	-	-	-	-	-	-
BCR 13	Spotted Sandpiper	Y	-	-	Y	-	Y	S5B	-	-	-	Y	-	Y	-
-	Stilt Sandpiper[1]	Y	-	-	Y	-	-	S3B,S4M	-	-	-	-	-	-	-
Rare	Upland Sandpiper	Y	-	-	Y	-	Y	S2B	-	-	-	Y	-	-	-
BCR 13	Wilson's Snipe	Y	-	-	-	-	Y	S5B	-	-	-	Y	-	-	-

Notes:
1. Breeding populations of these species are ranked as Critically Imperiled (S1B), Imperiled (S2B), or Vulnerable (S3B). However, only migrating populations are expected in the SON-South Bruce siting area based on known species ranges. Thus, these species are not considered provincially rare for the purposes of the BIS.

D.3 Waterbirds

Table D-3. List of waterbird species recorded within the AOI, LSA_{TER}, and $RSA_{AVI-AQU}$. See definitions and other explanatory notes on page D-1.

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	$RSA_{AVI-AQU}$	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
BCR 13	American Bittern	Y	-	-	-	-	Y	S5B	-	-	-	Y	-	Y	-
BCR 13	American Black Duck	Y	-	-	-	Y	Y	S4	-	-	-	Y	-	Y	-
Rare	American Coot	Y	-	-	-	-	Y	S3B,S4N	NAR	NAR	-	Y	-	-	-
-	American Wigeon	Y	-	-	-	Y	Y	S4B,S4N, S5M	-	-	-	-	-	-	-
SAR	Black Tern	Y	-	-	-	-	Y	S3B,S4M	SC	NAR	-	Y	-	Y	-
Rare	Blue-winged Teal	Y	-	-	-	-	Y	S3B,S4M	-	-	-	Y	-	Y	-
BCR 13	Bonaparte's Gull	Y	-	-	-	-	Y	S5	-	-	-	Y	-	Y	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	$RSA_{AVI-AQU}$	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
-	Bufflehead	Y	-	-	-	-	Y	S5	-	-	-	-	-	-	-
-	Cackling Goose	Y	-	-	-	-	Y	SUB,S4M	-	-	-	-	-	-	-
BCR 13, Engage.	Canada Goose	Y	Y	Y	Y	Y	Y	S5	-	-	-	Y	-	Y	-
Rare	Canvasback	Y	-	-	-	-	Y	S1B,S3N, S4M	-	-	-	Y	-	Y	-
Rare	Caspian Tern	Y	-	-	-	-	Y	S3B,S5M	NAR	NAR	-	Y	-	-	-
Rare	Common Gallinule	Y	-	-	-	-	Y	S3B	-	-	-	Y	-	-	-
BCR 13	Common Goldeneye	Y	-	-	-	Y	Y	S5	-	-	-	Y	-	Y	-
BCR 13	Common Loon	Y	-	-	-	-	Y	S5	NAR	NAR	-	Y	-	Y	-
BCR 13	Common Merganser	Y	-	-	Y	Y	Y	S5	-	-	-	Y	-	-	-
-	Double-crested Cormorant	Y	-	-	Y	-	Y	S5B,S4N	NAR	NAR	-	-	-	-	-
-	Gadwall	Y	-	-	-	-	Y	S4B,S4N, S5M	-	-	-	-	-	-	-
Rare	Great Black-backed Gull	Y	-	-	-	-	Y	S1B,S4N	-	-	-	Y	-	-	-
BCR 13, Engage.	Great Blue Heron	Y	-	Y	Y	**Y**	Y	S4	-	-	-	Y	-	-	-
Rare	Great Egret	Y	-	-	-	-	Y	S2B,S3M	-	-	-	Y	-	-	-
Rare	Greater White-fronted Goose	Y	-	-	-	Y	Y	S3M	-	-	-	-	-	-	-
BCR 13	Green Heron	Y	-	Y	**Y**	-	Y	S4B	-	-	-	Y	-	-	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	$RSA_{AVI-AQU}$	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
BCR 13	Green-winged Teal	Y	-	-	-	Y	Y	S4B,S4N, S5M	-	-	-	Y	-	-	-
-	Herring Gull	Y	-	-	-	Y	Y	S4B,S5N	-	-	-	-	-	-	-
-	Hooded Merganser	Y	-	Y*	Y	-	Y	S5	-	-	-	-	-	-	-
SAR	Horned Grebe[1]	Y	-	-	-	-	Y	S1B,S3N, S4M	SC	SC	-	Y	-	Y	-
SAR	Least Bittern	Y	-	-	-	-	Y	S4B	THR	THR	THR	Y	-	Y	-
BCR 13	Lesser Scaup	Y	-	-	-	-	Y	S4B,S4N, S5M	-	-	-	Y	-	Y	-
BCR 13	Long-tailed Duck[1]	Y	-	-	-	-	Y	S3B,S5N	-	-	-	Y	-	Y	-
BCR 13	Mallard	Y	-	Y*	Y	Y	Y	S5	-	-	-	Y	-	Y	-
BCR 13	Mute Swan	Y	-	-	-	-	Y	SNA	-	-	-	Y	-	-	-
-	Northern Pintail	Y	-	-	-	-	Y	S5B,S4N	-	-	-	-	-	-	-
-	Northern Shoveler	Y	-	-	-	-	Y	S4B,S4N, S5M	-	-	-	-	-	-	-
BCR 13	Pied-billed Grebe[2]	Y	-	-	-	-	Y	S4B,S2N	-	-	-	Y	-	-	-
-	Red-breasted Merganser	Y	-	-	-	-	Y	S5	-	-	-	-	-	-	-
Rare	Red-necked Grebe	Y	-	-	-	-	Y	S3	NAR	NAR	-	Y	-	-	-
-	Ring-billed Gull	Y	-	-	Y	Y	Y	S5	-	-	-	-	-	-	-
BCR 13	Ring-necked Duck	Y	-	-	-	Y	Y	S5B,S4N	-	-	-	Y	-	-	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	$RSA_{AVI-AQU}$	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
BCR 13, Engage.	Sandhill Crane[2]	Y	-	Y	Y	-	Y	S5B,S3N	-	-	-	Y	-	-	-
-	Snow Goose	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
BCR 13	Sora	Y	-	-	-	-	Y	S5B	-	-	-	Y	-	Y	-
Rare, Engage.	Tundra Swan	Y	-	-	-	Y	Y	S2B,S4N, S3M	-	-	-	Y	-	-	-
BCR 13	Virginia Rail	Y	-	Y*	-	-	Y	S4S5B	-	-	-	Y	-	Y	-
-	White-winged Scoter	Y	-	-	-	-	Y	S4B,S5N	-	-	-	-	-	-	-
BCR 13	Wood Duck[2]	Y	-	Y*	**Y**	-	Y	S5B,S3N	-	-	-	Y	-	-	-

Notes:
1. Breeding and non-breeding populations of horned grebe are ranked as Critically Imperiled (S1B) and Vulnerable (S3N), respectively, and breeding populations of long-tailed duck are ranked as Vulnerable (S3B). However, only migrating populations are expected in the SON-South Bruce siting area based on known species ranges. Thus, these species are not considered provincially rare for the purposes of the BIS.
2. Non-breeding populations of these species are ranked as Imperiled (S2N) or Vulnerable (S3N). However, only breeding populations are expected in the SON-South Bruce siting area based on known species ranges. Thus, these species are not considered provincially rare for the purposes of the BIS.

D.4 Raptors

Table D-4. List of raptor species recorded within the AOI, LSA_{TER}, and RSA_{AVI} or $RSA_{AVI-AQU}$. See definitions and other explanatory notes on page D-1.

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	RSA_{AVI} / $RSA_{AVI-AQU}$	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
BCR 13	American Kestrel	Y	-	-	-	-	Y	S4	-	-	-	Y	-	-	-
SAR, Engage.	Bald Eagle	Y	-	Y	Y	Y	Y	S4	SC	NAR	-	Y	-	-	Y
-	Broad-winged Hawk	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-

SOI?	Common Name	Desk-based	2020 Studies	2022 Field	AOI	LSA_{TER}	RSA_{AVI} / $RSA_{AVI-AQU}$	SRANK	SARO	COSEWIC	SARA	R/S Concern	R/S Steward.	N/C Concern	N/C Steward.
-	Common Raven	Y	-	Y	Y	Y	Y	S5	-	-	-	-	-	-	-
-	Cooper's Hawk	Y	-	-	Y	Y	Y	S4	NAR	NAR	-	-	-	-	-
-	Eastern Screech-Owl	Y	-	-	-	Y	Y	S4	NAR	NAR	-	-	-	-	-
SAR	Golden Eagle	Y	-	-	-	-	Y	S1B,S4N	END	NAR	-	-	-	-	-
-	Great Horned Owl	Y	-	-	-	Y	Y	S4	-	-	-	-	-	-	-
-	Merlin	Y	-	-	-	-	Y	S5	NAR	NAR	-	-	-	-	-
-	Northern Goshawk	Y	-	-	-	-	Y	S4	NAR	NAR	-	-	-	-	-
BCR 13	Northern Harrier	Y	-	-	-	-	Y	S5B,S4N	NAR	NAR	-	Y	-	-	-
-	Osprey	Y	-	-	-	-	Y	S5B	-	-	-	-	-	-	-
-	Red-tailed Hawk	Y	-	-	Y	Y	Y	S5	NAR	NAR	-	-	-	-	-
-	Rough-legged Hawk	Y	-	-	Y	Y	Y	S1B,S4N	NAR	NAR	-	-	-	-	-
-	Sharp-shinned Hawk	Y	-	-	-	Y	Y	S5	NAR	NAR	-	-	-	-	-
-	Snowy Owl	Y	-	-	-	-	Y	S4N	NAR	-	-	-	-	-	-
-	Turkey Vulture	Y	-	-	Y	Y	Y	S5B,S3N	-	-	-	-	-	-	-



Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 BASELINE REPORT (CHAPTER 8: FISH AND FISH HABITAT)

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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GLOSSARY AND ABBREVIATIONS

AHM	Aquatic Habitat Mapping
ALIS	Aquatic Landscape Inventory System; a system for delineating valley segments based on natural features.
ANSI	Area of Natural or Scientific Interest
AOI	Area of Interest
ARA	Aquatic Resource Area
Benthic	For fish, refer to bottom-dwelling fish
Benthopelagic	For fish, refer to species living and feeding near the bottom as well as in midwaters or near the surface
BIS	Biodiversity Impact Studies
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
BV	Biodiversity Value; the biotic environmental components that will be considered for study within the Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components.
CABIN	Canadian Aquatic Biomonitoring Network
Carnivore	For fish, refer to species that survive based on a meat-based diet, including fish and other invertebrates
Chlorophyll	A green pigment, present in all green plants and cyanobacteria, responsible for the absorption of light to provide energy for photosynthesis.
CNSC	Canadian Nuclear Safety Commission
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
Critical habitat	Habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species (*Species at Risk Act*, S.C. 2002, c. 29). Identification of critical habitat is not a required component of a recovery strategy under the Ontario *Endangered Species Act*. However, the approach used to identify critical habitat, in conjunction with the best scientific information available, is recommended when developing a habitat regulation. A habitat regulation is a legal instrument under the *ESA* that prescribes an area that will be protected as the habitat of the species.
Detritivore	An organism that eats dead or decaying plants or animals
EDDMapS	Early Detection and Distribution Mapping System
eDNA	Environmental DNA
EMBP	Environmental Media Baseline Program

ESA	Ontario *Endangered Species Act*
GBIF	Global Biodiversity Information Facility
GSWC	Greenock Swamp Wetland Complex
Herbivore	Organisms that are physiologically adapted to eating plant material, including foliage or algae for the main component of their diet.
IA	Impact Assessment
IK	Indigenous Knowledge
Invertivore	An organism that feeds primarily on invertebrates.
Lacustrine	For fish and fish habitat, refer to species that live in lakes for part of all of their life history requirements
LSA	Local Study Area LSA_{AQU} = Aquatic Local Study Area
Macrophyte	A large enough plant to be seen by the naked eye; often refers to aquatic plants.
MNRF	Ontario Ministry of Natural Resources and Forestry (formerly Ontario Ministry of Northern Development, Mines, and Natural Resources and Forestry [NDMNRF])
NHIC	Ontario Natural Heritage Information Centre
NHIC Observation and Elemental Occurrence	NHIC Observations are any record of a species sent to the NHIC and integrated into their dataset. NHIC Element Occurrences are generated from one or more observations following the Element Occurrence Specifications developed by NatureServe network. Occurrences represent areas of importance for the conservation of that species or vegetation community
NWMO	Nuclear Waste Management Organization
OBBN	Ontario Benthos Biomonitoring Network
Pelagic	For fish, refer to species living and feeding in the midwaters or near the surface
Periphyton	Freshwater organisms are composed of a complex mixture of algae, cyanobacteria, heterotrophic microbes, and detritus attached or clinging to plants and other objects projecting above the bottom sediments.
Phytoplankton	Plankton consisting of microscopic plants
Planktivore	For fish, refer to species that feed on planktonic food, including zooplankton and phytoplankton
Plankton	Microscopic organisms drifting or floating in the water column, consisting of diatoms, protozoans, small crustaceans, and the eggs and larval stages of larger animals.
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose traditional territories include the project location.
RSA	Regional Study Area RSA_{AQU} = Aquatic Regional Study Area

SAR	Species at Risk
SARA	Federal *Species at Risk Act*
SARO	Species at Risk in Ontario
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SOP	Standard Operating Procedure
SRANK	Subnational Rank; The conservation status of a species or vegetation community within a particular province, territory, or state. In Ontario, the NHIC assigns SRANKs using the best available information and considering factors such as abundance, distribution, population trends, and trends (NDMNRF 2021). Species assigned S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), and SH (Possibly Extirpated) are considered provincially rare by the NHIC. See the NatureServe website for more information:
SWH	Significant Wildlife Habitat. Defined in the Ontario Provincial Policy Statement, 2020 as: *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. *Significant* – in regard to wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system.
TEM	Terrestrial Ecosystem Mapping
The Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines for Designated Projects Subject to the *Impact Assessment Act and the Nuclear Safety and Control Act*
VC	Valued Component. For impact assessments of designated projects under the *Impact Assessment Act*, the Agency's Glossary of Terms defines VCs as "environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties. Valued components may be identified as having scientific, biological, social, health, cultural, traditional, economic, historical, archaeological and aesthetic importance."
Zooplankton	Plankton consisting of small animals and the immature stages of larger animals

1.0 INTRODUCTION

Fish are defined in the *Fisheries Act* as fish, shellfish, crustaceans, or any parts of these animals (e.g., eggs, sperm, spawn, larvae spat, and juvenile stages). Fish habitat, as defined under the *Fisheries Act,* includes any watercourse, waterbody, or wetland that fish use during their various life history stages (e.g., spawning, rearing, migrating). For the Biodiversity Impact studies (BIS), all biodiversity values (BVs) pertaining to fish and fish habitat as defined under the *Fisheries Act* are discussed in the current Chapter 8.

The Canadian Nuclear Safety Commission's (CNSC) *Guidance on Deep Geological Repository Site Characterization* includes the requirement that fish and fish habitat be characterized as aquatic ecosystem components in the area of interest (CNSC 2018). In addition, the Tailored Impact Statement Guidelines Template (generic version) (TISG Template[1]) includes guidance to characterize effects on fish and fish habitat in potentially affected waterbodies along with the characterization of life history and biotic interaction processes (e.g., food web and trophic levels, nutrient cycling), seasonal variability, ranges, and sensitive periods.

Fish and fish habitat play a vital role in the ecosystem and generate ecosystem services (see Chapter 9) based on ecosystem functions and human demands for fish (Holmlund and Hammer 1999). In addition to being critical components of aquatic and terrestrial food webs, fish are also central to human well-being, culture, and the economy. In the Saugeen Ojibway Nation (SON)-South Bruce siting area, fish and fish habitat are valued by recreational and commercial land users and Indigenous communities for social, recreational, commercial, domestic, and spiritual reasons (Environment Office SON 2021).

Several federal and provincial regulations in Canada restrict activities that could harm fish and their habitat. The *Fisheries Act*, updated in 2019, protects all commercial, recreational, or Aboriginal fisheries, provides clearer permitting requirements for development projects, uses traditional knowledge in habitat decisions, and provides provisions for habitat restoration and rebuilding fish stocks. Federal or provincially listed fish species and their habitat may be afforded even greater protections under the federal *Species at Risk Act* (*SARA*) or the provincial *Endangered Species Act* (*ESA*)[2]. A full list of regulatory requirements pertaining to biodiversity is available in Appendix E of the *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approaches* (BPPA) Report (Zoetica 2021).

In addition to regulations to protect fish, the Ontario *Invasive Species Act* (*ISA*) sets out rules to prevent and control the spread of regulated invasive species. The federal Aquatic Invasive Species Regulations (SOR/2015-121) under the *Fisheries Act* includes prohibitions and controls for certain invasive species. Several other species are considered invasive in Ontario but are not regulated (see **Table A-1**).

Stakeholders and rights-holders noted the health of aquatic ecosystems during engagement as important and brought up concerns about pressures on fishing. In addition, stakeholders and rights-holders identified the importance of recognizing the connection between all aspects of ecology and nature. For example, the connection between water quality and the food web structure should be considered during study design and implementation.

[1] Please see Chapter 1 for limitations of and planned updates to the TISG Template.

[2] See Appendix D and Section 3.1 in Zoetica's BPPA Report (Zoetica 2021) for a comprehensive list of SAR, and methods used to compile this list.

For the BIS, fish and fish habitat are classified into two groups based on their ecological role: fish, and primary and secondary producers (including molluscs and crustaceans).

1.1 General Objectives

The general objectives of fish and fish habitat studies for the BIS are to:

1. Determine the presence, distribution, and abundance of important habitats for select BVs with an emphasis on the following:
    a. species of conservation concern, including species at-risk (SAR),
    b. species of interest and potential importance to local stakeholders and rights-holders,
    c. indicator species;
2. Determine the potential presence and distribution of species of interest, including the select BVs listed in (1); and,
3. Provide additional baseline data to help inform the Adaptive Phased Management Project's (hereafter, 'the Project') biodiversity Impact Assessment (IA), mitigation measures, and to assist in the potential development of monitoring program(s) to address environmental, regulatory, and stakeholder/rights-holder concerns.

The current Chapter 8 on Fish and Fish Habitat begins to fulfil the requirements of the TISG Template required for fish and fish habitat (see Appendix C, in the BPPA Report (Zoetica 2021)).

Zoetica™ recommends the consideration of indicator species as species of interest. However, Zoetica also recommends that indicator species be determined after more information is gathered about potential project impacts and species' distributions and habitat associations (e.g., through Tier 2 community composition studies) within the BIS study areas for fish and fish habitat. See Section 4.2 of the BPPA Report (Zoetica 2021) for further discussion of indicator species. Thus, no indicator species are discussed in the current Chapter 8 (Fish and Fish Habitat) of the 2023 BIS Baseline Report. If the SON-South Bruce site is selected and a project description is made available, Zoetica will examine information on potential project impacts to fish and fish habitat, and report on potential indicator fish and primary and secondary producer species in future iterations of the BIS Baseline Report.

1.2 General Methods

Studies conducted in 2021 and 2022 were focused on collecting desk- and field-based Tier 1 data. Field studies commenced in the summer of 2022. This 2023 BIS Baseline Report focusses on information collected to date. Additional Tier 1 studies are anticipated to continue at the SON-South Bruce site in 2024.

This section addresses methods common to each Fish and Fish Habitat BV group. If BIS studies for a specific fish and fish habitat BV group include additional methods, these are listed within the BV-specific sections, beginning with Section 2.0.

1.2.1 Study Areas

The BIS study areas for fish and fish habitat include an Area of Interest (AOI), an aquatic local study area (LSA_{AQU}), and an aquatic regional study area (RSA_{AQU}). See Section 3.0 in Chapter 1 of the 2023 BIS Baseline Report for further detail on study areas. The rationale for developing these study areas can be found in Section 5.2.10.4 of Zoetica's BPPA report (Zoetica 2021).

For the Tier 1 baseline studies, work completed to date has primarily been focused within the AOI and LSA_{AQU}, along with select areas of the RSA_{AQU} to act as potential control sites. Where relevant, Zoetica extended searches of existing data for SAR and important habitat beyond the RSA_{AQU} to potential control sites for lakes and wetlands within the Greenock Swamp Wetland Complex (GSWC), should a need for control sites arise.

1.2.2 Collation of Species Observations and Habitat Data

Zoetica began desk-based investigations of fish by identifying species of interest that could potentially occur within the BIS study areas. See Appendix D and Section 3.1 in Zoetica's BPPA Report (Zoetica 2021) for a comprehensive list of SAR including at-risk fish species, and methods used to compile this list. Additional at-risk species that have been listed since the publication of the BPPA report are discussed in the BV sections of this report (Chapters 2 – 9). Provincially rare species are indicated by their subnational rank (SRANK; S1, S2, S3, SH) and tracked by the Ontario Natural Heritage Information Centre (NHIC)[3].

Zoetica proceeded with desk-based research and mapping by collating existing data from government, citizen science, and other biodiversity databases. For this 2023 BIS Baseline Report, data sources for verified species and habitat records included the NHIC, Ontario Ministry of Natural Resources and Forestry (MNRF), and the Global Biodiversity Information Facility (GBIF). As these datasets periodically pull observations from other biodiversity-related projects and programs (e.g., iNaturalist), they were deemed a good starting point to describe the biodiversity of fish species and their habitats that are found or are likely to be found in the BIS study areas. **Table 1-1** summarizes the datasets, data layers, and reports investigated and analyzed for fish species observations and habitat data for the 2023 BIS Baseline Report. Also see Appendix A, Chapter 1 for data scoring of datasets used.

Table 1-1. Spatial datasets and reports analyzed for fish and fish habitat groups for the 2023 BIS Baseline Report.

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains Relevant Data?
Zoetica / Sumac Geomatics *BIS Tier 1 studies*	Ecosite Classification Dataset	Shapefile	03/2020	Y
Tulloch Environmental *Phase 2 preliminary environmental studies for the Project*	July 2020 Site Reconnaissance (Tulloch Environmental 2020)	Report	10/2020	Y
	October 2020 Natural Heritage Features (Tulloch Environmental 2021)	Report	04/2021	Y
Ontario Natural Heritage Information Centre (NHIC)	Provincially Tracked Species 1km grid	Shapefile	08/2021	Y
	Species Occurrences	Shapefile	12/2020	Y
Ontario Ministry of Natural Resources and Forestry (MNRF)	Aquatic Resource Area (ARA) Polygon Dataset	Geodatabase	09/2021	Y
	Fish ON-Line	Webmap	09/2021	Y
	Fish Activity Area Database (GeoHub)	Shapefile	10/2021	Y

[3] For the purposes of this BIS Baseline Report chapter, conservation statuses described in text for at-risk species refer to their Species at Risk in Ontario (SARO) listings unless otherwise indicated. Conservation statuses for species of conservation concern were pulled from the NHIC's Ontario species list, current to March 1, 2023, then updated for any discrepancies with provincial and federal SAR listings up to August 15, 2023. As such, species and status listings may differ from those presented in Zoetica's 2021 BPPA Report (Zoetica 2021).

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains Relevant Data?
	Provincial SAR Recovery Strategies[1]	Reports	Various	Y
Global Biodiversity Information Facility (GBIF)	Species Occurrences	CSV	10/2021	Y
Ontario Ministry of the Environment (MOE)	Ontario Benthos Biomonitoring Network (OBBN)	Database	10/2022	N[2]
Environment and Climate Change Canada (ECCC)	Canadian Aquatic Biomonitoring Network (CABIN)	Database	09/2022	N[2]
Early Detection & Distribution Mapping System (EDDMapS) Ontario	Invasive Species Observations	Shapefile	01/2022	Y
Fisheries and Oceans Canada (DFO)	Federal Recovery Strategies[1]	Report	Various	Y
Johnson (Johnson 1994)	A Life Science Inventory of the Greenock Swamp Area of Natural and Scientific Interest (ANSI), Par II: Inventory Report	Report	10/2020	Y
Private	Ontario Freshwater Fishes Life History Database	Website information copied into a database	10/2022	Y

Notes:

1. SAR recovery strategies are published by DFO and MNRF, but authors may differ. Refer to Appendix D of Zoetica's BPPA Report (Zoetica 2021) for a full list of potentially occurring SAR that had provincial and/or federal recovery strategies available at the time of writing the BPPA Report (June 2021; note: new documents are continually posted on the SARO website and SARA Public Registry). The most updated versions of the recovery strategies for relevant species were reviewed and cited in this Baseline Report.
2. Zoetica determined dataset relevance based on geographic and temporal relevance, as well as relevance to fish and fish habitat. For example, data that were not within the relevant BIS study areas, data that were too old to be considered relevant, or data that did not include records of fish and primary producer species were labelled "N" for not containing relevant data. The Ontario Benthos Biomonitoring Network (OBBN) and Canadian Aquatic Biomonitoring Network (CABIN) databases were searched for relevant information on benthic invertebrates; however, no data were available within the BIS study areas.

See also Appendix A, Chapter 1 for data quality scoring.

A full list of the fish species mentioned in this report, including common and scientific names, is available in Appendix A. A list of invertebrate species mentioned in this report is available in Appendix B. For the many invertebrate species that do not have common names, scientific names are included in the body of the report.

Additional datasets that may be investigated further are found in Appendix F in the BPPA Report (Zoetica 2021). If additional datasets that are relevant to fish species in the applicable study areas are identified, they will be investigated and incorporated into baseline reports in future years. For example, once updated versions of Species Observation data are received from NHIC, through the Nuclear Waste Management Organization (NWMO), relevant data will be incorporated into baseline data maps in future iterations of the BIS Baseline Report. Future projects that may overlap with the BIS study areas may also provide data or identify data sources that can be integrated into future iterations of baseline reports.

1.2.3 Tier 1 Studies

Tier 1 studies to date focussed on the collation of desk-based data from accessible existing data sources, desk-based aquatic habitat mapping (see Appendix D, Chapter 1), and preliminary field studies conducted in summer of 2022. Field studies focused on collecting Tier 1 foundational habitat data and species detections through environmental DNA (eDNA) metabarcoding studies. Each field team also collected incidental observations of biodiversity including fish and primary and secondary producers. Detailed methods for the Tier 1 studies are available in the *Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design* (BPD) Report and associated Standard Operating Procedures (SOPs) (Zoetica 2022). In addition to the utility of each Tier 1 study outlined below for understanding fish and fish habitat in the BIS study areas, incidental observations collected during the terrestrial and aquatic field studies may also be informative in describing biodiversity.

1.2.3.1 Terrestrial Ecosystem Mapping

Terrestrial Ecosystem Mapping (TEM) completed to date is described in Appendix B, Chapter 1. The ecosite classification dataset resulting from desk-based TEM work was used for delineating various types of wetlands used in planning Aquatic Habitat Mapping (AHM) surveys for collecting fish habitat information.

1.2.3.2 Identification of candidate Significant Wildlife Habitat

Desk- and field-based candidate Significant Wildlife Habitat (SWH) identification work completed to date is described in Appendix C, Chapter 1. No SWH were considered for fish because the *Fisheries Act* (2019) protects all fish and fish habitat in all internal waters of Canada and thus, would cover any SWH for fish. If the *Fisheries Act* were to become less protective, SWH for Special Concern and rare fish species would be considered at that time. SWH types of relevance to primary and secondary producers are outlined in Section 3.3.1.2 of this report.

1.2.3.3 Aquatic Habitat Mapping

AHM completed to date is described in Appendix D, Chapter 1. The 2023 BIS Baseline Report presents desk-based mapping results for the delineation of reaches on watercourses, waterbodies, and wetlands selected for survey in the relevant aquatic study areas and field-collected habitat data of relevance to fish and primary and secondary producers. These data may help identify important habitats for various species of interest.

1.2.3.4 Environmental DNA Metabarcoding Studies

Environmental DNA (eDNA) metabarcoding studies completed to date are described in Appendix E, Chapter 1. The two vertebrate primers used for eDNA studies are primarily intended to capture aquatic and semi-aquatic species such as fish, amphibians, and turtles. Invertebrate primers used for eDNA studies were primarily intended to capture aquatic and semi-aquatic invertebrate species (see Zoetica's BPD Report (Zoetica 2022)). These data are used to identify the potential presence of species of interest and the general distribution of fish and invertebrate communities within the BIS study areas.

1.2.4 Mapping Considerations

For 2023 baseline reporting, mapping was limited to species of interest. Due to the sensitivity of at-risk and rare species and nesting/denning habitat features, spatial data from NHIC are represented by a 1 km grid rather than a point, as per the NHIC's Sensitive Data Location Standards (NHIC, n.d.). Descriptive reporting will also follow sensitivity standards and will not be detailed enough to allow for precise geolocation. GBIF data reported on maps were limited to observations from 1970 onward as older

observations were considered historic and not as reliable. See also Appendix A, Chapter 1 for data quality scoring.

For GBIF species observation data, when there were multiple entries with a count of one at the same location, Zoetica assumed the entries were all the same individual to avoid double-counting and erroneously reporting that multiple individuals were present. For simplicity, mapped species observations present the cumulative number of observations and counts and do not represent the number of individuals.

Incidental observations were recorded during various Tier 1 baseline field programs and were noted on different data forms. Incidental observations varied in life history stage of organisms and may have been recorded in transit to a site and thus not associated with habitat data. In addition, expertise in species identification may have varied among field contractors working on different field programs. Thus, not all pertinent information may have been available (e.g., observation type, activity, demographics) or collected in a directly comparable manner (e.g., quantity). Field-based observations of provincially-tracked species (at-risk and/or rare) are represented by a 1 km grid, rather than a point, on maps to align with the NHIC's Sensitive Data Location Standards. Data associated with mapped field observations are included in the appendices to this chapter.

2.0 FISH

2.1 Introduction

Fish are a vital component of biodiversity and are sustained by many aspects of functional aquatic and terrestrial environments. Fish and fish habitat are affected by other BVs (or sub-components) such as surface water quality and quantity, riparian vegetation (providing shading and water runoff filtration), primary and secondary aquatic producers (providing food), wildlife (e.g., beaver as ecosystem engineers), and humans (through fishing and land use and development). Conversely, any potential effects of the Project on fish and their habitats can impact other BVs that depend on them (e.g., fish-eating wildlife and humans). Due to their varied trophic positions in food webs, fish are often used as indicators of environmental impacts through different pathways (e.g., water quality, changes in benthic and plankton communities, sediment contamination, accumulation of toxins in tissues, overexploitation, habitat loss, and temperature changes).

Several species of conservation concern also have the potential to occur in the BIS aquatic study areas (see Appendix D in Zoetica's BPPA Report ((Zoetica 2021)). In addition, several fish species have been identified as prohibited invasive species in Ontario, and several other species are considered invasive in Ontario but are not regulated (see **Table A-1**). During engagement conducted with local stakeholders and rights-holders in the SON-South Bruce siting area, concerns were raised regarding changes in fish populations and the need for aquatic inventories in streams (see Appendix B in Zoetica's BPPA Report (Zoetica 2021)). Concerns voiced during engagement about changes in fish populations were in reference to contamination from agricultural runoff; however, the need for aquatic health studies, as a whole, was also mentioned (see Appendix B in Zoetica's BPPA Report (Zoetica 2021)). To date, no species of interest have been mentioned during engagement. However, whitefish are a species of interest to the SON people (Lowitt et al. 2017, Gobin and Lauzon 2019, 2020), and thus, observations of this species reported in the BIS aquatic study areas are discussed in the current Chapter 8 on fish and fish habitat. Future engagement may focus on species of interest to stakeholders and rights-holders in the SON-South Bruce siting area if species of interest are mentioned during future engagement.

2.1.1 Objectives

Several studies aim to collect baseline data to help inform the Project's biodiversity IA. General objectives for fish and fish habitat are listed in Section 1.1. Specific objectives of fish and fish habitat studies are to:

1. Achieve the general objectives listed in Section 1.1;
2. Assess the quality and quantity of fish habitat in watercourses and waterbodies within the aquatic study areas to meet the requirements of the TISG Template (IAAC 2023) including:
    a. Characterizing fish habitat features that demonstrate the presence of fish species in terms of appropriate habitats (e.g., spawning habitats, nursery habitats, rearing habitats, overwintering and migration routes);
3. Determine fish presence, community structure, and distribution within watercourses, waterbodies, and wetlands within the BIS aquatic study areas to meet the TISG Template requirements (IAAC 2023), including:
    a. Identifying the distribution and life history traits of species of importance (SAR, species of cultural importance and invasive species) within the AOI, LSA_{AQU}, RSA_{AQU}, and in reference areas outside of the RSA, where no suitable reference locations exist within the RSA;;

b. Describing the biodiversity within the freshwater environment, including trophic state and interactions and relative significance of species within identified food chains and identification of biodiversity metrics and indicators used to characterize aquatic biodiversity; and
c. Identifying suitable indicator species (if a community approach is not possible).

Zoetica™ recognizes that there are additional requirements for fish and fish habitat to meet TISG requirements. These additional requirements include the description of physical watercourse and waterbody habitat characteristics and mesohabitats (e.g., pool, riffle, run) and the identification of natural obstacles or existing structures that can impede the movement of fish. Work done to date by Zoetica to fulfill these requirements are included in the objectives for Tier 1 AHM studies (Appendix D, Chapter 1). The current Chapter 8 begins to fulfill the TISG requirements for fish and fish habitat outlined in Appendix C of Zoetica's BPPA Report (Zoetica 2021).

2.2 Methods

To meet the general objectives listed in Section 1.1 and fish-specific data objectives outlined in Section 2.1.1, Zoetica considered the best practices outlined in the BPPA report (Zoetica 2021) when designing the surveys for fish studies. Study designs also considered areas and species of importance to local stakeholders and rights-holders, and the statistical and scientific rigour needed for future analyses to inform the biodiversity IA and potential future monitoring programs.

2.2.1 Study Areas

The BIS study areas for fish include the AOI, LSA_{AQU}, and RSA_{AQU} (see Figures and descriptions included in Section 3.0, Chapter 1). The rationale for study area delineation is included in Zoetica's BPPA Report (Zoetica 2021). Several aquatic habitats outside of the RSA_{AQU} were included in desk-based assessments of information (e.g., fish presence) during Tier 1 studies, to act as potential control sites for sites within the GSWC, should the Project impact aquatic habitats within the GSWC.

2.2.2 Presence Distribution and Abundance of Habitat

Collation of both existing and Tier 1 habitat data for fish proceeded as described in Sections 1.2.2 and 1.2.3. Additional habitat studies may be conducted in future years to fill data gaps and to conduct more detailed habitat assessments in key areas, once a site has been selected and more is known regarding infrastructure placement.

2.2.3 Presence and Distribution of Species of Interest

The collation of existing observations and Tier 1 eDNA and incidental observations for fish species of interest proceeded as described in Sections 1.2.2 and 1.2.3.

2.2.4 Additional Baseline Data Collection to Inform the Impact Assessment

2.2.4.1 Fish Community Characterization

As the 2021 and 2022 BIS baseline program focused on Tier 1 habitat studies (see Section 1.2.3), data collection for fish community characterization was limited to the collation of desk-based studies (as per Section 1.2.2), eDNA detection (see Appendix E, Chapter 1), and incidental observations of fish collected during all Tier 1 field studies. The 2023 BIS Baseline Report includes all Tier 1 data collected to date.

