

TO: Mayor Savage and Members of Halifax Regional Council

SUBMITTED BY:

Original Signed by 

Jacques Dubé, Chief Administrative Officer

DATE: July 4, 2022

SUBJECT: **Case 23952: Sandy Lake Ecological Features Assessment**

ORIGIN

November 9, 2021 meeting of Regional Council, Item 15.5.1

MOVED by Councillor Blackburn, seconded by Councillor Outhit

THAT Halifax Regional Council:

1. Suspend the Rules of Procedure under section 17 of Administrative Order One, the Procedures of the Council Administrative Order; and
2. Direct the Chief Administrative Officer to direct staff to retain an independent consultant to assist with expediting the preparation of a staff report and recommendation for the purpose of identifying an optimal conceptual boundary for an expanded Sandy Lake Regional Park based on environmental information about the area considering:
 - a) The natural vegetation buffers required to protect the water quality and reduce downstream flooding of Sandy Lake, Sackville River, associated tributaries and wetlands.
 - b) The size of park needed to protect the multi-aged and old growth Acadian Forest in the area and documenting the habitats at Sandy Lake for their potential to support species at risk.
 - c) The locations of wildlife corridors that should be established to protect wildlife both within the park and movement through the area between the Chebucto Peninsula and mainland Nova Scotia.
 - d) Identification of a secondary, western trailhead.

LEGISLATIVE AUTHORITY

Halifax Regional Municipality Charter (HRM Charter), Part VIII, Planning & Development

HRM Charter:

61 (5) (a); The Municipality may acquire property, including property outside the Municipality, that the Municipality requires for its purposes or for the use of the public.

79A (1) Subject to subsections (2) to (4), the Municipality may only spend money for municipal purposes if (a) the expenditure is included in the Municipality's operating budget or capital budget or is otherwise authorized by the Municipality;

RECOMMENDATION

It is recommended that Halifax Regional Council direct the Chief Administrative Officer to:

1. Incorporate the analysis and findings of the Sandy Lake Ecological Features Assessment in the planning and development of Sandy Lake Park.
2. Review and use the findings of the Sandy Lake Ecological Features Assessment in the background studies being undertaken for the Sandy Lake Special Planning Area, including organizing the form and location of development to best protect:
 - a. the suggested widths for important corridors,
 - b. the suggested riparian and watercourse buffers, and
 - c. the identified areas of predicted old or mature forest.
3. Explore the use of conservation easements as part of the Sandy Lake Provincial Special Planning Area background studies to manage ecological features or corridors that extend outside of the conceptual park boundary.
4. Assess how to best organize land use and green infrastructure as part of the Sandy Lake Provincial Special Planning Area Background Watershed Study to mitigate any downstream impacts to the Sackville River and Sackville River Floodplain.

BACKGROUND

The Sandy Lake Regional Park is located in Bedford and includes a beach, formal trails, and undeveloped wilderness lands (Attachment A). It is comprised of approximately 520 hectares of municipally owned lands around Sandy Lake, Marsh Lake and Jack Lake. In some areas, there are private and provincial lands that are between park parcels or that are adjacent to the Park, that have been the subject of municipal acquisition initiatives.

This report responds to a motion of Regional Council, with the purpose to identify an optimal conceptual boundary for an expanded Sandy Lake Regional Park based on environmental information about the area. In response to the November 9, 2021 motion from Regional Council, Halifax Regional Municipality (HRM) engaged McCallum Environmental Ltd. (MEL) to undertake an ecological features assessment of the lands around Sandy Lake. The study focused on the area bordered by Highway 101, Highway 102, Hammonds Plains Road and Gatehouse Run/Viscount Run, as shown in Attachment A. This report outlines the findings of this study and the suggested next steps for Regional Council.

Project Process

Given the timeline for the study and the amount of work already completed in the area, MEL was asked to undertake a review and verification of the existing studies for Sandy Lake. This included a wide range of work completed by HRM, the Province, universities, and community groups. These documents were then used to identify and analyze the high value environmental systems and sensitive lands in the area and map them.

As part of the study, MEL hosted a Stakeholder Session on March 29, 2022, to review and validate the initial findings. The event was attended by representatives from the Sandy Lake-Sackville River Regional Park Coalition, representatives of Clayton Developments and United Gulf Developments, as well as MEL and HRM staff, and members of Regional Council. The session functioned as an opportunity to familiarize stakeholders with the data and process that was followed to identify sensitive and important environmental

areas. Feedback from the session has been incorporated in the final report by MEL.

Regional Planning Context

Lands to the west of Sandy Lake are designated by the Regional Municipal Planning Strategy (Regional Plan) as Urban Settlement, and as an Urban District Growth Centre. This designation is applied where future serviced development is anticipated within the life of the Plan (by 2031). Lands in this area have also been identified as a Special Planning Area by the Province on March 25, 2022.¹ Background studies are currently being initiated to gather information regarding natural systems conservation, heritage conservation and regional baseline infrastructure to inform future secondary planning for the area. As a Special Planning Area, the Minister of Municipal Affairs and Housing has the authority to make planning policy and development approval decisions for this site.

DISCUSSION

McCallum Environmental Ltd.'s complete Sandy Lake Ecological Features Assessment report is included as Attachment B. The study included the review of the various background documents and data sources from the perspective of ecological significance. After reviewing the available data, MEL generated a series of 28 spatial layers related to five main categories: Species at Risk, Landscape Connectivity, Wet Areas, Unique Habitats, and Negative Features. The layers were weighted and combined, with 24 layers weighing positively (+1), two layers considered to be neutral (0), and two layers weighing negatively (-1).

The resulting Sandy Lake Ecological Features Assessment Map (Figure 8 of Attachment B) shows the areas that are of higher or lower ecological value based on the chosen characteristics identified by Regional Council in their November 9, 2021 motion: water quality, multi-aged and old growth forest, species at risk habitat, and wildlife corridors. The map shows each layer with equal weight and does not consider human values, such as land ownership or the recreational needs for the Sandy Lake Regional Park. The work also evaluated the key elements of the Regional Council motion as follows:

Water Quality

In considering water quality preservation, the report identifies that the aquatic and riparian features in the study area generally scored highest in the overall analysis of the various environmental features. Figure 6 of Attachment B shows all identified wetlands with a 50 metre buffer for riparian areas, and all identified watercourses with a 100 metre buffer for riparian areas. The Assessment identifies the importance of Sandy Lake, Marsh Lake, Jack Lake and the Sackville River and their associated tributaries and riparian areas in protecting water quality.

Species at Risk and Old and Mature Forest

Habitats were identified in the study area for sixteen species at risk, as well as three unique habitats, including old and mature forest, rare lichens and interior forest. Generally speaking, habitats not associated with the aquatic or riparian features discussed above were identified with medium importance in Figure 8 of Attachment B. Figure 7 of Attachment B identifies predicted old and mature forest.

Landscape Connectivity

Corridors that allow wildlife to move through the study area were also analyzed. The relationship to wildlife movement at a regional scale is considered through the Halifax Green Network Plan, the Sandy Lake Ecological Features Assessment also considered the Wildlife Corridor Landscape Charette, which can be found on the Regional Planning website, and is catalogued as submission C114². The Sackville River was identified as an important and essential corridor for its role in providing aquatic connectivity downstream. An important corridor was also identified along the west side of Sandy Lake that provides a connection for wildlife from the south of the study area to the Sandy Lake Regional Park. The Green Network Plan identifies that wherever possible, a width of 100m should be maintained for Important Corridors and 1,000m for Essential Corridors.

¹ [Sandy Lake Special Planning Area Order - Housing in the Halifax Regional Municipality Act \(Nova Scotia\)](#)

² <https://www.shapeyourcityhalifax.ca/12651/widgets/91889/documents/74902>

Western Trailhead

Given that the identification of a location of a secondary, western trailhead would be largely informed by human values, such as land ownership, the availability of public access and the recreational needs of the Sandy Lake Regional Park, MEL identified that they did not have the information required to provide a recommendation for that component of the motion.

Findings

While MEL noted study limitations, including the omission of ground truthing, it found that:

“Concentrations of high valued ecological/environmental conditions were largely observed in areas of existing municipal parkland and the immediately adjoining lands, lands owned by other government (Marsh Lake lands), and the Sackville River system lands (Figure 9). Some of lands beyond these areas were not found to have concentrations of ecological values, and some existing municipal parkland areas, such as those lands near to the Bicentennial Highway possess lower ecological values. Areas beyond the concentrations of medium to high valued ecological condition may still be important for consideration and possible protection as supporting lands for the continued integrity of the areas of high ecological/environmental values. These lands may also have an important role for broader landscape and ecological connectivity, which also needs to be addressed.”

In particular reference to a conceptual park boundary, the study did not include a consideration of human values, including recreation potential, noting that this was outside the study context. However, it was noted that these considerations would be essential in delineating the park.

Implications for the Sandy Lake Conceptual Park Boundary

The Sandy Lake Ecological Features Assessment provides additional information to support HRM's efforts to fully realize the park. High value ecological components are largely found in areas of existing parkland and other adjacent lands, where an emphasis should continue to be placed on public land acquisition. Further analysis on how the Ecological Features Assessment Report can inform acquisition will be provided to Regional Council by a separate In Camera report.

Recreation values, associated with general nature appreciation, hiking, and swimming have been important attributes of the Park and will continue to be considered with respect to boundaries and opportunities for park development. Associated with this, additional opportunities for access from different areas are to be planned and developed.

Implications for Master Planning/Special Planning Area

It is recommended that Regional Council use the findings of the Sandy Lake Ecological Features Assessment to direct work on the Background Studies for the Sandy Lake Special Planning Area. These studies include a Land Suitability Analysis, a Watershed Study and an Infrastructure Capacity Analysis.

The Master Planning process that is anticipated to be used for the Sandy Lake Special Planning Area can allow for the protection of important and sensitive ecological features by directing the location and form of development on the lands. Based on the Ecological Features Assessment, important areas to be protected can include the suggested widths for corridors, as well as riparian and watercourse buffers and old growth and mature forest.

In addition to land use, conservation easements have been identified as a potential tool that would help with ongoing protection of valuable environmental features. This is something that will be explored during the ongoing Regional Plan Review, though should also be explored as part of the Background Study for the Sandy Lake Special Planning Area.

The western shore of Sandy Lake would be considered a priority area for any parkland dedication occurring as part of the subdivision and master planning process. Buffering, use of green infrastructure and the integration of green space into the community design should be key features of any master planning to

provide an appropriate interface between existing and future parkland, and to protect water quality, old growth forest and corridor integrity.

FINANCIAL IMPLICATIONS

There are no financial implications at this time. HRM received funding from the Province to pay for the background studies, mentioned above, for the Sandy Lake Special Planning area and such funds are included in the 22/23 operating budget.

RISK CONSIDERATION

The report notes that the results are based on the data available and the priorities identified by Regional Council. In particular, the consideration of additional values and the identification of priorities amongst those values may significantly influence results. The Sandy Lake Ecological Features Assessment shows each layer with equal weight though were a particular feature or consideration identified as being more important or essential to the park boundary, they would show as a high value asset in the mapping. Further report limitations are outlined in Section 4.4 of Attachment B.

COMMUNITY ENGAGEMENT

An engagement session was held on March 29, 2022 with identified stakeholders as part of the Sandy Lake Ecological Features Assessment.

ENVIRONMENTAL IMPLICATIONS

The Sandy Lake Ecological Features Assessment will support planning for the Sandy Lake Regional Park and Sandy Lake Special Planning Area in a manner that reduces negative impacts on the environmental health of the area.

ALTERNATIVES

1. That Regional Council not accept the Sandy Lake Ecological Features Assessment.
2. That Regional Council not incorporate the analysis and findings of the Sandy Lake Ecological Features Assessment in the planning and development of Sandy Lake Park.

ATTACHMENTS

Attachment A: Sandy Lake Park and Context

Attachment B: Sandy Lake Ecological Features Assessment Report

A copy of this report can be obtained online at halifax.ca or by contacting the Office of the Municipal Clerk at 902.490.4210.

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SANDY LAKE PARK AND CONTEXT

- Sandy Lake Parkland
- Other Lands

HALIFAX
 Parks & Recreation
 Policy & Planning



Date: 7/5/2022

Sandy Lake Ecological Features Assessment

PREPARED FOR

Halifax Regional Municipality

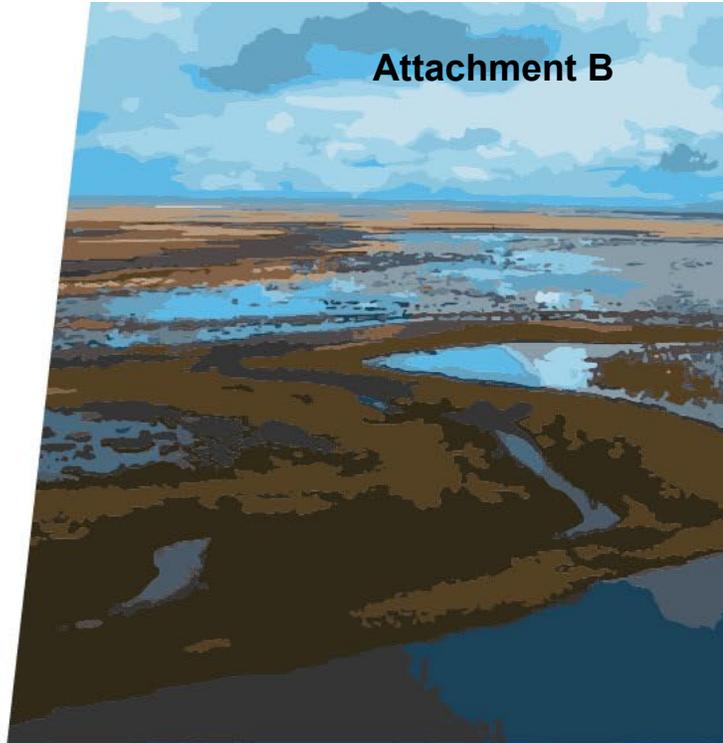
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June 27, 2022





SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

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1 INTRODUCTION

Halifax Regional Municipality (the Proponent) has retained McCallum Environmental Ltd. (MEL) to complete an ecological assessment of Sandy Lake Regional Park and the surrounding lands in order to guide land use recommendations.

1.1 Project Scope and Study Area

Halifax Regional Municipality (HRM) is seeking an analysis of sensitive lands and high value environmental features in the Sandy Lake-Sackville River Regional Park area to inform the expansion of the park's boundaries and the potential addition of a secondary trailhead. Regional Council has identified the need to protect water quality, forests, potential species at risk, and to reduce downstream flooding. Additionally, several community groups and NGOs recognize the ecological significance of the area and are invested in its protection.

At their November 9th, 2021 meeting, Regional Council passed a motion directing staff to retain an independent consultant to assist with identifying an optimal conceptual boundary for an expanded Sandy Lake Regional Park based on environmental information about the area considering:

- A) The natural vegetation buffers required to protect the water quality and reduce downstream flooding of Sandy Lake, Sackville River, associated tributaries and wetlands.
- B) The size of park needed to protect the multi-aged and old growth Acadian Forest in the area and documenting the habitats at Sandy Lake for their potential to support species at risk.
- C) The locations of wildlife corridors that should be established to protect wildlife both within the park and movement through the area between the Chebucto Peninsula and mainland Nova Scotia.
- D) Identification of a secondary, western trailhead.

Additionally, lands to the west of Sandy Lake are designated under HRM's Regional Municipal Planning Strategy (Regional Plan) as an Urban District Growth Centre, where future serviced development is expected. Therefore, in addition to the above, this study will provide a basis for understanding environmental and cultural land suitability and inform future site design. Effective March 24, 2022, these same lands have been designated by the Minister of Municipal Affairs and Housing, under the *Housing in the Halifax Regional Municipality Act*, as a Special Planning Area.

The Study Area boundaries were provided by the Proponent and include 1,700 hectares of municipal and private land in Bedford, NS. The Study Area is bordered by Highway 101 to the north, Highway 102 to the east, Hammonds Plains Road to the south, and Gatehouse Run/ Viscount Run to the west (Figure 1). The Halifax Green Network Plan (HGPN) identifies important habitat and primary corridors within this area that connect green spaces on the Chebucto Peninsula to those of mainland Nova Scotia.