Methods for future Tier 2 field studies planned for fish and fish habitat, should the SON-South Bruce siting area be selected, include fish community assessments to determine community composition and demographics of fish populations within the LSA_{AQU} and select areas in the RSA_{AQU}. In addition, more detailed habitat assessments may be conducted in the AOI and LSA_{AQU} once more is understood about the siting of Project infrastructure and the potential for effects. See Zoetica's BPPA report (Zoetica 2021) for more information on best practices for fish community characterization studies.

2.3 Results

2.3.1 Presence, Distribution and Abundance of Important Habitat

2.3.1.1 Critical Habitat

Critical habitat for pugnose shiner exists on the Teeswater River downstream of the LSA_{AQU} at the Cargill Mill Ponds (see Figure 4-13 in Appendix D, Chapter 1). The federal recovery strategy for pugnose shiner describes critical habitat in the Teeswater River as the area extending from the dam in Cargill Mill Pond upstream to the end of the first Aquatic Landscape Inventory System (ALIS) segment, including all contiguous waters and wetlands within the Cargill Mill Ponds (DFO 2012). The section of the Teeswater River containing critical habitat is approximately 1.4 km long with an area of approximately 0.014 km^2 (DFO 2012).

2.3.1.2 Watercourse Habitat

2.3.1.2.1 Spawning

Spawning habitat preferences vary considerably among fish species in Ontario (DFO 2008). For example, trout species may spawn in smaller cold-water streams with high levels of oxygen; northern pike will migrate upstream in spring to spawn in flooded shallow areas that typically dry during summer months; walleye and white suckers prefer to lay eggs in oxygen-rich waters of riffles over cobbles and boulders (DFO 2008).

A search of the Ontario GeoHub Fish Activity dataset revealed one brook trout spawning area on Alps Creek in the southern part of the LSA_{AQU} (see **Figure A-1**). No additional fish spawning areas were documented within the Ontario GeoHub Fish Activity dataset in watercourses within the RSA_{AQU}. No additional potential spawning areas were documented during AHM field surveys; however, several reaches surveyed on the Teeswater River and in tributaries to the Teeswater within the AOI, including Alps Creek south of the AOI, contained riffle habitat (see Figure B-2 in Appendix D, Chapter 1) which can be used by various species of fish for spawning. Additionally, several groundwater seeps and springs were noted during 2022 AHM field surveys, including within the AOI and in Alps Creek in the LSA_{AQU} south of the AOI (see Figure E-1 in Appendix D, Chapter 1). These areas could also be used by various fish species for spawning.

2.3.1.2.2 Rearing

Rearing habitat in watercourses requires healthy shoreline habitat with food availability, and places for fish to hide from predators and wait for food. Watercourse edges that offer suitable riparian and shoreline cover (e.g., coarse woody debris, boulders, in-water vegetation) can provide good quality rearing habitat (DFO 2008). "In-water" habitat such as large grain sediments (e.g., boulders, cobbles), coarse woody debris, and aquatic vegetation can also provide protection from predators (DFO 2008).

During desk-based searches of available datasets (see **Table 1-1**), no rearing habitat was reported in watercourses within the BIS aquatic study areas. However, during 2022 AHM field surveys, field crews recorded riparian and shoreline cover and in-water vegetation in reaches surveyed in the BIS study areas (see Figure B-1 and B-4 in Appendix D, Chapter 1). Riparian habitat varied greatly depending on the study area. Within the AOI, riparian cover types were dominated by initial cover such as meadow and wetland and significant amounts of cropland cover. South of the AOI, predominant riparian cover types were mixed forest, deciduous forest, and meadow. Riparian habitat north of the AOI was dominated by deciduous forest (see Figure B-1 in Appendix D, Chapter 1). Shoreline cover also varied among study areas with less shoreline cover on reaches in the LSA_{AQU} south of the AOI and in the southern portion of the AOI relative to reaches surveyed in the northern portion of the AOI and in the LSA_{AQU} north of the AOI (see Figure B-4 in Appendix D, Chapter 1).

2.3.1.2.3 Overwintering

Deep pools in watercourses, such as those created from beaver dams, can be used by fish species (e.g., minnows) for overwintering (Davis 2016; Brown et al. 2011). A search of existing databases revealed no overwintering habitat within watercourses in the BIS aquatic study areas. During 2022 AHM field surveys, several pools were reported in watercourse reaches in the BIS study areas (see Figure B-2 in Appendix D, Chapter 1). Pool habitat was located primarily in tributaries to the Teeswater River in the AOI and the LSA_{AQU} south of the AOI, and one reach in the LSA_{AQU} north of the AOI on Kinlough Creek (see Figure B-2 in Appendix D, Chapter 1).

2.3.1.2.4 Migratory

Fish require the ability to move from one type of habitat to another, dictated by seasonal changes and life cycle requirements (DFO 2008). For example, many species of fish migrate upstream to spawn. Thus, fish require barrier-free access to spawning areas from overwintering areas. The detection of fish barriers (which prevent fish passage) and obstacles (which make fish passage more difficult) can help elucidate potential migratory limitations to fish. No migratory watercourse habitat for fish has been documented in available desk databases in the BIS aquatic study areas. However, as part of Tier 1 studies, desk- and field-based barrier identification was conducted (see Section 4.3 of Appendix D, Chapter 1). A search of the Ontario GeoHub Fish activity dataset and the OHN Hydrographic point dataset revealed 52 features (e.g., dams, rapids, rocks) that may serve as potential barriers to fish passage within the RSA_{AQU}, two features within the LSA_{AQU}, and none within the AOI. In the LSA_{AQU}, a dam exists on the Teeswater River at the eastern edge of the LSA_{AQU} upstream of the AOI. In addition, a potential barrier (rocks) exists in the south end of the LSA_{AQU} (See Figure F-1 in Appendix D, Chapter 1). Within the RSA_{AQU}, most potential barriers are rock features with the majority occurring on the Saugeen River near its confluence with Lake Huron. Several dams exist on the Teeswater River, both upstream and downstream of the LSA_{AQU}. Several sets of rapids exist on the Teeswater River upstream of the AOI and LSA_{AQU} and on Formosa Creek which flows into the Teeswater River downstream of the AOI. During AHM field surveys, field contractors identified several additional potential barriers and obstacles in the BIS study areas (see Figure F-1 in Appendix D, Chapter 1), including several human-made structures (dams, rock weirs, docks, cement structures, and culverts) as well as several naturally made barriers or obstacles (e.g., log jams, blockages due to overgrowth). Many of the human-made features were culverts found in surveyed reaches on tributaries to the Teeswater River in the AOI. Additionally, in one reach on the Teeswater River in the northern portion of the AOI, a road had been created by raising the creek bed (using cobbles and small boulders) so that vehicles could cross the Teeswater River (see Figure F-1 in Appendix D, Chapter 1).

In addition to potential barriers listed above, a total of 17 beaver dams were reported in the MNRF Beaver Dam dataset, of which eight occur in the LSA_{AQU}. An additional 20 beaver dams or lodges were detected during AHM field surveys. Beaver dams in the AOI were primarily reported on tributaries to the Teeswater River in the northwest portion of the AOI. Beaver dams in the LSA_{AQU} were primarily located on smaller streams south of the AOI and on tributaries to the Teeswater River within the GSWC (see Figure F-1 in Appendix D, Chapter 1). Beaver dams can act as barriers to fish passage if they do not allow enough flow through the structure and may still present as obstacles to fish passage if they have enough flow.

2.3.1.3 Lake and Pond Habitat

2.3.1.3.1 Spawning

Shallow shoreline waters often offer ideal habitat for lacustrine species such as lake trout and lake whitefish (DFO 2008). However, like fish that spawn in watercourses, lake-dwelling species are selective regarding spawning habitat, and ideal spawning habitat is often species-specific. Lake trout typically need rocky shoals for spawning, while lake whitefish use hard or stony bottom sediments (Eakins 2020). Other species, such as perch, prefer shallow lakes and spawn in areas with extensive aquatic vegetation (Eakins 2020). Some lake-dwelling species migrate from lakes to adjoining watercourses to spawn. Desk-based searches of existing datasets (**Table 1-1**) revealed no documented lacustrine spawning areas within the AOI or the LSA_{AQU}. However, a review of fish inventory information in the Greenock Swamp Area of Natural and Scientific Interest (ANSI) revealed that walleye were introduced into the Silver Lake – Otter Lake system in 1964 and limited spawning success has occurred since then (Johnson 1994).

Shoreline data was collected during 2022 AHM field surveys in several lakes within the AOI, LSA_{AQU}, as well as Cargill Mill Pond downstream of the LSA_{AQU}, and Robson and Hines Lakes outside of the RSA_{AQU}. Such shoreline data could reveal spawning habitats for species that spawn in the shallow waters of lakes. Surveys conducted on lakes in 2022 revealed that most lakes, except Silver and Hines Lakes, contain abundant nearshore aquatic vegetation (see Figures C-3 through C-10 in Appendix D, Chapter 1). However, the 2022 AHM studies did not include surveys of deeper zones of lakes for their potential as spawning habitat.

2.3.1.3.2 Rearing

Shallow areas of deep lakes often offer nursery and rearing habitat for fish (DFO 2008). Like watercourses, shorelines with adequate riparian habitat and cover (both shoreline and in-water) provide the best quality rearing habitat as they offer plenty of food and good hiding places for fish to hide from predators and wait for food. To date, no lacustrine-rearing habitat has been identified through desk-based searches of existing datasets listed in **Table 1-1**. During AHM field surveys, most surveyed lakes had abundant shoreline and nearshore in-water cover (see Figures C-3 through C-10 in Appendix D, Chapter 1). These areas may provide rearing habitat for juvenile fish if spawning areas are found nearby.

2.3.1.3.3 Overwintering

Deeper zones of lakes that are well-oxygenated can offer overwintering habitat for lacustrine fish (DFO 2008). To date, no waterbody overwintering habitat has been identified through desk-based searches of existing datasets listed in **Table 1-1**. The 2022 AHM field surveys did not include surveys of deeper zones of lakes. However, bathymetric studies were planned in several lakes in the BIS study areas as part of the Environmental Media Baseline Program (EMBP (CanNorth 2021)). Full limnological studies were also planned as part of the EMBP in several lakes within the BIS study areas and several reference lakes outside of the RSA_{AQU}. Once available, Zoetica will review these data for potential overwintering fish habitat.

2.3.1.4 Wetland Habitat

Wetland environments are mid-way between aquatic and land-based ecosystems, as they are sometimes dry and sometimes wet. Wetlands offer unique habitat for fish, are biologically productive areas, and have high amounts of cover that may offer good foraging opportunities for fish and protection from predators. Many fish species may use wetlands for some or all of their life history phases.

2.3.1.4.1 Spawning

Wetlands may offer areas for northern pike to spawn. Northern pike often lay eggs attached to standing vegetation in wetland areas (DFO 2008). This vegetation protect eggs from sinking to the bottom, where they can be buried by muck or predated upon by other species (DFO 2008). To date, no spawning habitat has been identified through desk-based searches of existing datasets (**Table 1-1**) or during AHM surveys (see Appendix D, Chapter 1) in wetlands within the BIS aquatic study areas. Many of the wetlands surveyed during the 2022 AHM field surveys were dry at the time of survey (in July and August; see Figure A-3 in Appendix D, Chapter 1). However, field crews recorded shoreline and in-water habitat during AHM surveys in wetlands in the AOI and LSA_{AQU} that contained water. Additional Tier 1 studies are anticipated in 2024 to fill data gaps, including spring AHM field surveys of wetlands to account for habitat characteristics during the relevant period for spring spawning fish. Additional Tier 1 eDNA metabarcoding studies are also anticipated in spring of 2024 to detect the presence of fish and other biota that may use seasonally wetted wetlands for various life history requirements. Data collected from future AHM field studies and eDNA studies (see Appendix E, Chapter 1) in wetlands may help to determine the potential for spring-spawning fish, such as northern pike, to use wetlands for spawning. These data will be incorporated in future iterations of the BIS Baseline Report.

2.3.1.4.2 Rearing

Several species of fish, such as bass, bluegills, and black crappies, may periodically swim into wetlands for cover or to feed on forage fish within wetlands (DFO 2008). Wetlands are biologically productive areas that host diverse species, including insects and foraging fish.

To date, no rearing habitat has been identified through desk-based searches of existing datasets (**Table 1-1**) or during AHM surveys (see Appendix D, Chapter 1) in wetlands within the BIS aquatic study areas. However, during AHM surveys, field crews recorded shoreline and in-water habitat at surveyed wetlands that contained water in the AOI and LSA_{AQU}. In addition, field crews conducted eDNA studies in the summer and fall of 2022 to determine the potential for these waterbodies to support habitat for various species, including rearing habitat for fish. Results of eDNA are summarized in Appendix E, Chapter 1 and in Section 2.3.3.1. At the time of writing this 2023 BIS Baseline Report (September 2023), more data are required to interpret patterns in habitat use.

2.3.1.4.3 Overwintering

Wetlands that do not freeze to the bottom during winter months may provide overwintering habitat, especially for smaller fish species such as minnows and other bait fish (Henning 2004). To date, no overwintering habitat has been identified through desk-based searches of existing datasets (**Table 1-1**) or during AHM field surveys (see Appendix D, Chapter 1) in wetlands within the BIS aquatic study areas.

2.3.2 Presence and Distribution of Species of Interest

2.3.2.1 Species of Conservation Concern

Based on searched desk-based datasets (see Section 1.2.2) a total of five fish species of conservation concern have been recorded in the BIS aquatic study areas, four of which are SAR and one (greater redhorse) that is considered provincially rare (**Table 2-1**). One species of conservation concern reported in desk-based sources, pugnose shiner, was also detected during Tier 1 fieldwork in 2022. There were no observations of fish of conservation concern within the AOI. One location within the NHIC 1 km grid squares partially overlapped the LSA_{AQU}. Within the RSA_{AQU}, most observations of species of conservation concern were located at the mouth of the Saugeen River at its confluence with Lake Huron, with only two species of conservation concern reported south of the confluence of the Teeswater with the Saugeen (**Figure A-1**).

Table 2-1. Fish species of conservation concern with NHIC and GBIF observation records within the BIS study areas.

Common Name	Scientific Name	SARO	SRANK	*SARA*	COSEWIC	Provincial Recovery Strategy & Govt Response	Federal Recovery Strategy & Critical Habitat
Black Redhorse	*Moxostoma duquesnei*	THR	S2	THR	THR	-	-
Greater Redhorse	*Mosoxtoma valenciennesi*	-	S3	-	-	-	-
Pugnose Shiner	*Notropis anogenus*	THR	S2	THR	THR	RS, GR	RS, CH
Lake Sturgeon	*Acipenseridae fulvescens*	THR	S2		THR	RS	-
Northern Brook Lamprey	*Ichthyomyzon fossor*	SC	S3	SC	SC	-	-

Notes:
1. The official list of Species at Risk in Ontario (SARO) is provided in *Ontario Regulation 230/08* under the Ontario *Endangered Species Act, 2007*. SRANK is the Subnational Conservation Rank (where S1, S2, S3, SH are considered rare species by NHIC).
2. Conservation status ranks: THR = Threatened, SC = Special Concern; S2 = Imperiled, S3 = Vulnerable. Conservation statuses are current as of March 11, 2021, when public data were downloaded from the NHIC and the federal species at risk public registry.
3. RS = a provincial and/or federal recovery strategy is available for the species. GR = Ontario government response statement that outlines the actions the government intends to take or support to help recover the species. CH = critical habitat has been identified for the species within the applicable biodiversity value-specific study area.

The greater redhorse is the only species of interest that has NHIC 1 km grid squares that partially overlap the LSA_{AQU}. NHIC occurrences of greater redhorse were recorded northeast of the AOI, within the 1 km^2 grids on **Figure A-1**. In addition, two GBIF[4] records of greater redhorse were located on the Teeswater River north of the LSA_{AQU}. Greater redhorse is not a SAR but has a subnational conservation rank (SRANK) of S3 indicating that it is provincially rare and at moderate risk of extirpation in Ontario.

NHIC occurrences of pugnose shiner, a SAR designated as Threatened under the Ontario *ESA* and federal *SARA*, also occur within the Teeswater Quaternary Watershed north of the LSA_{AQU} (**Figure A-1**). In Ontario, pugnose shiner has a provincial recovery strategy (OMNR 2013) and government response statement available (MECP 2014). The government response statement also noted pugnose shiner to occur in the

[4] Note: where a species has only been detected using desk-based data, caution should be taken as those data could be as old as 1970, and the conditions supporting the species' presence in the area may have changed.

Teeswater River at the Cargill Mill Ponds. The pugnose shiner also has a federal recovery strategy (DFO 2012) and critical habitat defined within the recovery strategy that overlaps with the LSA_{AQU} (see Section 2.3.1.1). A NatureServe conservation rank of S2 indicates that the pugnose shiner is at high risk of extirpation in Ontario (NatureServe n.d.). Pugnose shiner was also detected during Tier 1 eDNA metabarcoding studies in the fall at Clam Lake, a waterbody in the LSA_{AQU} north of the AOI. eDNA collections in summer and fall at Cargill Mill Pond did not detect pugnose shiner, though it is known Critical Habitat for the species. There are several potential reasons for the lack of detection of pugnose shiner by eDNA metabarcoding studies in Cargill Mill Pond (discussed in detail in Section 5.1 of Appendix E, Chapter 1) and future investigation is warranted for the detections of pugnose shiner in Clam Lake versus the lack of detection in Cargill Mill Pond.

Additional SAR detected in the RSA_{AQU} include northern brook lamprey, black redhorse, and lake sturgeon. GBIF records of northern brook lamprey were reported near the confluence of the Saugeen River with the Teeswater River (**Figure A-1**; **Table A-2**). GBIF records of black redhorse were located at the mouth of the Saugeen River (**Figure A-1**; **Table A-2**). NHIC 1 km grid squares for lake sturgeon were also located near the mouth of the Saugeen River (**Figure A-1**).

In addition, Zoetica's previous investigations of NHIC observation (not occurrence) data for Zoetica's BPPA Report found three additional SAR recorded in the RSA_{AQU}: the northern sunfish (*Lepomis peltastes*) provincially and federally listed as Special Concern, silver shiner (*Notropis photogenis*) provincially and federally listed as Threatened, and American eel (*Anguilla rostrata*) provincially listed as Endangered and federally as Threatened (see Appendix D of Zoetica's BPPA Report (Zoetica 2021)). Since writing the BPPA, Zoetica has received an updated version of the NHIC verified occurrence data but has not yet received the requested updated NHIC observation data. Once received by Zoetica, these data will be included in future iterations of the BIS Baseline Report along with relevant data collected during field programs.

2.3.2.2 Species of Interest to Stakeholders and Rights-Holders and Species of Potential Socio-economic Importance

To date, no fish species were mentioned during biodiversity-focused engagement conducted for the Project. However, lake whitefish are important to communities in the SON-South Bruce siting area as they are noted to be a species of socio-ecological importance playing a vital role in the ecosystems of Lake Huron and in cultural and economic contexts for the SON who have harvested them since time immemorial (Lowitt et al. 2017, Gobin and Lauzon 2019, 2020). Lake whitefish are currently a commercially fished species providing sustenance to the SON community, and commercial value to the local economy. The SON, in collaboration with Parks Canada and MNRF, currently run a fisheries assessment program focused on integrating Indigenous Knowledge (IK) and western science-based approaches for understanding and addressing concerns about fish, specifically lake whitefish, in the waters of the SON traditional territory (Environment Office SON 2021). Based on searches of the MNRF Aquatic Resource Area (ARA) dataset and the GBIF dataset, lake whitefish were only recorded in Lake Huron and were not detected within other areas of the RSA_{AQU}.

2.3.2.3 Invasive Species

In the Early Detection and Distribution Mapping System (EDDMapS) Ontario and GBIF invasive species occurrences datasets, four invasive fish species (regulated or non-regulated) have been detected within the RSA_{AQU}: rainbow smelt, threespine stickleback, round goby, and white perch. All records of invasive fish species occurred at or near the mouth of the Saugeen River (**Figure A-1**; **Table A-2**). Round goby is a

regulated species listed on the federal Aquatic Invasive Species Regulation under the *Fisheries Act* as subject to prohibitions and controls, and people are prohibited from possession of this species. Round goby is also listed by the Invasive Species Centre in Ontario. Rainbow smelt and round goby are listed on the Ontario Invasive Species Awareness Program aimed at addressing threats posed by invasive species in Ontario. Threespine stickleback and white perch are additional species that are tracked by EDDMapS Ontario as they are exotic to the province and may be considered invasive but have not been indicated by other sources/organizations that track invasive species of particular concern.

2.3.3 Additional Baseline Data Collection to Inform the IA

2.3.3.1 Fish Community Characterization

In the MNRF ARA dataset, 83 fish species were reported in watercourses and waterbodies within the RSA_{AQU} and potential reference areas. Seven fish species not included in the ARA dataset were reported in GBIF and NHIC records within the RSA_{AQU} (**Figure A-2**; **Table A-3**). Seventeen fish species were detected in the AOI, 43 in the LSA_{AQU}, and 72 in the RSA_{AQU}. Fifty-one species were reported in Lake Huron, some of which were also detected in the RSA_{AQU} and LSA_{AQU} (**Table A-3**). A review of fish inventory data within the Greenock Swamp ANSI revealed 20 species present within the GSWC (**Table A-3**), including one additional species (ninespine stickleback) in the LSA_{AQU} that was not recorded in ARA, GBIF, or NHIC records within the same area. Zoetica explored the Fish ON-Line webmap (MNRF 2020) for detections of species in addition to those reported in the GBIF, NHIC and ARA datasets, but found none. The highest species richness occurred within Lake Huron (51 species) followed by the Saugeen River (43 species), Willow Creek (33 species), Beatty Saugeen (29 species), Mill Creek (28 species), and South Saugeen (27 species) (**Figure A-2**; **Table A-3**; **Table A-4**). Several species recorded in the GBIF and NHIC datasets at the mouth of the Saugeen River likely also occur in Lake Huron, including round goby, threespine stickleback, black redhorse, and lake sturgeon. In general, richness decreases the further upstream a watercourse or waterbody is from the Saugeen River and Lake Huron.

Forty unique species were reported in the Teeswater River, which is the main system running through the LSA_{AQU} and AOI. Within various sections of the Teeswater River, the number of species ranged between 12 and 21 species. Upstream of the LSA_{AQU} and AOI, 21 species were recorded in the Teeswater River (section 1 in **Table A-4** and on **Figure A-2**). Seventeen species were recorded in the Teeswater River directly downstream of the AOI (section 2 in **Table A-4** and on **Figure A-2**). These sections (1 and 2) of the Teeswater River are classified as having cold-water regimes. Seven species were reported in the Teeswater River downstream of the AOI that were not reported upstream of the AOI (see **Table A-4**). As the Teeswater enters the GSWC, it changes from a coldwater regime to a coolwater regime. In the coolwater section of the Teeswater River within the GSWC (section 3 in **Table A-4** and on **Figure A-2**), 15 species were reported, all of which also occurred upstream of this section of the river. As the Teeswater exits the LSA_{AQU}, a total of 25 species were reported in the coolwater sections of the river (sections 4 and 5 in **Table A-4** and on **Figure A-2**) including six species that were not reported upstream. The Teeswater River changes from a coolwater regime to a warmwater regime downstream of the Cargill Mill Ponds. In the warmwater sections of the Teeswater River (sections 6 and 7 in **Table A-4** and on **Figure A-2**) 23 species were reported, including three that were not reported upstream. Potential reference watercourses for the Teeswater include the Beatty Saugeen and North Saugeen (2 sections). Of the potential reference watercourses, the Beatty Saugeen was most similar in temperature regime and species assemblage to sections 1 and 2 of the Teeswater River, upstream and downstream of the AOI, respectively (**Table A-4**).

Within the LSA_{AQU}, several lakes, including Silver and Clam Lakes, are known to be fishing lakes. **Table A-5** presents the species reported in the larger lakes contained within the LSA_{AQU} along with potential reference lakes including Robson, Hines, Arran, and Clarke's Lakes. Twelve species were reported in Silver Lake and 15 species were reported in Clam Lake (**Figure A-2**; **Table A-5**). Several species including brook stickleback, fathead minnow, finescale dace, and shorthead redhorse were only detected in Clam Lake relative to the other lakes, and walleye was only detected in Silver Lake (**Table A-5**). Other lakes within the LSA_{AQU} contained between two and nine reported species (see **Table A-5**). Of the potential reference lakes, Arran Lake had the most species (21) and included many species not reported in lakes in the LSA_{AQU} (see **Table A-5**). Hines and Robson Lakes both hosted similar species and had a total of 14 species each. These lakes were also most similar in species to Clam and Silver Lakes. Clarke's Lake was similar in species to those reported in Silver and Clam Lakes, with a total of 10 species (see **Table A-5**).

The most reported species in watercourses and waterbodies in the RSA_{AQU} and potential reference areas were common shiner and creek chub, followed by white sucker (**Figure 2-1**). Other commonly reported species (recorded in greater than 50 locations) included brook trout, central mudminnow, blacknose dace, brook stickleback, rock bass, mottled sculpin, and northern redbelly dace. All species reported in the LSA_{AQU} (**Table A-3**) were also reported in watercourses and waterbodies in the RSA_{AQU} and/or in potential reference areas except for greenside darter, which was reported in the Teeswater River (section 2; **Figure A-2**; **Table A-4**). In addition, walleye was reported in Silver Lake but not in any other lakes within the LSA_{AQU} or RSA_{AQU} (**Figure A-2**; **Table A-5**). However, walleye was reported in Hamilton Creek (**Figure A-2**) near Robson Lake (a potential reference lake). While no detections of walleye were reported in Robson Lake, this lake flows into Hamilton Creek, and thus, walleye may also be present in Robson Lake. The RSA_{AQU} also captures a small portion of Lake Huron surrounding the mouth of the Saugeen River (data reported separately from RSA_{AQU}). Fifteen species were found to be unique to Lake Huron (**Table A-3**). However, these species aren't necessarily found within the 500 m radius at the confluence of the Saugeen River, which defines the extent of the RSA_{AQU} within Lake Huron.

During Tier 1 field surveys conducted in the BIS study areas and potential reference areas, several species of fish were detected through eDNA metabarcoding studies in select reaches of watercourses, waterbodies, and wetlands (Appendix E, Chapter 1) or incidentally during other Tier 1 studies (**Table A-7**; studies described in Chapter 1). Thirty-one fish species and the genus *Esox*, which includes the species northern pike, were detected across the AOI and LSA_{AQU} during eDNA metabarcoding studies (see Table 4-9 in Appendix E, Chapter 1). Two species, brook silverside and longear sunfish, have not previously been reported in the BIS study areas or potential reference areas. eDNA metabarcoding studies detected brook silverside in the fall in Silver Lake as well as in the outlet of Silver Lake. Longear sunfish were detected in Clam, Hines, and Robson Lakes, the outlet of Robson Lake, Cargill Mill Pond on the Teeswater River, both the inlet and outlet of Cargill Mill Pond, the Teeswater River upstream of the AOI, and in sections of the Teeswater River within the AOI. In addition, eDNA studies detected banded killifish in Hines Lake. Banded killifish were only previously reported in Lake Huron. Only white sucker and blacknose shiner had barcode gaps on at least one of the primers used in the eDNA study indicating further work to confirm the presence of species in the AOI and LSA_{AQU} may be required in future Tiers of study. During other Tier 1 studies conducted as part of the BIS in 2022, one species (brook trout) and at least 11 species reported to the genus level were recorded during field studies (**Table A-7** in Appendix A). In most cases field crews were unable to identify fish to the species level as Tier 1 studies did not include targeted fish studies. Targeted

fish community characterization studies are planned as part of Tier 2 studies, once a site has been selected.

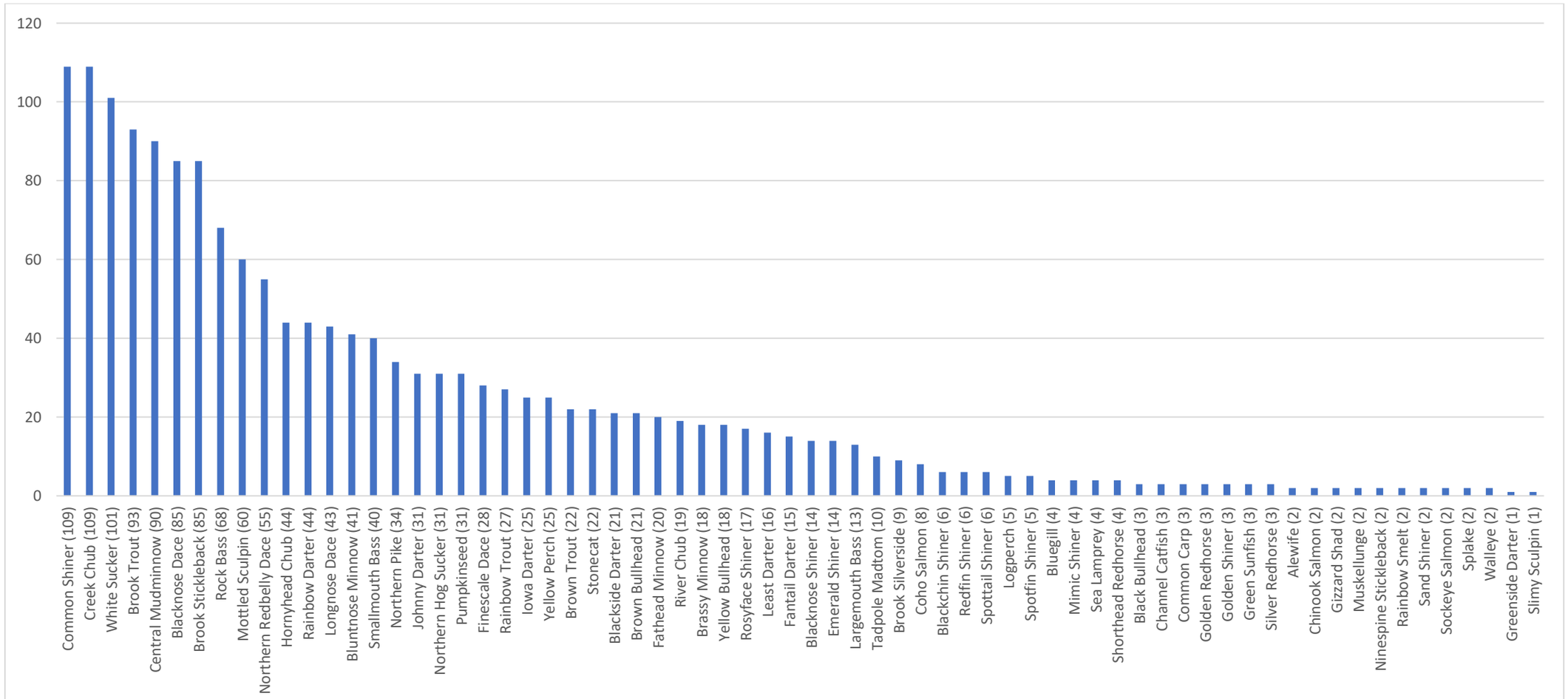


Figure 2-1. Frequency of fish species reported in watercourses and waterbodies in the RSA_{AQU} and potential reference areas. Note: Frequency graph does not include observations in Lake Huron, but includes occurrences in potential reference areas.

2.4 Discussion

To meet the requirements of the TISG Template and the objectives outlined in Section 2.1.1, the 2023 BIS Baseline Report presents initial results of important fish habitats, detections of species of interest, and information on fish community characterization. Results presented to date are based on desk-based searches of available data and initial Tier 1 field studies (AHM, eDNA, and incidental observations collected during TEM) that were initiated in the summer of 2022. Additional Tier 1 studies are anticipated to continue in 2024, and data collected will be incorporated into future iterations of the BIS Baseline Report. Zoetica's proposed Tier 2 studies, planned to commence after site selection, include additional community-level surveys to detect many fish species in watercourses, waterbodies, and wetlands in the study areas and to verify habitat and desk-based reported data collected in Tier 1 studies. Future data collection will also enable a retrospective analysis of newly identified species of interest, if needed.

2.4.1 Presence, Distribution and Abundance of Habitat in the BIS Aquatic Study Areas

The watercourses and waterbodies in the RSA_{AQU} support a wide variety of large- and small- bodied fish species occupying various trophic positions and requiring differing habitats to support their life history requirements (see **Table A-7**). To date, initial Tier 1 studies have successfully identified potentially important fish habitat through desk-based searches of existing information. Two important fish habitats were highlighted in desk-based sources, including critical habitat for pugnose shiner located in the RSA_{AQU} on the Teeswater River downstream of the AOI and LSA_{AQU}, and a brook trout spawning area located in the southern portion of the LSA_{AQU} south of the AOI. No seasonally important fish habitat has been detected to date in the AOI based on searched desk-based sources.

Tier 1 AHM field studies commenced in the summer of 2022 within the AOI, LSA_{AQU}, and select areas of the RSA_{AQU}. These studies included the characterization of aquatic habitats and the identification of potentially important fish habitat such as spawning, rearing, overwintering, and migratory habitat. No additional spawning, rearing, overwintering, or migratory habitat was reported during initial Tier 1 field studies; however, several habitats (e.g., ripple, pool, groundwater seeps and springs) were detected and may provide possible spawning and rearing areas. Additional Tier 1 studies anticipated to be conducted in 2024 may reveal additional potentially important habitat. Further discussion on fish habitat and habitat for other aquatic biota from initial Tier 1 AHM studies is presented in Appendix D, Chapter 1. Should the SON-South Bruce site be selected, future Tier 2 studies will aim to characterize fish communities in the LSA_{AQU} to confirm potentially important habitat for fish in these areas.

2.4.2 Presence and Distribution of Species of Interest in the BIS Aquatic Study Areas

Five species of conservation concern have been detected within the BIS aquatic study areas based on searches of desk-based data. None of the fish species of conservation concern from existing desk-based sources had been reported within the AOI. All fish species of conservation concern that have been detected using desk- and field- based studies conducted to date have been detected in the RSA_{AQU}, with one (and potentially two) exceptions – the potential pugnose shiner that was detected using eDNA and metabarcoding techniques in Clam Lake and the greater redhorse, which had NHIC 1 km^2 grids that partially overlaid the LSA_{AQU}. However, the 1 km^2 grid squares and Clam Lake occurred in areas that were upstream of the Teeswater River, and it is unlikely that the Project would interact with fish detected in

these locations unless these species also occurred in the Teeswater River downstream of the AOI. Of greatest relevance to the Project were detections of species of conservation concern downstream of the LSA_{AQU} on the Teeswater River. Pugnose shiner and greater redhorse were both reported on sections of the Teeswater River downstream of 20where the river exits the GSWC. However, it is unlikely that fish outside of the LSA_{AQU} will be impacted by the Project unless they also use areas within the LSA_{AQU}. Northern brook lamprey was reported in the main segment of the Saugeen River near the confluence with the Teeswater, and black redhorse and lake sturgeon were reported near the mouth of the Saugeen River (at the confluence with Lake Huron). However, these species of conservation concern are unlikely to be impacted by the Project as these records are beyond 50 km of the Project location the species have not been detected within the Teeswater River, and effects of the Project are not anticipated to extend beyond the LSA_{AQU}. Similarly, American eel, silver shiner, and northern sunfish were previously recorded in the RSA_{AQU} in an older version of the NHIC observation data but are not anticipated to interact with the Project for the same reasons.

Tier 1 eDNA metabarcoding field studies initiated in the summer of 2022 within aquatic habitats in the LSA_{AQU} detected pugnose shiner in Clam Lake. However, eDNA metabarcoding conducted in Cargill Mill Pond, where critical habitat for pugnose shiner is known to occur, did not detect the species. Additional studies are required to confirm results of eDNA metabarcoding studies (see Appendix E, Chapter 1 for further details). Alternatively, if the detections of pugnose shiner in Clam Lake are confirmed, additional Tier 1 eDNA metabarcoding studies could assess additional distribution of the species within the BIS study areas. Additional spring eDNA metabarcoding studies are planned as part of future Tier 1 studies in the SON-South Bruce BIS study areas. These data will be incorporated in future iterations of the BIS Baseline Report once collected by the field data collection contractor and received by Zoetica. Tier 1 eDNA metabarcoding data along with desk-based data can then be used to help design fish characterization studies that can confirm the presence of fish species of conservation concern.

2.4.3 Fish Community Characterization in the BIS Aquatic Study Areas

To date, 90 fish species have been detected in the BIS aquatic study areas through desk-based searches of existing datasets. A greater species richness occurred in the Saugeen River and Lake Huron and richness generally decreased moving upstream into the Teeswater River and into the LSA_{AQU} and AOI. Within the AOI, a total of 17 fish species have been reported. Only one location within the AOI had reported data in the ARA database and this was the section of the Teeswater River (section 2) that intersects the AOI. This section contained 17 species, two of which, common carp and greenside darter, were not reported in other sections of the Teeswater River but were reported within the RSA_{AQU}.

During eDNA metabarcoding studies that commenced in the summer of 2022, two additional species, brook silverside and longear sunfish, were detected within the LSA_{AQU}. Additionally, several species (e.g., pugnose shiner and banded killifish) were detected in waterbodies where they were not previously reported in the MNRF ARA database. However, additional studies to confirm eDNA metabarcoding results may be required and are planned for spring 2024. Once these data are collected by the field data collection contractor and received by Zoetica, relevant data will be analyzed to determine presence of any additional potentially occurring species and these data will be integrated into Chapter 8 in future iterations of the BIS Baseline Report. In addition, these Tier 1 studies will direct future Tier 2 studies that will be required to confirm the presence of fish species in representative watercourses, waterbodies, and wetlands in the AOI and LSA_{AQU}. The results of Tier 2 studies along with Tier 1 desk-based and eDNA metabarcoding studies

will help to characterize the fish communities within these study areas. Results will be reported in future iterations of the BIS Baseline Report.

2.4.4 Next Steps

The Project is still in early stages of baseline data collection and more information will be required in the future, should the SON-South Bruce site be selected. To date, field data collection has focussed on aquatic habitat information from watercourse, waterbody, and wetland habitat types (see Appendix D, Chapter 1) and the detection of aquatic biota through eDNA metabarcoding studies during the summer and fall (see Appendix E, Chapter 1). Due to logistics, the late start to the field season in 2022 meant that spring reconnaissance surveys to determine the extent of flooding of wetlands and spring eDNA metabarcoding could not be conducted. Zoetica and the NWMO recognize the importance of seasonally-used areas and plan to continue Tier 1 field data collection (anticipated in 2024) to fill data gaps. Many of the wetlands and first order streams surveyed within the AOI and LSA_{AQU} were dry during the summer season and may be seasonally wetted and used by various aquatic biota, including fish, during the spring. Additional Tier 1 studies will focus on spring wetland surveys to determine the extent of seasonal flooding and to characterize spring seasonal habitat potentially used by aquatic and semi-aquatic biota and to identify potential spawning areas for spring spawning fish. Additionally, spring eDNA metabarcoding studies will be initiated to detect the presence of biota using seasonal and permanent aquatic habitat. These data will help to identify the seasonal availability and potential use of aquatic habitats within the AOI and LSA_{AQU}. In addition to spring surveys, additional AHM surveys may be conducted within the tributaries to the Teeswater River in the AOI that were not previously surveyed if permission to additional sites is granted by landowners to characterize habitat within these areas. Once additional Tier 1 field data relevant to fish and fish habitat (e.g., spring eDNA results) are received by Zoetica, these data will be analyzed and included in this chapter in future iterations of the BIS Baseline Report.

Tier 1 data collection efforts to date have focussed in areas within the AOI and LSA_{AQU}. Since an official project description has not yet been released by the NWMO and site selection is still pending, reference areas have not been identified. These areas will largely depend on the anticipated impacts to aquatic habitats within and surrounding the AOI. The GSWC is downstream of the AOI and is an ecologically important area. Few comparable lakes exist within the remaining BIS study areas, thus Zoetica included several lakes outside of the RSA_{AQU} during 2022 AHM field surveys to act as potential reference lakes. Should the SON-South Bruce site be selected for the Project and once an official project description has been released, Zoetica will review data captured to date to identify suitable reference areas within and outside of the BIS study areas, if required. Reference areas will be selected with similar habitat features and species, wherever possible.

In addition, future Tier 2 baseline studies are planned to commence after site selection (if the SON-South Bruce site is selected) and are aimed at providing a more thorough characterization of fish biodiversity in the aquatic habitats within the BIS study areas. Methods for characterizing fish biodiversity in the BIS study areas include collecting fish using various fishing techniques (see Zoetica's BPPA report (Zoetica 2021) for further details). Fishing techniques will be determined based on known or suspected species presence determined through desk-based and field-based Tier 1 studies in areas within the AOI and LSA_{AQU} potentially impacted by the Project, and areas determined to be potentially important for fish to carry out important life history phases (e.g., spawning, rearing, migration, and overwintering). Species collected for

Tier 2 studies will be recorded and used to verify species lists generated via desk-based methods and validate eDNA detections of species.

Biodiversity and condition metrics for fish are anticipated to be included as part of Tier 2 fish community characterization studies. Once more is known about the fish community structure in these areas, aquatic food web interactions will be explored in various aquatic habitat types in the AOI, LSA_{AQU}, and potentially the RSA_{AQU}. Data collected from these Tier 2 studies will also help to identify additional important habitats for fish within the BIS aquatic study areas including spawning, rearing, overwintering, and migratory habitat. The presence of fish is required to verify potentially important areas for fish to carry out various life history phases and to determine potential migratory routes. Results will be included in future iterations of the BIS Baseline Report when studies have been completed.

3.0 PRIMARY AND SECONDARY PRODUCERS

3.1 Introduction

Primary and secondary aquatic producers are captured under fish and fish habitat within the *Fisheries Act* (2019) as they are sources of food for fish. Mussels and crayfish are aquatic invertebrate species that are defined as fish under the *Fisheries Act* (2019), and for the purposes of the BIS are captured as primary and secondary producers due to their life history requirements. Specifically, the *Fisheries Act* (2019) prohibits causing harmful alteration, disruption and destruction of fish and fish habitat, including food supply.

Primary and secondary aquatic producers include chlorophyll-a, periphyton, plankton, benthic invertebrates, and other aquatic invertebrates. Primary and secondary aquatic producers form an essential part of the food web for fish and other aquatic and semi-aquatic biota. Primary and secondary aquatic producers are often abundant and easy to study, providing robust baseline data collection. They are also good indicators of environmental change, as they often respond to various levels of change in water and sediment quality. These early changes may be the first tangible biological effects, which can cause ripple effects through the aquatic food web. In addition, primary and secondary aquatic producers often exhibit taxon-specific responses to stressors, making them ideal candidates for inclusion as valued components (VCs) in IAs, as changes in the relative abundance of various primary and secondary aquatic producer taxa can translate small changes in water quality up the food web (including to fish that eat these producers).

Several aquatic invertebrate species of conservation concern also have the potential to occur in the BIS aquatic study areas (see Appendix D in Zoetica's BPPA Report (Zoetica 2021)). In addition, several aquatic invertebrate species are considered invasive species (regulated or non-regulated) in Ontario and can potentially occur within the BIS aquatic study areas (see **Table B-1**). During engagement, stakeholders and rights-holders identified benthic invertebrate health and overall aquatic health as topics to be included in the BIS (see Appendix B of Zoetica's BPPA Report (Zoetica 2021)). These species are considered potential species of interest for the 2023 BIS Baseline Report.

Primary and secondary aquatic producers are included in the EMBP (CanNorth 2021) rather than the BIS, as they are often sampled in conjunction with physical environmental media such as water and sediment. Data on primary and secondary producers, and potential impacts on them, will also need to be interpreted within the BIS, as primary and secondary producers are important food sources for fish. As primary and secondary aquatic producers can be indicators of biotic integrity and aquatic ecosystem health (Hill *et al.* 2000), various measures of primary and secondary aquatic producer communities are included in the biodiversity program.

3.1.1 Objectives

Several studies aim to collect baseline data to help inform the Project's biodiversity IA. General objectives for fish and fish habitat are listed in Section 1.1. Specific objectives of primary and secondary producer studies to meet the requirements of the TISG Template (IAAC 2023) are to:

1. Achieve the general objectives listed in Section 1.1; and
2. Provide community-level species richness/diversity data that can indicate areas within the AOI and LSA_{AQU} that may host a greater richness of species.

3.2 Methods

3.2.1 Study Areas

The BIS study areas for primary and secondary producers include the AOI and LSA_{AQU} (see figures and descriptions in Section 3.0, Chapter 1). In the EMBP, the study areas for primary and secondary aquatic producers are linked to the Water Quality and Sediment Quality study components (CanNorth 2021) as sampling of benthic invertebrates is co-collected with water and sediment for chemistry analysis.

3.2.2 Benthic Invertebrate Studies

The collection of primary and secondary aquatic producers has been proposed as part of the EMBP baseline data collection activities, starting in 2022 in areas that may be affected by changes to water chemistry (CanNorth 2021). The survey designs for aquatic primary and secondary producer studies considered: spatial and temporal requirements needed for characterizing communities of aquatic primary and secondary producers using currently available guidelines, including the Ontario Benthos Biomonitoring Network (OBBN) and the Canadian Aquatic Biomonitoring Network (CABIN) benthic invertebrate survey protocols, and protocols for the collection of plankton, periphyton, and chlorophyll-a outlined in the EMBP (CanNorth 2021). The BIS expands on the collection of primary and secondary aquatic producers for assessing potential changes to overall species richness and abundance that could alter food web dynamics for fish. Additionally, eDNA studies commenced in the summer of 2022 as part of Tier 1 studies for the BIS Program (see Appendix E, Chapter 1) and included primers for the detection of aquatic and semi-aquatic invertebrates.

3.3 Results

3.3.1 Presence, Distribution and Abundance of Important Habitat

3.3.1.1 Critical Habitat

Critical habitat for rainbow[5] mussel (Special Concern, S1) is proposed within the Saugeen River watershed on the Saugeen River and the Teeswater River (see **Figure B-1**). The proposed federal recovery strategy for rainbow mussel describes critical habitat as the reaches of the Saugeen River that include all contiguous ALIS segments from the uppermost to lowermost stream segments with species present (DFO 2018). The Teeswater River is included from its confluence with the main stem of the Saugeen River, upstream to where it enters the GSWC. The separate uppermost area of critical habitat includes an approximately 15 km reach of the upper Teeswater River that flows through the Town of Teeswater. The entire bankfull width of the channel is included in this critical habitat description for all river segments identified (DFO 2018). After the draft version of the recovery strategy was published on the *SARA* species registry in 2018, rainbow mussel was downlisted to Special Concern (in 2019). Areas proposed as critical habitat within the recovery strategy may still represent important habitat for the species.

3.3.1.2 Significant Wildlife Habitat

A summary of candidate and confirmed SWH identified to date for primary and secondary producers and aquatic invertebrates is presented in Appendix C, Chapter 1. Desk-based ecosite analyses indicated that terrestrial crayfish could potentially occur throughout the AOI and LSA_{TER}, and the presence of terrestrial crayfish (visual incidental observations of chimneys/burrows) was confirmed during 2022 field studies

[5] In Ontario, “rainbow” and “rainbow mussel” are used interchangeably in SARO documents, while in the federal recovery strategy they are referred to as “rainbow”. For the BIS, the term “rainbow mussel” is used for clarity.

(see Section 3.3.2.1). Fourteen candidate SWH plots were found within the AOI in marshes and swamps. Chimneys or burrows were observed at 10 locations in the AOI, and one of those was identified to the digger crayfish species. Based on the MNRF's definition of terrestrial crayfish SWH, all 14 of these records are confirmed as SWH (see Appendix C, Chapter 1).

3.3.2 Presence and Distribution of Species of Interest

3.3.2.1 Species of Conservation Concern

A search of the datasets listed in **Table 1-1** revealed one species of conservation concern, the river bluet within the LSA_{AQU}. The river bluet is a species of damselfly with a provincial rank of S3, meaning that it is provincially rare. The river bluet was detected on the Teeswater River east (upstream) of the AOI (**Figure B-1**; **Table B-2**).

Zoetica's previous investigations of NHIC observation (not occurrence) data found that rainbow mussel has been recorded in the AOI and LSA_{AQU}. Rainbow mussel is provincially and federally listed as a species of Special Concern (see Appendix D of Zoetica's BPPA Report (Zoetica 2021)). Since writing the BPPA, Zoetica has received an updated version of the NHIC verified occurrence data but has not yet received the requested updated NHIC observation data. Once received by Zoetica, these data will be included in future iterations of the BIS Baseline Report. Since proposed critical habitat for rainbow mussel is defined within the AOI and LSA_{AQU} and is described as present in all segments of the Teeswater River where rainbow mussel occurs, the updated version of the NHIC observation data is likely to include rainbow mussel observations within these study areas.

During 2022 field studies, the presence of terrestrial crayfish (visual incidental observations of individuals and chimneys/burrows) including digger crayfish and Great Plains mudbug were confirmed. Digger crayfish and Great Plains mudbug are not a *SARA*- or *SARO*-listed species, but in Ontario have a NatureServe conservation status of S3, indicating that these species are vulnerable and at moderate risk of extirpation (NatureServe n.d.). Observations of terrestrial crayfish burrows were dispersed throughout the AOI and/or LSA_{TER} (**Figure B-2**; **Table B-3**). There was also a single observation of digger crayfish burrows in western AOI / LSA_{TER} (Grid square 6972; **Figure B-2**; **Table B-3**). Within the LSA_{AQU}, terrestrial crayfish burrows and visual observations of terrestrial crayfish were scattered throughout the GSWC (primarily on the eastern side) north of the AOI (**Figure B-2**; **Table B-3**) including burrows of Great Plains mudbug and a digger crayfish. Terrestrial crayfish burrows were also observed in the southern portion of the LSA_{AQU} near and within the Wingham Wetland Complex (**Figure B-2**, **Table B-3**).

During eDNA metabarcoding studies conducted in 2022 for the BIS (Appendix E, Chapter 1), digger crayfish were also detected in the fall at a reach on the Teeswater River in the northwest side of the AOI, at the outlet of Schmidt Lake, and at a wetland south of Cunningham Lake in the LSA_{AQU} north of the AOI (see Figure I-1 in Appendix E, Chapter 1).

3.3.2.2 Species of Interest to Stakeholders and Rights-holders

Other than terrestrial crayfish, no primary and secondary producer species of interest were mentioned during engagement conducted to date for the BIS. Terrestrial crayfish were also noted as species that occur in the Teeswater River system, and that they are easy to locate due to their chimney structures. Digger crayfish are also a species of conservation concern, and thus are discussed in Section 3.3.2.1. Future engagement may focus on species of interest to stakeholders and rights-holders, and if any primary and

secondary producer species are mentioned during future engagement, they will be reported in Chapter 8 in future iterations of the BIS Baseline Report.

3.3.2.3 Invasive Species

A search of the EDDMaps and GBIF datasets revealed one invasive primary and secondary producer species, rusty crayfish, reported within the LSA_{AQU}. Rusty crayfish was reported in the northern portion of the LSA_{AQU}, along the Teeswater River within the GSWC (**Figure B-1**; **Table B-2**). Rusty crayfish are thought to be introduced in Ontario by anglers from other areas who discard crayfish they were using as bait. Rusty crayfish are known to eat large amounts of aquatic vegetation and compete with other native crayfish for food and resources. Due to their aggressive nature, they are also better able to avoid being eaten by native fish relative to their native counterparts. Section 29 (4) of the Ontario Fishery Regulations (2007) prohibits the overland transport of all species of crayfish, both alive and dead, to avoid the spread of rusty crayfish to natural waterbodies. Rusty crayfish were also detected during eDNA metabarcoding studies conducted in the BIS study areas (see Appendix E, Chapter 1). Rusty crayfish were detected in both the summer and fall sampling events in reaches in the Teeswater River in the AOI, as well as in the summer at a reach of the Teeswater River in the GSWC in the LSA_{AQU} north of the AOI (see Figure I-2a in Appendix E, Chapter 1).

3.3.3 Additional Baseline Data Collection to Inform the IA

3.3.3.1 Community Characterization

In 2022, no comprehensive targeted studies were conducted to characterize community composition within the LSA_{AQU}. However, Tier 1 BIS field studies were initiated in 2022 in the LSA_{AQU} and may produce data relevant to primary and secondary producers. In addition, studies conducted as part of the EMBP (CanNorth 2021) were also initiated in 2022. The following sections outline Tier 1 BIS studies and EMBP studies that may produce data relevant to primary and secondary producers. At the time of writing the 2023 BIS Baseline Report (September 2023), data from these studies were not available. Once Zoetica receives these data, results relevant to biodiversity will be included in future iterations of the BIS Baseline Report.

3.3.3.1.1 Primary Producers

Some information, including information on algae and chlorophyll-a, was collected along with water samples as part of the EMBP (CanNorth 2021). Once Zoetica receives these data, results relevant to biodiversity will be included in future iterations of the BIS Baseline Report.

3.3.3.1.2 Aquatic and Semi-Aquatic Invertebrates (Secondary Producers)

In the summer and fall of 2022, eDNA metabarcoding field studies were conducted within watercourses, waterbodies, and wetlands in the LSA_{AQU} using primers targeted at fish and other vertebrates as well as invertebrates (Appendix E, Chapter 1). A total of 563 invertebrate species were detected within the LSA_{AQU}, including 126 insect families with 510 insect species, and 22 non-insect families including one diatom (class Bacillariophyceae) which is a primary producer (see Section 4.2.6 in Appendix E, Chapter 1). In addition to aquatic and semi-aquatic invertebrates detected through eDNA metabarcoding studies, several aquatic invertebrates were incidentally observed during 2022 field surveys for TEM, AHM, and eDNA within the AOI, LSA_{AQU}, or RSA_{AQU} (**Table B-4**). None of the aquatic invertebrates were recorded to the species level; thus, it is unclear whether they are species of interest.

3.3.3.1.3 Benthic Invertebrates

Benthic invertebrate studies were initiated in August 2022 alongside sediment collections in the LSA_{AQU} as part of the EMBP (CanNorth 2021). These studies also included the use of eDNA invertebrate primers to capture some aquatic and semi-aquatic invertebrate species. Once Zoetica receives these data, results relevant to biodiversity will be included in future iterations of the BIS Baseline Report.

3.3.3.1.4 Phytoplankton and Zooplankton

No phytoplankton or zooplankton studies have been conducted to date for the Project. Phytoplankton and zooplankton studies are planned as part of the EMBP (CanNorth 2021). Once Zoetica receives these data, results relevant to biodiversity will be included in future iterations of the BIS Baseline Report.

3.4 Discussion

Section 3.0 of the current Chapter 8 focused on analyses of desk-based data for primary and secondary producer species' habitat and observations. A search of existing datasets revealed proposed critical habitat for rainbow mussel within the AOI and LSA_{AQU}. The proposed critical habitat extends along the Teeswater River east of the AOI into the AOI and continues again north of the AOI along the Teeswater River in the GSWC. Searches of existing GBIF and NHIC data did not include reports of rainbow mussel in the Teeswater River; however, while Zoetica did not have an updated version of the NHIC observation data, a previous version of the NHIC observation data included rainbow mussel within the BIS study areas (see the BPPA Report (Zoetica 2021)). In addition, the proposed federal recovery strategy for rainbow mussel describes critical habitat as the reaches of the Saugeen River (including the Teeswater River) that include all contiguous ALIS segments from the uppermost stream segments with species present to the lowermost stream segments with species present. This indicates that rainbow mussel is likely present in the Teeswater River within the AOI and LSA_{AQU}. In addition, it is possible that rainbow mussel is present in the sections of the Teeswater River that are not included as critical habitat in the proposed federal recovery strategy. Tier 1 eDNA metabarcoding studies commenced in the summer of 2022 but did not detect rainbow in the Teeswater River. There are several possible reasons for the lack of detections of rainbow discussed in Appendix E, Chapter 1. However, given that proposed critical habitat exists in the Teeswater River it is assumed that rainbow occur in these areas.

In addition to important habitat reported in the AOI and LSA_{AQU}, one aquatic invertebrate species of conservation concern, river bluet, was detected during desk-based searches of databases and Tier 1 eDNA studies conducted in 2022 detected the digger crayfish, in the fall within the AOI / LSA_{TER} (see Appendix E, Chapter 1). Incidental observations recorded during Tier 1 BIS field studies conducted in the summer of 2022 revealed many terrestrial crayfish burrows in the AOI and LSA_{AQU}, including burrows belonging to digger crayfish and Great Plains mudbug (**Figure B-2**). Several visual observations of terrestrial crayfish (not identified to species) were also reported in the LSA_{AQU} north of the AOI. Future Tier 1 studies and targeted Tier 2 studies, should the SON-South Bruce site be selected, are likely to reveal additional aquatic invertebrate species of conservation concern (e.g., rainbow). Additionally, rusty crayfish, an invasive species was reported to occur in the LSA_{AQU} north of the AOI in desk-based sources and was detected in the AOI during Tier 1 eDNA metabarcoding studies. Data collected to date on species of interest will help Zoetica in planning future Tier 2 studies, should the SON-South Bruce site be selected.

3.4.1 Next Steps

To date, Tier 1 fieldwork has focussed on collecting aquatic habitat information from watercourses, waterbodies, and wetlands (see Appendix D, Chapter 1) and detecting aquatic biota through eDNA metabarcoding studies (see Appendix E, Chapter 1). Spring reconnaissance surveys to determine the extent of flooding of wetlands and spring eDNA metabarcoding were not conducted in 2022 but are planned for 2024. Spring surveys will determine whether the wetlands and first order streams that were dry during the summer surveys in 2022 are seasonally wetted and potentially provide habitat for primary and secondary producers. Data collected in the spring will help to identify the seasonal availability and potential use of aquatic habitats within the AOI and LSA_{AQU}. Once additional Tier 1 field data relevant to fish and fish habitat (e.g., spring eDNA results) are received by Zoetica, these data will be analyzed and included in this chapter in future iterations of the BIS Baseline Report.

In addition to Tier 1 studies conducted as part of the BIS, water quality studies including the collection of chlorophyll-a were carried out as part of the EMBP (CanNorth 2021) in 2021. Benthic invertebrate studies also planned as part of the EMBP commenced in the summer of 2022. Future iterations of the BIS Baseline Report will include summarizations of these data as they pertain to biodiversity. For example, the BIS may include reviews of primary and secondary producer data collected as part of the EMBP for any trends in abundance and biomass across various habitat types and geographical locations.

In addition, future Tier 2 baseline studies are planned to commence after site selection (if the SON-South Bruce site is selected) and are aimed at providing a more thorough characterization of fish and fish habitat within the BIS study areas. Once more is known about the fish community characterization in the BIS aquatic study areas (see Section 2.2.4.1), information gathered for primary and secondary producers will be used to understand and characterize food web interactions within these study areas.

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APPENDIX A – SUPPLEMENTARY INFORMATION FOR FISH

This appendix provides supplementary information for fish discussed in Section 2.0.

A.1 Tables

Table A-1. List of regulated and non-regulated invasive fish species of concern in Ontario. This list does not imply potential occurrence in the SON-South Bruce area, as several invasive species "on the radar" have not yet been found in Ontario or even Canada; however, these species are known to have significant ecological, social, health, and/or economic impacts in other areas of North America and worldwide, where they have been introduced. Species highlighted grey are those that have EDDMapS Ontario records within the extent of the BIS study areas. Note that species may have been confirmed within the study areas through other databases, inventories, studies, or local observations; however, these data sources need to be further investigated.

Subgroup	Common Name	Scientific Name	Ontario *ISA*[1]		Aquatic Invasive Species Regulations[2]			Ont. ISAP[3]	ISC[4]
			PRO.	RES.	Import	Possess, Transport, Release	Non-Indigenous		
Large-bodied Fishes	Grass carp	*Ctenopharyngodon idella*	X		X	X		X	X
Large-bodied Fishes	Silver carp	*Hypopthalmichthys molitrix*	X		X	X		X	X
Large-bodied Fishes	Bighead carp	*Hypopthalmichthys nobilis*	X		X	X		X	X
Large-bodied Fishes	Black carp	*Mylopharyngodon piceus*	X		X	X		X	X
Large-bodied Fishes	Snakeheads	All species in the family Channidae	X			X		X	X
Large-bodied Fishes	Zander	*Sander lucioperca*	X					X	
Large-bodied Fishes	Wels catfish	*Silurus glanis*	X					X	
Small-bodied Fishes	Stone mokoro	*Pseudorasbora parva*	X					X	
Small-bodied Fishes	Round goby	*Neogobius melanostomus*				X		X	X
Large-bodied Fishes	Rudd	*Scardinius erythrophthalmus*				X		X	
Small-bodied Fishes	Eurasian ruffe	*Gymnocephalus cernua*				X		X	
Small-bodied Fishes	Tubenose goby	*Proterorhinus semilunaris*				X		X	
Large-bodied Fishes	Prussian carp	*Carassius gibelio*						X	X
Other Fishes	Sea lamprey	*Petromyzon marinus*						X	X
Large-bodied Fishes	Goldfish	*Carassius auratus*						X	
Large-bodied Fishes	Tench	*Tinca tinca*						X	
Small-bodied Fishes	Rainbow smelt	*Osmerus mordax*						X	
Large-bodied Fishes	White perch	*Morone americana*				X			

Notes:

1. Prohibited "PRO." and Restricted "RES." species regulated under the Ontario *Invasive Species Act* (*ISA*) are presented on the Ontario Ministry of Natural Resources and Forestry's (MNRF) website, accessed on July 12, 2021: https://www.ontario.ca/page/managing-invasive-species-ontario
2. The federal Aquatic Invasive Species Regulations (SOR/2015-121) under the *Fisheries Act* includes schedules of Species Subject to Prohibitions and Controls (Part 2) and Species Subject to Controls Only in Areas Where They Are Not Indigenous (Part 3). Within the schedule Part 2, certain invasive species are prohibited from Importation, Possession, Transportation, and/or Release. The regulations are current to June 28, 2021; accessed on July 27, 2021.
3. Ontario's Invading Species Awareness Program (ISAP) is a partnership between the MNRF and the Ontario Federation of Anglers and Hunters. The webpages for Invasive Aquatic Plants, Forest Pests & Pathogens, Invasive Fish, Invasive Invertebrates, Invasive Terrestrial Plants, and Invasive Wildlife were accessed on July 27, 2021: http://www.invadingspecies.com/invaders/
4. The Invasive Species Centre (ISC) is a resource for Ontario and the rest of Canada. Based in Sault Ste. Marie, Ontario, the Board of Directors Organizations include the Great Lakes Fishery Commission, Grand Council Treaty #3, City of Ottawa, International Joint Commission, Wildlife Habitat Canada, University of Waterloo, BioForest, Nature Conservancy of Canada, Natural Resources Canada, Fisheries and Oceans Canada, and the CFIA. The webpages for Invasive Fish, Invasive Plants, Invasive Insects, Invasive Aquatic Plants, and Invasive Pathogens were accessed on July 27, 2021: https://www.invasivespeciescentre.ca/invasive-species/

Table A-2. Fish species of interest reported in GBIF and EDDMapS records within the BIS study area.

Grid	Source	Species	Count	Coordinates	AOI	LSA_{AQU}	RSA_{AQU}
7027	EDDMapS	Rainbow smelt	U	470809, 4927520	0	0	1
7027	EDDMapS	Rainbow smelt	U	470450, 4927594	0	0	1
7027	EDDMapS	White Perch	U	470851, 4927475	0	0	1
7228	GBIF	Black Redhorse	2	-	0	0	1
7328	EDDMapS	Round goby	U	473809, 4928022	0	0	1
7426	EDDMapS	Round goby	6	474197, 4926016	0	0	1
7789	GBIF	Greater Redhorse	1	-	0	0	1
7806	GBIF	Northern Brook Lamprey	48	-	0	0	1
8093	GBIF	Greater Redhorse	1	-	0	0	1
Notes: See **Figure A-1** for Grid locations of masked observations. Coordinates are not provided due to the sensitive nature of provincially rare species. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries.							

Table A-3. Fish species detected in the LSA_{AQU}, RSA_{AQU}, potential reference areas, and Lake Huron.

Common Name	Scientific Name	AOI	LSA_{AQU}	Greenock Swamp Wetland Complex[1]	RSA_{AQU}	RSA_{AQU} outside LSA_{AQU}	Potential Reference Areas (Outside RSA_{AQU})	Lake Huron
Catostomidae – suckers								
Black Redhorse[2]	*Moxostoma duquesnei*	-	-	-	Y	Y	-	-
Golden Redhorse	*Moxostoma erythrurum*	-	-	-	Y	Y	Y	-
Greater Redhorse[3]	*Moxostoma valenciennesi*	-	Y	-	Y	Y	-	-
Longnose Sucker	*Catostomus catostomus*	-	-	-	-	-	-	Y
Northern Hog Sucker	*Hypentelium nigricans*	Y	Y	-	Y	Y	Y	-
Shorthead Redhorse	*Moxostoma macrolepidotum*	-	Y	-	Y	Y	Y	Y
Silver Redhorse	*Moxostoma anisurum*	-	-	-	Y	Y	Y	-
White Sucker	*Catostomus commersonii*	Y	Y	Y	Y	Y	Y	Y
Centrarchidae – sunfishes								
Black Crappie	*Pomoxis nigromaculatus*	-	-	-	-	-	-	Y
Bluegill	*Lepomis macrochirus*	-	Y	Y	Y	Y	Y	Y
Green Sunfish	*Lepomis cyanellus*	-	-	-	-	-	Y	-

Common Name	Scientific Name	AOI	LSA_{AQU}	Greenock Swamp Wetland Complex[1]	RSA_{AQU}	RSA_{AQU} outside LSA_{AQU}	Potential Reference Areas (Outside RSA_{AQU})	Lake Huron
Largemouth Bass	*Micropterus salmoides*	-	Y	Y	Y	Y	Y	Y
Pumpkinseed	*Lepomis gibbosus*	-	Y	Y	Y	Y	Y	Y
Rock Bass	*Ambloplites rupestris*	Y	Y	Y	Y	Y	Y	Y
Smallmouth Bass	*Micropterus dolomieu*	Y	Y	Y	Y	Y	Y	Y
Cottidae – sculpins								
Mottled Sculpin	*Cottus bairdii*	-	Y	-	Y	Y	Y	Y
Slimy Sculpin	*Cottus cognatus*	-	-	-	-	-	Y	-
Leuciscidae – minnows								
Blackchin Shiner	*Notropis heterodon*	-	-	-	Y	Y	Y	-
Blacknose Dace	*Rhinichthys atratulus*	-	Y	-	Y	Y	Y	Y
Blacknose Shiner	*Notropis heterolepis*	-	Y	-	Y	Y	Y	-
Bluntnose Minnow	*Pimephales notatus*	Y	Y	Y	Y	Y	Y	Y
Brassy Minnow	*Hybognathus hankinsoni*	-	Y	-	Y	Y	Y	-
Common Shiner	*Luxilus cornutus*	Y	Y	Y	Y	Y	Y	Y
Creek Chub	*Semotilus atromaculatus*	Y	Y	Y	Y	Y	Y	Y
Emerald Shiner	*Notropis atherinoides*	Y	Y	Y	Y	Y	Y	-
Fathead Minnow	*Pimephales promelas*	-	Y	-	Y	Y	Y	Y
Finescale Dace	*Chrosomus neogaeus*	-	Y	-	Y	Y	Y	Y
Golden Shiner	*Notemigonus crysoleucas*	-	Y	-	Y	Y	Y	Y
Hornyhead Chub	*Nocomis biguttatus*	Y	Y	-	Y	Y	Y	-
Longnose Dace	*Rhinichthys cataractae*	-	Y	-	Y	Y	Y	-
Mimic Shiner	*Notropis volucellus*	-	-	-	Y	Y	Y	-
Northern Pearl Dace[4]	*Margariscus nachtriebi*	-	-	-	Y	Y		
Northern Redbelly Dace	*Chrosomus eos*	-	Y	Y	Y	Y	Y	Y
Pugnose Shiner	*Notropis anogenus*	-	-	-	Y	Y	-	-
Redfin Shiner	*Lythrurus umbratilis*	Y	Y	-	Y	Y	-	-
River Chub	*Nocomis micropogon*	-	Y	-	Y	Y	Y	-
Rosyface Shiner	*Notropis rubellus*	-	-	-	Y	Y	Y	-
Sand Shiner	*Notropis stramineus*	-	-	-	Y	Y	Y	-
Spotfin Shiner	*Cyprinella spiloptera*	-	-	-	Y	Y	Y	-
Spottail Shiner	*Notropis hudsonius*	-	-	-	Y	Y	Y	Y
Striped Shiner[4]	*Luxilus chrysocephalus*	-	-	-	Y	Y	-	-

Common Name	Scientific Name	AOI	LSA_{AQU}	Greenock Swamp Wetland Complex[1]	RSA_{AQU}	RSA_{AQU} outside LSA_{AQU}	Potential Reference Areas (Outside RSA_{AQU})	Lake Huron
Esocidae – pikes								
Muskellunge	*Esox masquinongy*	-	-	-	Y	Y	Y	Y
Northern Pike	*Esox lucius*	-	Y	Y	Y	Y	Y	
Gasterosteidae – sticklebacks								
Brook Stickleback	*Culaea inconstans*	Y	Y	Y	Y	Y	Y	Y
Ninespine Stickleback	*Pungitius pungitius*	-	Y	Y	Y	Y	-	-
Threespine Stickleback[2]	*Gasterosteus aculeatus*	-	-	-	Y	Y	-	-
Gadidae – codfishes								
Burbot	*Lota lota*	-	-	-	-	-	-	Y
Percidae – perches and darters								
Blackside Darter	*Percina maculata*	Y	Y	-	Y	Y	Y	-
Fantail Darter	*Etheostoma flabellare*	-	-	-	Y	Y	Y	-
Greenside Darter	*Etheostoma blennioides*	Y	Y	-	Y	-	-	-
Iowa Darter	*Etheostoma exile*	-	Y	Y	Y	Y	Y	-
Johnny Darter	*Etheostoma nigrum*	-	Y	Y	Y	Y	Y	Y
Least Darter	*Etheostoma microperca*	-	-	-	Y	Y	Y	-
Logperch	*Percina caprodes*	-	-	-	Y	Y	Y	-
Rainbow Darter	*Etheostoma caeruleum*	Y	Y	-	Y	Y	Y	Y
Sauger	*Sander canadensis*	-	-	-	-	-	-	Y
Walleye	*Sander vitreus*	-	Y	Y	Y	-	Y	Y
Yellow Perch	*Perca flavescens*	-	Y	Y	Y	Y	Y	Y
Umbridae – mudminnows								
Central Mudminnow	*Umbra limi*	-	Y	Y	Y	Y	Y	Y
Salmonidae – trouts and salmons								
Bloater	*Coregonus hoyi*	-	-	-	-	-	-	Y
Brook Trout	*Salvelinus fontinalis*	Y	Y	-	Y	Y	Y	Y
Brown Trout	*Salmo trutta*	-	-	-	Y	Y	Y	Y
Chinook Salmon	*Oncorhynchus tshawytscha*	-	-	-	Y	Y	Y	Y
Coho Salmon	*Oncorhynchus kisutch*	-	-	-	Y	Y	Y	Y
Lake Trout	*Salvelinus namaycush*	-	-	-	-	-	-	Y
Lake Whitefish	*Coregonus clupeaformis*	-	-	-	-	-	-	Y
Pink Salmon	*Oncorhynchus gorbuscha*	-	-	-	-	-	-	Y

Common Name	Scientific Name	AOI	LSA_{AQU}	Greenock Swamp Wetland Complex[1]	RSA_{AQU}	RSA_{AQU} outside LSA_{AQU}	Potential Reference Areas (Outside RSA_{AQU})	Lake Huron
Rainbow Trout	*Oncorhynchus mykiss*	-	Y	-	Y	Y	Y	Y
Round Whitefish	*Prosopium cylindraceum*	-	-	-	-	-	-	Y
Sockeye Salmon[5]	Oncorhynchus nerka	-	-	-	Y	Y	Y	-
Splake	*Salvelinus fontinalis x S. namaycush*	-	-	-	Y	Y	Y	-
Acipenseridae – sturgeons								
Lake Sturgeon[2]	*Acipenser fulvescens*	-	-	-	Y	Y	-	-
Amiidae – bowfins								
Bowfin	*Amia calva*	-	-	-	-	-	-	Y
Atherinopsidae – New World silversides								
Brook Silverside	*Labidesthes sicculus*	Y	Y	-	Y	Y	-	Y
Clupeidae – herrings								
Alewife	*Alosa pseudoharengus*	-	-	-	Y	Y	Y	-
Gizzard Shad	*Dorosoma cepedianum*	-	-	-	Y	Y	Y	-
Cyprinidae – carps								
Common Carp	*Cyprinus carpio*	Y	Y	-	Y	Y	-	Y
Fundulidae – topminnows								
Banded Killifish	*Fundulus diaphanus*	-	-	-	-	-	-	Y
Gobiidae – gobies								
Round Goby[2]	*Neogobius melanostomus*	-	-	-	Y	Y	-	-
Ictaluridae – North American catfishes								
Black Bullhead	*Ameiurus melas*	-	-	-	Y	Y	Y	Y
Brown Bullhead	*Ameiurus nebulosus*	-	Y	Y	Y	Y	Y	Y
Channel Catfish	Ictalurus punctatus	-	-	-	Y	Y	Y	Y
Stonecat	*Noturus flavus*	-	Y	-	Y	Y	Y	-
Tadpole Madtom	*Noturus gyrinus*	-	Y	-	Y	Y	-	-
Yellow Bullhead	*Ameiurus natalis*	-	Y	-	Y	Y	Y	-
Lepisosteidae – gars								
Longnose Gar	*Lepisosteus osseus*	-	-	-	-	-	-	Y
Moronidae – temperate basses								
White Bass	*Morone chrysops*	-	-	-	-	-	-	Y
White Perch	*Morone americana*	-	-	-	-	-	-	Y
Osmeridae – smelts								

Common Name	Scientific Name	AOI	LSA_{AQU}	Greenock Swamp Wetland Complex[1]	RSA_{AQU}	RSA_{AQU} outside LSA_{AQU}	Potential Reference Areas (Outside RSA_{AQU})	Lake Huron
Rainbow Smelt	*Osmerus mordax*	-	-	-	Y	Y	Y	Y
Petromyzontidae – lampreys								
Northern Brook Lamprey	*Ichthyomyzon fossor*	-	-	-	Y	Y	-	-
Sea Lamprey	*Petromyzon marinus*	-	-	-	Y	Y	Y	-
Sciaenidae – drums and croakers								
Freshwater Drum	*Aplodinotus grunniens*	-	-	-	-	-	-	Y
	Total	***17***	***43***	***20***	***72***	***70***	***62***	***51***

Notes:

1. Data only includes what is reported in the Greenock Swamp ANSI inventory document (Johnson 1994)
2. Round goby, threespine stickleback, black redhorse, and lake sturgeon were reported in NHIC Occurrence, GBIF, or EDDMapS Ontario datasets at the confluence of the Saugeen River with Lake Huron but were not reported in the MNRF ARA dataset within Lake Huron. However, these species likely occur in Lake Huron.
3. Greater redhorse NHIC 1 km^2 blocks partially overlap the LSA_{AQU} but this species may not be present in the LSA_{AQU} as they can occur anywhere within the 1 km^2 grids.
4. Northern pearl dace and striped shiner were reported in the RSA_{AQU} in GBIF records but not in the MNRF ARA database.
5. Sockeye salmon is likely a misidentification of another salmon species, as sockeye are not known to be present in Lake Huron and the Saugeen River

Table A-4. Species of fish known to occur in the Teeswater River upstream and downstream of the AOI and potential reference rivers. Data from the MNRF Aquatic Resource Area Polygon dataset. Note: Section number refers to the section of the Teeswater River defined on Figure A-2.