Prepared For:



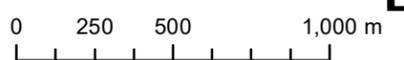
FIGURE 1

Sandy Lake Study Area & Aquatic Features

-  Watercourses
-  Tertiary Watershed
-  Wetlands (based on 2017 NSE data and DUC surveys in 2020-21)
-  Waterbodies
-  Study Area



Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

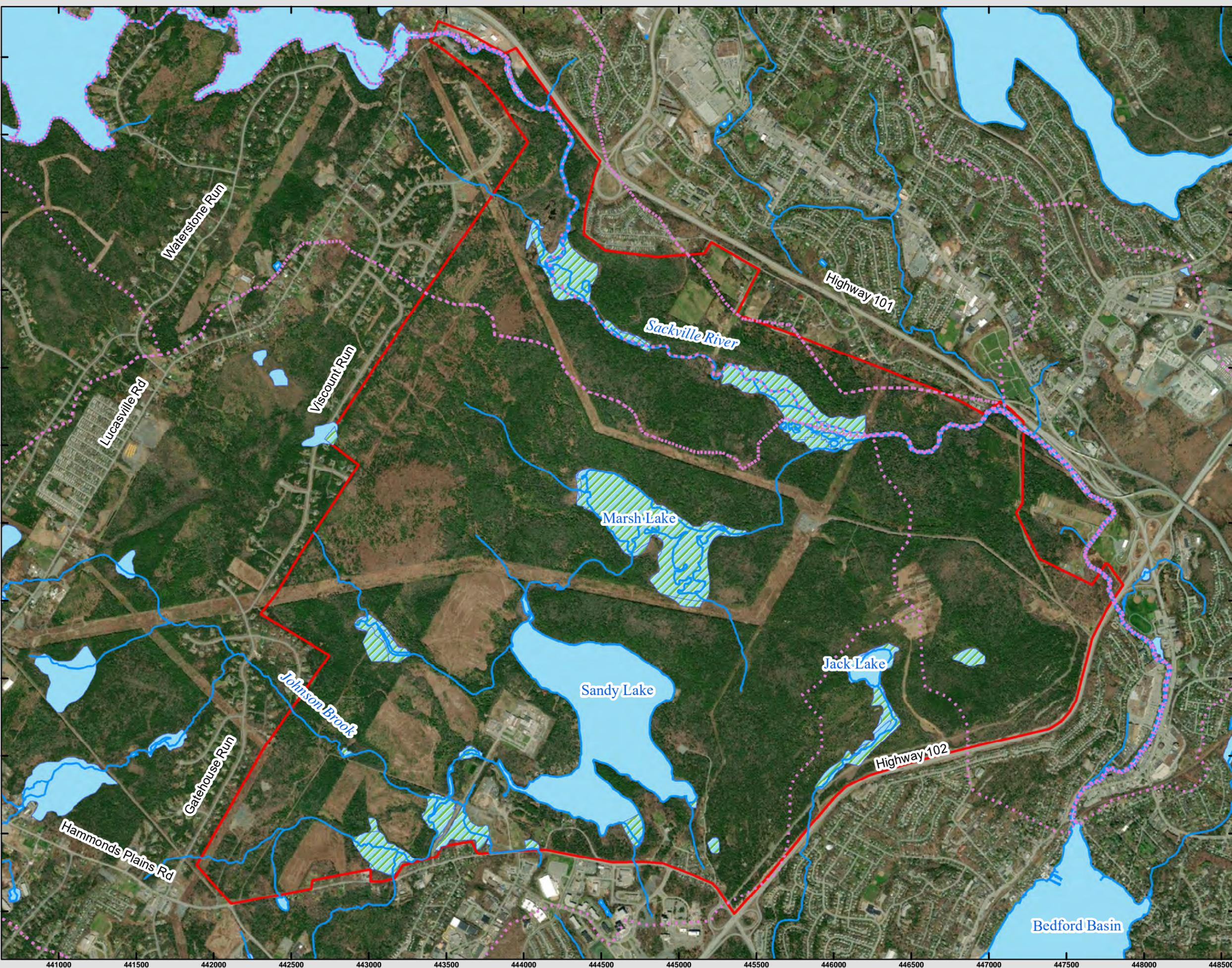


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McCallum Environmental Ltd.



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1.2 Study Objective

The study involved the review and verification of the existing plans and studies that have been completed for the Sandy Lake area. These documents were then used to identify and analyse the high value environmental systems and sensitive lands in the area and map them based on the layers identified by HRM and others. A synthesis of the importance of each environmental component was performed to support natural systems conservation. The initial results were presented to HRM staff and key stakeholders during a stakeholder engagement session, and feedback was gathered. The findings and final map identifying high value ecological features within the Study Area and suggested recommendations and considerations were updated according to stakeholder responses. The final map along with MEL's recommendations are being presented to HRM for review and they will determine next steps.

HRM has identified the central study questions as: What are the most important ecological areas and features? Based on this knowledge, what advice should be provided to Regional Council regarding an expanded park boundary?

The study has been informed by several key considerations:

- There is a breadth of existing documentation and knowledge of the land.
- Considerable ground-truthing and analysis has been completed by community volunteers with expertise in environmental science
- High level assessment of the ecological importance of the lands within the regional context has been done as part of the Halifax Green Network Plan (HGPN)
- Regional Council's direction was for a study to be completed using existing knowledge as quickly as possible, and staff were asked to target a turnaround of three months."

This study did not include any field reconnaissance; however, all conclusions herein would be informed by additional field verification and surveys of features, rather than reliance on desktop modelling methodologies to identify ecological features.

MEL's recommendations herein provide guidance for a proposed park boundary, the potential of the Sandy Lake Urban District Growth Centre, and suggestions for further field reconnaissance, protection of wildlife corridors, and improvement in water quality and watershed health. In addition, MEL has identified potential additional research and studies that may be required to refine and improve the above recommendations.

2 DOCUMENT REVIEW

The Sandy Lake area has been of interest to the HRM, community members and groups, and developers for many years and there is therefore a fair amount of historical information available, and several studies have been conducted on the landscape. The proponent provided MEL with a wide range of studies, articles, reports, and spatial data which was then reviewed from the perspective of ecological significance.



SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

2.1 Key Documents

The following documents and layers were important in informing modelling criteria decisions and provided data that could either directly or indirectly be shown on a map (Table 2-1).

Table 2-1: Information Gathered from Key Sources

Source*	Key Information Gathered
<p>Forests and Surface Waters of Sandy Lake and Environs: A Natural History Perspective</p> <p>Website maintained by Dr. David Patriquin</p>	<ul style="list-style-type: none"> - Overview of the natural environment, historical context, and key ecological considerations - Species occurrences - Watershed description and water quality monitoring data - Concern around rising salt and phosphorus levels and potential acid rock exposure - Concern about cutting old forest (clearcut area in 2013) and identification of old forest patches - Review/ critique of previous studies in the area
<p>Halifax Green Network Plan</p> <p>Halifax Regional Municipality (June 2018)</p>	<ul style="list-style-type: none"> - Provides wider context of the importance of landscape connectivity and efforts to maintain a wildlife corridor from the Chebucto Peninsula to the Nova Scotia mainland - Sets standards for “essential” and “important” corridors, and identification of their locations - Focus on both aquatic & terrestrial connectivity
<p>Avian and Species at Risk Surveys of the proposed Sandy Lake Sackville River Regional Park</p> <p>Natural Wonders Consulting Firm. (March 2020)</p>	<ul style="list-style-type: none"> - Comprehensive study of wildlife within the Study Area. - Habitat types and species that use them - 2017 breeding season Avian surveys and year-round data in 2018 and 2019 with broader species focus. - 21 species of interest to Federal and Provincial conservation bodies were detected, 12 of which have legal protection - Two major wildlife corridors were identified, and a dozen smaller ones. - Wet coniferous forest is habitat for Canada Warbler, Olive sided Flycatcher - Mature mixed woodlands are habitat for Evening grosbeak, Eastern wood-pewee (and wide diversity of common birds) - Little brown myotis observed feeding over Sandy Lake. No hibernacula found. Ample feeding and breeding habitat exists
<p>Atlantic Conservation Data Centre report and data.</p> <p>(Feb. 23, 2022)</p>	<ul style="list-style-type: none"> - Known occurrences of rare and endangered flora and fauna within one km of Study Area - 13 records of 10 vascular, 8 records of 8 nonvascular flora - 92 records of 32 vertebrate, 16 records of 5 invertebrate fauna
<p>WESP Summary Report and Data</p> <p>Ducks Unlimited Canada (2020 and 2021)</p>	<ul style="list-style-type: none"> - Spatial files, WESP scores, and summary report for 11 wetlands within Study Area - Description of habitat and functions



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Source*	Key Information Gathered
<p>Wildlife Corridor Lands Design Charette. Chebucto-Timberlea-Sandy Lake area of Halifax, NS.</p> <p>Summary Document. Nova Scotia Crown Share Land Legacy Trust. (March 2021)</p>	<ul style="list-style-type: none"> - Local experts gathered to share knowledge and map out wildlife corridors required to maintain both aquatic and terrestrial connectivity - Marsh Lake identified as important area for connectivity. The entire Sackville River Valley identified as critical. - Mapped out primary and secondary corridor centre lines (spatial data available).
<p>Sackville River Watershed Wetland Inventory Pt. 2.</p> <p>Sackville Rivers Association, by John-William Brunner (August 2011)</p>	<ul style="list-style-type: none"> - Wetland inventory was conducted in fall 2009, looking at the potential to enhance or expand existing wetlands. - Eight of the 26 sites were inventoried in the field to assess future potential wetland compensation possibilities. - Sites in the eastern portion of the sub-watershed, all adjacent to Big Sandy Lake, Marsh Lake, and Peverill's Brook
<p>Sandy Lake Watershed Study Final Report</p> <p>AECOM (August 2014).</p>	<ul style="list-style-type: none"> - Summary of current environmental conditions in the watershed with a focus on lake water quality. - Constraints map for development, and phosphorus load models - Potential sources of contamination in watershed: Pollutants entering water from impermeable surfaces like concrete and asphalt. (e.g. sediments, antifreeze, oil, road salt, pesticides, nutrients, and pet and waterfowl droppings).
<p>Sackville Rivers Flood Plain Study – Phase II Final Report.</p> <p>CBCL, prepared for HRM (March 2017)</p>	<ul style="list-style-type: none"> - Study of hydrology and hydraulic regime of the Sackville River and the Little Sackville River (and watersheds) to produce floodplain maps under various flood scenarios - A 1 in 20 year and 1 in 100 year flood line map was produced
<p>Response of Sandy Lake Conservation Association (SLCA) to: Sandy Lake Watershed Study – Final Report</p>	<ul style="list-style-type: none"> - Outlines the priorities and concerns of the Coalition. For instance: <ul style="list-style-type: none"> o Mature hemlock/ old growth was not adequately considered o Wider riparian areas around wetlands and waterbodies are necessary to counter rising nutrient inputs. o Lack of confidence in phosphorus measurements
<p>Submission to RP+10 Review</p> <p>From Sandy Lake-Sackville River Regional Park Coalition (April 2020)</p>	<ul style="list-style-type: none"> - Requesting protection of larger land area to protect a larger proportion of the Sandy Lake watershed - Overview of the importance of the area and reference to studies
<p>Second Submission to RP+10 Review</p> <p>From the Sandy Lake-Sackville River Regional Park Coalition. July 16, 2021.</p>	<ul style="list-style-type: none"> - Requesting more comprehensive studies of the area - 100m buffer on watercourses and 50m on wetlands



SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

Source*	Key Information Gathered
Bedford Rifle Range, Department of National Defense. The Sackville River Wetland Compensation Project	<ul style="list-style-type: none"> - Fish habitat and restoration plan based on field information gathered from 2009-2011 - Additional information on wetlands in the north section of Study area - Surveys of wildlife contributed to knowledge of SAR uses of the site and habitats present.
iNaturalist Project: Big Trees of Sandy Lake & Environs (Bedford, NS)	<ul style="list-style-type: none"> - Spatial records of trees >50cm DBH - Used to locate known old/mature forests and to improve modeling for other predicted patches in Study Area

* See references (Section 6) for full citations.

2.2 Documents for Background Context

Some of the documents provided to MEL helped to frame up the study and provided important context but did not factor directly into the model. Some of the ecological features did not fit within the scope or timeframe of this project and/or did not lend themselves well to a spatial modelling exercise. Others of these documents are dated, and more updated documents were available and provided more relevant data on current conditions.

These documents included:

- Sandy Lake-Sackville River Regional Park Coalition website
<https://www.sandylakecoalition.ca/>
- Forests and surface waters of Sandy Lake and Environs (Bedford, Nova Scotia) website
<http://versicolor.ca/sandylakebedford/>
- Sandy Lake – Marsh Lake Lands and Jack Lake Land Assembly: an environmental inventory, analysis, and synthesis (Fall 2001).
- Sandy Lake Watershed Study – Additional Modeling Scenario. AECOM. (February 2015)
- Halifax Regional Municipal Planning Strategy (Oct 2014).
- Jack Lake Environmental Evaluation Final Report – Jack Lake Land Assembly. Bedford, NS. (September 1986).
- Sandy Lake-Sackville River Regional Park Coalition Environment and Sustainability Standing Committee Correspondence (October 2019)
- Student Wet Area Mapping of the Sackville River Watershed (May 2013)
- HRM Water Quality Monitoring and Development Program (September 2020)
- Sandy Lake Community Profile (2002)



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- Bedford Municipal Planning Strategy (May 1996)
- Sandy Lake Park Master Plan (July 1986)
- Halifax-Dartmouth Regional Parks Report (July 1979)
- iNaturalist Observations:
 - Flora and Fauna of Sandy Lake, Bedford NS
 - Sandy Lake Peninsula (Bedford, NS) – Project
 - White Ash at Sandy Lake & Environs
 - Birches of Sandy Lake & Environs
 - Treasured Wetlands of Nova Scotia Bioblitz 2021 – Marsh Lake.

A review of the archaeological components of the documents provided was conducted by professional archaeologists at Davis MacIntyre and Associates. There was very little in the provided documents that could be used to develop an inventory of archaeological sites or landscapes. With no spatial data to draw from, an archaeological component was not furthered in this study.

2.3 Spatial Data

Spatial Data used in this study:

- ACCDC species observations (February 2022 ACCDC report with 1km buffer)
- HGNP_Ecological_Open_Space_Values (HRM Open Data)
- HGNP_Essential_Corridors (HRM Open Data)
- HGNP_Important_Corridors (HRM Open Data)
- Wildlife Corridor Design Charette data (HRM)
- Wood Turtle Streams, 200m buffer (from SMP)
- Endangered Mainland Moose Concentration Areas (Feb 2012)
- NSDNR Forestry Inventory
- Sackville River Floodplain Study
- Nova Scotia Significant Habitat Layer
- Nova Scotia buildings layer



SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

- Nova Scotia developed areas layers
- NSE wetlands
- NSE watercourses
- Nova Scotia roads
- iNaturalist Project: Big Trees of Sandy Lake & Environs (David Patriquin's entries)
- several other provincial datasets were used to build a habitat model (see Section 4.2)

Spatial Data that was reviewed, but did not fall within the bounds of this study, or were otherwise determined to not contribute to the analysis:

- Abandoned Mine sites (closest sites were >1 km away)
- Atlantic Coastal Plain Flora data
- MTRI Lichen Database (2021)
- Boreal Felt Lichen Predictive habitat layer (2010).
- NS Lands Proposed or Pending Protection
- CWS Migratory Bird Sanctuary
- NSE Potential Wetlands of Special Significance (June 2020)
- NS Old Forest polygons (2020)
- SARA Critical Habitat available from ECCC
- HGNP_Natural_Vegetation_Patches_Large (HRM OpenData)
- HGNP_Ecological_Open_Space_Values (HRM OpenData)
- HGNP_Overlapping_Values_Ecology_Working_Socio-Cultural (HRM OpenData)
- HGNP_Overlapping_Landscape_Values (HRM OpenData)
- HGNP_Working_Landscape_Open_Space_Values (HRM OpenData)
- HGNP_Working_Landscapes_Overlao_Ecology_Socio-Cultural (HRM OpenData)
- Canada Important Bird Areas



3 STAKEHOLDER ENGAGEMENT

3.1 Engagement Meeting Overview

A Stakeholder Engagement meeting was held on Tuesday March 29, 2022. The session was held virtually and was jointly organized by McCallum Environmental Ltd (MEL) and HRM. A PDF of MEL’s presentation was sent to all attendees prior to the meeting time. The meeting was a chance for experts who are familiar with the area to provide feedback on the findings of the ecological features assessment and comment on the methodology. The goal for the session was, “to come together as a group of key stakeholders to review and validate the initial findings of the ecological assessment.”

The meeting was attended by about 30 people including representatives from MEL; HRM Planning & Development, Regional Planning; HRM Parks & Recreation, Policy & Planning; HRM Environment & Climate Change; members of regional council; Sandy Lake - Sackville River Regional Park Coalition; Clayton Developments; and United Gulf Developments.