Species		Teeswater River					Saugeen River	Potential Reference Rivers		
Common Name	Scientific Name	Section 1	Section 2	Section 3	Section 4 & 5	Section 6 & 7	Main Section	Beatty Saugeen	North Saugeen Section 1	North Saugeen Section 2
	Temperature Regime	Cold	Cold	Cool	Cool	Warm	Cold	Cold	Cool	Cool
Catostomidae - suckers										
Black Redhorse	*Moxostoma duquesnei*	-	-	-	-	-	Y	-	-	-
Golden Redhorse	*Moxostoma erythrurum*	-	-	-	-	Y	Y	-	-	-
Greater Redhorse	*Moxostoma valenciennesi*	-	-	-	Y	-	-	-	-	-
Northern Hog Sucker	*Hypentelium nigricans*	Y	Y	-	-	-	-	-	-	-
Shorthead Redhorse	*Moxostoma macrolepidotum*	-	-	-	-	-	Y	-	-	-
Silver Redhorse	*Moxostoma anisurum*	-	-	-	-	-	Y	-	-	-
White Sucker	*Catostomus commersonii*	Y	Y	-	Y	Y	Y	Y	Y	-
Centrarchidae -sunfishes										
Largemouth Bass	*Micropterus salmoides*	-	-	Y	Y	Y	-	-	-	-
Pumpkinseed	*Lepomis gibbosus*	-	-	-	Y	Y	Y	Y	-	-
Rock Bass	*Ambloplites rupestris*	Y	Y	Y	Y	Y	Y	Y	Y	-
Smallmouth Bass	*Micropterus dolomieu*	Y	Y	Y	Y	Y	Y	-	Y	Y
Cottidae - sculpins										
Mottled Sculpin	*Cottus bairdii*	Y	-	-	-	-	-	Y	-	-
Leuciscidae - minnows										
Blackchin Shiner	*Notropis heterodon*	-	-	-	-	-	-	Y	-	-
Blacknose Dace	*Rhinichthys atratulus*	Y	-	-	Y	-	Y	Y	Y	-
Blacknose Shiner	*Notropis heterolepis*	Y	-	-	-	-	-	Y	-	-
Bluntnose Minnow	*Pimephales notatus*	Y	Y	-	-	Y	Y	Y	-	-
Brassy Minnow	*Hybognathus hankinsoni*	-	-	-	-	-	Y	-	-	-
Common Shiner	*Luxilus cornutus*	Y	Y	Y	Y	Y	Y	Y	Y	Y
Creek Chub	*Semotilus atromaculatus*	Y	Y	Y	Y	Y	Y	Y	Y	Y
Emerald Shiner	*Notropis atherinoides*	-	Y	-	-	-	Y	Y	Y	-
Fathead Minnow	*Pimephales promelas*	-	-	-	-	-	Y	Y	-	-
Finescale Dace	*Chrosomus neogaeus*	-	-	-	Y	-	-	-	-	-
Hornyhead Chub	*Nocomis biguttatus*	Y	Y	Y	Y	Y	Y	Y	Y	Y
Longnose Dace	*Rhinichthys cataractae*	-	-	-	Y	Y	y	Y	Y	Y

Species		Teeswater River					Saugeen River	Potential Reference Rivers		
Common Name	**Scientific Name**	**Section 1**	**Section 2**	**Section 3**	**Section 4 & 5**	**Section 6 & 7**	**Main Section**	**Beatty Saugeen**	**North Saugeen Section 1**	**North Saugeen Section 2**
	Temperature Regime	**Cold**	**Cold**	**Cool**	**Cool**	**Warm**	**Cold**	**Cold**	**Cool**	**Cool**
Mimic Shiner	*Notropis volucellus*	-	-	-	-	-	Y	-	-	-
Northern Redbelly Dace	*Chrosomus eos*	Y	-	-	-	-	Y	Y	-	-
Pugnose Shiner	*Notropis anogenus*	-	-	-	Y	-	-	-	-	-
Redfin Shiner	*Lythrurus umbratilis*	-	Y	-	-	Y	-	-	-	-
River Chub	*Nocomis micropogon*	-	-	Y	Y	Y	Y	Y	-	-
Rosyface Shiner	*Notropis rubellus*	Y	-	-	Y	Y	Y	Y	-	-
Sand Shiner	*Notropis stramineus*	-	-	-	-	-	Y	-	-	-
Spotfin Shiner	*Cyprinella spiloptera*	-	-	-	-	-	Y	-	Y	-
Spottail Shiner	*Notropis hudsonius*	-	-	-	-	-	-	Y	-	-
Esocidae - pikes										
Muskellunge	*Esox masquinongy*	-	-	-	-	-	Y	-	-	-
Northern Pike	*Esox lucius*	-	-	Y	Y	Y	Y	-	-	-
Gasterosteidae - sticklebacks										
Brook Stickleback	*Culaea inconstans*	-	Y	-	Y	-	Y	Y	-	-
Threespine stickleback	*Gasterosteus aculeatus*	-	-	-	-	-	Y	-	-	-
Percidae – perches and darters										
Blackside Darter	*Percina maculata*	-	Y	Y	Y	Y	Y	-	-	Y
Fantail Darter	*Etheostoma flabellare*	-	-	-	Y	-	Y	Y	-	-
Greenside Darter	*Etheostoma blennioides*	-	Y	-	-	-	-	-	-	-
Iowa Darter	*Etheostoma exile*	-	-	Y	Y	Y	-	Y	-	-
Johnny Darter	*Etheostoma nigrum*	-	-	Y	Y	Y	Y	Y	Y	-
Least Darter	*Etheostoma microperca*	Y	-	-	-	-	-	-	Y	-
Rainbow Darter	*Etheostoma caeruleum*	Y	Y	-	Y	Y	Y	Y	Y	-
Yellow Perch	*Perca flavescens*	-	-	-	Y	-	Y	-	-	-
Umbridae - mudminnows										
Central Mudminnow	*Umbra limi*	Y	-	Y	Y	Y	Y	Y	-	-
Salmonidae – trouts and salmons										
Brook Trout	*Salvelinus fontinalis*	Y	Y	-	-	Y	Y	Y	-	-

Species		Teeswater River					Saugeen River	Potential Reference Rivers		
Common Name	**Scientific Name**	**Section 1**	**Section 2**	**Section 3**	**Section 4 & 5**	**Section 6 & 7**	**Main Section**	**Beatty Saugeen**	**North Saugeen Section 1**	**North Saugeen Section 2**
	Temperature Regime	**Cold**	**Cold**	**Cool**	**Cool**	**Warm**	**Cold**	**Cold**	**Cool**	**Cool**
Brown Trout	*Salmo trutta*	-	-	-	-	-	Y	Y	-	-
Chinook Salmon	*Oncorhynchus tshawytscha*	-	-	-	-	-	Y	-	-	-
Coho Salmon	*Oncorhynchus kisutch*	-	-	-	-	-	Y	-	-	-
Rainbow Trout	*Oncorhynchus mykiss*	-	-	-	-	-	Y	Y	Y	-
Sockeye Salmon[1]	*Oncorhynchus nerka*	-	-	-	-	-	Y	-	-	-
Splake	*Salvelinus fontinalis x S. namaycush*	-	-	-	-	-	Y	-	-	-
Acipenseridae - sturgeons										
Lake Sturgeon	*Acipenser fulvescens*	-	-	-	-	-	Y	-	-	-
Atherinopsidae – New World silversides										
Brook Silverside	*Labidesthes sicculus*	Y	Y	-	-	-	-	-	-	-
Clupeidae - herrings										
Alewife	*Alosa pseudoharengus*	-	-	-	-	-	Y	-	-	-
Gizzard Shad	*Dorosoma cepedianum*	-	-	-	-	-	Y	-	-	-
Cyprinidae - carps										
Common Carp	*Cyprinus carpio*	-	Y	-	-	-	-	-	-	-
Gobiidae - gobies										
Round Goby	*Neogobius melanostomus*	-	-	-	-	-	Y	-	-	-
Ictaluridae – North American catfishes										
Brown Bullhead	*Ameiurus nebulosus*	Y	-	-	-	-	-	Y	Y	-
Channel Catfish	*Ictalurus punctatus*	-	-	-	-	Y	-	-	-	-
Stonecat	*Noturus flavus*	Y	-	Y	Y	Y	Y	-	-	-
Tadpole Madtom	*Noturus gyrinus*	-	-	Y	Y	-	-	-	-	Y
Yellow Bullhead	*Ameiurus natalis*	Y	-	Y	Y	-	-	-	-	-
Osmeridae - smelts										
Rainbow Smelt	*Osmerus mordax*	-	-	-	-	-	Y	-	-	-
Petromyzontidae – lampreys										
Northern Brook Lamprey	*Ichthyomyzon fossor*	-	-	-	-	-	Y	-	-	-
Sea Lamprey	*Petromyzon marinus*	-	-	-	-	-	Y	Y	-	-
	Total	***21***	***17***	***15***	***25***	***23***	***48***	***29***	***15***	***7***

Note: 1. Sockeye salmon is likely a misidentification of another salmonid species as sockeye are not known to occur in Lake Huron.

Table A-5. Species of fish reported in lakes in the LSA_{AQU} and in potential reference lakes.

Species		Larger Lakes in LSA_{AQU}					Reference Lakes			
Common Name	**Scientific Name**	**Schmidt**	**Cunningham**	**Clam**	**Silver**	**McFarlane**	**Arran**	**Hines**	**Robson**	**Clarke's**
	Temperature Regime	**Cool**	**Cool**	**Cool**	**Cool**	**Cool**	**Cool**	**Cold**	**Cool**	**Cold**
Catostomidae - suckers										
Shorthead Redhorse	Moxostoma macrolepidotum	-	-	Y	-	-	-	-	-	-
White Sucker	Catostomus commersonii	-	-	Y	Y	-	Y	Y	Y	Y
Centrarchidae - sunfishes										
Bluegill	Lepomis macrochirus	-	-	-	Y	-	-	Y	Y	-
Green Sunfish	Lepomis cyanellus	-	-	-	-	-	-	Y	Y	Y
Largemouth Bass	Micropterus salmoides	-	-	Y	Y	Y	Y	-	Y	-
Pumpkinseed	Lepomis gibbosus	-	-	Y	Y	Y	Y	Y	Y	-
Rock Bass	Ambloplites rupestris	-	-	Y	Y	Y	Y	Y	Y	Y
Smallmouth Bass	Micropterus dolomieu	-	-	Y	Y	Y	Y	Y	Y	Y
Leuciscidae - minnows										
Blackchin Shiner	Notropis heterodon	-	-	-	-	-	Y	-	-	-
Blacknose Shiner	Notropis heterolepis	-	-	Y	-	-	Y	Y	-	-
Bluntnose Minnow	Pimephales notatus	-	-	-	Y	Y	Y	Y	Y	Y
Brassy Minnow	Hybognathus hankinsoni	-	-	-	-	-	Y	-	-	-
Common Shiner	Luxilus cornutus	-	-	-	-	-	Y	Y	Y	Y
Creek Chub	Semotilus atromaculatus	-	-	-	-	Y	Y	Y	-	-
Emerald Shiner	Notropis atherinoides	-	-	-	-	-	Y	-	-	-
Fathead Minnow	Pimephales promelas	-	-	Y	-	-	-	-	-	-
Finescale Dace	Chrosomus neogaeus	-	-	Y	-	-	-	-	-	-
Golden Shiner	Notemigonus crysoleucas	-	-	-	-	-	Y	-	-	-
River Chub	Nocomis micropogon	-	-	-	-	-	Y	-	-	-
Spottail Shiner	Notropis hudsonius	-	-	-	-	-	-	-	Y	-
Esocidae - pikes										
Northern Pike	Esox lucius	Y	Y	Y	Y	Y	Y	Y	Y	Y
Gasterosteidae - sticklebacks										
Brook Stickleback	Culaea inconstans	-	-	Y	-	-	-	-	-	-
Percidae – perches and darters										
Iowa Darter	Etheostoma exile	-	-	Y	Y	-	Y	Y	Y	Y
Johnny Darter	Etheostoma nigrum	-	-	-	-	-	Y	-	-	-
Logperch	Percina caprodes	-	-	-	-	-	-	Y	Y	Y
Walleye	Sander vitreus	-	-	-	Y	-	-	-	-	-

Species		Larger Lakes in LSA_{AQU}					Reference Lakes			
Common Name	**Scientific Name**	**Schmidt**	**Cunningham**	**Clam**	**Silver**	**McFarlane**	**Arran**	**Hines**	**Robson**	**Clarke's**
	Temperature Regime	**Cool**	**Cool**	**Cool**	**Cool**	**Cool**	**Cool**	**Cold**	**Cool**	**Cold**
Yellow Perch	Perca flavescens	Y	Y	Y	Y	Y	Y	Y	Y	Y
Umbridae - mudminnows										
Central Mudminnow	Umbra limi	-	-	Y	-	Y	-	-	-	-
Ictaluridae – North American catfishes										
Brown Bullhead	Ameiurus nebulosus	-	-	Y	Y	-	Y	-	-	-
Channel Catfish	Ictalurus punctatus	-	-	-	-	-	Y	-	-	-
Yellow Bullhead	Ameiurus natalis	-	-	-	-	-	Y	-	-	-
	Total	***2***	***2***	***15***	***12***	***9***	***21***	***14***	***14***	***10***

Table A-6. Incidental observations of fish rates during TEM, AHM, and eDNA within the AOI, LSA_{AQU}, or RSA_{AQU} from field surveys in 2022.

Common Name	Scientific Name	SAR	Rare	Introduced /Invasive	Notes
Fish (True Fishes)					
Brook trout	*Salvelinus fontinalis*	N	N	N	
Bullhead sp.	Ameiurus sp.	NA	NA	NA	
Centrarchid (sunfishes)	Centrarchidae sp.	NA	NA	NA	
Chub	Cyprinidae sp.	NA	NA	NA	
Cyprinid sp.	Cyprinidae sp.	NA	NA	NA	
Dace minnows	Cyprinidae spp.	NA	NA	NA	
Darter	Percidae sp.	NA	NA	NA	
Minnows	Leuciscidae sp.	NA	NA	NA	
Sculpin sp.	Cottoidea sp.	NA	NA	NA	
Stickleback	Gasterosteidae sp.	NA	NA	NA	
Sucker	Catostomidae sp.	NA	NA	NA	
Trout	Salmonidae sp.	NA	NA	NA	
Unidentified Fishes	NA	NA	NA	NA	Included records of Baitfish, Small fish, and YOY fish from AHM and EDNA surveys

Table A-7. Life history characteristics of species reported in the AOI, LSA_{AQU}, and RSA_{AQU} through desk-based searches of datasets listed in **Table 1-1**. Life history information collated from the Ontario Freshwater Fishes Life History Database.

Species (Scientific Name)	Common Name(s)	General Abundance[1]	Economic Importance	General Habitat	Environment	Trophic Class	Thermal Regime	Habitat Preference	Spawning Habitat	Spawning Season	Spawning Month(s)	Spawning Temp (°C)	Fecundity	Nursery Habitat	Age at Maturity (years)	Lifespan (years)
Catostomidae - suckers																
Moxostoma duquesnei	Black Redhorse	rare	none	riverine	benthic	invertivore	warm	• pools and runs of creeks and small to medium rivers with sand, gravel and rocky substrates where siltation is minimal	• riverine	spring	May-June	14-21	1,343-17,252	riverine	3-6	10-17
Moxostoma erythrurum	Golden Redhorse	uncommon	none	riverine	benthic	invertivore	warm	• pools, runs and riffles of creeks and small to large rivers with varied substrates and moderate gradients; preferred water temperature range 26-27.5°C	• riverine	spring	May-June	10-22.5	5,041-35,000	riverine	3 (m) 4 (f)	7-11
Moxostoma valenciennesi	Greater Redhorse	uncommon	none	lacustrine riverine	benthic	invertivore	warm	• moderate to swift current riffles, runs and pools of medium to large rivers with clear water and substrates of gravel, cobble or boulders; lakes	• riverine	spring	May-June	13-19	25,190-71,920	riverine	5 (m) 6 (f)	12-20
Erimyzon sucetta	Lake Chubsucker	rare	none	lacustrine riverine	benthic	invertivore herbivore	warm	• clear, slow streams, shallow weedy lakes, ponds, wetlands and impoundments with clay, silt, sand or detritus substrates; preferred water temperature range 28-34°C	• lacustrine riverine	spring	May-June	16-23	998-18,478	lacustrine riverine	2-3	6-8
Catostomus catostomus	Longnose Sucker	common	forage fish; commercial fishery	lacustrine riverine	benthic	invertivore	cool	• clear, cold, deep water (up to 55 m) of lakes and tributary streams; occasionally brackish water; preferred water temperature range 8-17°C	• riverine	spring	April-May	5-15	10,270-89,000	lacustrine	4-6 (m) 5-7 (f)	19-28
Hypentelium nigricans	Northern Hog Sucker	common	baitfish (occasional)	riverine	benthic	invertivore herbivore	warm	• riffles runs and pools of clear creeks and small rivers with gravel, cobble substrates; rare in lakes; preferred water temperature range 25-29°C	• riverine	spring	April-May	11-22	30000	riverine	2-3 (m) 3-4 (f)	10-11
Moxostoma macrolepidotum	Shorthead Redhorse	common	none	lacustrine riverine	benthic	invertivore	warm	• pools runs and riffles in small to large rivers with sand and gravel substrates and lake shallows; preferred water temperature range 26-27.5°C	• Gravel beds in riffle areas in watercourses	spring	April-June	10-18	7,544 - 44,000	riverine	3-5	11-20
Moxostoma anisurum	Silver Redhorse	uncommon	none	lacustrine riverine	benthic	invertivore	cool	• mud- to rock-bottomed pools and runs of small to large rivers; occasionally lakes and impoundments	• riverine	spring	April-June	9-14.5	14,910-36,340	riverine	5-8	12-26
Catostomus commersonii	White Sucker	common	forage fish, baitfish, coarse fish	lacustrine riverine	benthic	invertivore detritivore	cool	• pools and riffles of creeks and rivers, warm shallow lakes and embayments of larger lakes, usually at depths of 6-9 m; preferred water temperature range 17-24°C	• Gravel beds in watercourses	spring	April-June	10-20	12,500 - 140,000	lacustrine riverine	2-3 (m) 3-4 (f)	15-25
Centrarchidae – sunfishes																
Pomoxis nigromaculatus	Black Crappie	common	pan fish	lacustrine riverine	benthopelagic	invertivore carnivore	cool	• clear, quiet waters of large ponds, small lakes, bays and shallower areas of larger lakes and areas of low flow in larger rivers, associated with abundant aquatic vegetation and mud or sand substrate; preferred water temperature range 21-25°C	• Sand or mud substrate in lakes or watercourses	spring	May-June	14-22	10,836 - 334,396	lacustrine riverine	2-3	8-13

Species (Scientific Name)	Common Name(s)	General Abundance[1]	Economic Importance	General Habitat	Environment	Trophic Class	Thermal Regime	Habitat Preference	Spawning Habitat	Spawning Season	Spawning Month(s)	Spawning Temp (°C)	Fecundity	Nursery Habitat	Age at Maturity (years)	Lifespan (years)
Lepomis macrochirus	Bluegill	common	pan fish	lacustrine riverine	benthopelagic	invertivore	warm	• vegetated small lakes, ponds, shallow weedy bays of larger lakes and pools of creeks and small to large rivers; preferred water temperature range 24-30°C	• lacustrine riverine	summer	June-August	19-26	2,450-45,575	lacustrine riverine	2-3 (m) 3-4 (f)	8-11
Lepomis cyanellus	Green Sunfish	common	pan fish	lacustrine riverine	benthopelagic	invertivore carnivore	warm	• quiet pools and backwaters of sluggish streams, ponds, lakes and impoundments, often near aquatic vegetation; preferred water temperature range 27-31°C	• lacustrine riverine	summer	June-August	20-28	2,000 - 10,000	lacustrine riverine	2-3	5-8
Micropterus salmoides	Largemouth Bass	common	sport fish	lacustrine riverine	benthopelagic	invertivore carnivore	warm	• Clear, warm, shallow lakes, bays, ponds, marshes and backwaters and pools of creeks and small to large rivers, often with soft mud or sand substrate and dense aquatic vegetation; usually at depths <6 m; preferred water temperature range 26-30°C	• Sand or mud substrate in lakes or watercourses	spring	May-June	15-21	4,550 - 54,732	lacustrine riverine	3-4 (m) 4-5 (f)	12-23
Lepomis peltastes	Northern Sunfish	uncommon	none	lacustrine riverine	benthopelagic	invertivore	warm	• warm, clear, quiet pools in creeks and rivers, ponds and lake shallows with aquatic vegetation and sand/silt/marl substrates; preferred water temperature 21°C	• lacustrine riverine	summer	June-July	20-25	480-3,560	lacustrine riverine	2-3	6-9
Lepomis gibbosus	Pumpkinseed	common	pan fish	lacustrine riverine	benthopelagic	invertivore carnivore	warm	• warm, shallows of lakes and ponds, quiet, pools of creeks and small rivers, with aquatic vegetation and organic debris; preferred water temperature range 22-30°C	• Shallow lakes or watercourses with abundant instream vegetation	spring-summer	May-August	17-26	2,451 - 10,633	lacustrine riverine	2-3	7-10
Ambloplites rupestris	Rock Bass	common	pan fish	lacustrine riverine	benthopelagic	invertivore carnivore	cool	• rocky or vegetated shallows of lakes and pools of creeks and small to medium rivers; reported to depths of 21 m; preferred water temperature range 21-26°C	• Shallow lakes or watercourses	spring	May-June	18-23	2,000 - 11,000	lacustrine riverine	3-5	8-131
Micropterus dolomieu	Smallmouth Bass	common	sport fish	lacustrine riverine	benthopelagic	invertivore carnivore	cool	• clear, gravel-bottomed runs and flowing pools of small to large rivers and shallow (5-7 m), rocky and sandy areas of lakes; preferred water temperature range 20-27°C	• Sand, gravel or rock substrate in lakes or watercourses	spring	May-June	13-20	1,724 - 27,200	lacustrine riverine	3-4 (m) 4-5 (f)	8-18
Cottidae – sculpins																
Cottus bairdii	Mottled Sculpin	common	forage fish baitfish (limited)	lacustrine riverine	benthic	invertivore	cool	• cobble and gravel riffles of cool creeks, small rivers and rocky shores of lakes (<16 m deep); preferred water temperature range 13-18°C	• Under a rock or ledge in lakes or watercourses	spring	April-May	5-16	35 - 949	lacustrine riverine	2-3	4-6
Cottus cognatus	Slimy Sculpin	common	forage fish baitfish (limited)	lacustrine riverine	benthic	invertivore	cold	• gravelly, rocky riffles of cold water streams and rocky substrates in deep (37-108 m), cooler waters of lakes; preferred water temperature range 9-14°C	• Under a rock or ledge in lakes or watercourses	spring	April-May	4-10	42 - 1,157	lacustrine riverine	2-3	4-7
Leuciscidae – minnows																

Species (Scientific Name)	Common Name(s)	General Abundance[1]	Economic Importance	General Habitat	Environment	Trophic Class	Thermal Regime	Habitat Preference	Spawning Habitat	Spawning Season	Spawning Month(s)	Spawning Temp (°C)	Fecundity	Nursery Habitat	Age at Maturity (years)	Lifespan (years)
Notropis heterodon	Blackchin Shiner	common	forage fish baitfish (occasional)	lacustrine riverine	benthopelagic	invertivore	cool	• nearshore of clear, vegetated lakes and quiet pools and slow runs in creeks and small rivers with sandy substrates	• Deposits adhesive eggs over aquatic vegetation in lakes and watercourses	summer	June-August	no data	675 - 1,800	lacustrine riverine e	1	2-4
Notropis heterolepis	Blacknose Shiner	common	baitfish	lacustrine riverine	benthopelagic	invertivore herbivore	cool	• clear vegetated lakes and pools of creeks and small rivers with sandy substrates	• Deposits adhesive eggs over sand or aquatic vegetation in lakes or watercourses	summer	June-July	no data	850 - 1,420	lacustrine riverine	1	2-3
Pimephales notatus	Bluntnose Minnow	common	forage fish baitfish (occasional)	lacustrine riverine	benthopelagic	detritivore	warm	• sand and gravel bottomed shallows of clear lakes, creeks, rivers and ponds; preferred water temperature range 26-29°C	• Spawns under rocks or woody debris in lakes or watercourses	summer	June-August	19-26	365 - 4,195	lacustrine riverine	2-3 (m) 1-2 (f)	3-5
Hybognathus hankinsoni	Brassy Minnow	common	forage fish baitfish (occasional)	lacustrine riverine	benthic	planktivore detritivore	cool	• pools of sluggish, clear creeks and small rivers with soft substrates, boggy lakes and shallow bays; often stained waters; usually associated with aquatic vegetation	• lacustrine riverine	spring-summer	May-July	16-27	120 - 2,500	lacustrine riverine	1-2	3-5
Luxilus cornutus	Common Shiner	common	forage fish baitfish	riverine	benthopelagic	invertivore	cool	• pools near riffles in clear, cool creeks and small to medium rivers, and nearshore in clear-water lakes; preferred water temperature 21.9°C	• Spawns under rocks or woody debris in lakes or watercourses	spring	May-June	16-26	400 - 3,940	riverine	1-3	5-7
Semotilus atromaculatus	Creek Chub	common	baitfish	riverine	benthopelagic	invertivore carnivore	cool	• pools of clear creeks and small rivers over sand, gravel and cobble substrates; rare in lakes and large rivers; preferred water temperature 20.8°C	• Spawns in gravel substrate above riffles in watercourses	spring	May-June	12-17	500 - 7,539	riverine	3 (m) 2 (f)	5-10
Rhinichthys atratulus	Eastern Blacknose Dace	limited distribution	forage fish bait fish (occasional)	riverine	benthic	invertivore	cool	• runs and pools of clear, cool, swiftly-flowing creeks and small rivers with gravelly substrate; preferred water temperature range 19-25°C	• riverine	spring	May-June	15.5-22	166-1,116	riverine	2	3-4
Notropis atherinoides	Emerald Shiner	common	forage fish baitfish	lacustrine riverine	benthopelagic	planktivore	cool	• pools and runs of medium to large rivers with sand or gravel substrates and open waters of lakes; preferred water temperature range 9-23°C	• Spawns in gravel in lakes and watercourses	summer	June-August	20-24	868 - 8,733	lacustrine riverine	1-2	2 (m) 3-4 (f)
Pimephales promelas	Fathead Minnow	common	forage fish baitfish	lacustrine riverine	benthopelagic	detritivore invertivore	warm	• still waters of ponds, lakes, creeks and small rivers with muddy substrate; preferred water temperature range 21-29°C	• Spawns under rocks or woody debris in lakes or watercourses	spring-summer	May-August	14-29	255 - 2,622	lacustrine riverine	1-2	3-6
Chrosomus neogaeus	Finescale Dace	common	forage fish baitfish	lacustrine riverine	benthopelagic	invertivore planktivore	cool	• lakes, bogs, ponds and sluggish pools of creeks and small rivers with silty substrates and aquatic vegetation; usually stained water; preferred water temperature 24.1°C	• Spawns in woody debris in watercourses and lakes	spring	April-May	11-18	250 - 5,850	lacustrine riverine	2	4-8

Species (Scientific Name)	Common Name(s)	General Abundance[1]	Economic Importance	General Habitat	Environment	Trophic Class	Thermal Regime	Habitat Preference	Spawning Habitat	Spawning Season	Spawning Month(s)	Spawning Temp (°C)	Fecundity	Nursery Habitat	Age at Maturity (years)	Lifespan (years)
Notemigonus crysoleucas	Golden Shiner	common	forage fish baitfish	lacustrine	benthopelagic	invertivore herbivore	cool	• clear, weedy, quiet waters of lakes, ponds, reservoirs and pools of small to large rivers with muddy substrate; preferred water temperature range 17-24°C	• Spawns in instream vegetation in watercourses and lakes	summer	June-August	20-27	2,680 - 4,670	lacustrine	2-3	5-8
Nocomis biguttatus	Hornyhead Chub	common	bait fish	riverine	benthopelagic	invertivore herbivore	cool	• pools and runs of clear, slow-flowing, gravelly small- to medium-sized streams, often tributary to larger rivers	• riverine	spring-summer	May-July	16-26	460-995	riverine	2-3	4
Rhinichthys cataractae	Longnose Dace	common	forage fish baitfish (occasional)	lacustrine riverine	benthic	invertivore	cool	• cobble, boulder or gravel riffles of clean, cool, swiftly-flowing creeks and small to medium rivers, and rocky shores of lakes; preferred water temperature range 13-21°C	• Deposits eggs over substrate in riffles in watercourses	spring-summer	May-July	11-23	150 - 3,374	riverine	2-3	4 (m) 5 (f)
Notropis volucellus	Mimic Shiner	common	forage fish baitfish (occasional)	lacustrine riverine	benthopelagic	invertivore herbivore	warm	• pools of creeks and small to large rivers, open waters and quiet backwaters of lakes; often associated with sand and gravel substrates	• Deposits adhesive eggs over aquatic vegetation	summer	June-July	no data	67 - 960	lacustrine riverine	1	2-3
Margariscus nachtriebi	Northern Pearl Dace	common	forage fish bait fish	lacustrine riverine	benthopelagic	invertivore carnivore	cool	• pools of cool, clear headwater streams, bogs, ponds and small lakes with silt, sand or gravel bottoms, close to aquatic vegetation; preferred water temperature 16.2°C	• lacustrine riverine	spring	May-July	12-18	621-4,240	lacustrine riverine	1 (m) 2 (f)	3 (m) 4 (f)
Chrosomus eos	Northern Redbelly Dace	common	forage fish baitfish	lacustrine riverine	benthopelagic	invertivore planktivore	cool	• lakes, bogs, ponds and pools of creeks with organic substrates and aquatic vegetation; usually stained water; preferred water temperature 25.3°C	• Spawns in algal beds in lakes and watercourses	spring-summer	May-July	13-21	435 - 6,450	lacustrine riverine	1 (m) 2 (f)	3-7
Notropis anogenus	Pugnose Shiner	rare	none	lacustrine riverine	benthopelagic	detritivore	cool	• clear weedy lakes and quiet vegetated pools and runs of creeks and rivers with clean sandy or marl substrates; often associated with wild rice beds	• lacustrine riverine	summer	June-July	21-29	530-1,275	lacustrine riverine	1	3
Lythrurus umbratilis	Redfin Shiner	uncommon	forage fish	riverine	benthopelagic	invertivore	cool	• warm, clear to turbid, quiet to flowing pools of creeks and small to medium rivers with abundant aquatic vegetation and clean cobble, gavel or sand substrates; preferred water temperature 20.5°C	• riverine	summer	June-August	21+	219-887	riverine	1	2-3
Nocomis micropogon	River Chub	common	bait fish	riverine	benthopelagic	planktivore invertivore	cool	• swift currents and pools in medium sized creeks and rivers of high to moderate gradients with clean clear water and gravel to boulder substrates; preferred water temperature 21.7°C	• riverine	spring	May-June	15-20.5	400-725	riverine	2-3 (m) 3 (f)	4-5
Notropis rubellus	Rosyface Shiner	common	forage fish	riverine	benthopelagic	Invertivore detritivore herbivore	warm	• clear, flowing pools and runs of small to medium rivers with sand and gravel substrates; preferred water temperature range 22-28°C	• riverine	spring-summer	May-July	20-27	450-1,482	riverine	1-2	3
Notropis stramineus	Sand Shiner	common	forage fish bait fish	lacustrine riverine	benthopelagic	Invertivore detritivore	warm	• sand and gravel runs and pools of warm, clear creeks and small to large	• lacustrine riverine	summer	June-August	21-27	150-2,660	lacustrine riverine	1	2-3