3.2 Feedback from Expert Stakeholders

Experts provided valuable feedback on the ecological feature modelling that aided MEL to enhance the initial findings. Some key feedback that was incorporated into the final model included:

- Moose should be included in the SAR species list.
- Increased buffers around watercourses would help protect salmon habitat, and provide additional protection against erosion, and more effectively protect water quality.
- Consider both aquatic and terrestrial corridors.
- Update Old/ Mature Forest model to include other climax community tree species.
- It is important to identify ecological features before determining boundaries, trailheads, or any other city planning implications.

Some additional sources identified by stakeholders were reviewed prior to creating the final model. These sources include:

- Environmental studies conducted on the Bedford Rifle Range on behalf of the Department of National Defense environmental studies.

A recent study to guide riparian buffers called, “Modeling Reforestation’s Role in Climate-Proofing Watersheds from Flooding and Soil Erosion” (France et al. 2019).

Some feedback received from experts can inform potential future phases of work associated with the Sandy Lake park planning process:

- Ground truthing is essential to fully understand ecological features.



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- It is important to consider features beyond the study boundary and how key features within the Study Area align with them.
- A study of the entire sub watershed of Sandy Lake is necessary in order to properly understand the impacts to water quality.
- Water quality should be a more central consideration in the discussion of ecological assessment.
- Including a model of pollution from road salts would be valuable.
- Not all of the available citizen science data is up-to-date (e.g. large tree point counts).
- Multi-age Acadian forest is valuable. Not just old-growth.

There were some additional comments about the modelling method used in general. It was cautioned that hot spot mapping is a useful tool, but can be misleading as an area with a low score may still be an essential area to protect. Further thought about which values the HRM would like to prioritize is recommended. There were also suggestions to present a wider variety of results, e.g. separating aquatic and terrestrial ecological values, or assigning higher values to a short list of ecological attributes that HRM identifies.

4 DESKTOP REVIEW

The parameters of the study resulted in a desktop analysis that has provided a preliminary or initial review of the lands. Spatial data was processed using a Geographic Information Systems software called QGIS using the processes described below. Models are useful tools to help predict habitat present on a landscape without field truthing being completed, which can be costly and time consuming. The results of modelling are useful to support broad planning initiatives where fine scale detail is not perhaps required to provide a fulsome approach. Field truthing will always add value with fine scale collection of data, but for the purpose of this analysis, desktop modelling has allowed for appropriate conclusions to be formed relating to the relative ecological value of identified characteristics within the Study Area.

4.1 Methodology

After reviewing the available data, the ecological characteristics within the Study Area were grouped into five main categories that could be presented spatially and where modelling could be completed to provide analysis relating to the ecological value of the Study Area: Species at Risk, Landscape Connectivity, Wet Areas (wetlands, watercourses, and riparian zones), Unique Habitats, and Negative Features. Spatial layers were then created for 28 different ecological aspects relating to these five categories. Some aspects were produced using existing spatial layers, while other aspects required predictive modelling, or combining data from different sources.



4.2 Habitat Model

The study aimed to target key features on the landscape that provided particular ecological value and one chosen representation is habitat for species at risk. Species at risk are inherently important to protect, as these individual species abundance decline, and are also useful proxies for healthy habitats, as often, a species is rare due to a loss of its habitat availability. Publicly available spatial data has limitations, and often does not provide enough detail for mapping species habitat requirements with any real level of specificity. To better identify key habitat traits on the landscape with what is available at a desktop level, a habitat model was created from combining three different spatial files representing different aspects of habitat suitability to better predict habitat types across the landscape. The Canopy Height Model, Depth to Water (created from Digital Elevation Model data) and the Provincial Forestry Layer were combined to produce a habitat model that could then be used to identify areas of particular value to species selected for this exercise.

The Canopy Height Model data was divided into four height class categories (see Table 4-1 and Figure 4) to represent age of stands. The Depth to Water layer was created using the Digital Elevation Model from the NS DataLocator (see Table 4-1 and Figure 3) to predict wet or upland forest. Information on land cover type and tree species dominance was used to create eight categories within the provincial forestry data (see Table 4-1 and Figure 2).

Combining these three sources resulted in more comprehensive habitat descriptions which could then be used to better identify habitats that suited each species according to their specific habitat needs (Figure 5). This habitat model was then used to isolate areas that would be most likely to be used by each of the species at risk considered to create layers for the final analysis (see Section 4.3.1).



SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

Table 4-1: Intermediate layers used to build habitat model

	Class Descriptions	Justification/ Source
(1) Canopy Height Class	<ul style="list-style-type: none"> - herbaceous layer (0-1 m) - regenerative (1-6 m) - young forest (6-11 m) - mature forest (>11 m) 	<ul style="list-style-type: none"> - Canopy Height Model from GeoNova - Tree age was a more important indicator of habitat use in the Study Area than tree species (Natural Wonders 2020) - Tree height is an important predictor of tree age (Schumacher et al. 2020) - Forest seral stage designations are based on a NS DNR report (Stewart and Neily 2008)
(2) Depth to Water	<ul style="list-style-type: none"> - Wet (≤ 0.5 m) - Dry (> 0.5 m) 	<ul style="list-style-type: none"> - The DTW result provides a continuous network of wetlands connected by drainages and streams - ≤ 0.5 m to ground water is generally considered a good prediction of wet areas in the Maritimes (White et al. 2013)
(3) Forestry Data	<ul style="list-style-type: none"> - Shrub/ Alders - Barrens/ Open areas - Hardwood Forests - Mixedwood Forests - Softwood Forests - Urban/ Developed - Waterbodies - Wetlands 	<ul style="list-style-type: none"> - Layer used: Nova Scotia Interpreted Forestry Inventory – Current Forest Data, 2021. - Forestry data was re-classified into categories present in Study Area based on the FORNON and COVER_TYPE attributes, and comparing aerial imagery.

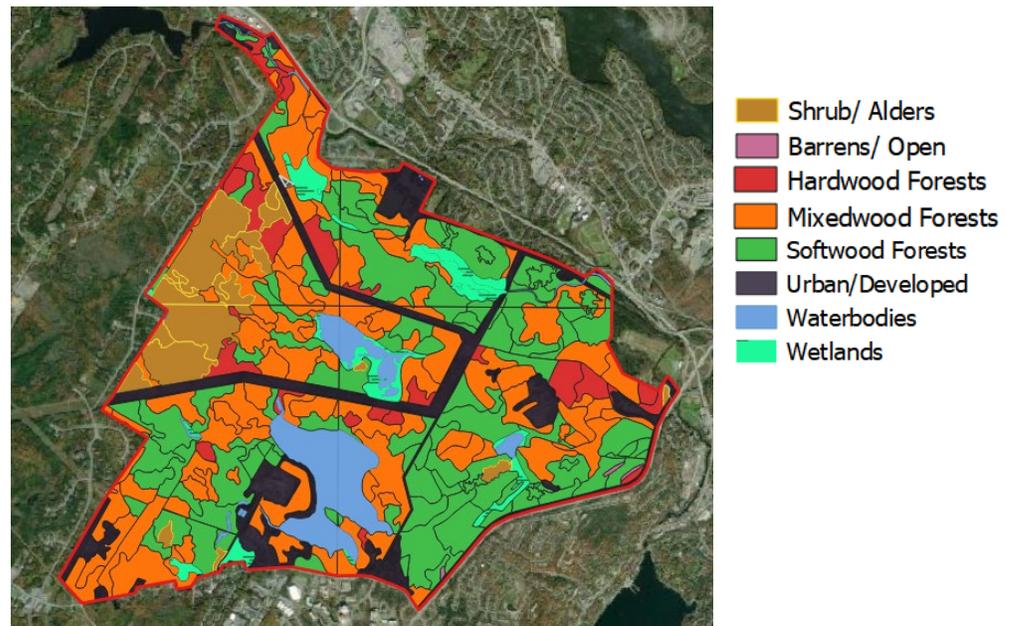


Figure 2: Provincial Forestry Layer



SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

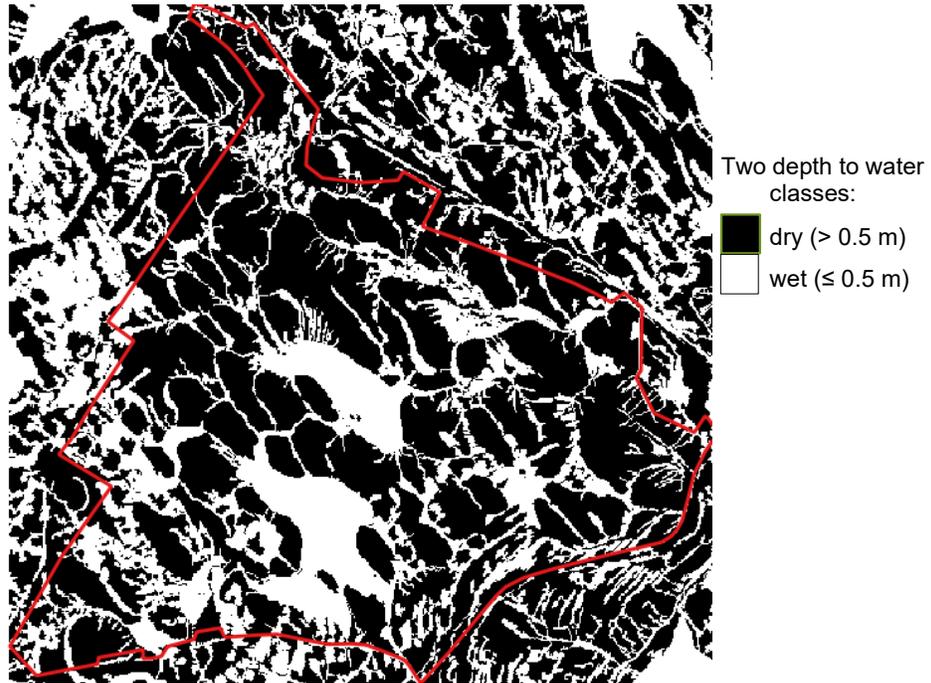


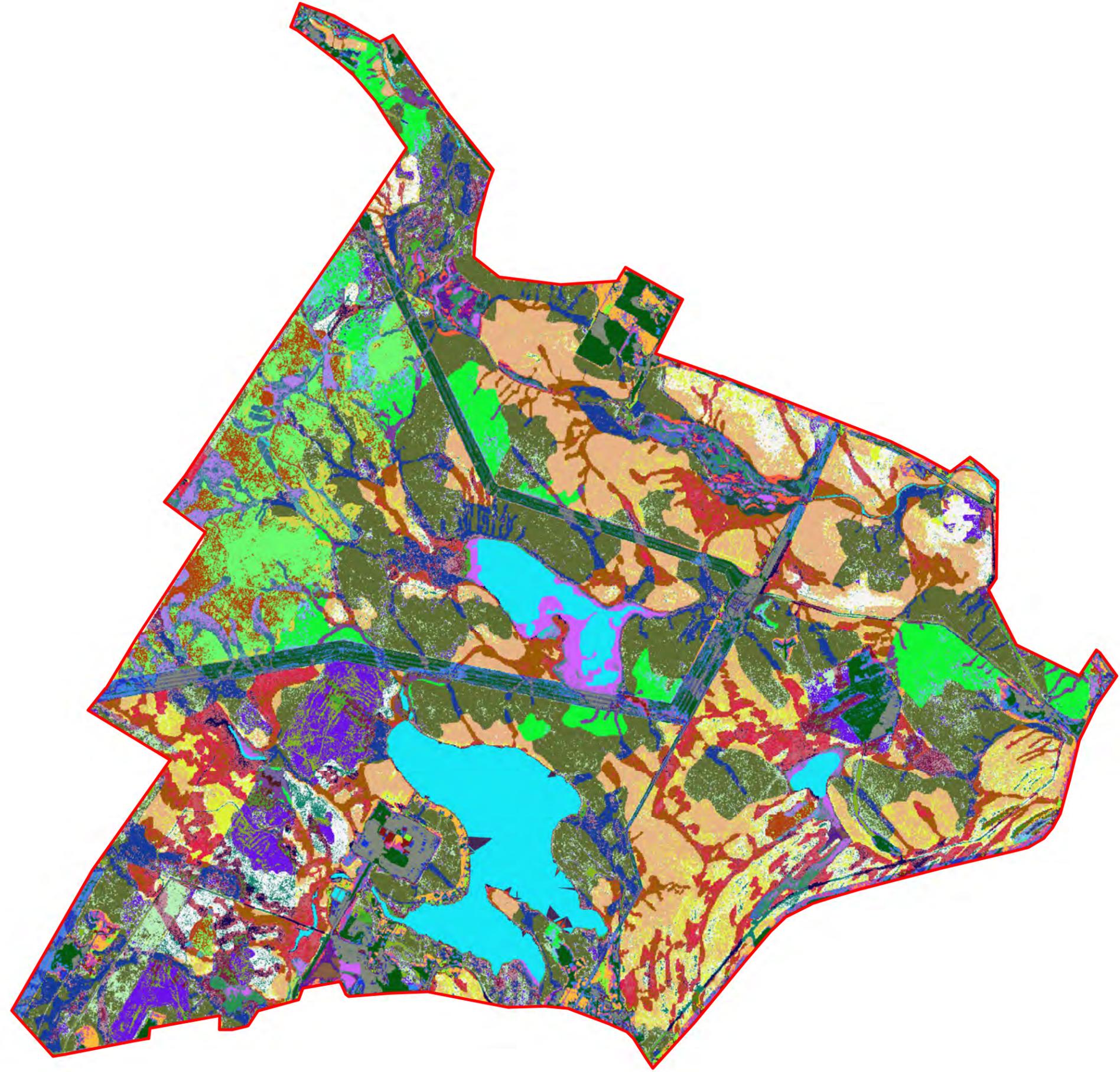
Figure 3: Depth to Water Layer



Figure 4: Canopy Height Model

FIGURE 5

**Sandy Lake Habitat Model
 (Intermediate Model)**



101	205	308	414
102	206	309	415
104	207	311	416
105	208	312	417
106	209	314	418
107	211	315	419
108	212	316	Study Area
109	214	317	
111	215	318	
112	216	319	
114	217	401	
115	218	402	
116	219	404	
117	301	405	
118	302	406	
119	304	407	
201	305	408	
202	306	409	
204	307	411	

Note on Symbology
 The colours represent three-digit habitat codes (combination of Canopy Height, Depth to Water, and Forestry class)

Coordinate System: NAD 1983 CSRS UTM Zone 20N
 Projection: Transverse Mercator
 Datum: North American 1983 CSRS
 Units: Meter

1:23,000 Scale when printed @ 11" x 17"

Drawn By: EH Date: 2022-05-27





4.3 Final Layers

The document analysis resulted in a final list of 28 ecological aspects that could be represented spatially and transformed into layers for analysis using QGIS. Of this list, two were considered neutral, therefore the final model consists of 24 layers of positive ecological value, and two layers of negative ecological value. Each layer was given an equal weighting of “1 – positive” or “-1 – negative”. The layers were categorized into the following groups:

- 16 Species at Risk habitat layers (section 4.3.1)
- 2 layers representing Landscape Connectivity (section 4.3.2)
- 3 layers representing Wet Areas (section 4.3.3)
- 3 layers representing Unique Habitats (section 4.3.4)
- 2 layers representing “Negative” ecological values (section 4.3.5)

Layers that received a neutral value, and therefore did not affect the final score include:

- Bedrock: Acid rock drainage potential (section 4.3.6)
- Right of Way Corridors (section 4.3.6)

4.3.1 Species at Risk Habitat Layers

The reviewed literature contains information on many species identified in the Sandy Lake area over the years. This study focuses on the habitat needs of rare species as these can also be indicative of rare or important habitats to preserve. The species considered for modeling were identified as species at risk either by the surveys that were completed between 2017 and 2019 (Natural Wonders 2020), or data records from the Atlantic Canada Conservation Data Centre (ACCDC)(Appendix A). These are species that are listed as Threatened, Endangered, or Special Concern under the Federal *Species at Risk Act*, or listed as Threatened, Endangered, or Vulnerable under the *Nova Scotia Endangered Species Act*. Of note, the 16 species included have all been documented on site or present within 1km. Undoubtedly, additional species that are rare also are likely present and using habitats in the study area, but these have not yet been documented and as such, were not used to inform the modelling exercise.

The habitat needs for each of the 16 chosen species were identified and then applicable traits were pulled from the habitat model (section 4.2) to create a layer that would represent applicable habitat within the Study Area. Appendix B provides a visual representation of each of the layers that were input into the model. The applicable areas have a value of “1” or “presence” and the null areas have a value of “0” or “absence” of suitable aspects. Overlapping these layers demonstrates which parts of the Study Area provide multiple habitat values. The 16 modelled species and their primary habitat requirements that were considered and included in the model are discussed below.



Blue Felt Lichen

Blue felt lichen (*Pectenaria plumbea*) is usually found on the trunks of old broad-leaved trees growing in moist habitats or close to streams and lake margins. It is federally listed as Special Concern, and provincially listed as Vulnerable. This lichen occurs in coastal suboceanic areas but also some distance inland in damp valleys. It prefers cool, humid woodlands that may be mixed coniferous/hardwood or dominated by deciduous trees. The blue felt lichen seems to prefer mature deciduous trees, particularly maple, ash and yellow birch. At its northerly limit of distribution in Nova Scotia, the blue felt lichen has once been found on moss-covered rocks.

The ACCDC records report one observation of blue felt lichen that was within one kilometer of the Study Area. The blue felt lichen layer for the model included mature wet forests and wetlands with mature trees.

Atlantic Salmon

Atlantic salmon (*Salmo salar pop. 6*) are listed as Endangered under COSEWIC. In the autumn these fish move into rocky shallows to prepare for spawning, in the winter they can be found throughout lakes, and in the spring they often occur in surface waters. As water warms up, salmon will retire to the cooler waters, and spawning occurs in the fall (Scott and Crossman, 1973).

There are several references of current or historic salmon observations in Sandy Lake (AECOM 2014, ECA 2010, Patriquin 2018). The ACCDC records have two reported observations of Atlantic salmon within the Study Area. To build the model for Atlantic salmon, all waterbodies were considered as potential habitat.

Wood Turtle Layer

Wood turtles (*Glyptemys insculpta*) are listed as Threatened federally and Vulnerable provincially. ACCDC includes observations of this species within the Study Area, though it is considered a location sensitive species, so exact locations are not provided. Wood turtles were also observed during environmental studies in the DND area (ECA 2010, ECA 2016).

The wood turtle needs water for many of its vital functions, including mating, hibernation and temperature regulation. It generally hibernates at the bottom of the water, spends spring and fall in or near water and summers on the ground. However, it is considered a semi-aquatic turtle because it spends a great deal of time on land, although it rarely strays far from water. Distance from aquatic to nesting sites is an average of 10-50 metres with a maximum distance of 150 – 700 metres, but females will travel large distances, so this shouldn't be a limiting factor (ECCC 2020).

The wood turtle uses a wide range of habitat types, but are strongly associated with rivers and streams – especially those with sandy or gravelly-sand bottoms and a moderate current. For the wood turtle habitat layer, a 200 m buffer around suitable watercourses was used.



Eastern Painted Turtle

Eastern painted turtle (*Chrysemys picta picta*) was assessed as Special Concern under COSEWIC, but has not been listed under SARA or under provincial legislation.

Painted turtles occupy slow moving, relatively shallow and well-vegetated wetlands (e.g., swamps, marshes, ponds, fens, bogs, and oxbows) and water bodies (e.g., lakes, rivers, creeks, and streams) with abundant basking sites and organic substrate. The species is semi-tolerant of human-altered landscapes and may occasionally be found occupying urban ponds and lands subject to anthropogenic disturbance (e.g., farm ponds, impoundments, water treatment facilities). Suitable nesting habitat includes open, often south-facing, and sloped areas with sandy-loamy and/or gravel substrate usually within 1200 m of aquatic active season habitats. Painted turtles overwinter in shallow water with deep sediment (COSEWIC Assessment and Status Report). The layer for this species included all waterbodies and wetlands as potential habitat.

Snapping Turtle

Snapping turtles (*Chelydra serpentina*) are federally listed as Special Concern and provincially listed as Vulnerable. There were five observations within the Study Area reported in ACCDC's records.

Snapping turtles occupy a wide variety of habitats, but the preferred habitat for this species is characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation. Established populations are most often found in ponds, marshes, swamps, peat bogs, shallow bays, river and lake edges, and slow-moving streams. Snapping turtles appear to prefer the following characteristics for their hibernacula: water shallow enough to let the turtle reach the surface to breathe, but deep enough so the water will not freeze to the bottom; a location that is likely to freeze over later in the season and thaw earlier in the spring; a thick layer of mud in which the turtle can bury itself; and additional submerged cover, such as a floating mat of vegetation, roots, stumps, branches or logs, a muskrat dwelling or an overhanging bank. The layer for this species included all waterbodies and wetlands as potential habitat.

Canada Warbler

The Canada warbler (*Cardellina canadensis*) is listed as Threatened federally, and as Endangered provincially. There is one recorded observation for this species reported in the ACCDC data.

This bird prefers forest undergrowth and shady thickets and breeds in mature mixed hardwoods of extensive forests and streamside thickets. They prefer to nest in moist habitat: in luxuriant undergrowth, near swamps, on stream banks, in rhododendron thickets, in deep, rocky ravines and in moist deciduous second-growth.

In general, it is most common in wet, mixed deciduous-coniferous forest types having a well-developed shrub layer, often as a result of canopy gaps and suitable drainage and soil moisture conditions (COSEWIC 2020). The Canada warbler layer for the model included mature forests, and wetlands and wet forests with vegetation higher than the herbaceous layer.



Chimney Swift

Chimney swifts (*Chaetura pelagica*) are federally listed as Threatened, and provincially Endangered. The chimney swift is associated with urban and rural areas where chimneys are available for nesting and roosting. In their northern breeding range, chimney swifts look for sites with a relatively constant ambient temperature.

ACCDC data reports two observations of chimney swifts within the Study Area, both at Marsh Lake. The chimney swift layer included waterbodies and open wetlands to account for feeding habitat and observation locations. No data on suitable chimney nesting locations was provided, and including all urban areas would not provide adequate specificity for this study.

Common Nighthawk

Common nighthawks (*Chordeiles minor*) are listed as Threatened both federally and provincially. ACCDC data has two records of this species within the Study Area. Studies mention several common nighthawk sightings over Sandy Lake and Marsh Lake (Natural Wonders 2020).

Common nighthawks are aerial insectivores that feed over open areas with low canopy height. They breed in a range of open and partially open habitats, including forest openings and post-fire habitats, prairies, bogs, and rocky or sandy natural habitats, as well as disturbed areas. It is also found in settled areas that meet its habitat needs, those with open areas for foraging and bare or short-cropped surfaces for nesting. The species uses of a wide range of habitats which makes it difficult to estimate trends in habitat availability, except in urban habitats, where their main nesting sites – flat graveled roofs – are disappearing. For the purposes of this study urban habitats were not included, as there was no available spatial data on suitable roofs. The final layer for this species included wetlands with low vegetation heights, waterbodies, cutover areas, barrens, and open areas.

Barn Swallow

Barn swallows (*Hirundo rustica*) are listed as Threatened both federally and provincially. This species forages over a wide range of open and semi-open habitats including natural and anthropogenic grasslands, other farmland, open wetlands, open water, savannah, tundra, highways and other cleared right-of-ways, and cities and towns. They avoid forested regions and high mountains. Barn swallows throughout the world have adapted to nesting in or on human structures, including buildings, barns, bridges, culverts, wells and mine shafts. Use of natural nest sites such as caves or rock cliffs with crevices or ledges protected by overhangs is rarely reported. Nocturnal roosts are typically in reed or cane beds or other dense vegetation, usually in or near water.

A small population of barn swallows nest along the urban edges of the proposed park's boundary and rely on various open habitats for foraging, and they are often seen over Sandy Lake (Natural Wonders 2020). ACCDC data reports four observations of this species within the Study Area. The final layer for this species included wetlands, waterbodies, cutover areas, barrens, and open areas.



Bank Swallow

Bank swallows (*Riparia riparia*) are listed as Threatened federally and listed as Endangered provincially. They live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies. Bank swallows are most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover. In this study the habitats in the bank swallow layer included waterbodies, barrens, and open areas. The ACCDC data reports 25 records of bank swallows within the study area.

Rusty Blackbird

Rusty blackbird (*Euphagus carolinus*) was identified within 1 (+/-5) km of the Sackville Wetland Complex during the environmental surveys in the DND lands (ECA 2010). This bird is listed as Special Concern federally, and is provincially listed as Endangered. ACCDC records show two observations of rusty blackbird within the project area.

This bird's breeding habitat is characterized by coniferous-dominated forests adjacent to wetlands, such as slow-moving streams, peat bogs, sedge meadows, marshes, swamps and beaver ponds. On migration, the rusty blackbird is primarily associated with wooded wetlands. In winter, it occurs primarily in lowland forested wetlands, cultivated fields and pecan groves. Suitable habitat for the species appears to be decreasing on its breeding range and wintering grounds, due mainly to the loss and degradation of wetlands by human activities. The final layer for rusty blackbird included wetlands, wet alder/shrub areas, wet softwood forests, and wet mixedwood forests.

Olive-sided Flycatcher

The olive-sided flycatcher (*Contopus virens*) is listed as Threatened both federally and provincially. There is one observation of this species reported in the ACCDC data.

Olive-sided flycatchers have been widely observed in open coniferous or mixed coniferous forests, often located near water or wetlands with the presence of tall snags or trees from which the species sallies for prey and advertises its territory. Mature conifer stands within patchy landscapes influenced by natural disturbance (e.g., recent burns) support the highest densities of olive-sided flycatcher. Nests are generally placed toward the tip of coniferous branches (although other tree types have been used). The layer created for this species included wetlands, wet shrub areas, and wet forests.

Eastern Wood-pewee

The eastern wood-pewee (*Contopus virens*) is federally listed as Special Concern, and provincially listed as Vulnerable. The ACCDC data reports five recorded observations of this species within the Study Area.

The eastern wood-pewee is most abundant in intermediate or mature forests of mixedwood or hardwood with little understory vegetation. It is associated with the mid-canopy layer of forest clearings and edges of



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deciduous and mixed forests. During migration, a variety of habitats are used, including forest edges, early and successional clearings. For the purposes of this study the habitats in the eastern wood-pewee layer included all intermediate forests and mature mixedwood and hardwood forests.

Evening Grosbeak

Evening grosbeak (*Coccothraustes vespertinus*) is federally listed as Special Concern and provincially listed as Vulnerable. ACCDC records show one observation of this species within the Study Area.

Evening grosbeak breeding habitat generally includes open, mature mixedwood forests, where fir species and/or white spruce are dominant, and spruce budworm is abundant. Outside the breeding season, the species seems to depend largely on seed crops from various trees such as firs and spruces in the boreal forest, but is also attracted to ornamental trees that produce seeds or fruit, and bird feeders stocked with sunflower seeds. They have been seen in mature forest areas of Sandy Lake Regional Park and along urban edges at feeders (Natural Wonders 2020). All mature forests were included in the layer for this species.

Little Brown Myotis

Three bat species in Nova Scotia are listed as Endangered both federally and provincially. Their locations are considered sensitive, but the ACCDC report lists “bat hibernaculum or bat species occurrence” within the Study Area. Other reports list observations of little brown myotis (*Myotis lucifugus*) feeding above Sandy Lake (Natural Wonders 2020), so this could be the same observations recorded by ACCDC.

Like most bat species, little brown bats are nocturnal, typically roosting in buildings, trees and caves during the day, with cave roosting occurring with pre- and post-hibernation. Compared to other bat species the little brown myotis is less forest-dependent and will readily use human structures such as barns or attics as day-roosts. This species often feeds aerially over water bodies such as ponds, lakes and streams (Randall 2011). Abandoned mines often create suitable conditions for hibernation, and bats are known to use many such sites (Randall 2011). Hibernacula are used when ambient temperatures decline and insects are unavailable e.g caves, abandoned mines, cellars, wells, tunnels with low noise and light levels. Currently male roosting sites, migration routes, and swarming sites are not identified as critical habitat. Due to spatial data constraints, the layer for this species only included waterbodies and mature forests.

Mainland Moose

The mainland moose (*Alces americanus*) is listed as Endangered provincially. The Natural Wonders (2020) report identifies moose evidence within the Study Area in 2017. Moose are referred to in other documentation as well (Anderson et al. 2002). The ACCDC data reports no observations within the Study Area, but there are 28 records within 18.2 km of the Study Area. Moose use a range of habitat types. The Endangered Mainland Moose Concentration Areas shapefile was used as a predictor of moose habitat within the Study Area.



4.3.2 Landscape Connectivity

Landscape connectivity was chosen as its own category of ecological characteristics because maintaining connectivity between ecological features to sustain long-term health and persistence of species and ecosystems is of its own intrinsic value. It is acknowledged that maintaining connectivity beyond the boundaries of the Study Area is important. The corridors were evaluated within the Study Area, with the context and analysis for broader connectivity provided through the review of the Halifax Green Network Plan (HGNP (2018)). Two corridor layers were available for use in this analysis as discussed below.

Essential Corridors Layer

The HGNP (2018) and the Design Charette (NSCSLLT 2021) outlined the importance of connecting mainland Nova Scotia and the Chebucto Peninsula. The HGNP (2018) defined two types of natural corridors:

1. *Essential Corridors are connections that provide unique or critical connections between important core area, the loss of which would severely degrade connectivity throughout the Region, and to adjacent Municipalities.*
2. *Important Corridors are connections between natural habitats, the loss of which would impact local connectivity, but are unlikely to impact overall regional connectivity.* (Pg. 34: HGNP, 2018)

The Essential Corridor Layer follows the Sackville River predominantly signifying aquatic connectivity.

Important Corridors Layer

The Important corridors layer from the Halifax Green Network Plan overlaid with and adjusted to include other corridors that are mentioned in the available documents (Natural Wonders 2020, NSCSLLT 2021, Natural Wonder). This map shows both aquatic and terrestrial connectivity on the landscape. Between Sandy Lake and the regen sites west of the lake is a very important corridor, connecting to a major North-South corridor through the park (Natural Wonders 2020). This corridor has an average width of 100 m, which is considered to be the minimum corridor width required by many species (Natural Wonders 2020, NSCSLLT 2021). The Sackville River has also been identified as an important aquatic corridor (Natural Wonders 2020, NSCSLLT 2021).

4.3.3 Wet Areas

Wet and riparian areas are important ecological characteristics because they provide habitat to a high diversity of species and provide many important ecological services like water filtration and retention. Included in this category is watercourses and riparian areas and wetlands, both known and predicted, as described below.



Watercourses and Riparian + Sackville River Floodplain

This layer was built by combining the Sackville River 1 in 100-year floodplain mapping results with all mapped watercourses within the study area- with a 100 m buffer added to account for riparian areas (see Figure 1 for mapped watercourses). This layer represents the aquatic connectivity across the landscape which provides homes for numerous species and plays a large role in overall ecosystem health.

A 100 m buffer of undisturbed riparian area has been shown to support amphibians and reptiles, provide nesting habitat for birds (Rideout 2012) and protect salmon-bearing waterbodies (HGNP 2018). Additionally, wider riparian areas are known to filter nitrogen, trap sediments, and reduce the risk of erosion (Sweeney and Newbold 2014, France et al. 2019). The 1 in 100-year flood line layer was chosen as the more conservative option in the modelling that was produced in the Sackville River Floodplain Study (CBCL 2017). The final layer produced covers most of the Study Area (see Appendix B).

Wetlands and Riparian

Wetlands for this study were gathered from all available resources including the Wetland Ecosystem Services Protocol (WESP) studies conducted by Duck's Unlimited Canada, the spatial data available from Nova Scotia Environment, and surveys conducted by the Department of National Defense (see Figure 1 for mapped wetlands). Available spatial data was merged to one wetland layer, and a 50 m buffer was then placed on this as a protective buffer zone for identified wetlands (Figure 6). Riparian areas provide important ecological functions like water storage and sediment retention, protecting banks from erosion, filtering sediments and nutrients, and provide habitat for a diversity of wildlife. A riparian area of at least 50 m provides terrestrial habitat services (Rideout 2012). A riparian width of 50 m includes the necessary home range for the majority of riparian obligate species and will help preserve the ecological functions associated with these areas (Stoffyn-Egli and Duinker 2013).

Predictive Wetland Layer

The NSE wetland layer model has limited accuracy, especially for treed wetlands. A predictive wetland layer was created to help to predict wetlands in the landscape when field delineation is not feasible. It was created using depth to water table data and SAGA Wetness Index to create a predicted wetland layer. A 50 m buffer was then added to this layer to account for potential riparian areas, consistent with the other wetland layer as described above (Figure 6).