Species (Scientific Name)	Common Name(s)	General Abundance[1]	Economic Importance	General Habitat	Environment	Trophic Class	Thermal Regime	Habitat Preference	Spawning Habitat	Spawning Season	Spawning Month(s)	Spawning Temp (°C)	Fecundity	Nursery Habitat	Age at Maturity (years)	Lifespan (years)
								rivers, and sandy shallows of lakes with rooted aquatic vegetation								
Cyprinella spiloptera	Spotfin Shiner	common	forage fish bait fish (occasional)	riverine	benthopelagic	Invertivore herbivore	warm	• sand and gravel runs and pools of creeks and small to medium rivers with moderate gradient; occasionally lake shallows; preferred water temperature 29.5°C	• riverine	summer	June-August	21-24	207-1,580	riverine	1-2	4-5
Notropis hudsonius	Spottail Shiner	common	forage fish bait fish	lacustrine riverine	benthopelagic	Invertivore planktivore	cool	• lakes, rivers and streams with slow to moderate current and sand, gravel, mud or silt substrates; preferred water temperature range 13-22°C	• lacustrine riverine	spring	May-June	15-22	746-8,898	lacustrine riverine	1-2	3-5
Luxilus chrysocephalus	Striped Shiner	common	forage fish bait fish	riverine	benthopelagic	invertivore	cool	• pools near riffles in clear to fairly turbid, warm creeks and small- to medium-sized rivers with moderate current and gravel or cobble substrate, often associated with aquatic vegetation	• riverine	spring-summer	May-July	15-27	900-1,150	riverine	2	4-6
Esocidae - pikes																
Esox masquinongy	Muskellunge (muskie)	common	sport fish commercial fishery (historical)	lacustrine riverine	benthopelagic	carnivore	warm	• clear, cool to warm waters of medium to large lakes and slow rivers; preferred water temperature range 22-26°C	• Shallow vegetated floodplains of lakes and watercourses	spring	April-May	9-16	6,315 - 454,717	lacustrine riverine	3-6 (m) 4-8 (f)	15-30
Esox lucius	Northern Pike	common	sport fish commercial fishery	lacustrine riverine	benthopelagic	carnivore	cool	• clear, cool to warm, weedy bays of lakes and slow, meandering, heavily vegetated rivers; preferred water temperature range 17-24°C	• Shallow vegetated floodplains of lakes and watercourses	spring	March-May	4-11	7,691 - 595,200	lacustrine riverine	2-3 (m) 3-4 (f)	10-26
Gasterosteidae – sticklebacks																
Culaea inconstans	Brook Stickleback	common	forage fish baitfish (incidental)	lacustrine riverine	benthopelagic	planktivore invertivore	cool	• small, boggy headwater streams, shallow lake margins, ponds, and clear pools and backwaters of creeks and small rivers; usually associated with aquatic vegetation; occasionally brackish water; preferred water temperature 21.3°C	• Constructs organic debris nest	spring-summer	May-July	8-19	40 - 451	lacustrine riverine	1	2-3
Pungitius pungitius	Ninespine Stickleback	common	forage fish baitfish (incidental)	lacustrine riverine	benthopelagic	planktivore	cool	• shallow vegetated nearshore of lakes, ponds, pools of sluggish streams, and marine/estuarine environments; preferred water temperature range 9-16°C	• Constructs organic debris nest	summer	June-July	9-17	20 - 174	lacustrine riverine	1 (m) 1-2 (f)	1-2 (m) 3-4 (f)
Gasterosteus aculeatus	Threespine Stickleback	common	forage fish	lacustrine riverine estuarine marine	benthopelagic	invertivore	cool	• shallow vegetated areas of creeks and rivers, protected bays of lakes with mud or sand bottom, and coastal marine/estuarine environments; preferred water temperature range 9-12°C	• lacustrine riverine	spring-summer	May-July	10-22	41-885	lacustrine riverine	1	1-3
Gadidae – codfishes																

Species (Scientific Name)	Common Name(s)	General Abundance[1]	Economic Importance	General Habitat	Environment	Trophic Class	Thermal Regime	Habitat Preference	Spawning Habitat	Spawning Season	Spawning Month(s)	Spawning Temp (°C)	Fecundity	Nursery Habitat	Age at Maturity (years)	Lifespan (years)
Lota lota	Burbot (ling)	common	sport fish (incidental)	lacustrine riverine	benthic	invertivore carnivore	cold	• moderate to deep waters (to 90 m) of lakes, large cool rivers and streams, often under rocks, among roots or in holes in the banks; preferred water temperature range 7-18°C	• Sand or gravel substrate in lakes or large watercourses under ice cover	winter	January-March	1-4	45,600 - 1,444,122	lacustrine riverine	3 - 7 (m) 4 - 8 (f)	10-20
Percidae - perches and darters																
Percina maculata	Blackside Darter	uncommon	forage fish baitfish (incidental)	riverine	benthic	invertivore	cool	• quiet reaches and pools of creeks and small to medium rivers with moderate current and cobble, gravel or sand substrates, utilizing cover afforded by coarse woody debris, aquatic vegetation and undercut banks	• riverine	spring	May-June	16-17	121-1,758	riverine	1-2	4
Etheostoma flabellare	Fantail Darter	common	forage fish baitfish (incidental)	riverine	benthic	invertivore	cool	• shallow, rocky riffles of creeks and small to medium rivers with deep pools and slow to moderate currents; preferred water temperature 22.4°C	• riverine	spring	May-June	13-17	37-588	riverine	1-2	4-5
Etheostoma blennioides	Greenside Darter	uncommon	forage fish	riverine	benthic	invertivore	warm	• algae-covered rocky riffles of creeks and small to medium rivers with clear water and moderate to fast current; preferred water temperature 25.4°C	• riverine	spring	April-June	10-19	181-3.664	riverine	1-2	3-5
Etheostoma exile	Iowa Darter	Common	baitfish (incidental)	lacustrine riverine	benthic	invertivore	cool	• clear waters of lakes, and slow-flowing pools of creeks and small to medium rivers, having rooted aquatic vegetation and organic to sand substrates; preferred water temperature range 12-25°C	• Shallow water with woody debris or roots in watercourses and lakes	spring	April-June	12-16	312 - 2,048	lacustrine	1	3-4
Etheostoma nigrum	Johnny Darter[2]	common	forage fish baitfish (incidental)	lacustrine riverine	benthic	invertivore	cool	• sandy, silty, gravelly, sometimes rocky, pools of creeks and small to medium rivers, and sandy shores of lakes; reported to a depth of 42 m in the Great Lakes; preferred water temperature 22.8°C	• under rocks in watercourses and lakes	spring	May-June	12-21	48 - 1,248	lacustrine riverine	1	3 (m) 4 (f)
Etheostoma microperca	Least Darter	uncommon	none	lacustrine riverine	benthic	invertivore	warm	• among submergent vegetation in clear lakes, stream margins and pools of creeks and small rivers with soft sand, mud or organic substrates	• lacustrine riverine	spring	May-June	13-18	31-1,102	lacustrine riverine	1	1
Percina caprodes	Logperch	common	forage fish baitfish (occasional)	lacustrine riverine	benthic	invertivore	warm	• sand, gravel or rocky beaches in lakes and over similar substrates in creeks and rivers, avoiding silted areas and swift currents; reported at depths up to 39 m in Lake Erie	• Sand or gravel substrate in lakes or watercourses	spring	May-June	10-18	402 - 3,172	lacustrine riverine	1-2	3-4
Etheostoma caeruleum	Rainbow Darter	common	forage fish baitfish (incidental)	riverine	benthic	invertivore	cool	• fast-flowing gravel and cobble riffles of clear creeks and small to medium rivers; preferred water temperature 19.8°C	• riverine	spring	April-June	15-18	82-1,462	riverine	1	3-5
Sander canadensis	Sauger	uncommon	commercial fishery sport fish	lacustrine riverine	benthopelagic	invertivore carnivore	cool	• sand and gravel runs, pools and backwaters of small to large rivers, and shallow, turbid lakes; usually inhabit surface waters (<6 m);	• Sand or gravel substrate in lakes or watercourses	spring	May-June	6-12	4,208 - 209,920	lacustrine riverine	2-3 (m) 4-6 (f)	7-13

Species (Scientific Name)	Common Name(s)	General Abundance[1]	Economic Importance	General Habitat	Environment	Trophic Class	Thermal Regime	Habitat Preference	Spawning Habitat	Spawning Season	Spawning Month(s)	Spawning Temp (°C)	Fecundity	Nursery Habitat	Age at Maturity (years)	Lifespan (years)
								preferred water temperature range 20-24°C								
Sander vitreus	Walleye (yellow pickerel)	common	commercial fishery sport fish	lacustrine riverine	benthopelagic	invertivore carnivore	cool	• lakes (at depths up to 21 m), and pools, backwaters and runs of medium to large rivers; preferred water temperature range 19-23°C	• Gravel or rocky substrate in lakes or watercourses	spring	April-June	4-11	22,000 - 615,000	lacustrine riverine	3-4 (m) 4-5 (f)	12-26
Perca flavescens	Yellow Perch	common	forage fish commercial fishery panfish	lacustrine riverine	benthopelagic	invertivore carnivore	cool	• lakes, ponds and pools of creeks and small to large rivers with moderate aquatic vegetation and clear water, usually at depths <9 m; preferred water temperature range 18-24°C	• Over vegetation or woody debris in lakes and watercourses	spring	April-May	6-12	950 - 210,000	lacustrine	2-3 (m) 3-4 (f)	7-12
Umbridae – mudminnows																
Umbra limi	Central Mudminnow[3]	common	forage fish baitfish	Riverine	benthic	invertivore	cool	• heavily vegetated ponds, wetlands, bogs or pools of small creeks and quiet, shallow (0.5 m) areas of lakes with mud and organic substrates	• Areas with instream vegetation in watercourses and lakes	spring	April-May	10-16	189 - 3,828	riverine	1-2 (m) 2-3 (f)	4-9
Salmonidae - trouts and salmons																
Coregonus hoyi	Bloater	common	commercial fishery forage fish	lacustrine	pelagic	planktivore invertivore	cold	• clear, deep waters (38-121 m), usually 55-91 m, at water temperatures of 1.5-11.4°C; preferred water temperature range 4-7°C	• lacustrine	fall-winter	November-March	<5	1,387 - 34,891	lacustrine	2-3	9-10 (m) 10-11 (f)
Salvelinus fontinalis	Brook (speckled) Trout	common	sport fish	lacustrine riverine	benthopelagic	invertivore carnivore	cold	• cold, clear, well-oxygenated streams, rivers, ponds and lakes with a maximum water temperature of less than 22°C	• Gravel substrates in riffles in watercourses or groundwater upwelling areas in lakes	fall	September-November	3.5-9	88 - 6,894	lacustrine riverine	2-3	4-8
Salmo trutta	Brown Trout	common	sport fish	lacustrine riverine	benthopelagic	invertivore carnivore	cold	• cool creeks and rivers with moderate flow, gravelly substrates and riffle-pool habitat, and lake shallows; preferred water temperature range 15-18°C	• riverine	fall	October-November	6-9		riverine	2-4 (m) 3-5 (f)	5-12
Oncorhynchus tshawytscha	Chinook Salmon	common	sport fish	lacustrine marine	pelagic	invertivore carnivore	cold	• mid-waters (15-60 m) in or below the thermocline; preferred water temperature range 12-16°C	• riverine	fall	September-October	5.5-14.5		lacustrine marine	4-5	4-5
Oncorhynchus kisutch	Coho Salmon	uncommon	sport fish	lacustrine marine	pelagic	invertivore carnivore	cold	• mid-waters (16-60 m); preferred water temperature range 11-17°C	• riverine	fall	October-November	1-8		riverine	3-4	3-4
Salvelinus namaycush	Lake Trout	common	commercial fishery sport fish	lacustrine	benthopelagic	invertivore carnivore	cold	• cold deeper waters (12-23m) of lakes, below the thermocline in summer; preferred water temperature range 9-13°C	• Rocky substrates in lakes in shallow or deep water lakes	fall	September-November	9-14	1,093 - 18,051	lacustrine	3-7 (m) 4-8 (f)	15-30
Coregonus clupeaformis	Lake Whitefish	common	commercial fishery sport fish	lacustrine riverine	benthic	invertivore carnivore	cold	• cool waters (18-37 m) of lakes and large rivers below the thermocline; preferred water temperature range 8-14°C	• Rocky substrates in lakes and potentially	fall	October-December	1-8	5,958 - 121,700	lacustrine riverine	4-7	12-28

Species (Scientific Name)	Common Name(s)	General Abundance[1]	Economic Importance	General Habitat	Environment	Trophic Class	Thermal Regime	Habitat Preference	Spawning Habitat	Spawning Season	Spawning Month(s)	Spawning Temp (°C)	Fecundity	Nursery Habitat	Age at Maturity (years)	Lifespan (years)
									larger watercourses							
Oncorhynchus gorbuscha	Pink Salmon	uncommon	sport fish	lacustrine marine	pelagic	invertivore	cold	• mid-waters (6-36 m); preferred water temperature range 13-17°C	• riverine	fall	September-October	8-14		lacustrine marine	2-3	2-3
Oncorhynchus mykiss	Rainbow Trout (steelhead)	common	sport fish	lacustrine riverine	benthopelagic	invertivore carnivore	cold	• mid-waters of lakes; creeks and rivers with moderate flow, gravelly bottoms and riffle-pool habitat; preferred water temperature range 12-18°C	• Gravel substrates in watercourses	Spring	March-May	4-10	200 - 12,749	riverine	2-4 (m) 3-5 (f)	3-8
Prosopium cylindraceum	Round Whitefish	common	commercial fishery	lacustrine riverine	benthopelagic	invertivore carnivore	cold	• shallow waters (<37 m) of deep lakes and clear streams; preferred water temperature 17.5°C	• lacustrine riverine	fall	November-December	2-4.5	1,076-26,732	lacustrine riverine	2-4	16-25
Salvelinus fontinalis x S. namaycush	splake (backcross)	uncommon	sport fish	lacustrine	benthopelagic	invertivore carnivore	cold	• mid-waters (9-11m) of lakes, near the thermocline; preferred water temperature range 10-16°C	• lacustrine	fall	October-November	6-14	855 - 6,075	lacustrine	3-4	7-9
Acipenseridae – sturgeons																
Acipenser fulvescens	Lake Sturgeon	uncommon	commercial fishery (historical)	lacustrine riverine	benthic	invertivore herbivore	cool	• bottoms of lakes and large rivers, usually 5 to 10 m deep, over clay, mud, sand and gravel; preferred water temperature range 15-17°C	• lacustrine riverine	spring	May-June	11-18	48,420-885,360	lacustrine riverine	12-20 (m) 14-33 (f)	50-60 (m) 80-155 (f)
Amiidae – bowfins																
Amia calva	Bowfin	common	coarse fish	lacustrine riverine	benthopelagic	carnivore	warm	• warm, weedy lake embayments and sluggish pools and backwaters of lowland rivers; preferred water temperature range 28-32°C	• lacustrine	spring	May-June	16-19	2,765-98,737	lacustrine	3-4 (m) 4-5 (f)	6 (m) 10-12 (f)
Atherinopsidae - New World silversides																
Labidesthes sicculus	Brook Silverside	common	forage fish	lacustrine riverine	pelagic	planktivore invertivore	warm	• surface waters (10-12 cm) of lakes and reservoirs, usually in open water, and quiet pools of rivers; preferred water temperature 24.5°C	• lacustrine riverine	spring-summer	May-August	17-23	73-785	lacustrine riverine	1	1
Clupeidae – herrings																
Alosa pseudoharengus	Alewife	common	forage fish	lacustrine marine	pelagic	planktivore	cold	• open, waters (16-28 m) to a depth of 50 m (summer) or 90 m (winter); preferred water temperature range 16-21°C	• lacustrine riverine	summer	June-August	13-21	2,180-22,407	lacustrine riverine	1-2 (m) 2-3 (f)	5-8
Dorosoma cepedianum	Gizzard Shad	common	forage fish	lacustrine riverine	pelagic	herbivore	cool	• open surface waters (<33 m) of medium to large rivers, lakes and impoundments over mud bottom; often ascends creeks and small rivers with well-developed pools; preferred water temperature range 19-23°C	• lacustrine riverine	summer	June-July	17-23	22,404-543,912	lacustrine riverine	2-3	6-10
Cyprinidae – carps																
Cyprinus carpio	Common Carp	common	coarse fish commercial fishery	lacustrine riverine	benthopelagic	invertivore detritivore	warm	• pools of small to large low gradient rivers, lakes, reservoirs and ponds, with abundant aquatic vegetation, at depths of <30 m; preferred water temperature range 27-32°C	• lacustrine riverine	spring-summer	May-August	17-26	36,000-2,208,000	lacustrine riverine	2-4 (m) 3-5 (f)	9-20
Fundulidae - topminnows																

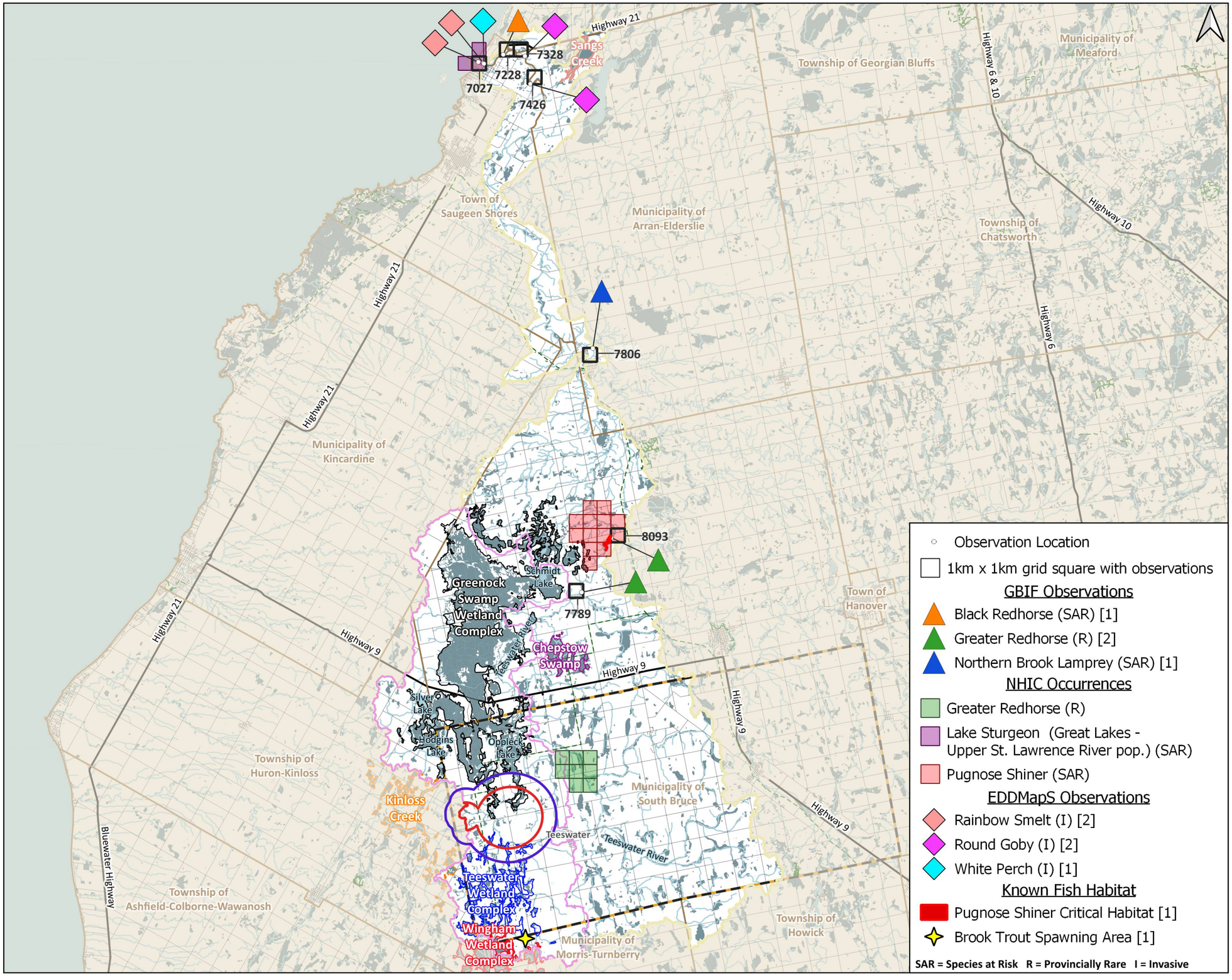
Species (Scientific Name)	Common Name(s)	General Abundance[1]	Economic Importance	General Habitat	Environment	Trophic Class	Thermal Regime	Habitat Preference	Spawning Habitat	Spawning Season	Spawning Month(s)	Spawning Temp (°C)	Fecundity	Nursery Habitat	Age at Maturity (years)	Lifespan (years)
Fundulus diaphanus	Banded Killifish	common	none	lacustrine riverine	benthopelagic	invertivore planktivore	cool	• quiet, shallow, margins of lakes, ponds and sluggish streams in areas with sand and gravel substrates and patches of aquatic macrophytes; preferred water temperature 21°C	• lacustrine riverine	summer	June-August	19-24	426-1,062	lacustrine riverine	1-2	3-4
Gobiidae – gobies																
Neogobius melanostomus	Round Goby	common	invasive species	lacustrine riverine	benthic	invertivore	cool	• cobble, gravel and sandy substrates in the lower to middle reaches of rivers and nearshore of lakes (to 20 m); optimum water temperature range 23-26°C	• lacustrine riverine	spring-summer	May-July	9-26	198-1,818	lacustrine riverine	2-3 (m) 1-2 (f)	4-5 (m) 3-4 (f)
Ictaluridae - North American catfishes																
Ameiurus melas	Black Bullhead	uncommon	none	lacustrine riverine	benthic	invertivore carnivore	warm	• lakes, ponds, impoundments, and oxbows, pools and backwaters of creeks and rivers with low gradient and soft substrates	• lacustrine riverine	spring	May-June	16-24	1,040-6,820	lacustrine riverine	2-3	6-10
Ameiurus nebulosus	Brown Bullhead	common	commercial fishery	lacustrine riverine	benthic	invertivore herbivore carnivore	warm	• pools and sluggish runs over sand to mud substrates in creeks and rivers, impoundments, ponds and lake embayments; preferred water temperature range 25-31°C	• lacustrine riverine	spring	May-June	14-25	1,050-13,800	lacustrine riverine	2-3	8-12
Ictalurus punctatus	Channel Catfish	common	commercial fishery sport fish	lacustrine riverine	benthic	invertivore carnivore	warm	• deep pools and runs in small to large rivers with sand, gravel or cobble substrates, and cool, clear, deeper waters of lakes; preferred water temperature range 25-31°C	• lacustrine riverine	spring-summer	May-July	18-27	1,052-70,000	lacustrine riverine	5-7	15-27
Noturus flavus	Stonecat	common	none	riverine	benthic	invertivore carnivore	warm	• cobble and boulder riffles and runs of creeks and small to large rivers, and gravel shoals of lakes; preferred water temperature 25.1°C	• riverine	summer	June-August	23-29	767-1,205	riverine	3 (m) 4-5 (f)	6-10
Noturus gyrinus	Tadpole Madtom	uncommon	none	lacustrine riverine	benthic	invertivore planktivore	warm	• quiet, slow moving, pools and backwaters of creeks and small to large rivers, and clear waters of shallow lakes, ponds, and stream mouths, with soft, muddy substrates and extensive vegetation	• riverine	summer	June-July	20-25	43-529	lacustrine riverine	1-2	3-4
Ameiurus natalis	Yellow Bullhead	uncommon	none	lacustrine riverine	benthic	invertivore carnivore	warm	• pools and backwaters over muddy substrates in sluggish creeks and small to large rivers, oxbows, ponds, impoundments and heavily vegetated areas of shallow bays and small lakes; preferred water temperature range 27-29°C	• lacustrine riverine	spring	May-June	16-24	1,652-6,600	lacustrine riverine	2-3	6-12
Lepisosteidae – gars																
Lepisosteus osseus	Longnose Gar	common	sport fish	lacustrine riverine	benthopelagic	carnivore	warm	• vegetated, sluggish pools, backwaters and oxbows of medium to large rivers and weedy, quiet shallows of warm lakes with silty, sandy substrates; often near logs and brushpiles;	• lacustrine	spring	May-June	16.5-21	1,110-77,156	lacustrine	3-4 (m) 4-6 (f)	9-17 (m) 16-22 (f)

Species (Scientific Name)	Common Name(s)	General Abundance[1]	Economic Importance	General Habitat	Environment	Trophic Class	Thermal Regime	Habitat Preference	Spawning Habitat	Spawning Season	Spawning Month(s)	Spawning Temp (°C)	Fecundity	Nursery Habitat	Age at Maturity (years)	Lifespan (years)
								preferred water temperature range 25.3-33.1°C								
Moronidae – temperate basses																
Morone chrysops	White Bass	uncommon	commercial fishery (historical)	lacustrine riverine	benthopelagic	invertivore carnivore	warm	• open, surface waters (<14 m) of lakes and pools of small to large rivers with moderate current and sand to gravel substrates; preferred water temperature range 28-32°C	• lacustrine riverine	spring	May-June	14-22.5	61,700-1,049,207	lacustrine riverine	2 (m) 3 (f)	7-9
Morone americana	White Perch	common	commercial fishery pan fish	lacustrine riverine estuarine marine	benthopelagic	invertivore carnivore	warm	• shallows of lakes and bays, pools and quiet water areas of medium to large rivers, usually over mud substrate; preferred water temperature range 26-30°C	• lacustrine riverine	spring	May-June	11-16	5,100-388,736	lacustrine riverine estuarine	2-3 (m) 3-4 (f)	7-10
Osmeridae – smelts																
Osmerus mordax	Rainbow Smelt	common	forage fish commercial fishery sport fish invasive species	lacustrine marine	pelagic	invertivore carnivore	cold	• cool, clear, mid-waters (14-64 m) of lakes and medium to large rivers; preferred water temperature range 7-16°C	• lacustrine riverine	spring	March-April	4.5-11	1,700-69,600	lacustrine estuarine	2-3	5-7
Petromyzontidae – lampreys																
Ichthyomyzon fossor	Northern Brook Lamprey	uncommon	none	riverine	benthic	herbivore	cool	• adults in clean, clear riffles and runs of small rivers with gravel and sand substrates; ammocoetes occupy quiet water with sand, silt and detritus substrates	• riverine	spring	May-June	13-20.5	501-1,979	riverine	3-7	4-8
Petromyzon marinus	Sea Lamprey	common	invasive species	lacustrine marine	benthopelagic	herbivore detritivore (carnivore)	cool	• feeding adults in open waters of lakes and large rivers; ammocoetes inhabit flowing areas of streams, burrowing in sandy silt substrates; preferred water temperature range 6-15°C	• riverine	spring	May-June	11-24	13,974-107,138	riverine	3-7	5-9
Sciaenidae – drums and croakers																
Aplodinotus grunniens	Freshwater Drum (sheepshead)	common	commercial fishery sportfish (incidental)	lacustrine riverine	benthic	invertivore carnivore	warm	• sandy, silty bottoms of lakes and reservoirs (to 18 m), and pools in low to moderate-gradient, often turbid, rivers; preferred water temperature range 24-28°C	• lacustrine riverine	spring-summer	May-July	18-26	27,400-850,000	lacustrine riverine	3-5 (m) 4-6 (f)	21 (m) 32 (f)

Notes:

1. General Abundance is used in The Ontario Freshwater Fishes Life History Database (Eakins 2020); however, no description is provided to contextualize abundance.
2. Johnny Darter were present in the Ontario GeoHub webmap of the MNRF ARA dataset but were not included in the dataset download from Ontario GeoHub. Zoetica is investigating whether these observations should be included in future iterations of the BIS Baseline Report.
3. Central mudminnow were detected by Tulloch Engineering Inc. in a small study area that partially overlaps the eastern portion of the RSA_{AQU}. However, no information was available to determine whether this species was detected within the boundary of the RSA_{AQU}.

A.2 Figures



NWMO Biodiversity Impact Studies

Species of Interest Desk-based Observations: Fish and Fish Habitat

Figure A-1

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Regional Study Area (RSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

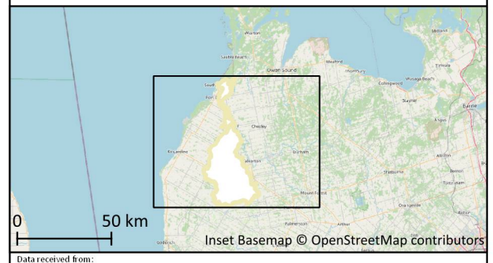
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:270,000

0 4 8 km

ZOETICA



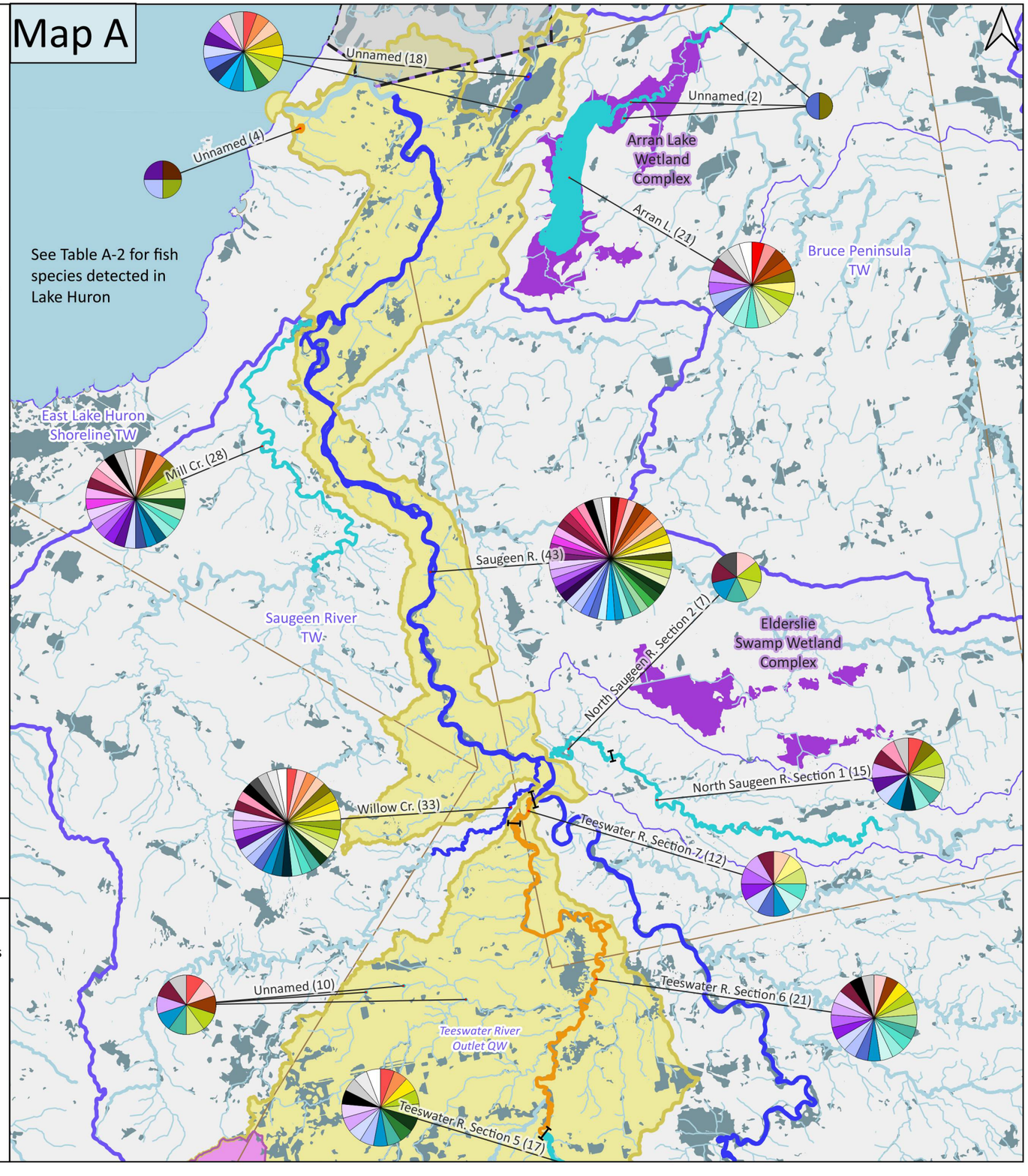
Data received from:
Ontario GeoHub — Fish Activity Area (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NHIC Species Occurrences (MNRF)
GBIF.org — GBIF Occurrence Download - Accessed Oct., 2021
EDDMapS Ontario — Invasive Species Observations - Accessed Jan 12, 2022
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
January 18, 2024	Map ID: NWMO_BIS_A078	

Fish Species Leged for Pie Charts

- Alewife
- Black Bullhead
- Blackchin Shiner
- Blacknose Dace
- Blacknose Shiner
- Blackside Darter
- Bluegill
- Bluntnose Minnow
- Brassy Minnow
- Brook Silverside
- Brook Stickleback
- Brook Trout
- Brown Bullhead
- Brown Trout
- Central Mudminnow
- Channel Catfish
- Chinook Salmon
- Coho Salmon
- Common Carp
- Common Shiner
- Creek Chub
- Emerald Shiner
- Fantail Darter
- Fathead Minnow
- Finescale Dace
- Gizzard Shad
- Golden Redhorse
- Golden Shiner
- Green Sunfish
- Greenside Darter
- Hornyhead Chub
- Iowa Darter
- Johnny Darter
- Largemouth Bass
- Least Darter
- Logperch
- Longnose Dace
- Mimic Shiner
- Mottled Sculpin
- Muskellunge
- Ninespine Stickleback
- Northern Hog Sucker
- Northern Pike
- Northern Redbelly Dace
- Pumpkinseed
- Rainbow Darter
- Rainbow Smelt (I)
- Rainbow Trout
- Redfin Shiner
- River Chub
- Rock Bass
- Rosyface Shiner
- Sand Shiner
- Sea Lamprey (I)
- Shorthead Redhorse
- Silver Redhorse
- Slimy Sculpin
- Smallmouth Bass
- Sockeye Salmon
- Splake
- Spotfin Shiner
- Spottail Shiner
- Stonecat
- Tadpole Madtom
- Walleye
- White Sucker
- Yellow Bullhead
- Yellow Perch