Prepared For:



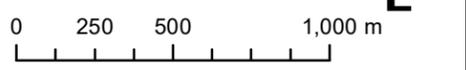
FIGURE 6

Sandy Lake Aquatic Features and Riparian Areas with Buffers

- Watercourses
- 50 m Wetland Riparian Area
- 100 m Watercourse Riparian Area
- Wetlands (based on 2017 NSE data & DUC surveys in 2020-21)
- Predicted Wetlands+ 50m Riparian Area
- Predicted Wetland Layer
- Waterbodies
- Study Area



Coordinate System: NAD 1983 CSRS UTM Zone 20N
 Projection: Transverse Mercator
 Datum: North American 1983 CSRS
 Units: Meter

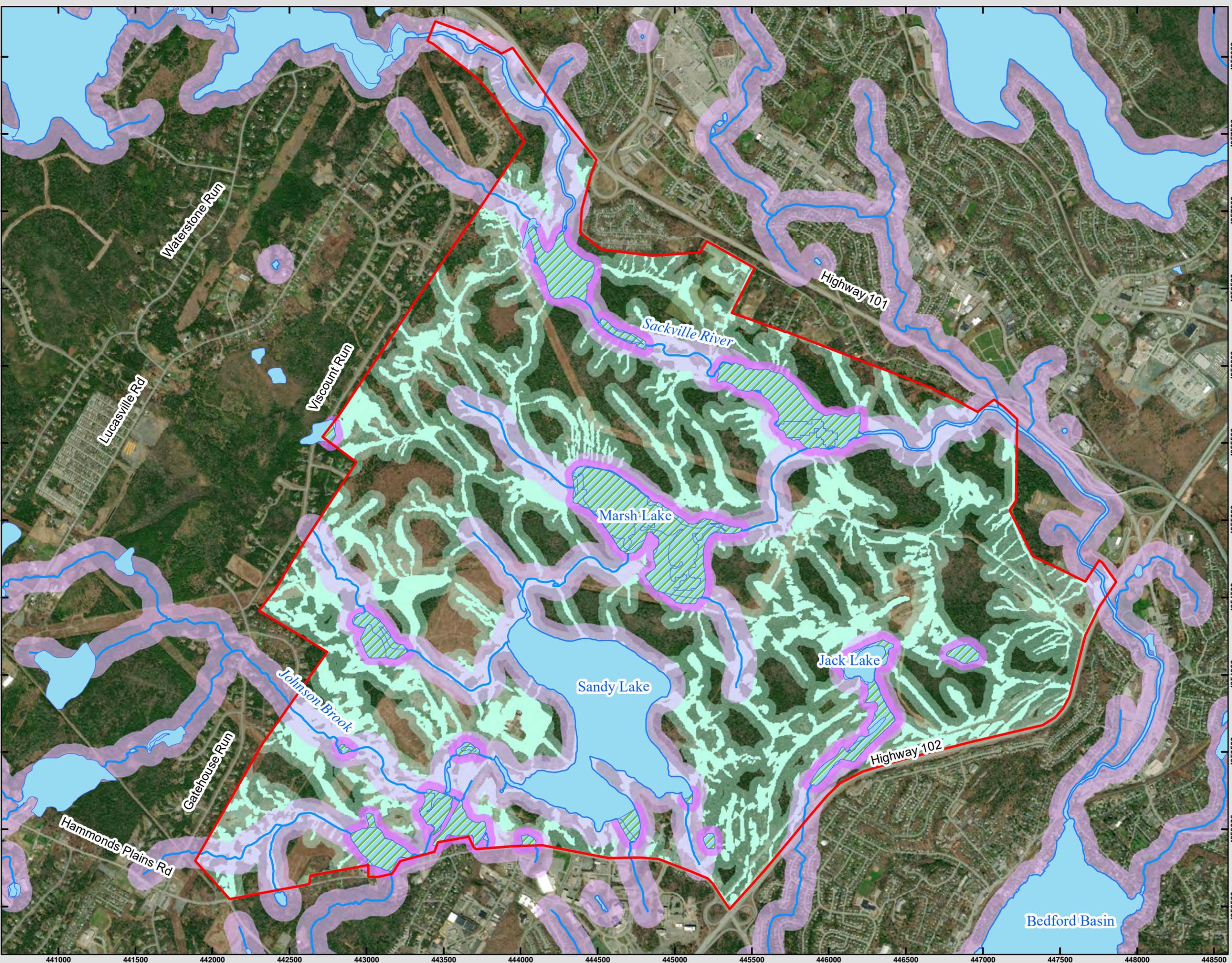


1:23,000 Scale when printed @ 11" x 17"

Drawn By: EH Date: 2022-05-27



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441000 441500 442000 442500 443000 443500 444000 444500 445000 445500 446000 446500 447000 447500 448000 448500

4956000 4957500 4957000 4956500 4956000 4955500 4955000 4954500 4954000 4953500 4953000 4952500



4.3.4 Unique Habitats

The unique habitats category captures ecological characteristics that provide unique benefits for a suite of species with specific habitat requirements and are generally limited or vulnerable in Nova Scotia. Three unique habitat types were chosen: Old/Mature Forest, Rare Lichen Habitat, and Interior Forests.

Old/ Mature Forest

Old Forest is defined as a stand or collection of stands containing old growth and/or mature climax conditions (NSDNR 2012). Mature climax is a forest stand of trees aged 80 to 125 years old and old growth forest is a stand with trees 125 years or older, with at least half of the basal area composed of climax species, and the total crown closure is a minimum of 30%.

In absence of adequate data for forest stand age, the layer was built using tree height and species data and available field data. A Nova Scotia Ecological Landscape Analysis report classified mature forest as stands with a height >11 m in their modelling exercises (Stewart and Neily 2008). Climax stands in Nova Scotia are typically dominated by Hemlock, Red Spruce, White Pine, Sugar Maple, Yellow Birch, and American Beech (NSDNR 2012). The layer used in this model therefore included polygons with any of the climax species as the primary or secondary species and tree height >11m. The polygons were then adjusted to include areas with field-validated Old Forest, and areas known to be clearcut were removed (Figure 7).

Prepared For:



FIGURE 7

Predicted Old and Mature Forest within the Sandy Lake Study Area

Bedford, NS

-  Predicted Old/ Mature Forest
-  Study Area



Coordinate System: NAD 1983 CSRS UTM Zone 20N
 Projection: Transverse Mercator
 Datum: North American 1983 CSRS
 Units: Meter

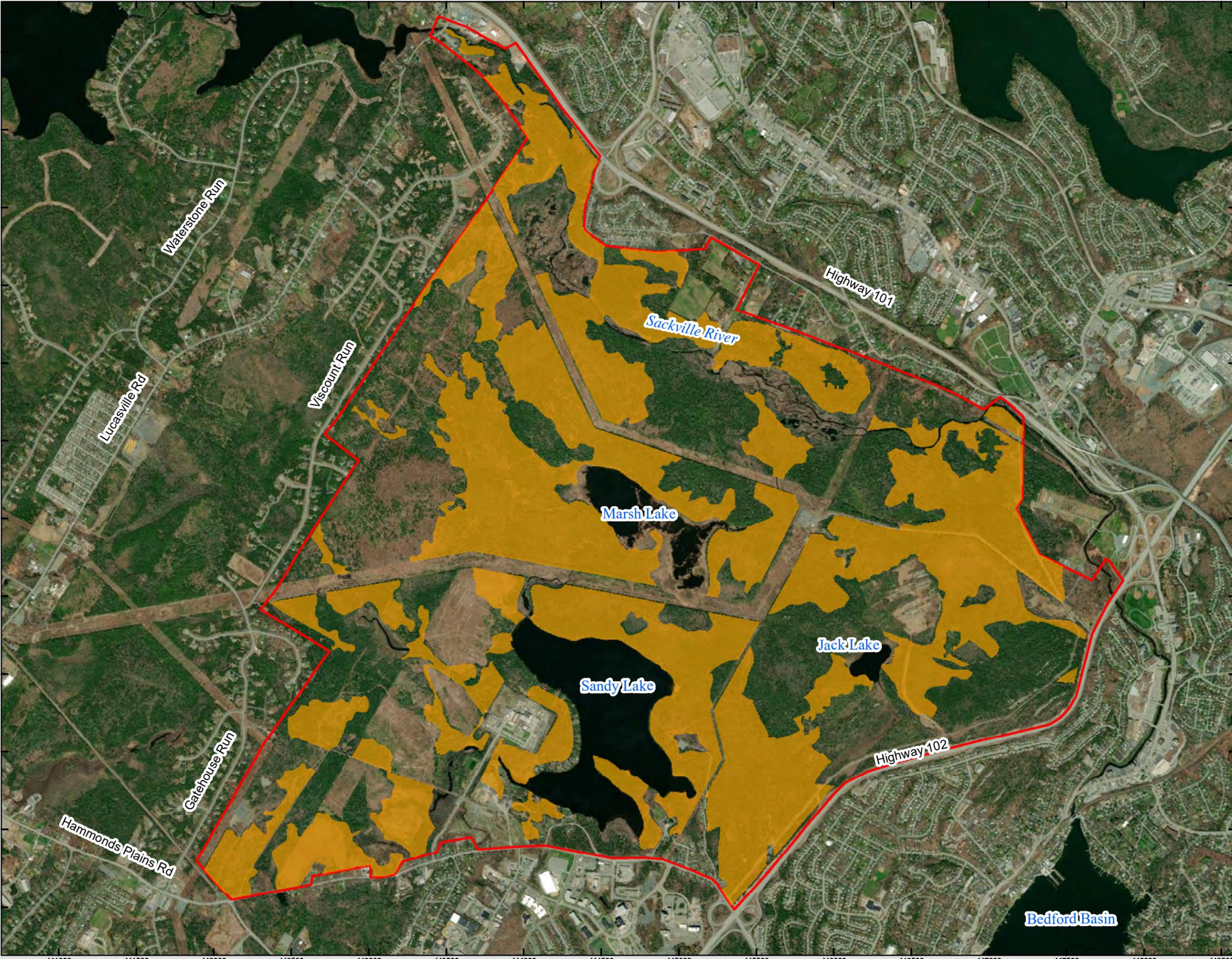


1:23,000 Scale when printed @ 11" x 17"

Drawn By: EH Date: 2022-05-27



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Rare Lichens

The rare lichen layer was built as an indicator of where a suite of lichen species is likely to be, mainly targeting swamps with mature tree cover. Mature forested swamps often provide suitable habitat for many rare epiphytic lichen species, including the majority of the SAR lichens found in NS. This layer, although primarily built for blue felt lichen, would also predict suitable habitat for many rare lichens with similar habitat requirements. Some of the species that could potentially be found in these habitats are: *Pannaria lurida*, boreal felt lichen, blue gray shingles lichen. The DND report lists boreal felt lichen 15 (+/- 1) km from site (ECA 2010), and ACCDC data reports eight different rare lichen species within 1 km of the Study Area.

Interior Forest

A desktop GIS analysis was conducted to identify potential interior habitat in the Study Area guided by the NSDNR Old Forest Policy 2012 (NSDNR 2012). Interior forest is defined as an area within a forest sheltered from edge effects. These forests provide suitable habitat for interior bird species, wildlife, and epiphytic lichens that are sensitive to fragmented habitats. The Old Forest Policy uses an edge effect distance of 200 meters from disturbance to define interior forest condition. Any patch that is suitably outside of this edge effect and over 15 ha is considered as capable of supporting interior forest. In reality, interior forest is dependent on the condition being measured and the nature of the edge interface (NSDNR 2012).

To simulate current conditions, the NSTBD Roads and Railroads layer and polygons from the NS Forest Inventory layer classified as: clearcut, urban, agriculture, gravel pit, misc. (non-forest), and gravel pit were buffered by 200 m to represent existing anthropogenic disturbance and associated edge effect. Patches of potential interior forest within the Study Area were then identified as any polygon outside this existing disturbance and edge effect, excluding open water/lakes, and greater than 15 ha. Based on visual review using aerial imagery, this method yields a relatively representative prediction of potential interior forest availability, though it overestimates in areas where new clearcuts have not been updated in the forestry inventory layer.

4.3.5 Neutral Values

Two characteristics that were identified in the document and spatial file review were considered to be a “net neutral” ecological value. The layers that received a neutral value, and therefore did not affect the final score include: Bedrock (acid rock drainage potential) and Right of Way corridors.

Right of Way Corridors

Right of Way (ROW) corridors in the Study area were considered to have a “net neutral” ecological value because they have some positive benefits, and some negative ecological impacts. Corridors along powerline ROWs are known to be used by wildlife (NSCSLLT 2021). Members of the Sackville River-Sandy Lake Regional Park Coalition have also pointed out that ROW corridors are frequented by illegal motor vehicles, and have been associated with poaching, littering, and fires. These corridors are a source of regular



SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

disturbance, but still provide valuable feeding and nesting habitat, as well as easy routes for wildlife movement. These areas are regularly maintained and will not fully restore/naturalize with time.

Bedrock/ Geology

Potential for Acid Rock Drainage (ARD) was the only identified geological condition that was determined to be relevant for the scope of this analysis. ARD can significantly affect construction processes and the management of surface water during the construction period. Potential acid producing rocks within the HRM include Bluestone, Cunard, and Beaverbank formations (White et al. 2013). The Northwest corner of the Study Area contains acid slate of the Halifax Formation.

While acid slate is known to potentially alter pH within a watershed, the ecological effects of this feature were not included in this study. An analysis of the constructability of the area would yield different conclusions on how this feature should be considered. As the ecological “value” of this feature will change depending on the context, it was assigned a “net neutral” value. There are many mitigation procedures for construction on Halifax Formation slate, and assigning a high or low ecological value did not provide a helpful analysis for this type of modelling.

4.3.6 Negative Values

Two characteristics that were identified as having negative ecological value and were included in the modelling as negative inputs as they provide ecological traps or impact the ecosystems in a detrimental way. Steep slopes and urban/heavy use areas were selected to represent these negative values.

Steep Slopes

Slopes greater than 20% are considered development constraints and may require more environmental controls (AECOM 2014). They are also considered ecologically sensitive because of their vulnerability to erosion and degradation (HGPN 2018). This modelling exercise considered steep slopes to also have a net negative ecological value because they inhibit wildlife movement across the landscape.

Urban/ Heavy Use

This layer represents urban and industrial areas, and roads. These areas have a lower relative ecological value, and were assigned a value of negative one. Urban and industrial areas are sources of pollution including sediment, road salt. Impermeable surfaces offer less suitable habitat (HGPN 2018) and potential sources of contamination from runoff (AECOM 2014). Roads and traffic endanger wildlife and roads are considered to be an ecological trap.



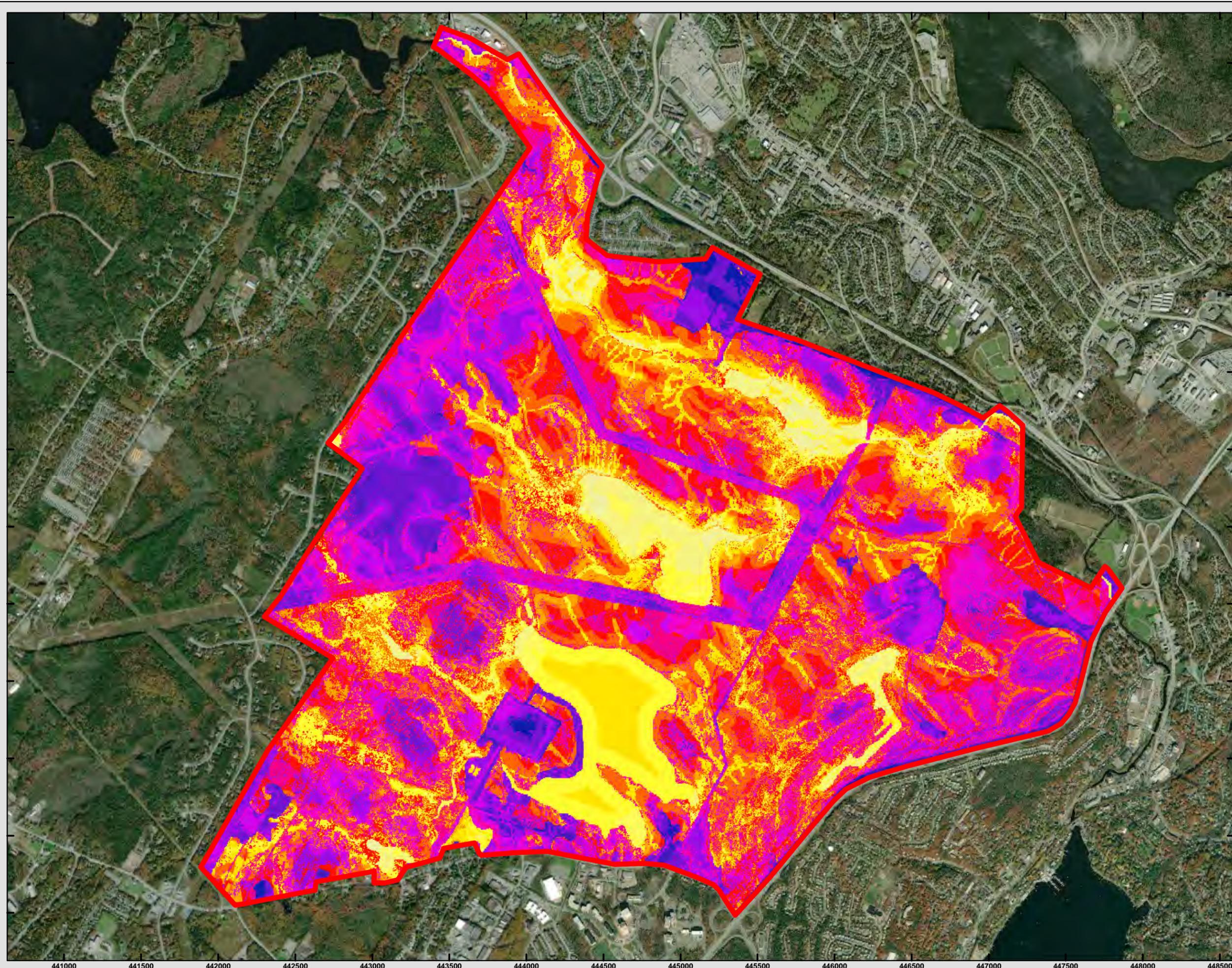
4.4 Limitations

Spatial models are representations of spatial data across landscape features, and are a useful tool to make predictions and provide visual representations of summary concepts, but can be limiting as they only describe or represent a specific sequence of information. Some of the limitations of this analysis are as follows:

1. There are many ways in which ecological features can be identified and modelled and some of the choices made in this application were based on professional judgement. A different team could ultimately put value on different ecological features and get a different result.
2. It is unlikely that these adjustment would change the overall results of the modelling exercise. For instance, some wetlands would score higher in their benefit to wildlife, while other wetlands would score higher in their water storage and delay function.
3. This was a desktop study and is therefore limited by available spatial data.
4. Vegetation type mapping and its boundaries strongly relied on aerial imagery and represent the general location of these vegetation types and not the exact boundaries.
5. While mapping vegetation types, polygons sometimes overlapped others causing an overestimation of the total area of all vegetation types. The vegetation type abundance should be considered an approximation only.
6. Intermediate vegetation types often exist between the boundaries of two or more communities, and at times, do not fit any definitions in any available classifications. Communities were then assigned a vegetation type which was the ‘best fit’.
7. All reasonable assessment programs will involve an inherent risk that some conditions will not be detected and all reports summarizing such investigations will be based on assumptions of what characteristics may exist between the sample point.

4.5 Results – Sandy Lake Ecological Features

Figure 8 shows the resulting ecological features heat map of the modelling after all 26 layers have been combined. For each point, or pixel on the map, there is a different number of overlapping layers. The values ranged from -2, which represents the lowest ecological value, to 17, indicating that 17 positive layers representing an ecological characteristic overlapped in that location. The mean value was 7 with a standard deviation of 3. Areas of low ecological value are represented in the blue, medium ecological value in orange, and high ecological value in bright yellow colours. This map shows the aquatic features registering as high ecological value, many of the forested areas came out with medium values, and urban, clearcut, and shrubby regenerating areas came out with lower ecological values.

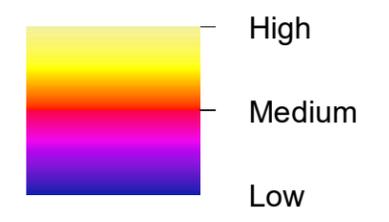


Prepared For:

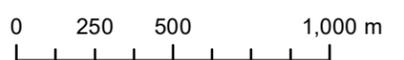


FIGURE 8

Sandy Lake Ecological Features



Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter



1:23,000 Scale when printed @ 11" x 17"

Drawn By: LP Date: 2022-04-19



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5 SUMMARY AND RECOMMENDATIONS

The objectives of the Study were to prepare a map identifying the high value ecosystem components of the Sandy Lake Study Area and to provide recommendations for areas to include in an expanded conceptual park boundary of the Sandy Lake-Sackville River Regional Park. Additionally, the Study objectives also included a recommendation relating to a potential generalized location of a secondary western park entrance, if an expanded conceptual boundary to Sandy Lake-Sackville River Regional Park was recommended. These Study objectives were developed based on the November 9, 2021 Regional Council motion which requested staff to retain a consultant to assist in the process of identifying an optimal conceptual boundary for an expanded Sandy Lake Regional Park. This request was contextualized by Regional Council through the consideration of environmental information including:

- riparian buffers to protect water quality and reduce downstream flooding of aquatic systems
- documentation of multi-aged and old growth Acadian forest in the Study Area and its potential to support species at risk, and,
- evaluation of the locations of wildlife corridors to project wildlife within the park, and broader movement outside of the park.

MEL developed the final map deliverable to identify high value ecosystem components considering these environmental considerations requested by the Regional Council motion. MEL developed 16 species at risk layers, based on known species at risk that have been documented as being present within the Study Area (Section 4.3.1) within riparian habitat, old/mature forest habitat and other habitat types present. MEL also considered the corridors presented in the HGNP and carried these into the layers included in the ecological features mapping (Section 4.3.2) and used the HGNP to provide context to the broader movement of wildlife outside of the park. Given the directive offered by council to focus on riparian buffer areas, MEL considered these habitats through two mechanisms/layers (Section 4.3.3): previously mapped watercourses and wetlands were provided a 100m and 50m riparian buffer zone respectively and included as a layer in the ecological features mapping exercise; and a model of predicted wetland habitat was also prepared. This model was completed as a layer for inclusion in the broader ecological features mapping exercise given the fact that it is well understood by provincial representatives and wetland specialists that the mapped wetland layer underpredicts wetlands (especially forested swamps which are common in Nova Scotia). This predicted wetland layer was then also provided a 50m riparian buffer zone. All riparian areas that were considered as part of the overall ecological features mapping are shown on Figure 6. Finally, MEL also used the overall habitat modelling completed to predict old/mature forest (Section 4.3.4), supported by confirmed old/mature forest layers provided by others, for inclusion into the layers used for the ecological features mapping exercise (Figure 7).

The ecological characteristics within the Study Area were grouped into five main categories that could be presented spatially and where modelling could be completed to provide analysis relating to the ecological value of the Study Area: Species at Risk, Landscape Connectivity, Wet Areas (wetlands, watercourses, and riparian zones), Unique Habitats, and Negative Features. Spatial layers were then created for 28 different ecological aspects relating to these five categories. Some aspects were produced using existing spatial layers, while other aspects required predictive modelling, or combining data from different sources.



SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

The final ecological features heat map visually represents the areas of the Sandy Lake Study Area that are of higher or lower ecological value based on the chosen characteristics (28) representing important ecological values. These characteristics were chosen to be able to identify “hot spots” relative to other areas in the Study Area. As shown in Figure 8, the features that scored the highest (bright yellow) were mainly aquatic or riparian features focusing around Sandy Lake, Marsh Lake, Jack Lake, and the Sackville River. There is a distinct corridor of high scoring features surrounding the Sackville River that highlights the importance of this system and its surrounding habitat. Marsh Lake has been identified in other studies as being of high importance to the larger ecosystem and this is again reflected in its scoring in this analysis. Given that these two areas were identified as high scoring features and are aquatic habitats, protecting open water and riparian areas should therefore be a key consideration in further park and development planning.

The medium (orange) values represent areas of mature forest and habitat that are important to avian species at risk as well as important corridor areas and should also be considered for park and development planning. Maintaining connectivity through these medium scoring areas also supports the overall success of the high scoring riparian features. As was expected, the industrial or urban areas (ie – Agropur Cooperative – Farmers Dairy) scored low (blue). These areas include impermeable surfaces and human disturbance that are negatively impacting their value.

Concentrations of high valued ecological/environmental conditions were largely observed in areas of existing municipal parkland and the immediately adjoining lands, lands owned by other government (Marsh Lake lands), and the Sackville River system lands (Figure 9). Some of lands beyond these areas were not found to have concentrations of ecological values, and some existing municipal parkland areas, such as those lands near to the Bicentennial Highway possess lower ecological values. Areas beyond the concentrations of medium to high valued ecological condition may still be important for consideration and possible protection as supporting lands for the continued integrity of the areas of high ecological/environmental values. These lands may also have an important role for broader landscape and ecological connectivity, which also needs to be addressed.

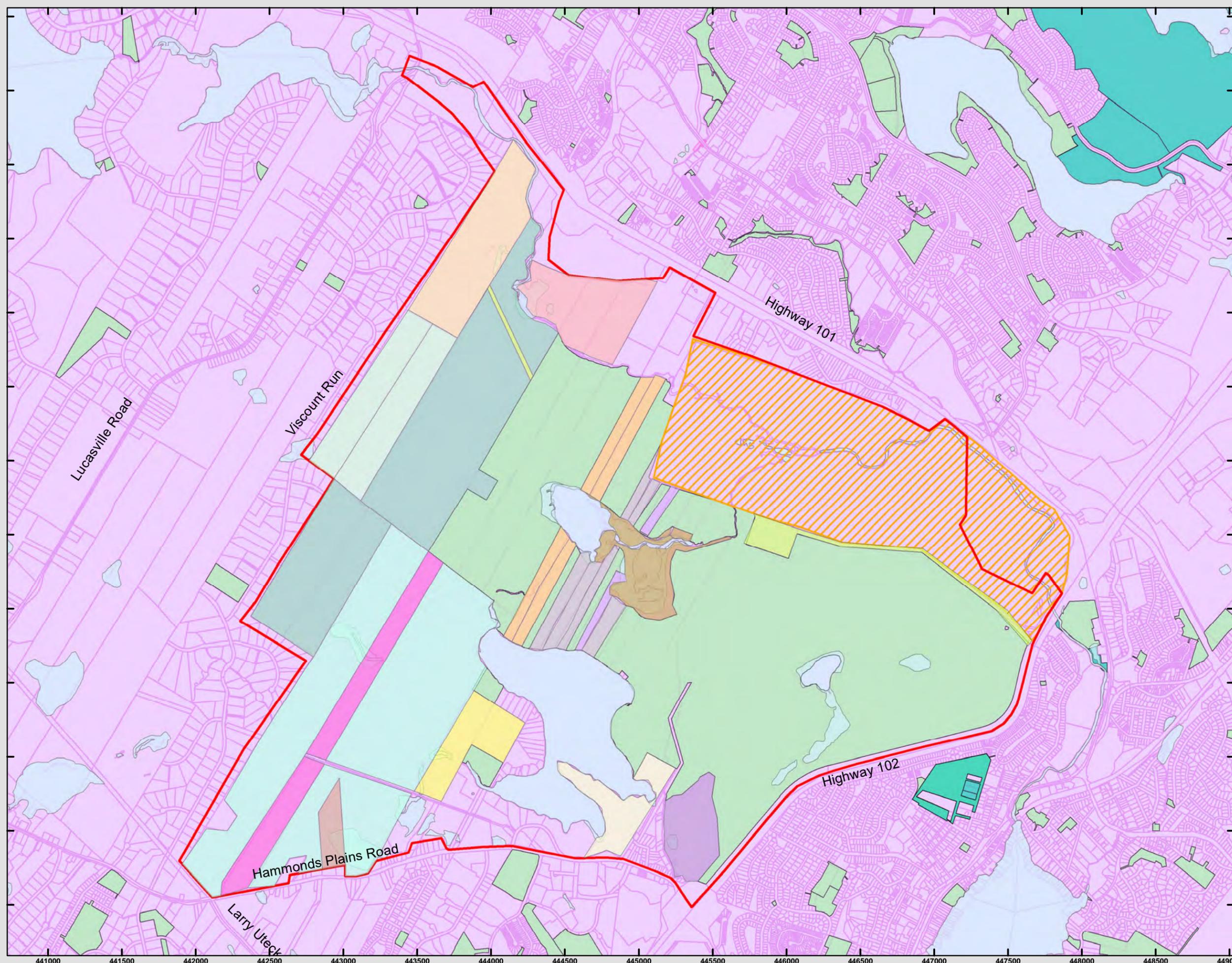
The study context and assignment did not include a consideration of human values, including considerations for matters such recreation potential, which would be essential in the delineation of conceptual park boundaries and trailhead location. A future western trailhead was not specifically identified but the findings of this Study should allow the planning team to consider an appropriate trailhead location with ecological characteristics in mind.

Prepared For:

HALIFAX

FIGURE 9

Land Ownership around the Sandy Lake Study Area Bedford, NS



Main Property Owners	
	3063063 NS Ltd
	4380407 NS Ltd
	Agropur
	Cooke
	ECL General Partner IV Ltd
	Lucas
	Mitchell
	NS Crown Municipal Affairs & Housing
	NS Power
	Peveril
	Sackville Manor
	Sandy Lake Academy
	Sandy Lake Holdings Ltd
	Shaw
	United Gulf Developments
	NS Crown Land
	DND Bedford Rifle Range
	HRM Parks
	Private Landowner (small parcels)
	Waterbodies
	Study Area



Coordinate System: NAD 1983 CSRS UTM Zone 20N
 Projection: Transverse Mercator
 Datum: North American 1983 CSRS
 Units: Meter



1:24,000 Scale when printed @ 11" x 17"

Drawn By: EH Date: 2022-05-27



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SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

While these ecological features identified in this analysis are a good first step in identifying areas appropriate for incorporating into protected park lands, additional work could be completed to support the placement of a park boundary. Recommended next steps include:

- Ground truthing is valuable to fully understand ecological features and should be considered for future work to support the placement of a park boundary. Ground truthing can support a finer scale understanding of the ecological features present and can further support prioritization of areas for protection. Ground truthing can also verify changes in habitat quality from anthropogenic activities (infilling, disturbance, others).
- Water quality should be a central consideration in the discussion of ecological assessment. Protection of natural vegetation buffers to support the water quality and reduce downstream flooding of Sandy Lake, Sackville River, associated tributaries and wetlands should be a priority during park planning efforts to support improved watershed health.
- It is important to consider features beyond the study boundary and how key features within the Study Area align with them. The HGNP provides the basis for this analysis.
- It is important to consider the entire sub watersheds associated with the Study Area when considering the protection of environmental features especially water quality (Figure 10).
- Identification of HRM key objectives in changing the park boundary including consideration of cultural/land use/users needs.
- Weightings – the model could be adjusted to incorporate different versions

Prepared For:



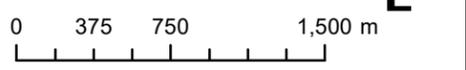
FIGURE 10

Secondary and Tertiary Watersheds in the Sandy Lake Area Bedford, NS

- | | | | |
|--|-----------------|--|-------------------------------|
| | Nine Mile R. | | Watercourses |
| | Sackville R. | | Sandy Lake Sub-Watershed |
| | Shubenacadie R. | | Tertiary Watershed Boundaries |
| | Waterbodies | | Study Area |
| | Kearney Run | | |
| | Shore Direct | | |
| | Wrights Brook | | |



Coordinate System: NAD 1983 CSRS UTM Zone 20N
 Projection: Transverse Mercator
 Datum: North American 1983 CSRS
 Units: Meter