Notes:
- In the pie chart, the fish species will appear in the same order as the legend starting at the top and moving clockwise. Pie chart size is scaled to the number of species.
- The name of the lake or river will appear along the callout line for the pie chart. The number in brackets is the number of species in that lake or river.
(I) Species considered invasive



NWMO Biodiversity Impact Studies

Lakes and Watercourses with Known Species Presence in the North of the RSA_{AQU}

Figure A-2a

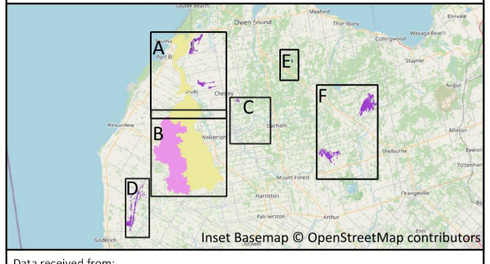
- Local Study Area (LSA_{AQU})
- Regional Study Area (RSA_{AQU})
- Lake With No Species Information
- Watercourse
- Wetland
- Reference Wetland
- Tertiary Watershed (TW) Boundary
- Quaternary Watershed (QW) Boundary
- Municipal Boundary
- South Bruce Boundary
- Saugeen No. 29
- Breaks in the ARA Dataset

Lake with Species Information

- Cold Regime
- Cool Regime
- Warm Regime

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ZOETICA



Data received from:
Ontario GeoHub — Aquatic Resource Area [ARA] polygon segment (MNRF); Indian Reserve (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); Ontario Watershed Boundaries (MNRF); Municipal Boundary - Lower Tier (MMAH); Wetlands (MNRF)

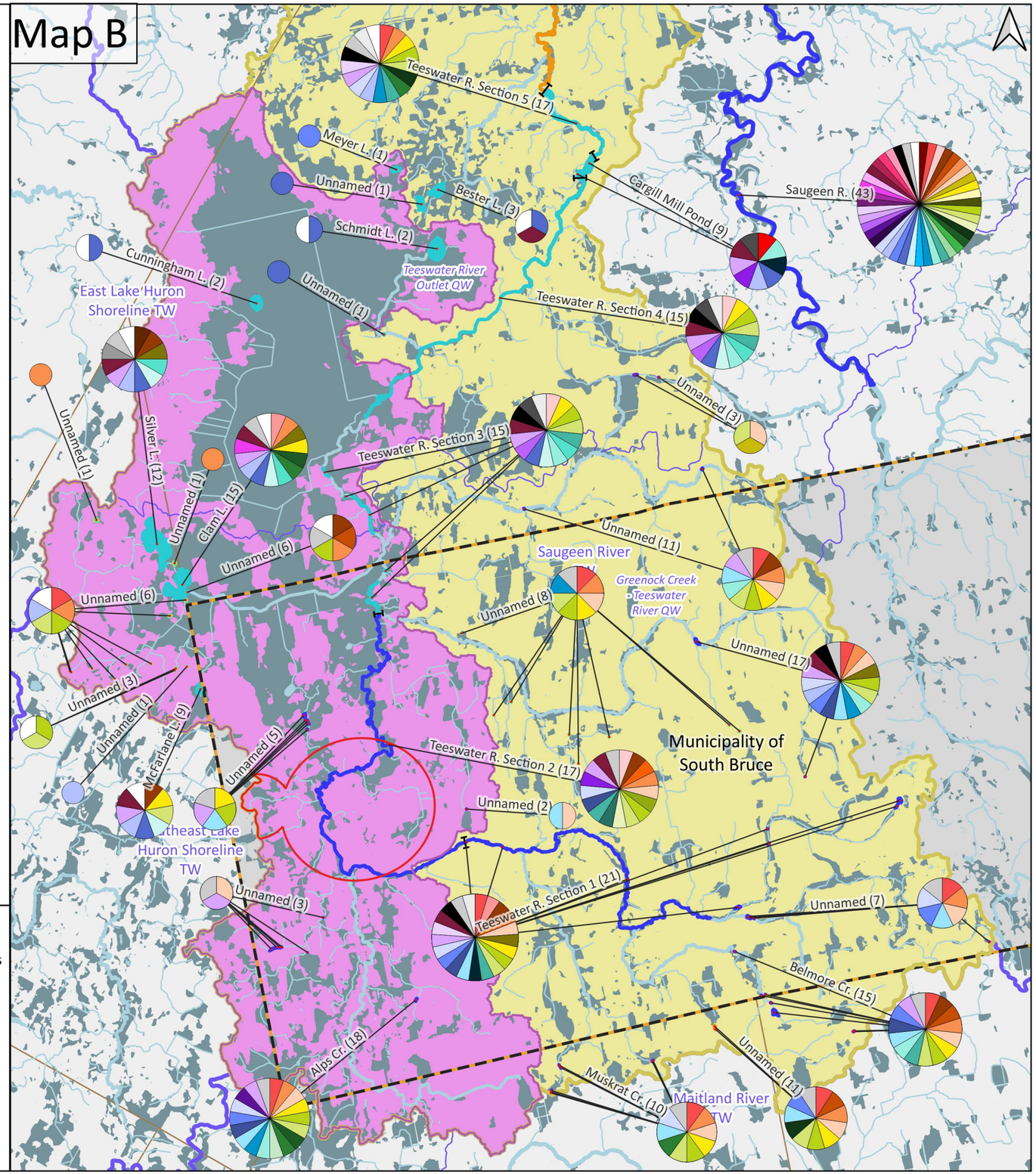
Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: AB
September 28, 2023	Map ID: NWMO_BIS_D191a	

Fish Species Leged for Pie Charts

- Alewife
- Black Bullhead
- Blackchin Shiner
- Blacknose Dace
- Blacknose Shiner
- Blackside Darter
- Bluegill
- Bluntnose Minnow
- Brassy Minnow
- Brook Silverside
- Brook Stickleback
- Brook Trout
- Brown Bullhead
- Brown Trout
- Central Mudminnow
- Channel Catfish
- Chinook Salmon
- Coho Salmon
- Common Carp
- Common Shiner
- Creek Chub
- Emerald Shiner
- Fantail Darter
- Fathead Minnow
- Finescale Dace
- Gizzard Shad
- Golden Redhorse
- Golden Shiner
- Green Sunfish
- Greenside Darter
- Hornyhead Chub
- Iowa Darter
- Johnny Darter
- Largemouth Bass
- Least Darter
- Logperch
- Longnose Dace
- Mimic Shiner
- Mottled Sculpin
- Muskellunge
- Ninespine Stickleback
- Northern Hog Sucker
- Northern Pike
- Northern Redbelly Dace
- Pumpkinseed
- Rainbow Darter
- Rainbow Smelt (I)
- Rainbow Trout
- Redfin Shiner
- River Chub
- Rock Bass
- Rosyface Shiner
- Sand Shiner
- Sea Lamprey (I)
- Shorthead Redhorse
- Silver Redhorse
- Slimy Sculpin
- Smallmouth Bass
- Sockeye Salmon
- Splake
- Spotfin Shiner
- Spottail Shiner
- Stonecat
- Tadpole Madtom
- Walleye
- White Sucker
- Yellow Bullhead
- Yellow Perch

Notes:
- In the pie chart, the fish species will appear in the same order as the legend starting at the top and moving clockwise. Pie chart size is scaled to the number of species.
- The name of the lake or river will appear along the callout line for the pie chart. The number in brackets is the number of species in that lake or river.
(I) Species considered invasive

Map B



NWMO Biodiversity Impact Studies

Lakes and Watercourses with Known Species Presence in the South of the RSA_{AQU}

Figure A-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Regional Study Area (RSA_{AQU})
- Lake With No Species Information
- Watercourse
- Wetland
- Tertiary Watershed (TW) Boundary
- Quaternary Watershed (QW) Boundary
- Municipal Boundary
- South Bruce Boundary
- Breaks in the ARA Dataset

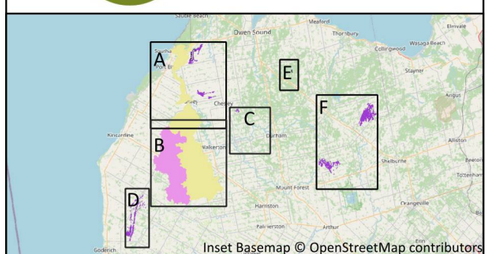
Lake with Species Information

- Cold Regime
- Cool Regime
- Warm Regime
- Unknown Regime

1:140,000

0 2 4 km

ZOETICA



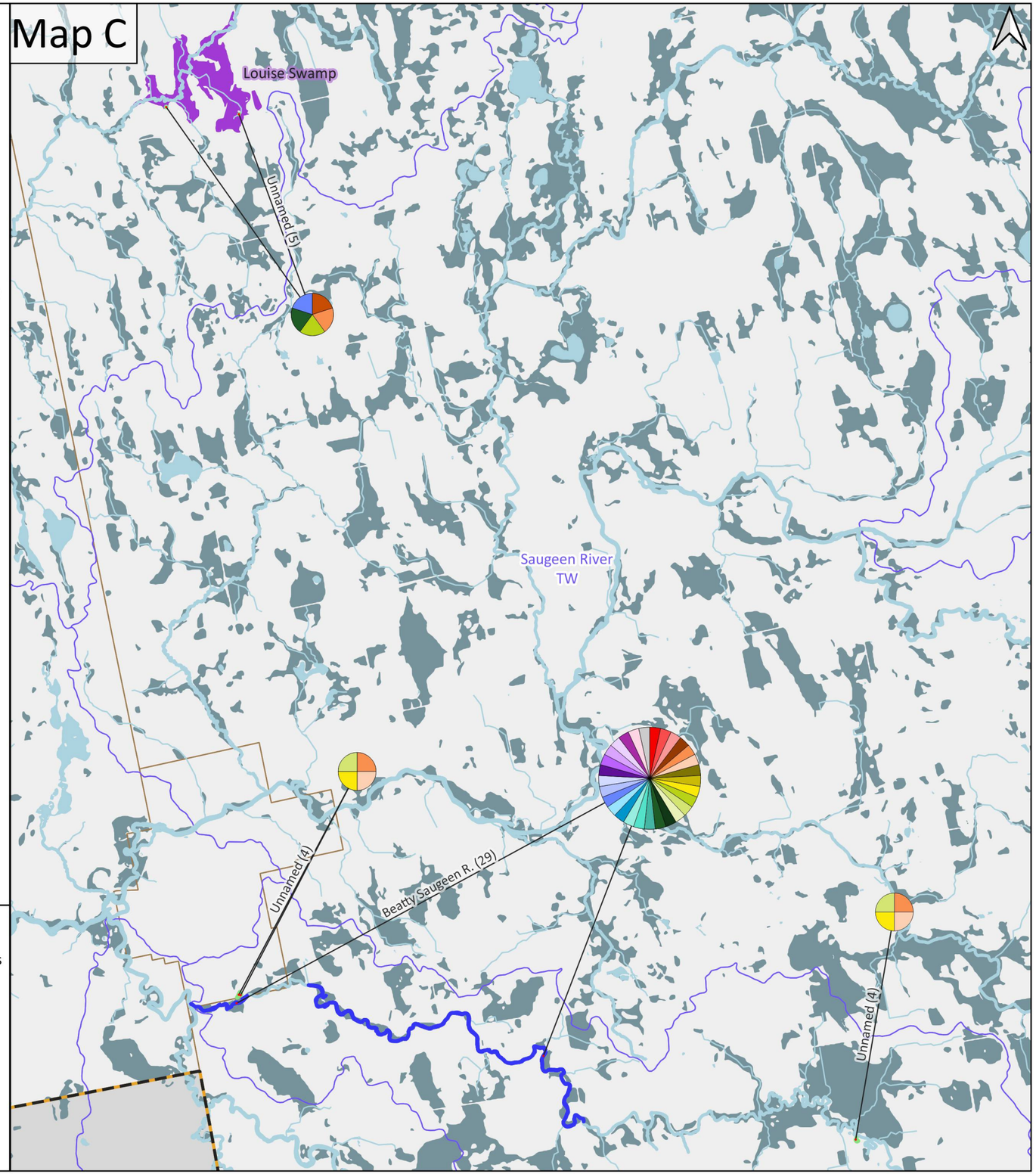
Data received from:
Ontario GeoHub — Aquatic Resource Area [ARA] polygon segment (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); Ontario Watershed Boundaries (MNRF); Municipal Boundary - Lower Tier (MMAH); Wetlands (MNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: AB
September 28, 2023	Map ID: NWMO_BIS_D191b	

Fish Species Leged for Pie Charts

- Alewife
- Black Bullhead
- Blackchin Shiner
- Blacknose Dace
- Blacknose Shiner
- Blackside Darter
- Bluegill
- Bluntnose Minnow
- Brassy Minnow
- Brook Silverside
- Brook Stickleback
- Brook Trout
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- Brown Trout
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- Chinook Salmon
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- Common Carp
- Common Shiner
- Creek Chub
- Emerald Shiner
- Fantail Darter
- Fathead Minnow
- Finescale Dace
- Gizzard Shad
- Golden Redhorse
- Golden Shiner
- Green Sunfish
- Greenside Darter
- Hornyhead Chub
- Iowa Darter
- Johnny Darter
- Largemouth Bass
- Least Darter
- Logperch
- Longnose Dace
- Mimic Shiner
- Mottled Sculpin
- Muskellunge
- Ninespine Stickleback
- Northern Hog Sucker
- Northern Pike
- Northern Redbelly Dace
- Pumpkinseed
- Rainbow Darter
- Rainbow Smelt (I)
- Rainbow Trout
- Redfin Shiner
- River Chub
- Rock Bass
- Rosyface Shiner
- Sand Shiner
- Sea Lamprey (I)
- Shorthead Redhorse
- Silver Redhorse
- Slimy Sculpin
- Smallmouth Bass
- Sockeye Salmon
- Splake
- Spotfin Shiner
- Spottail Shiner
- Stonecat
- Tadpole Madtom
- Walleye
- White Sucker
- Yellow Bullhead
- Yellow Perch

Notes:
- In the pie chart, the fish species will appear in the same order as the legend starting at the top and moving clockwise. Pie chart size is scaled to the number of species.
- The name of the lake or river will appear along the callout line for the pie chart. The number in brackets is the number of species in that lake or river.
(I) Species considered invasive



NWMO Biodiversity Impact Studies

Lakes and Watercourses with Known Species Presence in Reference Areas

Figure A-2c

- Lake With No Species Information
- Watercourse
- Wetland
- Reference Wetland
- Quaternary Watershed (QW) Boundary
- Municipal Boundary
- South Bruce Boundary

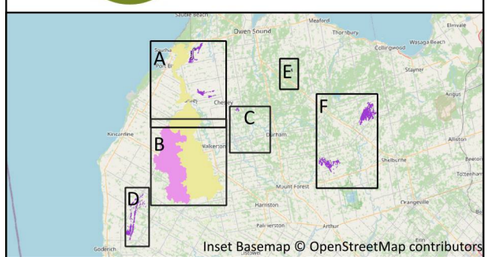
Lake with Species Information

- Cold Regime
- Unknown Regime

1:75,000

0 2 4 km

ZOETICA



Data received from:
Ontario GeoHub — Aquatic Resource Area [ARA] polygon segment (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); Ontario Watershed Boundaries (MNRF); Municipal Boundary - Lower Tier (MMAH); Wetlands (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: AB
September 28, 2023	Map ID: NWMO_BIS_D191c	

Map D

Southeast Lake Huron Shoreline TW

Nine Mile R. (13)

Unnamed (2)

Saratoga Wetland Complex

Unnamed (17)

Unnamed (6)

Maitland River TW

0 2 4 km

1:125,000

Map E

Southwest Georgian Bay TW

Hines L. (14)

Clarke's L. (10)

Robson L. (14)

Unnamed (5)

Hamilton Cr. (18)

Saugeen River TW

0 1 2 km

1:65,000

Map F

Osprey Wetland

Nottawasaga River TW

Saugeen R. (19)

Southw Georgian Bay TW

Unnamed (11)

Mad R. (12)

Saugeen River TW

South Saugeen R. (27)

Gildale Wetland

Upper Grand River TW

0 3 6 km

1:200,000

Fish Species Leged for Pie Charts

- Alewife
- Black Bullhead
- Blackchin Shiner
- Blacknose Dace
- Blacknose Shiner
- Blackside Darter
- Bluegill
- Bluntnose Minnow
- Brassy Minnow
- Brook Silverside
- Brook Stickleback
- Brook Trout
- Brown Bullhead
- Brown Trout
- Central Mudminnow
- Channel Catfish
- Chinook Salmon
- Coho Salmon
- Common Carp
- Common Shiner
- Creek Chub
- Emerald Shiner
- Fantail Darter
- Fathead Minnow
- Finescale Dace
- Gizzard Shad
- Golden Redhorse
- Golden Shiner
- Green Sunfish
- Greenside Darter
- Hornyhead Chub
- Iowa Darter
- Johnny Darter
- Largemouth Bass
- Least Darter
- Logperch
- Longnose Dace
- Mimic Shiner
- Mottled Sculpin
- Muskellunge
- Ninespine Stickleback
- Northern Hog Sucker
- Northern Pike
- Northern Redbelly Dace
- Pumpkinseed
- Rainbow Darter
- Rainbow Smelt (I)
- Rainbow Trout
- Redfin Shiner
- River Chub
- Rock Bass
- Rosyface Shiner
- Sand Shiner
- Sea Lamprey (I)
- Shorthead Redhorse
- Silver Redhorse
- Slimy Sculpin
- Smallmouth Bass
- Sockeye Salmon
- Splake
- Spotfin Shiner
- Spottail Shiner
- Stonecat
- Tadpole Madtom
- Walleye
- White Sucker
- Yellow Bullhead
- Yellow Perch

NWMO Biodiversity Impact Studies

Lakes and Watercourses with Known Species Presence in Reference Areas

Figure A-2d

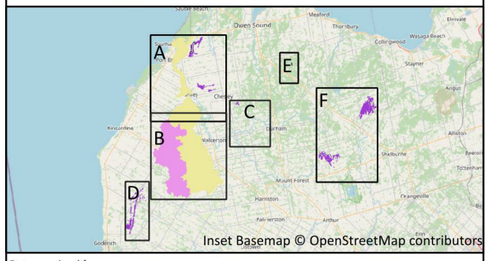
- Lake With No Species Information
- Watercourse
- Wetland
- Reference Wetland
- Tertiary Watershed (TW) Boundary
- Quaternary Watershed (QW) Boundary
- Municipal Boundary

Lake with Species Information

- Cold Regime
- Cool Regime
- Unknown Regime

Notes:
- In the pie chart, the fish species will appear in the same order as the legend starting at the top and moving clockwise. Pie chart size is scaled to the number of species.
- The name of the lake or river will appear along the callout line for the pie chart. The number in brackets is the number of species in that lake or river.
(I) Species considered invasive

ZOETICA



Data received from:
Ontario GeoHub — Aquatic Resource Area [ARA] polygon segment (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); Ontario Watershed Boundaries (MNRF); Municipal Boundary - Lower Tier (MMAH); Wetlands (MNRF)

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: AB	Approved by: AB
September 29, 2023	Map ID: NWMO_BIS_D191d	

APPENDIX B – SUPPLEMENTAL INFORMATION FOR PRIMARY AND SECONDARY PRODUCERS

B.1 Tables

Table B-1. List of regulated and non-regulated invasive aquatic invertebrate species of concern in Ontario. This list does not imply potential occurrence in the SON-South Bruce area, as several invasive species "on the radar" have not yet been found in Ontario or even Canada; however, these species are known to have significant ecological, social, health, and/or economic impacts in other areas of North America and worldwide, where they have been introduced. Species highlighted grey are those that have EDDMapS Ontario records within the extent of the BIS study areas. Note that species may have been confirmed within the study areas through other databases, inventories, studies, or local observations; however, these data sources need to be further investigated.

Subgroup	Common Name	Scientific Name	Ontario *ISA*[1]		Aquatic Invasive Species Regulations[2]			Ont. ISAP[3]	ISC[4]
			PRO.	RES.	Import	Possess, Transport, Release	Non-Indigenous		
Crustaceans	Killer shrimp	*Dikerogammarus villosus*	X					X	X
Crustaceans	Common yabby (crayfish)	*Cherax destructor*	X					X	
Freshwater Molluscs	Golden mussel	*Limnoperna fortunei*	X					X	
Freshwater Molluscs	Quagga mussel	*Dreissena bugensis*			X			X	X
Freshwater Molluscs	Zebra mussel	*Dreissena polymorpha*			X			X	X
Crustaceans	Bloody-red shrimp	*Hemimysis anomala*					X	X	
Crustaceans	Chinese mitten crab	*Eriocheir sinensis*					X		
Crustaceans	Spiny water flea	*Bythotrephes longimanus*						X	X
Crustaceans	Rusty crayfish	*Faxonius rusticus*						X	X
Crustaceans	Fish-hook water flea	*Cercopagis pengoi*						X	
Crustaceans	Red swamp crayfish	*Procambarus clarkii*						X	
Crustaceans	Marmorkrebs (marbled crayfish)	*Procambarus virginalis*						X	
Freshwater Molluscs	Chinese mysterysnail	*Cipangopaludina chinensis*						X	
Freshwater Molluscs	Asian clam	*Corbicula fluminea*						X	
Freshwater Molluscs	Channeled apple snail	*Pomacea canaliculata*						X	
Freshwater Molluscs	New Zealand mud snail	*Potamopyrgus antipodarum*						X	
Freshwater Molluscs	Banded mysterysnail	*Viviparus georgianus*						X	

Notes:

1. Prohibited "PRO." and Restricted "RES." species regulated under the Ontario *Invasive Species Act* (*ISA*) are presented on the Ontario Ministry of Natural Resources and Forestry's (MNRF) website, accessed on July 12, 2021: https://www.ontario.ca/page/managing-invasive-species-ontario
2. The federal Aquatic Invasive Species Regulations (SOR/2015-121) under the *Fisheries Act* includes schedules of Species Subject to Prohibitions and Controls (Part 2) and Species Subject to Controls Only in Areas Where They Are Not Indigenous (Part 3). Within the schedule Part 2, certain invasive species are prohibited from Importation, Possession, Transportation, and/or Release. The regulations are current to June 28, 2021; accessed on July 27, 2021.
3. Ontario's Invading Species Awareness Program (ISAP) is a partnership between the MNRF and the Ontario Federation of Anglers and Hunters. The webpages for Invasive Aquatic Plants, Forest Pests & Pathogens, Invasive Fish, Invasive Invertebrates, Invasive Terrestrial Plants, and Invasive Wildlife were accessed on July 27, 2021: http://www.invadingspecies.com/invaders/
4. The Invasive Species Centre (ISC) is a resource for Ontario and the rest of Canada. Based in Sault Ste. Marie, Ontario, the Board of Directors Organizations include the Great Lakes Fishery Commission, Grand Council Treaty #3, City of Ottawa, International Joint Commission, Wildlife Habitat Canada, University of Waterloo, BioForest, Nature Conservancy of Canada, Natural Resources Canada, Fisheries and Oceans Canada, and the CFIA. The webpages for Invasive Fish, Invasive Plants, Invasive Insects, Invasive Aquatic Plants, and Invasive Pathogens were accessed on July 27, 2021: https://www.invasivespeciescentre.ca/invasive-species/

Table B-2. Primary and secondary producer species of interest reported in GBIF and EDDMapS records within the BIS study area.

Grid	Source	Species	Count	Coordinates	AOI	LSA_{AQU}
7183	EDDMapS	Rusty Crayfish	200	471642, 4883637	0	1
7183	EDDMapS	Rusty Crayfish	200	471595, 4883732	0	1
7571	GBIF	River Bluet	U	-	0	1
Notes: See **Figure B-1** for Grid locations of masked observations. Coordinates are not provided due to the sensitive nature of provincially rare species. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries.						

Table B-3. Field-based observations of Primary and Secondary Producer species of interest at SON-South Bruce in 2022.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{AQU}
6779	Terrestrial Crayfish species	Burrow	1	Incidental	-	0	1
6783	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
6878	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
6972	Digger Crayfish	Burrow	med density	Incidental	-	1	1
6972	Terrestrial Crayfish species	Burrow	>1	SWH	-	1	1
6981	Great Plains Mudbug	Burrow	high density	Incidental	-	0	1
6983	Terrestrial Crayfish species	Visual	>1	SWH	-	0	1
6992	Terrestrial Crayfish species	Burrow	1	Incidental	-	0	1
6992	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
6992	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
6993	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
7065	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
7065	Terrestrial Crayfish species	Burrow	1	SWH	-	0	1
7072	Terrestrial Crayfish species	Burrow	1	Incidental	-	1	1
7072	Terrestrial Crayfish species	Burrow	1	SWH	-	1	1
7080	Terrestrial Crayfish species	Burrow	3	SWH	-	0	1
7163	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
7164	Terrestrial Crayfish species	Burrow	med density	Incidental	-	0	1
7164	Terrestrial Crayfish species	Burrow	med density	Incidental	-	0	1

7164	Terrestrial Crayfish species	Burrow	low density	SWH	-	0	1
7172	Terrestrial Crayfish species	Burrow	low density	Incidental	-	1	1
7172	Terrestrial Crayfish species	Burrow	med density	Incidental	-	1	1
7172	Terrestrial Crayfish species	Burrow	>1	SWH	-	1	1
7172	Terrestrial Crayfish species	Burrow	>1	SWH	-	1	1
7174	Terrestrial Crayfish species	Burrow	low density	Incidental	-	1	1
7174	Terrestrial Crayfish species	Burrow	3	SWH	-	1	1
7184	Terrestrial Crayfish species	Burrow	low density	Incidental	-	0	1
7184	Terrestrial Crayfish species	Burrow	med density	Incidental	-	0	1
7184	Terrestrial Crayfish species	Burrow	1	SWH	-	0	1
7184	Terrestrial Crayfish species	Burrow	>10	SWH	-	0	1
7185	Terrestrial Crayfish species	Burrow	1	Incidental	-	0	1
7185	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
7185	Terrestrial Crayfish species	Burrow	1	SWH	-	0	1
7190	Digger Crayfish	Burrow	1	Incidental	-	0	1
7271	Terrestrial Crayfish species	Burrow	low density	Incidental	-	1	1
7271	Terrestrial Crayfish species	Burrow	>1	SWH	-	1	1
7273	Terrestrial Crayfish species	Burrow	low density	SWH	-	1	1
7278	Terrestrial Crayfish species	Burrow	low density	Incidental	-	0	1
7278	Terrestrial Crayfish species	Burrow	low density	Incidental	-	0	1
7278	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
7279	Great Plains Mudbug	Burrow	low density	Incidental	-	0	1
7279	Great Plains Mudbug	Burrow	1	Incidental	-	0	1
7279	Terrestrial Crayfish species	Burrow	med density	Incidental	-	0	1
7279	Terrestrial Crayfish species	Burrow	1	Incidental	-	0	1
7279	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
7279	Terrestrial Crayfish species	Visual	1	SWH	-	0	1
7286	Terrestrial Crayfish species	Burrow	low density	Incidental	-	0	1
7286	Terrestrial Crayfish species	Burrow	>1	SWH	-	0	1
7287	Terrestrial Crayfish species	Burrow	1	Incidental	-	0	1
7288	Terrestrial Crayfish species	Burrow	med density	Incidental	-	0	1

7288	Terrestrial Crayfish species	Burrow	med density	SWH	-	0	1
7373	Terrestrial Crayfish species	Burrow	low density	Incidental	-	1	1
7373	Terrestrial Crayfish species	Burrow	>1	SWH	-	1	1
7385	Terrestrial Crayfish species	Burrow	low density	Incidental	-	0	1
7386	Terrestrial Crayfish species	Visual	1	SWH	-	0	1
7389	Terrestrial Crayfish species	Visual (juv)	1	Incidental	-	0	1
7389	Terrestrial Crayfish species	Burrow	1	Incidental	-	0	1
7389	Terrestrial Crayfish species	Burrow	1	SWH	-	0	1
7389	Terrestrial Crayfish species	Visual	1	SWH	-	0	1

Notes:
See **Figure B-2** for Grid locations of masked observations. Coordinates are not provided due to the sensitive nature of provincially rare species.
For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries.

Table B-4. Incidental observations of aquatic invertebrates during TEM, AHM, and eDNA within the AOI, LSA_{AQU}, or RSA_{AQU} from field surveys in 2022.

Common Name	Scientific Name	SAR	Rare	Introduced /Invasive	Notes
Crayfish	Cambaridae sp.	NA	NA	NA	
Mussels	Unionidae spp.	NA	NA	NA	
Water striders	Gerridae spp.	NA	NA	NA	
Unidentified Semi-aquatic or Aquatic Invertebrates	NA	NA	NA	NA	Included records of Leech, Dragonflies, and Snails (which may be aquatic or terrestrial)

B.2 Figures

NWMO Biodiversity Impact Studies

Species of Interest Desk-based Observations: Primary and Secondary Producers

Figure B-1

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

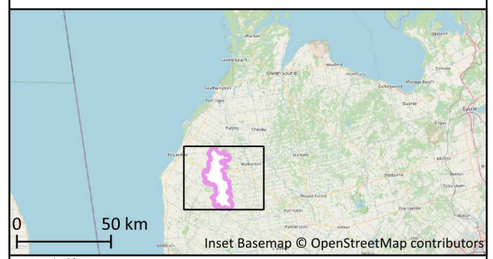
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:130,000

0 2 4 km

ZOETICA



- Observation Location
- 1km x 1km grid square with observations

GBIF Observations

- River Bluet (R) [1]

EDDMapS Observations

- Rusty Crayfish (I) [2]

Known Critical Habitat

- Critical Habitat for Rainbow [Mussel]

R = Provincially Rare I = Invasive

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI
GBIF.org — GBIF Occurrence Download - Accessed Oct., 2021
EDDMapS Ontario — Invasive Species Observations - Accessed Jan 12, 2022
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
December 11, 2023	Map ID: NWMO_BIS_A077	

NWMO Biodiversity Impact Studies

Primary and Secondary Producers Species of Interest Field Observations - North LSA_{AQU}

Figure B-2a

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

Municipality of Kincardine
Bruce Road 15
Bruce Road 1
Bruce Road 20
Bruce Road 3
Bruce Road 2
Chepstow Road
Concession 6
Schmidt Lake
Cunningham Lake
Greenock Swamp Wetland Complex
Chepstow Swamp
Teeswater River
Highway 9
Silver Lake
Clam Lake
Township of Huron-Kinloss
Municipality of Brockton
Municipality of South Bruce

6993, 6992, 7190, 7389, 7288, 7287, 7286, 7386, 7185, 7385, 7184, 6783, 6983, 6981, 7080, 6779, 7279

Species Observed

- Digger Crayfish (R)
- Great Plains Mudbug (R)
- Unk. Terrestrial Crayfish Spp. (R)

R = Provincially Rare

SAR and Provincially Rare species were masked with a 1km grid and may occur anywhere within that grid square. Circle colour(s) within the grid represent the species observed incidentally. Species may have been observed more than once within a grid square.

* Unknown terrestrial crayfish species were identified to genus level. There are two potentially occurring terrestrial crayfish (Digger Crayfish, Great Plains Mudbug) in the area and both are provincially rare.

Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:65,000
0 1 2 km

ZOETICA

0 50 km
Inset Basemap © OpenStreetMap contributors

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
January 26, 2024	Map ID: NWMO_BIS_A121a	

NWMO Biodiversity Impact Studies

Primary and Secondary Producers Species of Interest Field Observations - South LSA_{AQU}

Figure B-2b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

See Figure B-2a for Full Legend

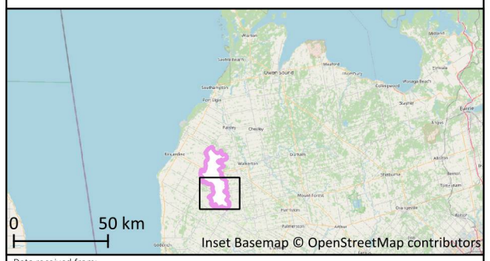
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
January 26, 2024	Map ID: NWMO_BIS_A121b	

NWMO Biodiversity Impact Studies

Primary and Secondary Producers Species of Interest Field Observations - AOI

Figure B-2c

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

See Figure B-2a for Full Legend

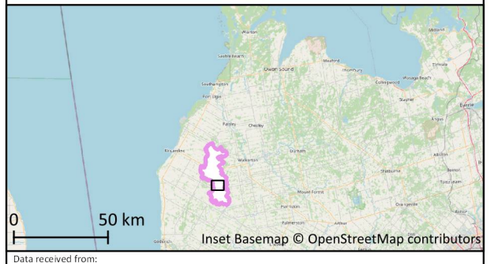
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:20,000

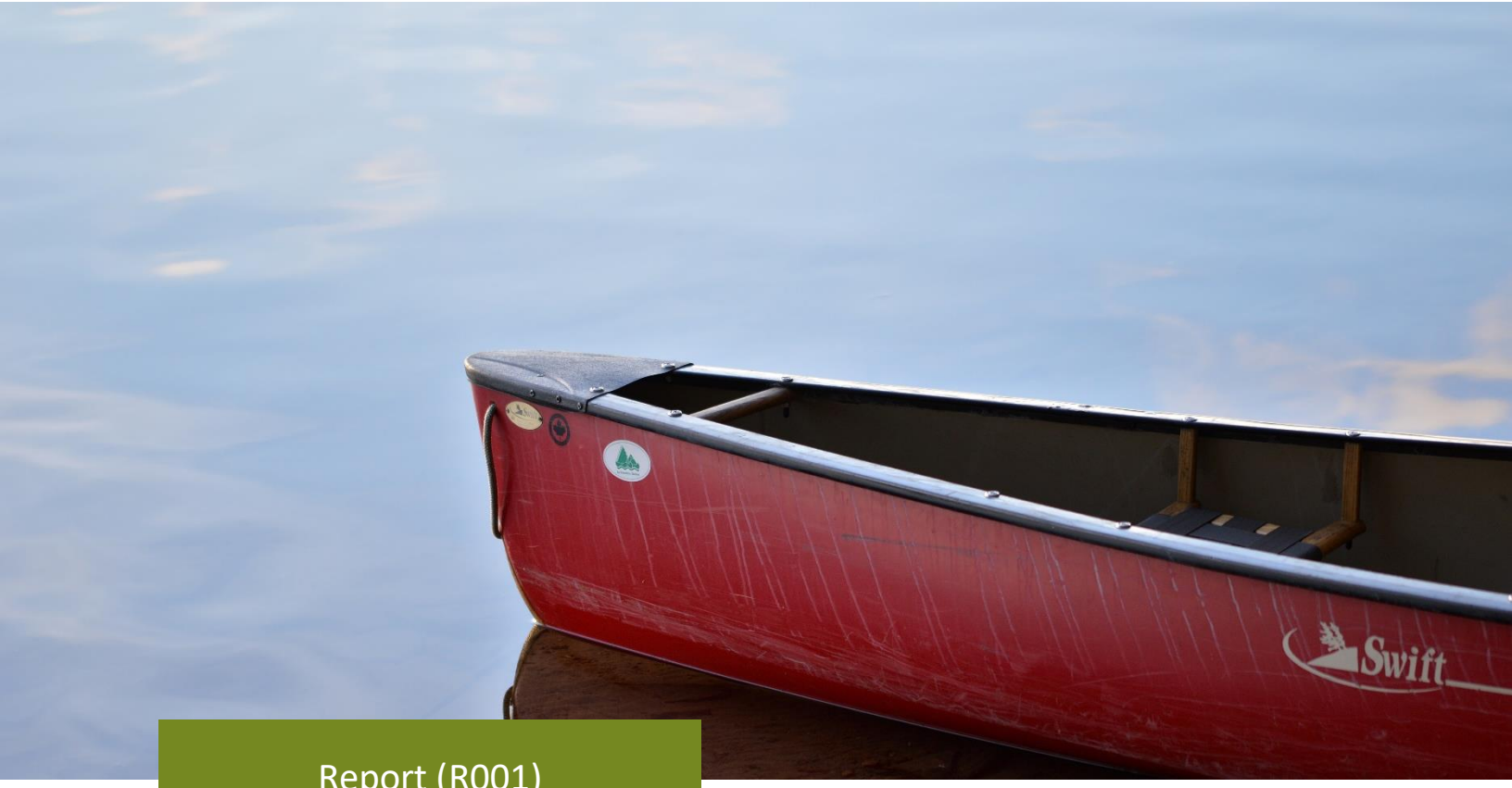
0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: AB	Approved by: HB
January 26, 2024	Map ID: NWMO_BIS_A121c	



Report (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2023 BASELINE REPORT (CHAPTER 9: ECOSYSTEM FUNCTION AND SERVICES)

December 13, 2023

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 St Anne Ave, Maple Ridge, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE www.zoeticaenvironmental.com

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GLOSSARY AND ABBREVIATIONS

AHM	Aquatic Habitat Mapping
ANSI	Area of Natural or Scientific Interest; areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study, or education (MMAH 2020).
AOI	Area of Interest
BBD	Beech bark disease
BIS	Biodiversity Impact Studies
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approaches
BV	Biodiversity Value; The biotic environmental components that will be considered for study within The Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components
CA	Conservation Authority
CNSC	Canadian Nuclear Safety Commission
DED	Dutch elm disease
EAB	Emerald ash borer
Ecosystem function	In the context of biodiversity, ecosystem functions include the physiochemical and biological processes that occur within the ecosystem to maintain biodiversity.
Ecosystem services	Ecosystem services are the direct and indirect benefits to human well-being that the natural environment provides through healthy ecosystems. Ecosystem services include provisioning services such as the production of food and water, regulating services, such as the control of climate and disease, supporting services, such as nutrient cycles and oxygen production, and cultural services, such as spiritual and recreational benefits.
EDDMapS	Early Detection and Distribution Mapping System
eDNA	Environmental DNA
EMBP	Environmental Media Baseline Program
GBIF	Global Biodiversity Information Facility
GSWC	Greenock Swamp Wetland Complex
IA	Impact Assessment
IBAT	Integrated Biodiversity Assessment Tool
IUCN	International Union for Conservation of Nature
LSA	Local Study Area LSA_{ECO} = Local Study Area for ecosystem function and services

MNRF	Ontario Ministry of Natural Resources and Forestry
MVCA	Maitland Valley Conservation Authority or Maitland Conservation
NWMO	Nuclear Waste Management Organization
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose traditional territories include the project location.
RSA	Regional Study Area RSA_{ECO} = Regional Study Area for ecosystem function and services
SAR	Species at Risk
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SOP	Standard Operating Procedure
SWH	Significant Wildlife Habitat; Defined in the Ontario Provincial Policy Statement, 2020 as: *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. *Significant* – in regard to wildlife habitat, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system.
SVCA	Saugeen Valley Conservation Authority or Saugeen Conservation
TEM	Terrestrial Ecosystem Mapping
The Project	The Adaptive Phased Management Project is the Deep Geological Repository and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
TISG	Tailored Impact Statement Guidelines. 'TISG Template' refers to the Tailored Impact Statement Guidelines Template (generic version) (IAAC 2022).
TWC	Teeswater Wetland Complex
VC	Valued Component. For impact assessments of designated projects under the *Impact Assessment Act*, the Agency's Glossary of Terms defines VCs as "environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties. Valued components may be identified as having scientific, biological, social, health, cultural, traditional, economic, historical, archaeological and/or aesthetic importance."

1.0 ECOSYSTEM FUNCTION AND SERVICES

1.1 Introduction

All biodiversity values previously discussed in this 2023 BIS Baseline Report rely on a healthy functioning ecosystem. The current Chapter 9 (Ecosystem Function and Services) focuses on ecosystem functions and the related ecosystem services that maintain biodiversity and may benefit humans. Ecosystem functions are the physical, chemical, and biological processes within the ecosystem that maintain biodiversity. Ecosystem functions control the flux of energy, nutrients, and organic matter through an environment and provide the habitats on which biota depend for survival. Ecosystem services are the variety of benefits that nature provides to people. These services include tangible benefits (e.g., goods such as merchantable timber) and intangible benefits (e.g., carbon sequestration, spiritual practices).

A healthily functioning ecosystem is composed of various ecosystem components that work together to support biodiversity values (BVs) and benefit humans. The value of each ecosystem component can be determined based on its function, along with cultural ideals or scientific concerns. For example, wetlands (see Chapter 3) are typically recognized as valued components due to their important ecological functions and socio-economic values. Wetlands provide ecosystem services to humans, such as water retention and flood control, and so are ascribed high societal value. Wetlands also provide critical ecological functions – natural processes independent of their benefits to humans (Hanson et al. 2008) that are essential for supporting biodiversity.

The Millennium Ecosystem Assessment (MEA 2005) defines four main categories of ecosystem services:

- **Provisioning services**: Material benefits provided to people and wildlife. Examples include food (growing, collecting, hunting, harvesting), freshwater (flow and storage), raw materials (merchantable timber, biofuels, fibre), and medicinal resources (vegetation).
- **Regulating services**: Benefits (often invisible) from regulating ecosystem processes. Examples include local air quality (shading, pollutant removal), carbon sequestration and storage (greenhouse gases), moderation of extreme events (natural buffers), waste-water treatment (filter, decompose, eliminate), erosion prevention and maintenance of soil fertility, pollination (insects, birds, bats), biological control (predators and parasites), and regulation of water flow.
- **Cultural services**: Non-material benefits people obtain from ecosystems. Examples include recreation and mental and physical health; tourism; aesthetic appreciation and inspiration for culture, art, and design; and spiritual experience and sense of place.
- **Supporting services**: Supporting services are necessary to produce all other ecosystem services. Examples include nutrient cycling, soil formation, and primary production (i.e., photosynthesis).

Biodiversity loss has been directly linked to a decline in ecosystem services (MEA 2005). Ecosystem services are often included in Impact Assessments (IAs) to account for the human value of biodiversity and assess the importance of different ecosystems and their services. Ecosystem services are derived from the natural environment and are, therefore, necessarily assessed as a component of the biophysical baseline conditions. However, this Chapter of the Biodiversity Impact Studies (BIS) Baseline Report will be linked to other baseline assessments being conducted for the Adaptive Phased Management Project

(hereafter, 'the Project') when considering the four pillars of sustainability (e.g., health, social, and economic assessments).

The Canadian Nuclear Safety Commission's (CNSC) *Guidance on Deep Geological Repository Site Characterization* requires that the aquatic and terrestrial environment be characterized as ecosystem components in the Area of Interest (AOI) (CNSC 2018). In addition, the Tailored Impact Statement Guidelines (TISG) Template (generic version) ('TISG Template'[1]) requires that the impact statement include detailed descriptions of baseline conditions and potential project effects on the biophysical, human health, social, and economic environments, and Indigenous peoples (IAAC 2022). Assessment of ecosystem services will require consideration of the interactions between these valued components (VCs). Further, the TISG Template indicates that the rationale for inclusion (or exclusion) of VCs must consider environmental, cultural, spiritual, historical, health, social, economic, recreational, and aesthetic considerations, and Indigenous Knowledge. The value of a component, including biodiversity, depends on both its intrinsic function in the ecosystem and the extrinsic value placed on it by local communities and Indigenous communities. Zoetica™ aims to address these types of VCs in this Chapter 9, in combination with work done on other pillars of the IA. The TISG Template also includes guidance to characterize the project's effects on riparian and wetland environments, which are relevant for ecosystem function and services. A full list of acts, regulations, and other biodiversity considerations is available in Appendix E of the *Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approaches* (BPPA) Report (Zoetica 2021).

1.1.1 Objectives

The objectives of Ecosystem Function and Services studies are to:

1. Identify ecosystems and ecosystem components critical to sustaining biodiversity, and thus ecosystem function, within the relevant BIS study areas (see Section 3.0, Chapter 1);
2. Identify ecosystem processes that provide regulating services (as defined in Section 1.1) which are essential for maintaining biodiversity and ecological functions and may also be important for people; the latter of which will be considered within the social and economic IA pillars; and
3. Identify ecosystems and ecosystem components that underlie the provisioning of goods and provide cultural services (as defined in Section 1.1) to people; the latter of which will be considered within the social and economic IA pillars.

The current Chapter 9 (Ecosystem Function and Services) begins to fulfill the requirements of the TISG Template required for ecosystem function and services (see Appendix C in the BPPA Report (Zoetica 2021)). Cultural services such as recreation, tourism, aesthetic appreciation, and spiritual enjoyment of nature are not part of the BIS but will be included in other IA pillars.

1.2 Methods

1.2.1 Study Area

The BIS study areas for ecosystem function and services include the AOI, a local study area (LSA_{ECO}), and a regional study area (RSA_{ECO}) that combines the largest areas covered by all biodiversity values. See Section

[1] Please see Chapter 1 for limitations of and planned updates to the TISG Template (IAAC 2022).

3.0, Chapter 1 of the 2023 BIS Baseline Report and Section 5.2.12.4 of the BPPA report (Zoetica 2021) for more details on study area descriptions.

1.2.2 Collation of Data

Zoetica began desk-based collation of data for this chapter of the 2023 BIS Baseline Report by searching existing datasets for areas known to provide ecosystem function and services, including national and provincial parks and reserves, Areas of Natural or Scientific Interest (ANSIs), conservation authority (CA) lands, county lands (e.g., county forests), municipal parks, and trails that exist within the relevant BIS study areas (see **Table 1-1**).

In future years of the baseline program, additional available databases (including regional and municipal data sources) will be investigated to identify more areas that may protect ecosystem functions or services. Additional areas, if identified, will be reported in subsequent iterations of the BIS Baseline Report. Engagement with stakeholders and rights-holders is ongoing (see Section 2.4, Chapter 1), and additional ecosystem information received will be interwoven with information collected from other sources and studies.

Zoetica identified species of forest pests and diseases relevant to ecosystem function and services that could potentially occur within the BIS study areas. Desk-based research and mapping of these species proceeded by collating existing data from government, citizen science, and other biodiversity databases. For this 2023 BIS Baseline Report, data sources for verified species and habitat records included the Ontario Ministry of Natural Resources and Forestry (MNRF), Global Biodiversity Information Facility (GBIF), and Early Detection and Distribution Mapping System (EDDMapS) Ontario. As these datasets periodically pull observations from other biodiversity-related projects and programs (e.g., iNaturalist), they were deemed to be a good starting point to investigate observations of forest pests and diseases that are found or are likely to be found in the BIS study areas. In addition, Zoetica investigated findings from previous environmental studies conducted for the Project in the Saugeen Ojibway Nation (SON)-South Bruce siting area (Tulloch Environmental 2020, 2021). **Table 1-1** summarizes the datasets, data layers, and reports investigated and analyzed for species observations and habitat data for the 2023 BIS Baseline Report. Data reported on maps were limited to observations from 1970 onward as older observations were considered historic and not as reliable. Data on desk-based observations of species of interested are presented in **Table A-2**. See Appendix A, Chapter 1 for data quality scoring.

Table 1-1. Spatial datasets and reports analyzed for information relevant to ecosystem function and services.

Data Source / Owner	Dataset	Data Format	Date Accessed / Received	Contains relevant[1] data?
Integrated Biodiversity Assessment Tool (IBAT)[2]	World Database on Protected Areas	Shapefile	03/2020	Y
Ontario Ministry of Natural Resources and Forestry (MNRF)	Ontario Trail Network (OTN) Trail Segment	Shapefile	12/2019	Y
	Areas of Natural and Scientific Interest	Shapefile	12/2019	Y
Ontario Ministry of the Environment, Conservation and Parks (MECP)	Conservation authority administrative area	Shapefile	01/2022	Y

County of Bruce Open Spatial Data	Bruce County Forests	Shapefile	11/2021	Y
Huron County Open Data	County Tracts	Shapefile	11/2021	Y
	Parks	Shapefile	11/2021	Y
Saugeen Conservation (SVCA)	Saugeen Conservation properties	Shapefile	01/2022	Y
Species Observations				
Tulloch Environmental *Phase 2 preliminary environmental studies for the Project*	July 2020 Site Reconnaissance (Tulloch Environmental 2020)	Report	10/2020	Y
	October 2020 Natural Heritage Features (Tulloch Environmental 2021)	Report	04/2021	Y
Ontario Ministry of Natural Resources and Forestry (MNRF)	Wildlife Activity Site	Shapefile	12/2020	N
	Wildlife Activity Area	Shapefile	12/2020	N
	Greenock Swamp ANSI Report (Johnson 1994a, 1994b)	Reports	10/2020	Y
Global Biodiversity Information Facility (GBIF)	Species Occurrences	CSV	09/2021	Y
Early Detection and Distribution Mapping System (EDDMapS) Ontario	Invasive Species Observations	Shapefile	01/2022	Y

Notes:
1. Zoetica determined dataset relevance based on geographic and temporal relevance as well as relevance to ecosystem function and services. For example, data that were not within the relevant BIS study areas, data that were too old to be considered relevant, or data that did not include information related to biodiversity, ecosystem functions, or ecosystem services were labelled "N" for not containing relevant data.
2. Data were received from IBAT, but the data were created by the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and the International Union for Conservation of Nature (IUCN).

A full list of the species mentioned in this report, including common and scientific names, is available in **Table A-1** in Appendix A.

In addition, information collected as part of Tier 1 studies outlined in Section 1.2.3 may be used to infer areas of relevance for providing ecosystem functions and services. Zoetica designed Tier 1 field studies (see Section 1.2.3) that commenced in the summer of 2022. In addition, as described in the BPPA (Zoetica 2021), Tier 2 BIS studies are planned for many of the BVs reported in this BIS Baseline Report, if the SON-South Bruce siting area is selected for further study. The results of these studies will help establish baseline conditions for ecosystem function and services. For example, Ontario Wetland Evaluation System studies are planned as Tier 2 methods to evaluate wetland function (see Chapter 3). Similarly, merchantable timber will be assessed in collaboration with economic studies conducted for the Project (see Chapter 2). These studies will improve understanding of valuable ecosystem functions and services within the RSA_{ECO}.

1.2.3 Tier 1 Studies

Tier 1 studies to date focused on collating desk-based data from accessible existing data sources, desk-based habitat mapping, and one season of field studies. Field work commenced in the summer of 2022 and focused on collecting Tier 1 foundational habitat data and species detections through eDNA metabarcoding and incidental observations (see Section 2.0, Chapter 1 for information on study tiers). Detailed methods for the Tier 1 studies outlined below are available in the *Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design* (BPD) Report (Zoetica 2022) and associated

Standard Operating Procedures (SOPs). Data from the 2022 field season are included in this 2023 iteration of the BIS Baseline Report. Field work was not conducted in the SON-South Bruce siting area in 2023.

1.2.3.1 Terrestrial Ecosystem Mapping

Terrestrial Ecosystem Mapping (TEM) completed to date is described in Appendix B, Chapter 1. The ecosite dataset resulting from desk-based TEM was refined with field data from 2022. This included identifying ecosites that are associated with rare vegetation communities and ecosite types that are rare within the BIS study areas. Zoetica used ecosite delineations to plan Aquatic Habitat Mapping (AHM) studies (see Appendix D, Chapter 1), and determine candidate Significant Wildlife Habitat (SWH) for various BVs (see Appendix C, Chapter 1).

1.2.3.2 Identification of Candidate Significant Wildlife Habitat

Zoetica conducted desk-based work to identify candidate SWH and preliminary fieldwork was done in 2022 to evaluate candidate SWH at select TEM survey plots. SWH work completed to date is described in Appendix C, Chapter 1, and field examination of candidate SWH will be expanded to additional survey plots in subsequent years of Tier 1 data collection. SWH is ecologically important habitat within which plants, animals, and other organisms live and find adequate food, water, shelter, and space needed to sustain their populations. Areas of SWH often provide ecosystem components critical to sustaining biodiversity (see Objective 1), and thus can be considered in the ecosystem function and services BV.

1.2.3.3 Aquatic Habitat Mapping

AHM completed to date is described in Appendix D, Chapter 1. AHM studies focus on characterizing watercourses, waterbodies (ponds, lakes), and wetlands in the relevant aquatic study areas. These studies can identify potentially important habitats for fish and other aquatic and semi-aquatic wildlife. Aquatic and semi-aquatic habitats can be considered in the ecosystem function and services BV for their potential to support biodiversity.

1.2.3.4 Environmental DNA Metabarcoding

Environmental DNA (eDNA) metabarcoding studies[2] completed to date are described in Appendix E, Chapter 1. The two vertebrate primers used for eDNA studies were primarily intended to capture aquatic and semi-aquatic species such as fish, amphibians, and turtles. Invertebrate primers used for eDNA studies were targeted to capture aquatic and semi-aquatic invertebrate species (see Zoetica's BPD Report (Zoetica 2022)). eDNA metabarcoding is a powerful tool that can potentially identify biodiversity hotspots in sampled habitats within the BIS study areas. Such areas provide a relatively important ecosystem function with regard to sustaining local biodiversity and may be important to protect. eDNA surveys may also identify the presence of pests that are currently impacting the ability of the ecosystem to function, or could threaten to impact ecosystem function in the future with growth and spread.

1.2.4 Mapping Considerations

Desk-based species observations reported on maps were limited to observations from 1970 onward as older observations were considered historic and not as reliable. See Appendix A, Chapter 1 for data quality scoring. For EDDMapS data, when there were multiple entries with a count of one at the same location, Zoetica assumed the entries were all the same individual to avoid double-counting and erroneously reporting that multiple individuals were present. For simplicity, mapped species observations in **Figure**

[2] In all sections of this 2023 BIS Baseline Report, where eDNA studies and results are noted, they refer to the use of eDNA in combination with metabarcoding for multi-species identification.

A-2 present the *cumulative* number of observations and counts and do not represent the number of individuals.

Incidental observations were recorded during various Tier 1 baseline field programs and were noted on different data forms. Incidental observations varied in method of observation (audio, visual, etc.) and life history stage of organisms, and may have been recorded in transit to a site and thus not associated with habitat data. As well, expertise in species identification may have varied among field contractors working on different field programs. Thus, not all pertinent information may have been available (e.g., observation type, activity, demographics) or collected in a directly comparable manner (e.g., quantity). Data on incidental observations of species of interest are included in Appendix A (**Table A-3**).

1.3 Results

1.3.1 Ecosystems and ecosystem components critical to sustaining biodiversity

Habitats that are important for species support biodiversity and thus provide ecosystem functions. Zoetica considered areas of protected habitat for biodiversity to be important for evaluating ecosystem function.

1.3.1.1 National and Provincial Parks and Reserves

Parks and reserves support ecosystem functions by preventing development within these areas and protecting ecosystems that support biodiversity. They also support ecosystem services that can provide regulating, cultural, and supporting services for local people. According to the World Database on Protected Areas, no national or provincial parks overlap with the BIS study areas (AOI, LSA_{ECO}, and RSA_{ECO}).

1.3.1.2 Areas of Natural or Scientific Interest (ANSI)

ANSIs are areas of land and water in Ontario containing natural landscapes or features that have significant life science or earth science values on a local, regional, or provincial scale. ANSIs are considered natural heritage areas and are subject to the requirement that development and site alteration not occur on adjacent lands unless it has been demonstrated that there will be no negative impacts on the ANSI or its ecological function (see the Provincial Policy Statement (MMAH 2020) for more information). The province recommends a 120 m buffer for “adjacent lands" around Life Science ANSIs and a 50 m buffer around Earth Science ANSIs (OMNR 2010). Thirteen ANSIs exist within the BIS study areas, including five of provincial significance and eight of regional significance. No ANSIs were found within the AOI (**Figure A-1**). The Greenock Swamp Wetland Complex (GSWC) is classified as a Life Science ANSI of provincial significance, thus providing critical ecosystem function in the SON-South Bruce area. The GSWC is primarily captured within the LSA_{ECO} north of the AOI, with a small portion in the RSA_{ECO} (**Figure A-1**). Of note, the southern end of the GSWC that protrudes into the northern AOI is not considered part of the ANSI. The Turnberry Swamp, a Life Science ANSI of regional significance, partially occurs in the southern end of the LSA_{ECO} (**Figure A-1**). These Life Science ANSIs are defined by their important ecological features, and thus provide significant ecosystem functions to the SON-South Bruce area. In the RSA_{ECO}, several other Life Science ANSIs occur, including the eastern border of the Glammis Bog (provincially significant) just north of the LSA_{ECO}; the St. Helens Beech Maple Forest (regionally significant) in the southwestern RSA_{ECO};

most of the St. Augustine Bog and Swamp Forest (regionally significant) in the southwestern RSA_{ECO}; Murrays Bog (regionally significant) in the eastern RSA_{ECO}; portions of the Lakelet Lake Bog (regionally significant) close to Murray's Bog; the Bog North of Gorrie (regionally significant) in the southeastern RSA_{ECO}; and parts of the Wroxeter Swamp (regionally significant) in the southeastern RSA_{ECO} (**Figure A-1**). Earth Science ANSIs have important geological landscapes or features in their area, which might also provide unique habitats to support biodiversity and ecosystem function. Four Earth Science ANSIs also exist within the $RSA_{ECO,}$ including the Lothian-Lake Warren Shorelines (provincially significant) in the western RSA_{ECO}; the Saugeen River Section (provincially significant) in the northeastern RSA_{ECO}; the Formosa North Road Cut (provincially significant) in the eastern RSA_{ECO}; and the Elma Tavistock Tills (regionally significant) in the southern RSA_{ECO} (**Figure A-1**).

1.3.1.3 Conservation Authority Lands

The jurisdictions of two conservation authorities (CAs) partially overlap with the BIS study areas (**Figure A-1**). The AOI and the LSA_{ECO} fall within the Saugeen Valley Conservation Authority (Saugeen Conservation; SVCA) jurisdiction, except for a small portion of the western LSA_{ECO} that is in the jurisdiction of the Maitland Valley Conservation Authority (Maitland Conservation; MVCA). The RSA_{ECO} overlaps primarily with the western extent of the SVCA jurisdiction, but the southern portion of the RSA_{ECO} overlaps with the northwest extent of the MVCA jurisdiction.

Conservation lands, owned by either the SVCA or the MVCA, exist within the boundaries of the CA jurisdictions. No conservation lands overlap the AOI (**Figure A-1**). Within the LSA_{ECO}, the SVCA owns 35 properties in the GSWC north of the AOI and one, the Hardwood Hill Management Unit, south of the AOI (**Figure A-1**). The RSA_{ECO} contains conservation lands owned and managed by the SVCA and MVCA. In addition to those in the LSA_{ECO}, the SVCA owns 18 properties in the RSA_{ECO}, of which three occur in the northern portion of the GSWC outside of the LSA_{ECO} (**Figure A-1**). The MVCA owns 18 properties contained within the southern RSA_{ECO} (**Figure A-1**). The SVCA and MVCA manage these lands to conserve their ecosystem functions and support biodiversity.

1.3.1.4 County and Municipal Lands

Huron and Bruce County open datasets both included forest tracts, but no forest tracts occur in the AOI. Five forest tracts occur in the RSA_{ECO}, one of which (Culross Tracts) occurs within the LSA_{ECO} (**Figure A-1**). All forest tracts in the RSA_{ECO} are within the Bruce County boundary. Timber harvest, which is an ecological service of relevance to humans, may occur in these forest tracts. The forest tracts are also managed by the counties to also provide habitat for biodiversity.

Huron County datasets indicated that 11 municipal parks occur within the RSA_{ECO}, none overlapping with the AOI or LSA_{ECO} (**Figure A-1**). The parks primarily occur as a cluster south of the LSA_{ECO}, with one occurring southwest of the LSA_{ECO}, one in the far south of the RSA_{ECO} along the boundary between the Township of North Huron and the Municipality of Morris-Turnberry, and another two southeast of the LSA_{ECO}, near Wroxeter Swamp. When writing the 2023 BIS Baseline Report (September 2023), Zoetica did not have data for Bruce County to map municipal parks within this boundary and the BIS study areas. Municipal parks can provide ecosystem function via habitat for biodiversity, while also containing land types that provide less ecosystem function such as lawns, pavilions, playgrounds, and other paved or built spaces. Thus, they are heterogeneous units in terms of providing ecosystem functions and services and vary more from park to park compared to other types of protected lands.

1.3.1.5 Additional areas identified during Tier 1 studies

Tier 1 studies to date focused on determining the presence, distribution, and abundance of important habitat for BVs with an emphasis on species of conservation concern (including species at risk (SAR) and provincially rare species), species of interest and potential importance to local stakeholders and rights-holders, invasive species, and indicator species. Each BV chapter outlines existing information on important habitats within their respective study areas collated through searches of desk-based datasets and field surveys. In addition, Appendix C, Chapter 1 presents candidate SWH identified using ecosite information from TEM studies (Appendix B, Chapter 1) for these species. Appendix D, Chapter 1 includes potentially important aquatic habitats for fish and other aquatic and semi-aquatic biota. All of these important habitats identified in the previous chapters are providing key ecosystem functions to allow species to carry out life history stages within those habitats. In future iterations of the BIS Baseline Report, Zoetica will consider important areas for each BV holistically to identify any biodiversity hotspots and assess potentially important areas for sustaining high biodiversity.

1.3.2 Ecosystems and ecosystem components providing regulating services

To date, insufficient baseline information has been collected to understand ecosystems and ecosystem components providing regulating services. Tier 1 TEM and AHM studies focused on collecting information within terrestrial and aquatic habitats, including wetlands. Chapter 3 examined information from these studies to understand the areas within the AOI and LSA_{AQU} that directly contribute to the health of existing aquatic habitats. Although the complete extent of each study area has not been mapped, currently 12.7% of the AOI and 28.1% of the LSA_{ECO} were covered by wetlands. Riparian buffers of 100 m around all mapped wetlands, waterbodies, and watercourses would cover 37.8% of the AOI and 30.5% of the LSA_{ECO}. Provincially significant wetlands and their required 120 m riparian buffers constituted 24.2% of the AOI and 48.8% of the LSA_{ECO}. Mapped ecosites within riparian buffers were mostly forest (hardwood, mixedwood, and conifer), which is likely good quality riparian habitat (see Figures D-4 and D-5 in Chapter 3). If riparian habitat is prevalent and in good condition, it could provide regulating functions for aquatic habitats in these study areas. However, 64.4% of 100 m riparian buffers in the AOI, and 58.8% in the LSA_{ECO}, were unmapped anthropogenic areas (see Table C-1 in Chapter 3), which are likely poor quality riparian habitat. Additional Tier 2 studies (e.g., Ontario Wetland Evaluation System) are planned for future years if the SON-South Bruce siting area is selected for additional baseline investigations for the Project. Data from Tier 2 studies, along with data collected as part of the Environmental Media Baseline Program (EMBP) on water and sediment quality, surface water hydrology, and groundwater (CanNorth 2021), will help Zoetica to ascertain ecosystems and ecosystem components providing regulating services in the future.

1.3.3 Ecosystems and ecosystem components providing provisioning services and cultural services

Insufficient baseline information has been collected to understand ecosystems and ecosystem components providing provisioning and cultural services. Future Tier 2 studies may be conducted once more is understood from studies on other IA pillars examining which provisioning services are important to people, and which make sense to include within the BIS scope of study.

1.3.3.1 Forest Health

Community concerns regarding emerald ash borer (EAB) and Dutch elm disease (DED) and their effects on forest health and diversity were expressed during engagement (see Appendix B in the BPPA Report (Zoetica 2021)). EAB is an invasive beetle that can quickly spread among ash trees to feed on them, resulting in tree death (NRCan 2020). Since its introduction to North America around 2002, EAB has killed millions of ash trees of several species (Herms and McCullough 2014). Without control measures to manage EAB, up to 99% of all ash trees in an area die within 8-10 years of EAB arrival (NRCan 2020). Die-off of ash can have cascading impacts on forest communities, including by altering succession and increasing invasion by non-native plants (Klooster et al. 2018).

There are desk-based records of invasive spongy moth (previously called LDD moth) at one site in the far western AOI, one site in the northern AOI and a nearby site just north of the AOI in the LSA_{ECO}, and a site in the GSWC by Clam Lake within the LSA_{ECO} (**Figure A-2**; **Table A-2**). In 2022, spongy moth was detected via eDNA metabarcoding at one stream site in the east-central AOI in the summer (see Figure I-2 in Appendix E, Chapter 1). While the spongy moth is not a provincially regulated invasive species, it is a federally regulated pest under the authority of the *Plant Protection Act* and the attendant Plant Protection Regulations (CFIA 2021). All of southern and central Ontario, and the southern parts of northern Ontario (up to the Sudbury area and west to Lake Superior) have been designated as 'regulated areas' by the Canadian Food Inspection Agency[3] for spongy moth (EDDMapS Ontario 2021). This species infests mainly oak trees but will also feed on most hardwoods and sometimes spruce, causing severe and prolonged defoliation leading to tree mortality.

In 2022 TEM surveys, forest health was assessed at 33 sites within the BIS study areas. Assessments were partially based on tree health, which was rated as poor, fair, or good. All sites rated 'fair' (n = 21) and three of four sites rated 'poor' had evidence of EAB. Forest health surveys were primarily conducted in the LSA_{ECO} north of the AOI (28 of 33 sites). Thus, EAB was only detected at sites in the LSA_{ECO} north of the AOI, despite ash trees being present at two sites south of the AOI. The only site surveyed for forest health within the AOI did not contain ash trees. EAB was the most prevalent factor in determining tree health among sites. Additional surveys will help determine the full distribution of ash species and EAB within the BIS study areas. TEM forest health surveys also detected beech bark disease (BBD) at one site in the LSA_{ECO} south of the AOI. There were no records of DED in the forest health surveys. For a complete discussion of TEM forest health surveys, see Section 4.3 in Appendix B, Chapter 1.

Several forest pests and diseases were recorded as incidental observations in the 2022 field surveys (**Table 1-2**). Such records may include observations of individuals of the given species, but often were observations of damage caused by the species. Observations from TEM surveys, AHM surveys, and incidental observations are mapped in **Figure A-3** and described in **Table A-3**. Within the AOI, field contractors detected EAB at 13 sites, and BBD and spongy moth at the same site in the southeastern AOI (which also had EAB). Field contractors detected spongy moth at one site west of the AOI in the LSA_{ECO}. In the LSA_{ECO} south of the AOI, field contractors detected EAB at ten sites, mostly within the Teeswater Wetland Complex (TWC). Also in the TWC, field teams detected DED at three sites, BBD at two sites, and white pine blister rust at one site (which also had DED and spongy moth). Field contractors detected spongy moth at one site near the TWC and one near the Wingham Wetland Complex. In the LSA_{ECO} north

[3] In regulated areas, it is prohibited to move, import, or export items that could be infested with spongy moth from the area.

of the AOI, field contractors observed EAB at 48 sites, mostly within the GSWC. Field contractors recorded spongy moth at two sites in the GSWC and two in the northeastern LSA_{ECO} (including a record of eggs), DED at two sites in the northeastern GSWC, black knot disease at one site in the northeastern GSWC, ash leaf spot disease at one site just north of Oppleck Lake, BBD at four sites in the northern GSWC, and tar spot disease at three sites in the northern portion of the LSA_{ECO}.

Table 1-2. Incidental observations of forest pests and diseases during TEM field surveys within the AOI or LSA_{ECO} in 2022. Listed BVs are in addition to the Ecosystem Function and Services BV.

Common Name	BV	Status
Ash leaf spot fungi	Vegetation	-
Beech bark disease (BBD)	Vegetation, Terrestrial Invertebrate	Invasive
Black knot	Vegetation	-
Dutch elm disease (DED)	Vegetation, Terrestrial Invertebrate	Invasive
Emerald ash borer (EAB)	Terrestrial Invertebrate	Invasive
Spongy moth	Terrestrial Invertebrate	Invasive
Tar spot fungus	Vegetation	-
White pine blister rust	Vegetation	Invasive

Annual forest health monitoring conducted by the MNRF can provide additional insight into existing stressors on forest health in the SON-South Bruce siting area. A summary of invasive forest pests and other forest disturbances in the MNRF Midhurst and Guelph districts, within which the RSA_{ECO} is contained, is provided in **Table 1-3**. Where data are available, a more detailed analysis focusing on spatial data within the RSA_{ECO} will be conducted in future years of BIS baseline program.

Table 1-3. Forest disturbances identified in the MNRF Midhurst and Guelph districts between 2017 and 2021.

District	Forest Disturbance	Status	Level of Impact	Pest Type	Host Species
Guelph	Ash leaf spot	-	Minor	Leaf disease	Ash spp.
Midhurst	Basswood leafminer	-	Minor	Defoliator	Basswood
Midhurst, Guelph	Beech bark disease	One sp. is invasive	Major	Disease	American beech
Guelph	Beech leaf disease	-	Major	Nematode	American beech
Midhurst, Guelph	Beech scale	invasive	Minor	Sucking insect	American beech
Midhurst, Guelph	Brown spot needle blight	-	Major	Needle blight	Scots pine, eastern white pine, red pine, Austrian pine
Midhurst, Guelph	Cedar leafminer complex	-	Major	Defoliator	Eastern white cedar
Midhurst, Guelph	Fall webworm	-	Minor	Defoliator	American elm, ash spp., alder spp., cherry spp., poplar spp., black walnut, hickory spp. and white birch
Midhurst	Forest tent caterpillar	-	Major	Defoliator	Various deciduous species
Guelph	Hemlock woolly adelgid	invasive	Major	Defoliator	Eastern hemlock
Midhurst, Guelph	Spongy moth	invasive	Major	Defoliator	Most hardwood species

Midhurst	Spruce gall adelgid	-	Minor	Gall making insect	White spruce, Norway spruce
Guelph	Tar spot on maple	-	Minor	Fungal foliar disease	Maple spp.

Data on the size of the impacted areas are available for some of the forest disturbance factors listed in **Table 1-3**; trends over the period of 2017-2022 are shown in **Figure 1-1**. Cedar leafminer complex and forest tent caterpillar were not causing moderate or severe damage/defoliation from 2019 to 2021 (and forest tent caterpillar was not an issue in the Guelph District from 2017 - 2022). However, cedar leafminer complex returned to both the Midhurst and Guelph districts in 2022. As well, moderate to severe damage to pine trees from brown spot needle blight returned to both districts in 2022 after being absent in 2020 and 2021. Spongy moth infestation was increasing substantially from 2017 to 2021 in the Midhurst District, and steadily in the Guelph District, and is a primary forest health concern for both regions. In 2021, the MNRF mapped 176,264 ha and 112,978 ha of spongy moth infestation in the Midhurst and Guelph districts, respectively. With respect to the SON-South Bruce siting area, small areas of spongy moth defoliation were mapped in and around the GSWC between Glammis (County Rd 15) and Kinloss (County Rd 9) in 2021 – this area falls within the RSA_{ECO} and potentially the LSA_{ECO} (NDMNRF 2022). However, in the report on 2022 data, the MNRF noted that 2021 was the peak of an outbreak and moderate to severe defoliation declined to zero and 3,128 ha in Midhurst and Guelph, respectively (MNRF 2023). Spongy moth outbreaks are naturally cyclical (every 7-10 years), and susceptibility to pathogens and egg parasitism may have contributed to the recent decline in their populations (MNRF 2023).