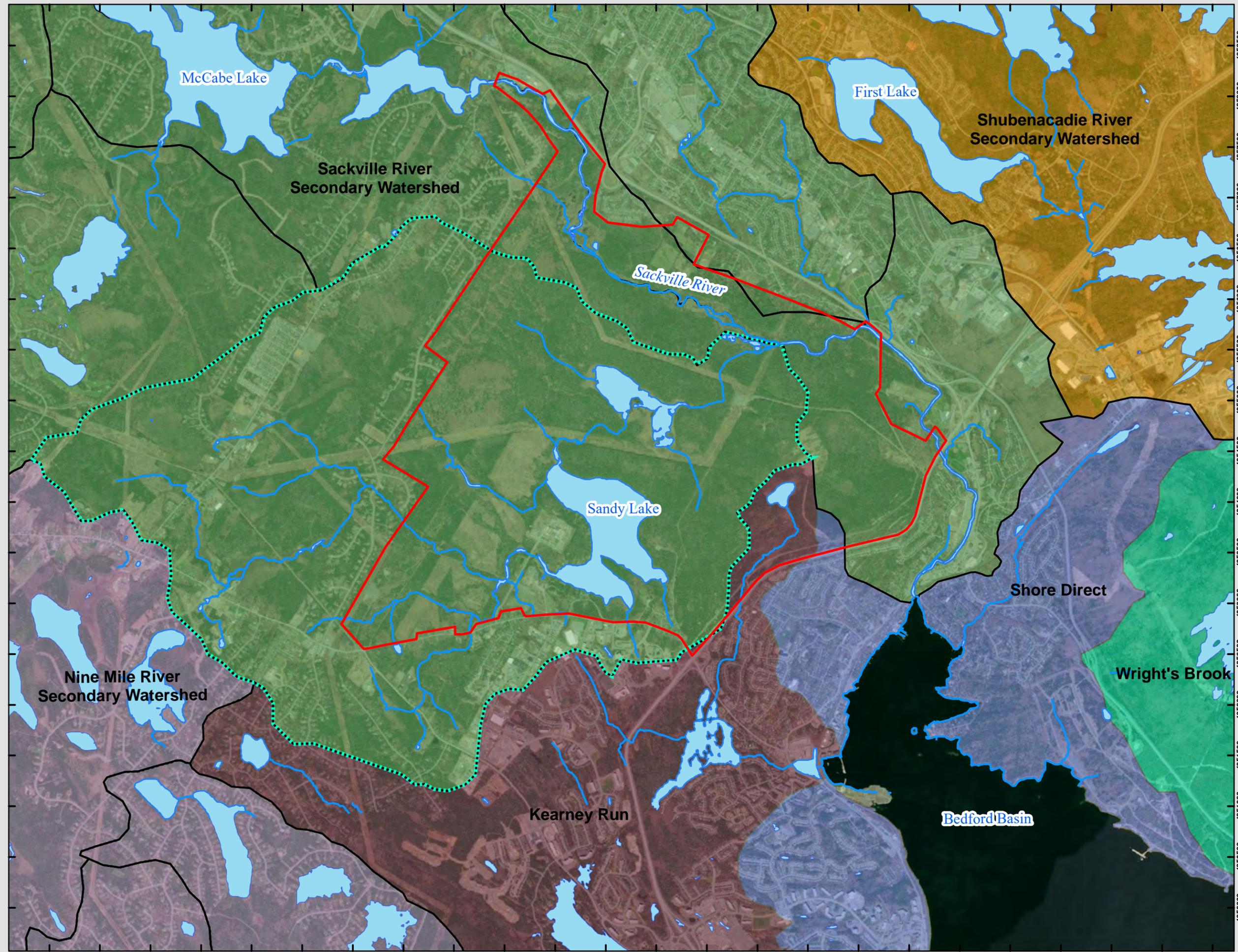


1:35,000 Scale when printed @ 11" x 17"

Drawn By: EH Date: 2022-05-27



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SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

The Sandy Lake area is also planned to include areas for development. Recommendations for Sandy Lake Urban District Growth Centre development around and outside of a proposed park boundary include:

- Consideration of the Sandy Lake sub-watershed area(s) outside of the Study Area (Figure 10)
- Requirement for stormwater treatment prior to discharge (water quality objectives)
- Recommendations for development of regulations, such as vegetation buffers and stormwater management approaches, that will maintain environmental health in the area.
- Additional flood plain mapping within the sub-watershed(s)
- Identify recommendations regarding size of wildlife corridors and connectivity considerations from the park to surrounding areas of ecological importance.

If you have any questions or comments, please do not hesitate to contact the undersigned.

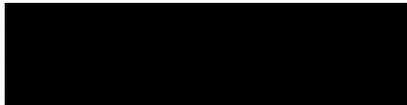
Respectfully submitted,



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SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

Appendix A: ACCDC Report

DATA REPORT 7176: Sandy Lake, NS

Prepared 23 February 2022
by J. Pender, Data Manager

CONTENTS OF REPORT

1.0 Preface

- 1.1 Data List
- 1.2 Restrictions
- 1.3 Additional Information
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- 2.2 Fauna
- Map 2: Flora and Fauna

3.0 Special Areas

- 3.1 Managed Areas
- 3.2 Significant Areas
- Map 3: Special Areas

4.0 Rare Species Lists

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- 4.2 Flora
- 4.3 Location Sensitive Species
- 4.4 Source Bibliography

5.0 Rare Species within 100 km

- 5.1 Source Bibliography



Map 1. A 100 km buffer around the study area

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (AC CDC; www.accdc.com) is part of a network of NatureServe data centres and heritage programs serving 50 states in the U.S.A, 10 provinces and 1 territory in Canada, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The AC CDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Although a non-governmental agency, the AC CDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees.

Upon request and for a fee, the AC CDC queries its database and produces customized reports of the rare and endangered flora and fauna known to occur in or near a specified study area. As a supplement to that data, the AC CDC includes locations of managed areas with some level of protection, and known sites of ecological interest or sensitivity.

1.1 DATA LIST

Included datasets:

Filename

SandyLkNS_7176ob.xls
SandyLkNS_7176ob100km.xls
SandyLkNS_7176ff_py.xls

Contents

Rare or legally-protected Flora and Fauna in your study area
A list of Rare and legally protected Flora and Fauna within 100 km of your study area
Rare Freshwater Fish in your study area (DFO database)

1.2 RESTRICTIONS

The AC CDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting AC CDC data, recipients assent to the following limits of use:

- a) Data is restricted to use by trained personnel who are sensitive to landowner interests and to potential threats to rare and/or endangered flora and fauna posed by the information provided.
- b) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
- c) The AC CDC requires Data Users to cease using and delete data 12 months after receipt, and to make a new request for updated data if necessary at that time.
- d) AC CDC data responses are restricted to the data in our Data System at the time of the data request.
- e) Each record has an estimate of locational uncertainty, which must be referenced in order to understand the record's relevance to a particular location. Please see attached Data Dictionary for details.
- f) AC CDC data responses are not to be construed as exhaustive inventories of taxa in an area.
- g) The absence of a taxon cannot be inferred by its absence in an AC CDC data response.

1.3 ADDITIONAL INFORMATION

The accompanying Data Dictionary provides metadata for the data provided.

Please direct any additional questions about AC CDC data to the following individuals:

Plants, Lichens, Ranking Methods, All other Inquiries

Sean Blaney
Senior Scientist / Executive Director
(506) 364-2658
sean.blaney@accdc.ca

Animals (Fauna)

John Klymko
Zoologist
(506) 364-2660
john.klymko@accdc.ca

Data Management, GIS

James Churchill
Conservation Data Analyst / Field Biologist
(902) 679-6146
james.churchill@accdc.ca

Billing

Jean Breau
Financial Manager / Executive Assistant
(506) 364-2657
jean.breau@accdc.ca

Questions on the biology of Federal Species at Risk can be directed to AC CDC: (506) 364-2658, with questions on Species at Risk regulations to: Samara Eaton, Canadian Wildlife Service (NB and PE): (506) 364-5060 or Julie McKnight, Canadian Wildlife Service (NS): (902) 426-4196.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in New Brunswick, please contact Hubert Askanas, Energy and Resource Development: (506) 453-5873.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in Nova Scotia, please contact Donna Hurlburt, NS DLF: (902) 679-6886. To determine if location-sensitive species (section 4.3) occur near your study site please contact a NS DLF Regional Biologist:

Western: Emma Vost
(902) 670-8187
Emma.Vost@novascotia.ca

Western: Sarah Spencer
(902) 541-0081
Sarah.Spencer@novascotia.ca

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Eastern: Elizabeth Walsh
(902) 563-3370
Elizabeth.Walsh@novascotia.ca

For provincial information about rare taxa and protected areas, or information about game animals, fish habitat etc., in Prince Edward Island, please contact Garry Gregory, PEI Dept. of Communities, Land and Environment: (902) 569-7595.

2.0 RARE AND ENDANGERED SPECIES

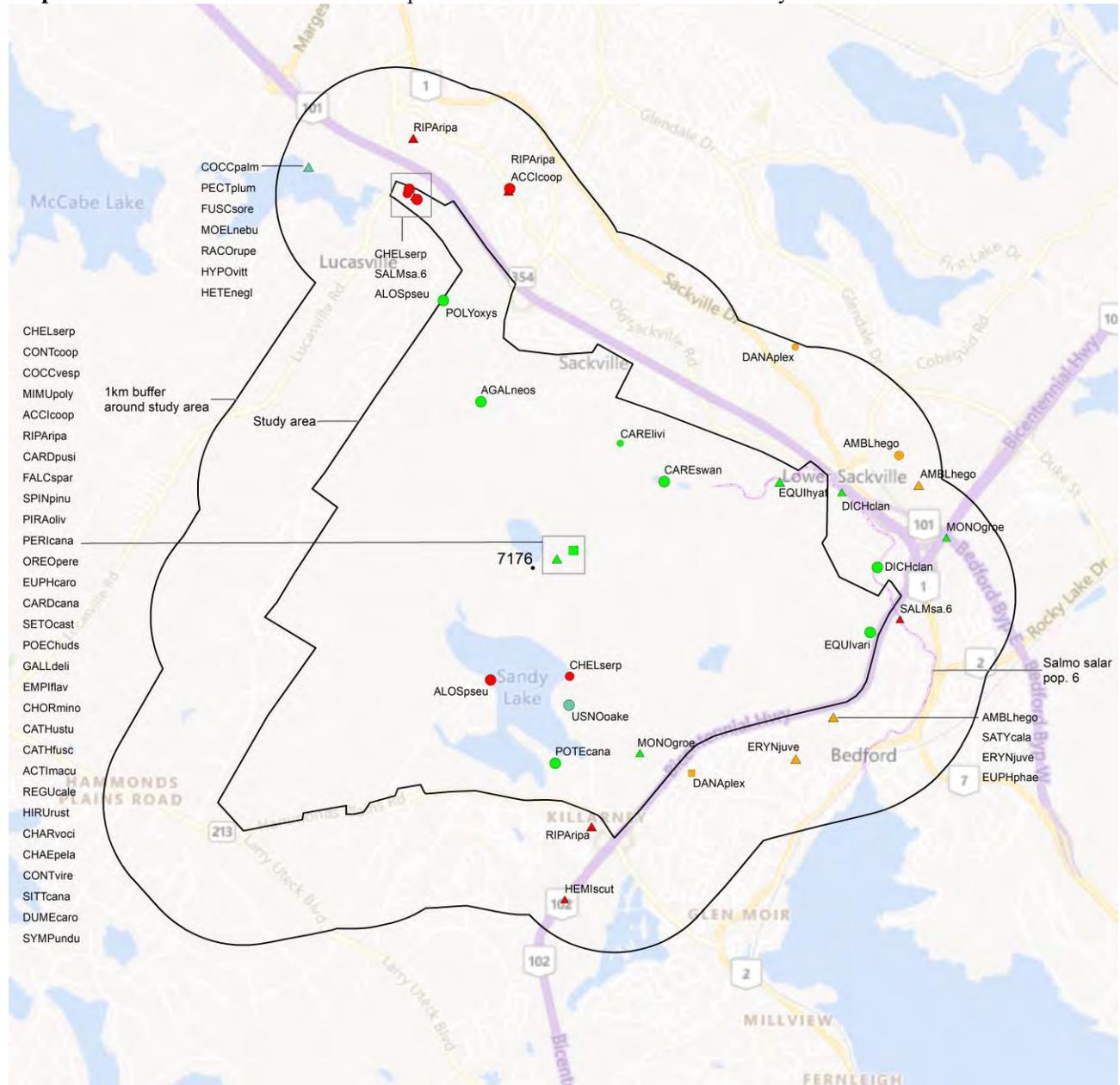
2.1 FLORA

The study area contains 13 records of 10 vascular, 8 records of 8 nonvascular flora (Map 2 and attached: *ob.xls), excluding 'location-sensitive' species.

2.2 FAUNA

The study area contains 92 records of 32 vertebrate, 16 records of 5 invertebrate fauna (Map 2 and attached data files - see 1.1 Data List), excluding 'location-sensitive' species. Please see section 4.3 to determine if 'location-sensitive' species occur near your study site.

Map 2: Known observations of rare and/or protected flora and fauna within the study area.



- RESOLUTION**
- 4.7 within 50s of kilometers
 - 4.0 within 10s of kilometers
 - 3.7 within 5s of kilometers
 - △ 3.0 within kilometers
 - △ 2.7 within 500s of meters
 - ◇ 2.0 within 100s of meters
 - ◇ 1.7 within 10s of meters

- HIGHER TAXON**
- vertebrate fauna
 - invertebrate fauna
 - vascular flora
 - nonvascular flora

3.0 SPECIAL AREAS

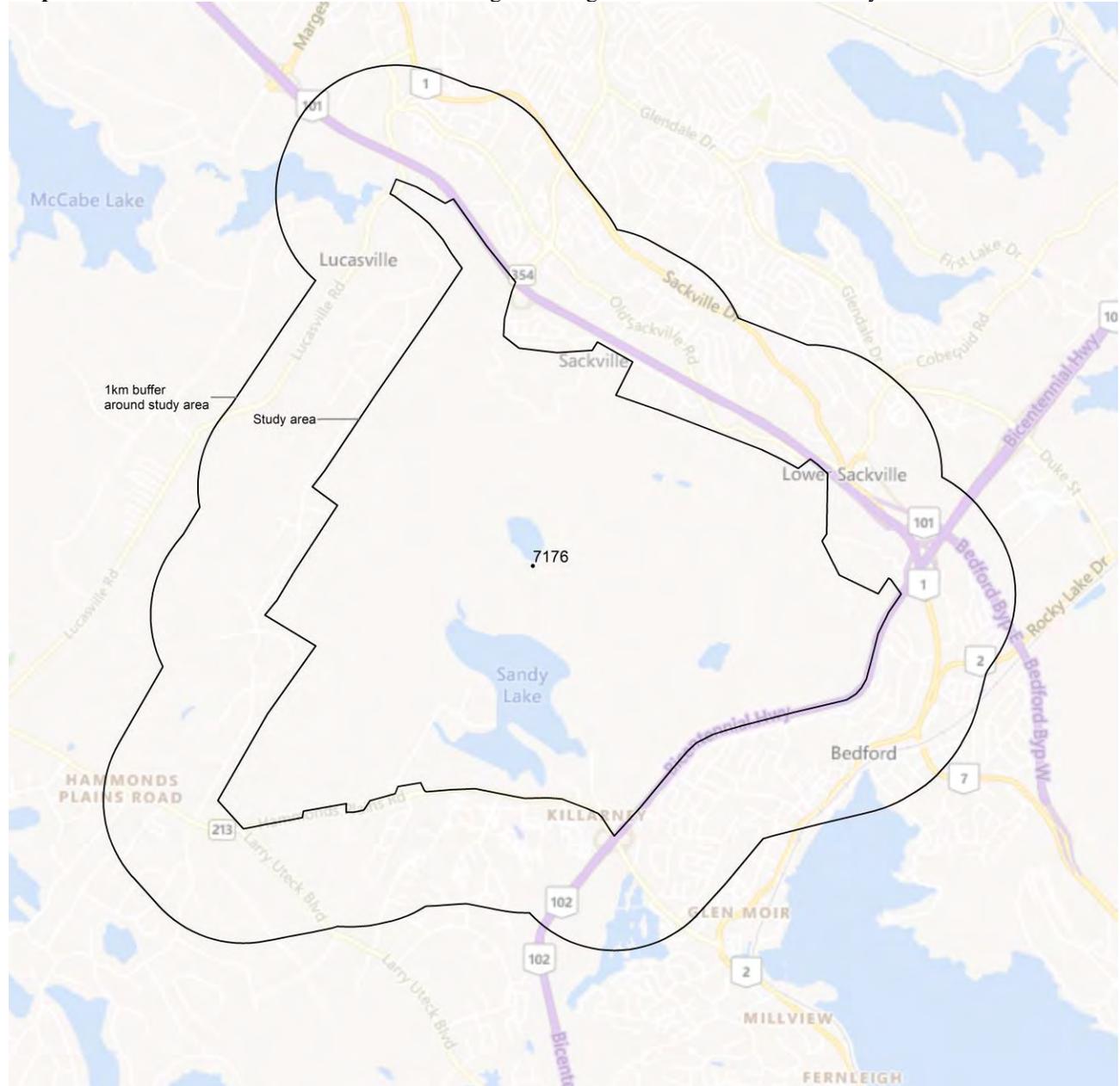
3.1 MANAGED AREAS

The GIS scan identified no managed areas in the vicinity of the study area (Map 3).

3.2 SIGNIFICANT AREAS

The GIS scan identified no biologically significant sites in the vicinity of the study area (Map 3).

Map 3: Boundaries and/or locations of known Managed and Significant Areas within the study area.



 Managed Area  Significant Area

4.0 RARE SPECIES LISTS

Rare and/or endangered taxa (excluding “location-sensitive” species, section 4.3) within the study area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (\pm the precision, in km, of the record). [P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community. Note: records are from attached files *ob.xls/*ob.shp only.