Further information on major and minor forest disturbances, including locations of low-level damage or defoliation (not included in **Figure 1-1**), is available in the MNRF's *Forest Health Conditions in Ontario* reports (MNRF 2017, 2018, 2019, 2020, 2023, NDMNRF 2021, 2022). If the SON-South Bruce siting area is selected, Tier 2 studies will include additional surveys for EAB and other forest pests in all woodlands within the AOI, as these pests change the structure and canopy of woodlands.

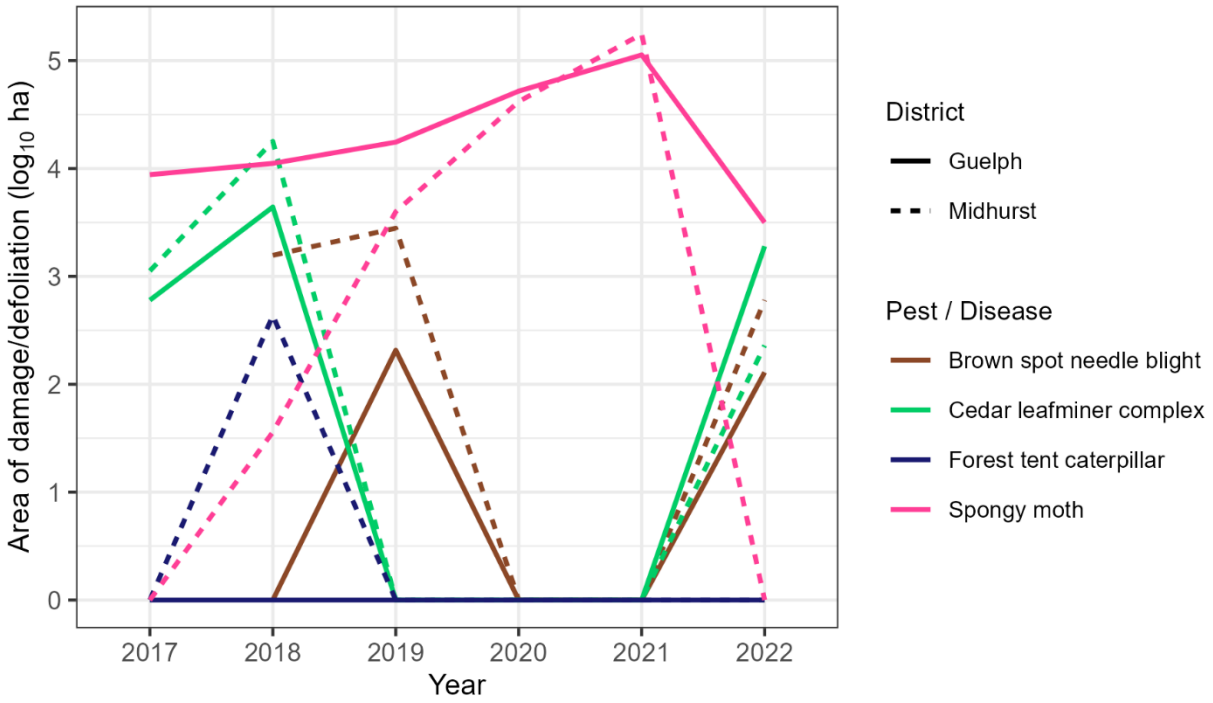


Figure 1-1. Areas of moderate to severe damage or defoliation caused by each forest disturbance type in the Midhurst and Guelph districts from 2017-2022 (MNRF 2023).

1.3.3.2 Trails

In addition to the areas listed in Section 1.3.1, the Ontario Trail Network has 28 trails within the RSA_{ECO}. Trails are managed by various trail management associations. Trails have been grouped, where appropriate, into trail networks for mapping purposes. One trail, maintained by the Huron Shores ATV Club, runs through the western part of the AOI and the southwestern part of the LSA_{ECO} (**Figure A-1**). An additional trail network (the Culross Trails) occurs in the southern LSA_{ECO} (**Figure A-1**). The remainder of the trails occur as small trail networks primarily within the southern RSA_{ECO} (south of the AOI), except for the Bruce Country Rail Trail, which runs along the eastern side of the southern RSA_{ECO}, and crosses to the western side at the town of Paisley in the northern RSA_{ECO}. In addition, the Saugeen River Trail and the Brant Tract Trails occur in the RSA_{ECO} northeast of the AOI (**Figure A-1**).

1.3.3.3 Areas of Interest to Stakeholders and Rights-Holders

During engagement conducted with stakeholders and rights-holders in the SON-South Bruce siting area, concerns about the existing state of the environment and biodiversity were raised. Individuals expressed concerns about existing water contamination (from agriculture) and aquatic health (including effects on biological diversity and abundance of fish populations, perceived to be related to the use of pesticides and insecticides), which may be addressed by water quality assessments in the EMBP. Concerns were also raised regarding the area's low amount of remaining forest and the impacts that deforestation has had on rivers, streams, wetlands, and forest diversity. Participants raised the need to preserve biological diversity, including SAR. Participants also noted the current degradation of ecosystem function and services, especially provisioning services (e.g., agriculture and livestock, drinking water wells and aquifers, and species such as maple trees for syrup harvesting) and regulating services (e.g., wetlands and ecosystem features that act as water regulating services to prevent flooding). In addition, the influence of

climate change was brought up as a concern as it relates to water management, including the increasing seasonal risk of drought and floods, and the spread of zoonotic diseases (e.g., Lyme disease).

Future engagement may include questions about land and resource use; types and locations of food, medicine, water, and other resources that are hunted, collected, or grown; culturally or spiritually important sites; the interconnectedness between ecosystems; types and locations of recreation; and locations of commercial use (including tourism). Many of the issues and concerns expressed during engagement will be relevant to considerations for ecosystem function and services within the BIS, and close collaboration across the IA pillars is necessary.

1.4 Discussion

The current Chapter 9 of the 2023 BIS Baseline Report focused on a desk-based analysis of available information, along with observations of forest pests from 2022 field survey results. This Chapter examined ecosystems and ecosystem components critical to sustaining biodiversity within relevant BV study areas, and components that provide regulating, provisioning, or cultural services. Tier 1 and proposed Tier 2 BIS studies, additional studies in the EMBP (CanNorth 2021), and information on other sustainability pillars (i.e., social, economic, health) will ultimately feed into determining the baseline conditions for ecosystem function and services. When data from these studies are received, relevant information will be incorporated into this chapter.

To date, Zoetica has compiled a list of ANSIs, CA lands, county and municipal lands, and trail networks within the RSA_{ECO}. This information points to areas important for sustaining biodiversity and providing cultural services. Zoetica conducted a preliminary analysis of regional forest health conditions and trends, as forest disturbances may impact provisioning services (e.g., merchantable timber) and supporting services (e.g., habitat for biodiversity). Additional Tier 1 studies aimed at collating important habitat information for various BVs and mapping foundational habitat information within relevant BIS study areas (see Section 3.0, Chapter 1) are presented in BV-specific chapters. Additional field-based Tier 1 data and future BV-specific Tier 2 studies will confirm locations of important habitats, which may be highlighted in this chapter if certain BIS study areas are more suited for supporting biodiversity than other areas.

TEM and AHM results to date indicate that riparian buffers in mapped areas of the AOI and LSA_{ECO} are predominately forested, with lesser representation by meadows, plantations, and shrublands (see Figures D-4 and D-5 in Chapter 3). Approximately half of the riparian buffers were unmapped anthropogenic areas. This suggests that many wetlands, watercourses, and waterbodies in the BIS study areas have some good quality and some poorer quality riparian habitat. When healthy, wetlands can promote ecosystem functioning that may support biodiversity and provide ecosystem services like water retention and flood control.

Of the forest pests and diseases detected in desk- and field-based data thus far, spongy moth and EAB may be the greatest causes for forest health concerns. Data from Ontario's annual forest health monitoring program showed that spongy moth defoliation is a major forest disturbance factor in the Midhurst District and could be impacting merchantable timber and other ecosystem functions and services within the BIS study areas (see Section 1.3.3.1). Spongy moth was also detected within the AOI in eDNA samples from summer 2022, and individuals or evidence of individuals were incidentally observed

during 2022 field surveys. Evidence of EAB was incidentally observed in 2022 field surveys and detected during forest health surveys (see Appendix B, Chapter 1). In forest health surveys, EAB was noted as the primary pest or disease associated with sites with fair or poor tree health (as opposed to 'good' tree health). The need for targeted baseline studies and ground-based monitoring of spongy moth and EAB will be determined after more information is gathered about potential project impacts and stakeholder and rights-holder concerns.

The objectives outlined in Section 1.1.1 can provide a framework for integrating data and information from different IA pillars to examine impacts on ecosystem function and services related to biodiversity in the biodiversity IA. Relevant information from other environmental studies (i.e., conducted under the EMBP) and through the socio-economic pillar will be used alongside biodiversity information to identify ecosystems and ecosystem components that are critical for sustaining biodiversity and for providing regulatory and provisioning services related to biodiversity. In addition, biodiversity information presented in the BIS Baseline Report may be used by other pillars (e.g., socioeconomic) to identify regulating, cultural, and provisioning services important for people.

Objective 1, to identify ecosystems and ecosystem components critical to sustaining biodiversity, will largely be informed by the desk-based research and various field programs of the BIS. Protected and conserved lands and parks often provide ecosystem functions and important habitat for supporting biodiversity. For example, ANSIs are lands deemed significant on the provincial or reginal landscape, and thus provide key ecosystem functions that may not occur in many nearby areas. TEM work will highlight areas with rare ecosites on the landscape, which are likely to house different species compositions. TEM surveys also examine habitat features for wildlife, such as coarse woody debris and tree attributes like bark retention, which can support animal biodiversity. TEM and AHM surveys both examine vegetation species diversity across sites, and thus can highlight biodiversity hotspots within the BIS study areas. eDNA metabarcoding studies provide a vast amount of information on species diversity across sites and across several taxa, which will further contribute to identifying biodiversity hotspots. Identification of SWH will highlight areas that contribute to the quality and diversity of the region, supporting additional or important biodiversity. These can include seasonal concentration areas, rare vegetation communities, specialized habitat for wildlife, habitat for species of conservation concern, and animal movement corridors. TEM forest health surveys may also reveal unhealthy areas where biodiversity is likely poor, due to disturbances such as logging, various human activities, and forest diseases and pests. Desk-based work will continue to draw on publicly available databases of species observations and occurrences, which have and may continue to reveal the presence of species of conservation concern that require protection. TEM, AHM, and eDNA surveys have also indicated the presence of species of conservation concern, along with invasive species that may be negatively impacting biodiversity in an area if they are taking over the landscape and outcompeting a variety of native species. Future engagement will better inform Zoetica's analysis of species of importance to stakeholders and rights-holders, which will also be considered when evaluating biodiversity in the context of ecosystem services. After all Tier 1 data are collected, these biodiversity data will be mapped in layers (e.g., species of interest observations, SWH locations, forest health disturbances, amount and diversity of eDNA species detections) to show areas that are providing greater ecological functioning than others, which may be prioritized for protection. If the SON-South Bruce site is selected, additional Tier 2 studies will build upon the identification of ecosystems and ecosystem components critical to sustaining biodiversity and may incorporate information collected as part of the EMBP (e.g., bathymetry data for determining important fish habitat).

Objective 2, to identify ecosystem processes that provide regulating services for sustaining biodiversity and ecological function, will be informed by a combination of data from the BIS and EMBP data collection programs. The EMBP includes data collection on several regulating services: air quality, light and noise, water quality, water flow, and soil quality (CanNorth 2021). The BIS includes data collection on species presence, which may include pollinators, biological control agents for invasive species, species that benefit soil fertility, and vegetation species that sequester carbon. All of these species can provide or improve regulating services (see Section 1.1.1). The BIS program will continue to examine the habitats within riparian buffers around wetlands, which can increase ecosystem functioning, protect against erosion and sediment runoff, and moderate impacts from extreme weather events. Ecosite classification may also highlight habitats with greater or lesser potential to store carbon. TEM surveys include collecting data on soil conditions like texture and moisture, which are important for considering mitigation aimed at preventing or minimizing erosion and sedimentation, and in maintaining soil fertility. As an example, wetlands have great potential to provide regulating services for other aquatic habitats and provide a buffer between aquatic and upland habitat. Zoetica may integrate information on hydrology and groundwater from the EMBP with information on wetland and riparian function, habitat quality, and aquatic biodiversity from the BIS datasets to assess regulating services for sustaining biodiversity and ecological function. In future years, Zoetica may map these various components that are involved in regulating services (e.g., air quality, water quality, soil quality and conditions, observations of species that may provide regulating services, riparian buffers, ecosites) in layers to potentially reveal areas that may be more important for regulating services than others, which may be prioritized for protection.

Objective 3, to identify ecosystems and ecosystem components that underlie the provisioning of goods and provide cultural services, will require information from both the BIS and EMBP, and may be used within the socio-economic pillar. Identifying ecosystems and ecosystem components that underlie the provisioning of certain goods may require information collected as part of the BIS (e.g., identifying key species and ecosystems, mature forests that may provide merchantable timber), but will likely be assessed for their importance as provisioning services in the socioeconomic pillar. The EMBP will collect data on tissue chemistry including contaminants of potential concern, and a traditional foods dietary survey to learn of the quantity, type, and harvest locations of traditional foods by local stakeholders and rights-holders. The various water chemistry and planktonic / aquatic invertebrate sampling programs of the EMBP will inform the health of aquatic environments which can provide extensive cultural services to people. The EMBP also includes a drinking water quality program (CanNorth 2021). Within the BIS, AHM and eDNA surveys will provide data on fish and other aquatic species diversity, which can impact cultural services and provisioning of goods such as fish for food. AHM surveys specifically include identifying potentially important fish habitat. The TEM forest health surveys will inform cultural services as disturbances to the environment can impact human health, use of the space, and appreciation. The forest health surveys will also inform provisioning of goods such as timber. Species observations from various BIS desk- and field-based data, along with identification of SWH for deer and other prey, can allow for the examination of the provisioning of hunted and / or gathered foods within the area.

In addition, future Tier 2 studies specific to ecosystem function and services (see Zoetica's BPPA Report (Zoetica 2021)), are anticipated to be conducted after site selection. These studies will help determine ecosystems' ecological function and importance for maintaining biodiversity. A more complete discussion of ecosystem accounting is presented in Section 5.2.12.6 of Zoetica's BPPA Report (Zoetica 2021b).

A more complete discussion of ecosystem function and services will be included in future iterations of the BIS Baseline Report after Tier 1 field data collection has been completed and analyzed. Tier 2 studies will be completed if the SON-South Bruce siting area is selected for additional baseline investigations for the Project.

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APPENDIX A – SUPPORTING INFORMATION FOR ECOSYSTEM FUNCTION & SERVICES

Table A-1. Common and scientific names for species mentioned in this report. Species names follow the NHIC's Ontario species lists (current to March 1, 2023) or NatureServe Explorer if the species does not exist in the NHIC dataset.

Common Name	Scientific Name	Notes
Forest pests and diseases		
Ash leaf spot fungi	*Mycosphaerella effigurata*	
Basswood leafminer	*Baliosus nervosus*	
Beech bark disease	*Neonectria faginata; N. ditissima*	BBD
Beech scale	*Cryptococcus fagisuga*	
Beech leaf disease	*Litylenchus crenatae* ssp. *mccannii*	
Black knot	*Apiosporina morbosa*	
Brown spot needle blight	*Lecanosticta acicola*	
Cedar leafminer complex	*Argyresthia aureoargentella; A. canadensis; A. thuiella; Coletechnites thujaella*	
Dutch elm disease	*Ophiostoma ulmi*	DED
Elm bark beetles	*Hylurogopinus rufipes*; *Scolytus multistriatus*	
Emerald ash borer	*Agrilus planipennis*	EAB
Fall webworm	*Hyphantria cunea*	
Forest tent caterpillar	*Malacosoma disstria*	
Hemlock woolly adelgid	*Adelges tsugae*	
Spruce gall adelgid	*Adelges* sp.	
Spongy moth	*Lymantria dispar dispar*	Previously called LDD / gypsy moth
Tar spot fungus	*Rhytisma acerinum; R. americanum*	
White pine blister rust	*Cronartium ribicola*	
Other species (trees)		
Ash	*Fraxinus* spp.	
Alder	*Alnus* spp.	
American beech	*Fagus grandifolia*	
American elm / white elm	*Ulmus americana*	
Austrian pine	*Pinus nigra*	
Basswood	*Tilia americana*	
Black walnut	*Juglans nigra*	
Cherry	*Prunus* spp.	
Eastern hemlock	*Tsuga canadensis*	
Eastern white cedar	*Thuja occidentalis*	
Eastern white pine	*Pinus strobus*	
Hickory	*Carya* spp.	
Maple	*Acer* spp.	
Norway spruce	*Picea abies*	
Oak	*Quercus* spp.	
Poplar	*Populus* spp.	
Red pine	*Pinus resinosa*	
Scots pine	*Pinus sylvestris*	
Spruce	*Picea* spp.	
White birch / paper birch	*Betula papyrifera*	
White spruce	*Picea glauca*	

Map Acronyms:
Area of Scientific Interest (ANSI)
Conservation Area (CA)
Management Unit (MU)
Provincial Park (PP)
Saugeen Valley Conservation Authority (SVCA)
Maitland Valley Conservation Authority (MVCA)
Grey Sauble Conservation Authority (GSCA)

Lake Huron

Southampton Boardwalk
Chantry Island Bird Sanctuary
Saugeen Rail Trail
MacGregor Point PP
Town of Saugeen Shores
Scott Point
Inverhuron PP
Highway 21
Municipality of Kincardine
Town of South Bruce Peninsula
Township of Georgian Bluffs
Municipality of Meaford
Grey Sauble CA
GSCA
Municipality of Arran-Elderslie
Township of Chatsworth
Municipality of Grey Highlands
Municipality of West Grey
Glammis Bog
Powers Property
Glammis Bog MU
Portal Forest MU
Greer Property
Willie Property
Meyer Lake
Bester Lake
Brant Tracts
Brant Tract Trails
Brant Forest MU
Saugeen River Section
Bruce County Rail Trail
Huron Shores ATV Club Trails
Municipality of Brockton
Saugeen Valley CA
Lake Trail
Highway 9
Greenock Swamp
Schmidt Lake
Knechtel Property
Bushell Property
Hehn Property
Saugeen River Trail
Walkerton HEPC Property
Town of Hanover
Martyn Property
The Boot
Woods Property
Formosa North Road Cut
SVCA Administration Centre
Township of Huron-Kinloss
Township of Huron-Kinloss
Huron Tracts
Culross Tracts
Huron Shores ATV Club Trails
Municipality of South Bruce
Normanby Tract Trail
Township of Southgate
Eighteen Mile South Shorecliff
Bruce Conservancy Trails
Kinloss Tracts
Hardwood Hill MU
Carrick Forest MU
Cedardale Forest MU
Carrick Tracts
Carrick Tract Trails
Lucknow Walk Trails
Lucknow Waterworks CA
Lothian Lake Warren Shorelines
St Helens Beech Maple Forest
Murrays Bog
Blind Lake Bog CA
Lakelet Lake Bog
Culross Trails
Culross Tracts
Turnberry Swamp
Stapleton Tract
Elma Tavistock Tills
Morley Tract
Bog North of Gorrie
Township of Ashfield-Colborne-Wawanosh
Wingham Community Trail
Howick Forest and Source Area
Township of Howick
Town of Minto
Township of Wellington North
Lake Wawanosh CA
Turnberry Flood Plain CA
Mud Lake Forest Tract
Wroxeter Swamp
Maitland Valley CA
Grand River GRCA CA
St Augustine Bog and Swamp Forest
Township of North Huron
Pioneer CA
MVCA Administration Centre
Lucknow River
Saratoga Swamp
Wawanosh Park CA
Moreland Tract
Wawanosh Valley CA
Wawanosh Valley Conservation Area Trail
Municipality of Morris-Turnberry
Point Farms PP
Saratoga Swamp
Saratoga Swamp
Westfield Swamp
Municipality of Huron East
Municipality of North Perth
Township of Mapleton

NWMO Biodiversity Impact Studies

Protected and Recreation Areas

Figure A-1

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{ECO})
- Conservation Authority Boundary
- ANSI, Earth Science
- ANSI, Life Science
- Protected Areas or Provincial Park (PP)
- Trail
- Highway
- Local Road
- Watercourse
- Lake
- Wetland
- South Bruce Boundary
- Other Municipal Boundary
- County Boundary
- Saugeen No. 29
- SVCA Properties
- MVCA Properties or Conservation Area (CA)
- Municipal Park in Huron County
- Huron County Forest Tract
- Bruce County Forest Tract

Only areas of relevence to the project have been labeled. No data was available at the time of mapping for municipal parks in Bruce County.

1:325,000

0 4 8 km

ZOETICA



Data received from:
Ontario GeoHub — Areas of Natural and Scientific Interest (NDMNRF); Conservation authority administrative area (MECP); Indian Reserve (NDMNRF); OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment (NDMNRF); OTN Trail Segment (NDMNRF); Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (NDMNRF)
NWMO — AOI; SVCA Properties (SVCA)
IBAT — World Database on Protected Areas (UNEP-WCMC and IUCN)
Bruce County Open Spatial Data — Bruce County Forests
Huron County Open Data — County Tracts; Parks

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: HB
October 06, 2023	Map ID: NWMO_BIS_D110	

Table A-2. Desk-based observations of species of interest relevant to Ecosystem Function and Services within the BIS study areas.

Grid	Source	Species	Count	Coordinates	AOI	LSA_{ECO}
6579	EDDMapS	Spongy Moth	U	465949, 4879865	0	1
6973	EDDMapS	Spongy Moth	U	469602, 4873715	1	1
7275	EDDMapS	Spongy Moth	U	472878, 4875398	0	1
7375	EDDMapS	Spongy Moth	U	473082, 4875161	1	1

Notes:
Refer to **Figure A-2** for the grid locations.
For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected.
Count of 'U' = unspecified.

Table A-3. Field-based incidental observations of species of interest relevant to Ecosystem Function and Services within the BIS study areas in 2022.

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{ECO}
6872	Spongy Moth	Visual	>1	TEM	468168, 4872973	0	1
6890	Emerald Ash Borer	Visual	1	TEM	468509, 4890278	0	1
6981	Emerald Ash Borer	Visual	high density	TEM	469926, 4881546	0	1
6983	Emerald Ash Borer	Visual	>1	TEM	469644, 4883714	0	1
6990	Emerald Ash Borer	Visual	1	TEM	469040, 4890199	0	1
6991	Emerald Ash Borer	Visual	1	TEM	469914, 4891483	0	1
6992	Emerald Ash Borer	Visual	1	TEM	469005, 4892285	0	1
6992	Beech Bark disease	Visual	1	TEM	469005, 4892285	0	1
6993	Emerald Ash Borer	Visual	>1	TEM	469610, 4893465	0	1
7064	Emerald Ash Borer	Visual	1	TEM	470496, 4864902	0	1
7065	Dutch Elm disease	Visual	>1	TEM	470695, 4865814	0	1
7071	Emerald Ash Borer	Visual	1	TEM	470868, 4871879	1	1
7073	Emerald Ash Borer	Visual	1	TEM	470454, 4873877	0	1
7077	Emerald Ash Borer	Visual	1	TEM	470203, 4877034	0	1
7077	Emerald Ash Borer	Visual	1	TEM	470163, 4877001	0	1
7077	Emerald Ash Borer	Visual	1	Incidental	470059, 4877776	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{ECO}
7077	Emerald Ash Borer	Visual	1	Incidental	470215, 4877033	0	1
7078	Emerald Ash Borer	Visual	high density	TEM	470242, 4878937	0	1
7081	Emerald Ash Borer	Visual	high density	TEM	470560, 4881851	0	1
7081	Emerald Ash Borer	Visual	high density	TEM	470273, 4881965	0	1
7082	Emerald Ash Borer	Visual	high density	TEM	470384, 4882224	0	1
7082	Emerald Ash Borer	Visual	high density	TEM	470384, 4882224	0	1
7088	Emerald Ash Borer	Visual	>1	TEM	470055, 4888021	0	1
7088	Beech Bark disease	Visual	1	TEM	470352, 4888328	0	1
7088	Beech Bark disease	Visual	1	TEM	470973, 4888214	0	1
7090	Emerald Ash Borer	Visual	high density	TEM	470798, 4890789	0	1
7163	Spongy Moth	Visual	>1	TEM	471864, 4863279	0	1
7164	Emerald Ash Borer	Visual	1	TEM	471321, 4864762	0	1
7164	Emerald Ash Borer	Visual	high density	TEM	471230, 4864510	0	1
7165	Emerald Ash Borer	Visual	high density	TEM	471101, 4865542	0	1
7165	Dutch Elm disease	Visual	>1	TEM	471101, 4865542	0	1
7167	Emerald Ash Borer	Visual	>1	TEM	471136, 4867893	0	1
7167	Beech Bark disease	Visual	1	TEM	471406, 4867938	0	1
7167	Beech Bark disease	Visual	1	TEM	471406, 4867938	0	1
7167	Beech Bark disease	Visual	1	TEM	471406, 4867938	0	1
7169	Emerald Ash Borer	Visual	1	TEM	471630, 4869782	0	1
7172	Emerald Ash Borer	Visual	1	TEM	471221, 4872051	1	1
7172	Emerald Ash Borer	Visual	>1	TEM	471524, 4872315	1	1
7173	Emerald Ash Borer	Visual	1	TEM	471268, 4873472	1	1
7173	Emerald Ash Borer	Visual	high density	TEM	471136, 4873834	1	1
7173	Emerald Ash Borer	Visual	1	Incidental	471177, 4873673	1	1
7174	Emerald Ash Borer	Visual	1	TEM	471606, 4874431	1	1
7186	Emerald Ash Borer	Visual	>1	TEM	471585, 4886653	0	1
7187	Emerald Ash Borer	Visual	>1	TEM	471336, 4887743	0	1
7188	Emerald Ash Borer	Visual	1	TEM	471079, 4888946	0	1
7188	Beech Bark disease	Visual	1	TEM	471105, 4888386	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{ECO}
7188	Emerald Ash Borer	Visual	high density	Incidental	471564, 4888373	0	1
7189	Emerald Ash Borer	Visual	1	TEM	471696, 4889357	0	1
7265	Emerald Ash Borer	Visual	1	TEM	472499, 4865789	0	1
7265	Beech Bark disease	Visual	1	TEM	472499, 4865789	0	1
7266	Emerald Ash Borer	Visual	1	TEM	472296, 4866083	0	1
7266	Spongy Moth	Visual	high density	TEM	472269, 4866419	0	1
7266	Dutch Elm disease	Visual	high density	TEM	472269, 4866419	0	1
7266	White Pine Blister Rust	Visual	high density	TEM	472269, 4866419	0	1
7269	Emerald Ash Borer	Visual	1	TEM	472760, 4869877	0	1
7271	Emerald Ash Borer	Visual	1	TEM	472045, 4871484	1	1
7271	Emerald Ash Borer	Visual	high density	TEM	472074, 4871571	1	1
7272	Emerald Ash Borer	Visual	1	TEM	472997, 4872352	1	1
7273	Emerald Ash Borer	Visual	high density	TEM	472906, 4873888	1	1
7277	Emerald Ash Borer	Visual	1	TEM	472189, 4877948	0	1
7279	Ash Leaf Spot disease	Visual	>1	TEM	472763, 4879905	0	1
7279	Ash Leaf Spot disease	Visual	1	TEM	472763, 4879905	0	1
7280	Emerald Ash Borer	Visual	1	Incidental	472710, 4880128	0	1
7284	Emerald Ash Borer	Visual	>1	TEM	472596, 4884989	0	1
7284	Emerald Ash Borer	Visual	1	TEM	472077, 4884985	0	1
7285	Emerald Ash Borer	Visual	>1	TEM	472249, 4885296	0	1
7285	Emerald Ash Borer	Visual	high density	SWH	472249, 4885296	0	1
7285	Spongy Moth	Visual	>1	TEM	472022, 4885059	0	1
7286	Emerald Ash Borer	Visual	high density	SWH	472445, 4886583	0	1
7286	Emerald Ash Borer	Visual	1	Incidental	472443, 4886583	0	1
7287	Emerald Ash Borer	Visual	1	TEM	472041, 4887722	0	1
7287	Emerald Ash Borer	Visual	1	TEM	472095, 4887464	0	1
7287	Spongy Moth	Visual	>1	TEM	472293, 4887424	0	1
7373	Emerald Ash Borer	Visual	>1	TEM	473379, 4873989	1	1
7385	Emerald Ash Borer	Visual	med density	Incidental	473618, 4885341	0	1
7385	Emerald Ash Borer	Visual	1	Incidental	473522, 4885581	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{ECO}
7388	Emerald Ash Borer	Visual	>1	TEM	473168, 4888250	0	1
7388	Emerald Ash Borer	Visual	1	TEM	473571, 4888507	0	1
7388	Dutch Elm disease	Visual	>1	TEM	473020, 4888498	0	1
7388	Black Knot disease	Visual	1	TEM	473422, 4888746	0	1
7391	Emerald Ash Borer	Visual	>1	TEM	473673, 4891967	0	1
7391	Emerald Ash Borer	Visual	>1	TEM	473861, 4891906	0	1
7391	Emerald Ash Borer	Visual	>1	TEM	473861, 4891906	0	1
7391	Tar Spot disease	Visual	low density	TEM	473673, 4891967	0	1
7391	Tar Spot disease	Visual	1	TEM	473673, 4891967	0	1
7391	Tar Spot disease	Visual	med density	TEM	473861, 4891906	0	1
7392	Emerald Ash Borer	Visual	1	TEM	473887, 4892177	0	1
7392	Emerald Ash Borer	Visual	>1	TEM	473595, 4892133	0	1
7392	Emerald Ash Borer	Visual	high density	TEM	473887, 4892177	0	1
7392	Spongy Moth	Eggs	>1	TEM	473887, 4892177	0	1
7392	Tar Spot disease	Visual	low density	TEM	473595, 4892133	0	1
7392	Tar Spot disease	Visual	low density	TEM	473595, 4892133	0	1
7392	Spongy Moth	Visual	>1	TEM	473595, 4892133	0	1
7392	Spongy Moth	Visual	>1	TEM	473887, 4892177	0	1
7472	Emerald Ash Borer	Visual	>1	TEM	474211, 4872353	1	1
7472	Spongy Moth	Visual	>1	TEM	474211, 4872353	1	1
7472	Beech Bark disease	Visual	1	TEM	474211, 4872353	1	1
7477	Emerald Ash Borer	Visual	>1	TEM	474826, 4877263	0	1
7490	Emerald Ash Borer	Visual	>1	TEM	474680, 4890892	0	1
7490	Emerald Ash Borer	Visual	>1	TEM	474848, 4890232	0	1
7490	Emerald Ash Borer	Visual	high density	TEM	474916, 4890735	0	1
7490	Emerald Ash Borer	Visual	>1	TEM	474485, 4890531	0	1
7490	Dutch Elm disease	Visual	>1	TEM	474680, 4890892	0	1
7491	Emerald Ash Borer	Visual	>1	TEM	474257, 4891158	0	1
7576	Emerald Ash Borer	Visual	1	TEM	475156, 4876902	0	1
7577	Emerald Ash Borer	Visual	>1	TEM	475102, 4877116	0	1

Grid	Species	Observation Type	Count	Source Type	Coordinates	AOI	LSA_{ECO}
7666	Emerald Ash Borer	Visual	high density	TEM	476918, 4866522	0	1

Notes:
See **Figure A-3** for Grid locations of observations.
For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed within its boundaries. 1 = detected, 0 = not detected.

NWMO Biodiversity Impact Studies

Desk-based Observations: Ecosystem Function and Services

Figure A-2

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

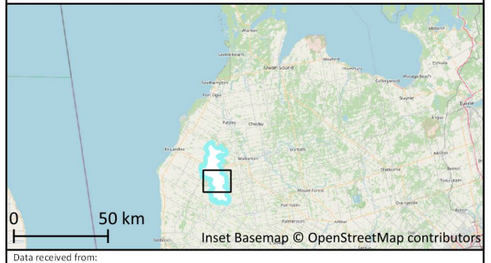
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:45,000

0 1 2 km

ZOETICA



- Observation Location
- 1km x 1km grid square with observations*

EDDMapS Observations

- Spongy Moth (Invasive) [4]

* NHIC 1km grids are provided for reference only, not intended to mask observations (see Table A-2 in Appendix A).

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI
EDDMapS Ontario — Invasive Species Observations - Accessed Jan.12, 2022
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: RC	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A122	

NWMO Biodiversity Impact Studies

Field Observations: Ecosystem Function and Services - North LSA_{ECO}

Figure A-3a

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:65,000

0 1 2 km

ZOETICA



- Observation Location
- 1km x 1km grid square with observations*

Species Observed

- Ash Leaf Spot disease [2]
- Beech Bark disease [8]
- Black Knot disease [1]
- Dutch Elm disease [5]
- Emerald Ash Borer [62]
- Spongy Moth [8]
- Tar Spot disease [5]
- White Pine Blister Rust [1]

Observation Type

- Eggs [1]
- Visual [91]

* NHIC 1km grids are provided for reference only, not intended to mask observations (see Table A-3 in Appendix A).

Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC/RC	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A120a	

NWMO Biodiversity Impact Studies

Field Observations: Ecosystem Function and Services - South LSA_{ECO}

Figure A-3b

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary

See Figure A-3a for Full Legend

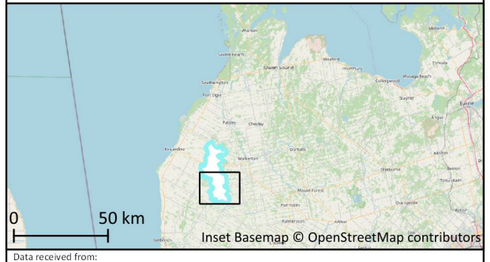
Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:65,000

0 1 2 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary - Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC/RC	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A120b	

NWMO Biodiversity Impact Studies

Field Observations: Ecosystem Function and Services - AOI

Figure A-3c

- Area of Interest (AOI)
- Local Study Area (LSA_{ECO})
- Lake
- Wetland
- Watercourse
- Highway
- Local Road
- South Bruce Boundary
- Municipal Boundary
- NWMO Purchased or Optioned Land

See Figure A-3a for Full Legend

Of all wetlands shown, only Provincially Significant Wetlands (PSWs) are labelled. The colour of the outline surrounding PSWs matches the colour of the respective PSW label.

PSW boundaries may not match wetland boundaries due to changes in aquatic habitat coverage since their creation compared to 2022.

1:20,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (MNRF); OHN Watercourse (MNRF); MNRF Road Segments (MNRF); Municipal Boundary Lower and Single Tier (MMAH); Wetlands (MNRF)
NWMO — AOI; NWMO Purchased or Optioned Land; 2022 SB TEM Ecosite Data Export V4 (Tulloch)
Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC/RC	Approved by: HB
December 13, 2023	Map ID: NWMO_BIS_A120c	