4.1 FLORA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
N	<i>Pectenia plumbea</i>	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S3	1	4.0 \pm 1.0
N	<i>Usnocetraria oakesiana</i>	Yellow Band Lichen				S2S3	1	1.2 \pm 0.0
N	<i>Racodium rupestre</i>	Rockhair Lichen				S2S3	1	4.0 \pm 1.0
N	<i>Moelleropsis nebulosa</i>	Blue-gray Moss Shingle Lichen				S3	1	4.0 \pm 1.0
N	<i>Fuscopannaria sorediata</i>	a Lichen				S3	1	4.0 \pm 1.0
N	<i>Hypogymnia vittata</i>	Slender Monk's Hood Lichen				S3S4	1	4.0 \pm 1.0
N	<i>Coccocarpia palmicola</i>	Salted Shell Lichen				S3S4	1	4.0 \pm 1.0
N	<i>Heterodermia neglecta</i>	Fringe Lichen				S3S4	1	4.0 \pm 1.0
P	<i>Carex livida</i>	Livid Sedge				S1S2	1	1.3 \pm 0.0
P	<i>Symphyotrichum undulatum</i>	Wavy-leaved Aster				S2	2	0.2 \pm 1.0
P	<i>Polygonum oxyspermum</i>	Sharp-fruit Knotweed				S2S3	1	2.5 \pm 0.0
P	<i>Potentilla canadensis</i>	Canada Cinquefoil				S2S3	1	1.7 \pm 0.0
P	<i>Mononeuria groenlandica</i>	Greenland Stitchwort				S3	2	1.9 \pm 0.0
P	<i>Carex swanii</i>	Swan's Sedge				S3	1	1.4 \pm 0.0
P	<i>Dichanthelium clandestinum</i>	Deer-tongue Panic Grass				S3	2	2.8 \pm 0.0
P	<i>Equisetum variegatum</i>	Variegated Horsetail				S3	1	3.0 \pm 0.0
P	<i>Agalinis neoscotica</i>	Nova Scotia Agalinis				S3S4	1	1.5 \pm 0.0
P	<i>Equisetum hyemale ssp. affine</i>	Common Scouring-rush				S3S4	1	2.3 \pm 2.0

4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	<i>Salmo salar pop. 6</i>	Atlantic Salmon - Nova Scotia Southern Upland pop.	Endangered			S1	2	3.2 \pm 0.0
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Endangered	S2B,S1M	2	0.4 \pm 7.0
A	<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened	Endangered	S2S3B	25	0.4 \pm 7.0
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2B	2	0.4 \pm 7.0
A	<i>Chordeiles minor</i>	Common Nighthawk	Special Concern	Threatened	Threatened	S2B	2	0.4 \pm 7.0
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S2B	1	0.4 \pm 7.0
A	<i>Hirundo rustica</i>	Barn Swallow	Special Concern	Threatened	Endangered	S2S3B	4	0.4 \pm 7.0
A	<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	5	0.4 \pm 10.0
A	<i>Cardellina canadensis</i>	Canada Warbler	Special Concern	Threatened	Endangered	S3B	1	0.4 \pm 7.0
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern	Special Concern	Vulnerable	S3S4B	5	0.4 \pm 7.0
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	Special Concern	Special Concern	Vulnerable	S3S4B,S3N	1	0.4 \pm 7.0
A	<i>Accipiter cooperii</i>	Cooper's Hawk	Not At Risk			S1?B	2	0.4 \pm 7.0
A	<i>Hemidactylium scutatum</i>	Four-toed Salamander	Not At Risk			S3	1	2.9 \pm 0.0
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S1B	1	0.4 \pm 7.0
A	<i>Piranga olivacea</i>	Scarlet Tanager				S2B	1	0.4 \pm 7.0
A	<i>Spinus pinus</i>	Pine Siskin				S2S3	2	0.4 \pm 7.0
A	<i>Perisoreus canadensis</i>	Canada Jay				S3	3	0.4 \pm 7.0
A	<i>Poecile hudsonicus</i>	Boreal Chickadee				S3	3	0.4 \pm 7.0
A	<i>Sitta canadensis</i>	Red-breasted Nuthatch				S3	5	0.4 \pm 7.0
A	<i>Alosa pseudoharengus</i>	Alewife				S3	2	1.0 \pm 0.0
A	<i>Falco sparverius</i>	American Kestrel				S3B	1	0.4 \pm 7.0
A	<i>Charadrius vociferus</i>	Killdeer				S3B	2	0.4 \pm 7.0
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3B	2	0.4 \pm 7.0

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	<i>Dumetella carolinensis</i>	Gray Catbird				S3B	3	0.4 ± 7.0
A	<i>Cardellina pusilla</i>	Wilson's Warbler				S3B	1	0.4 ± 7.0
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B	2	0.4 ± 7.0
A	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher				S3S4B	2	0.4 ± 7.0
A	<i>Regulus calendula</i>	Ruby-crowned Kinglet				S3S4B	2	0.4 ± 7.0
A	<i>Catharus fuscescens</i>	Veery				S3S4B	2	0.4 ± 7.0
A	<i>Catharus ustulatus</i>	Swainson's Thrush				S3S4B	2	0.4 ± 7.0
A	<i>Oreothlypis peregrina</i>	Tennessee Warbler				S3S4B	1	0.4 ± 7.0
A	<i>Setophaga castanea</i>	Bay-breasted Warbler				S3S4B	2	0.4 ± 7.0
I	<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	Endangered	S2B	3	2.3 ± 6.0
I	<i>Satyrrium calanus</i>	Banded Hairstreak				S2	2	2.9 ± 2.0
I	<i>Amblyscirtes hegon</i>	Pepper and Salt Skipper				S2S3	5	2.9 ± 2.0
I	<i>Euphydryas phaeton</i>	Baltimore Checkerspot				S2S3	1	2.9 ± 2.0
I	<i>Erynnis juvenalis</i>	Juvenal's Duskywing				S3S4	5	2.8 ± 2.0

4.3 LOCATION SENSITIVE SPECIES

The Department of Natural Resources in each Maritimes province considers a number of species “location sensitive”. Concern about exploitation of location-sensitive species precludes inclusion of precise coordinates in this report. Those intersecting your study area are indicated below with “YES”.

Nova Scotia

Scientific Name	Common Name	SARA	Prov Legal Prot	Known within the Study Site?
<i>Fraxinus nigra</i>	Black Ash		Threatened	No
<i>Emydoidea blandingii</i>	Blanding's Turtle - Nova Scotia pop.	Endangered	Vulnerable	No
<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	YES
<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Vulnerable	No
Bat hibernaculum or bat species occurrence		[Endangered]'	[Endangered]'	YES

1 *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all Endangered under the Federal Species at Risk Act and the NS Endangered Species Act.

4.4 SOURCE BIBLIOGRAPHY

The recipient of these data shall acknowledge the AC CDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

# recs	CITATION
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1	Newell, R.E. 2000. E.C. Smith Herbarium Database. Acadia University, Wolfville NS, 7139 recs.
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1	Pronych, G. & Wilson, A. 1993. Atlas of Rare Vascular Plants in Nova Scotia. Nova Scotia Museum, Halifax NS, I:1-168, II:169-331. 1446 recs.
1	White, S. 2018. Notable species sightings, 2016-2017. East Coast Aquatics.

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 45561 records of 162 vertebrate and 1550 records of 69 invertebrate fauna; 9332 records of 309 vascular, 2747 records of 188 nonvascular flora (attached: *ob100km.xls).

Taxa within 100 km of the study site that are rare and/or endangered in the province in which the study site occurs (including “location-sensitive” species). All ranks correspond to the province in which the study site falls, even for out-of-province records. Taxa are listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (\pm the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	<i>Coregonus huntsmani</i>	Atlantic Whitefish	Endangered	Endangered	Endangered	S1	128	80.2 \pm 1.0	NS
A	<i>Myotis lucifugus</i>	Little Brown Myotis	Endangered	Endangered	Endangered	S1	323	4.9 \pm 0.0	NS
A	<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Endangered	Endangered	Endangered	S1	31	34.7 \pm 0.0	NS
A	<i>Perimyotis subflavus</i>	Eastern Pipistrelle	Endangered	Endangered	Endangered	S1	30	34.7 \pm 0.0	NS
A	<i>Emydoidea blandingii</i>	Blanding's Turtle - Nova Scotia pop.	Endangered	Endangered	Endangered	S1	1570	89.4 \pm 0.0	NS
A	<i>Salmo salar pop. 1</i>	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered		S1	38	12.9 \pm 0.0	NS
A	<i>Salmo salar pop. 6</i>	Atlantic Salmon - Nova Scotia Southern Upland pop.	Endangered			S1	29	3.2 \pm 0.0	NS
A	<i>Charadrius melodus melodus</i>	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B	998	20.8 \pm 0.0	NS
A	<i>Sterna dougallii</i>	Roseate Tern	Endangered	Endangered	Endangered	S1B	65	23.6 \pm 0.0	NS
A	<i>Morone saxatilis pop. 2</i>	Striped Bass - Bay of Fundy pop.	Endangered			S1B	4	24.3 \pm 0.0	NS
A	<i>Dermochelys coriacea (Atlantic pop.)</i>	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered		S1S2N	3	29.0 \pm 5.0	NS
A	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Endangered	Threatened		SNA	1	73.8 \pm 0.0	NS
A	<i>Protonotaria citrea</i>	Prothonotary Warbler	Endangered	Endangered		SNA	1	32.6 \pm 0.0	NS
A	<i>Icteria virens</i>	Yellow-Breasted Chat	Endangered	Endangered		SNA	5	14.3 \pm 0.0	NS
A	<i>Colinus virginianus</i>	Northern Bobwhite	Endangered	Endangered			7	11.1 \pm 0.0	NS
A	<i>Antrostomus vociferus</i>	Eastern Whip-Poor-Will	Threatened	Threatened	Threatened	S1?B	13	8.4 \pm 0.0	NS
A	<i>Asio flammeus</i>	Short-eared Owl	Threatened	Special Concern		S1S2B	10	14.3 \pm 7.0	NS
A	<i>Limosa haemastica</i>	Hudsonian Godwit	Threatened			S1S2M	96	24.2 \pm 0.0	NS
A	<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	Threatened	S2	1187	1.2 \pm 0.0	NS
A	<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	Threatened			S2	7	35.5 \pm 0.0	NS
A	<i>Anguilla rostrata</i>	American Eel	Threatened			S2	49	3.4 \pm 0.0	NS
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Endangered	S2B,S1M	273	0.4 \pm 7.0	NS
A	<i>Thamnophis sauritus pop. 3</i>	Eastern Ribbonsnake - Atlantic pop.	Threatened	Threatened	Threatened	S2S3	377	83.6 \pm 0.0	NS
A	<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened	Endangered	S2S3B	1460	0.4 \pm 7.0	NS
A	<i>Oceanodroma leucorhoa</i>	Leach's Storm-Petrel	Threatened			S3B,S5M	28	25.4 \pm 0.0	NS
A	<i>Tringa flavipes</i>	Lesser Yellowlegs	Threatened			S3M	890	24.2 \pm 0.0	NS
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened	Threatened	Vulnerable	S3S4B	691	1.7 \pm 0.0	NS
A	<i>Sturnella magna</i>	Eastern Meadowlark	Threatened	Threatened		SHB	2	42.1 \pm 7.0	NS
A	<i>Melanerpes lewis</i>	Lewis's Woodpecker	Threatened	Threatened		SNA	1	30.5 \pm 0.0	NS
A	<i>Hylocichla mustelina</i>	Wood Thrush	Threatened	Threatened		SUB	36	36.4 \pm 7.0	NS
A	<i>Passerculus sandwichensis princeps</i>	Savannah Sparrow princeps ssp	Special Concern	Special Concern		S1B	5	25.9 \pm 0.0	NS
A	<i>Bucephala islandica (Eastern pop.)</i>	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern		S1N	2	64.8 \pm 2.0	NS
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2B	221	0.4 \pm 7.0	NS
A	<i>Chordeiles minor</i>	Common Nighthawk	Special Concern	Threatened	Threatened	S2B	435	0.4 \pm 7.0	NS
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S2B	697	0.4 \pm 7.0	NS
A	<i>Histrionicus histrionicus pop. 1</i>	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S2N	39	17.6 \pm 0.0	NS
A	<i>Balaenoptera physalus</i>	Fin Whale	Special Concern	Special Concern		S2S3	1	63.7 \pm 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	<i>Hirundo rustica</i>	Barn Swallow	Special Concern	Threatened	Endangered	S2S3B	1073	0.4 ± 7.0	NS
A	<i>Phalaropus lobatus</i>	Red-necked Phalarope	Special Concern	Special Concern		S2S3M	8	24.2 ± 0.0	NS
A	<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	242	0.4 ± 10.0	NS
A	<i>Cardellina canadensis</i>	Canada Warbler	Special Concern	Threatened	Endangered	S3B	846	0.4 ± 7.0	NS
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern	Special Concern	Vulnerable	S3S4B	850	0.4 ± 7.0	NS
A	<i>Coccythraustes vespertinus</i>	Evening Grosbeak	Special Concern	Special Concern	Vulnerable	S3S4B,S3N	550	0.4 ± 7.0	NS
A	<i>Phocoena phocoena</i>	Harbour Porpoise	Special Concern			S4	6	14.5 ± 0.0	NS
A	<i>Podiceps auritus</i>	Horned Grebe	Special Concern	Special Concern		S4N	6	24.1 ± 0.0	NS
A	<i>Chrysemys picta picta</i>	Eastern Painted Turtle	Special Concern			S4S5	388	4.8 ± 0.0	NS
A	<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	Special Concern	Special Concern		SNA	47	26.3 ± 0.0	NS
A	<i>Zonotrichia querula</i>	Harris's Sparrow	Special Concern			SNA	1	15.0 ± 0.0	NS
A	<i>Lynx canadensis</i>	Canadian Lynx	Not At Risk		Endangered	S1	2	75.1 ± 1.0	NS
A	<i>Accipiter cooperii</i>	Cooper's Hawk	Not At Risk			S1?B	3	0.4 ± 7.0	NS
A	<i>Fulica americana</i>	American Coot	Not At Risk			S1B	10	5.5 ± 0.0	NS
A	<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius	Not At Risk	Special Concern	Vulnerable	S1B,SNAM	102	13.1 ± 0.0	NS
A	<i>Sorex dispar</i>	Long-tailed Shrew	Not At Risk			S2	3	76.4 ± 0.0	NS
A	<i>Aegolius funereus</i>	Boreal Owl	Not At Risk			S2?B	4	45.1 ± 7.0	NS
A	<i>Glaucomys volans</i>	Southern Flying Squirrel	Not At Risk			S2S3	6	59.6 ± 0.0	NS
A	<i>Globicephala melas</i>	Long-finned Pilot Whale	Not At Risk			S2S3	2	24.9 ± 0.0	NS
A	<i>Hemidactylium scutatum</i>	Four-toed Salamander	Not At Risk			S3	28	2.9 ± 0.0	NS
A	<i>Megaptera novaeangliae</i>	Humpback Whale (NW Atlantic pop.)	Not At Risk			S3	1	69.1 ± 0.0	NS
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk			S3B	230	3.9 ± 0.0	NS
A	<i>Sialia sialis</i>	Eastern Bluebird	Not At Risk			S3B	62	17.5 ± 0.0	NS
A	<i>Buteo lagopus</i>	Rough-legged Hawk	Not At Risk			S3N	1	25.5 ± 0.0	NS
A	<i>Accipiter gentilis</i>	Northern Goshawk	Not At Risk			S3S4	123	9.9 ± 7.0	NS
A	<i>Lagenorhynchus acutus</i>	Atlantic White-sided Dolphin	Not At Risk			S3S4	5	27.6 ± 0.0	NS
A	<i>Circus hudsonius</i>	Northern Harrier	Not At Risk			S3S4B	278	10.6 ± 0.0	NS
A	<i>Ammodramus nelsoni</i>	Nelson's Sparrow	Not At Risk			S3S4B	124	22.4 ± 7.0	NS
A	<i>Calidris canutus rufa</i>	Red Knot rufa subspecies	E,SC	Endangered	Endangered	S2M	644	24.2 ± 0.0	NS
A	<i>Morone saxatilis</i>	Striped Bass	E,SC			S2S3	8	14.6 ± 0.0	NS
A	<i>Gadus morhua</i>	Atlantic Cod	E,SC,DD			SNR	2	32.8 ± 0.0	NS
A	<i>Martes americana</i>	American Marten			Endangered	S1	1	98.4 ± 0.0	NS
A	<i>Alces americanus</i>	Moose			Endangered	S1	28	18.2 ± 0.0	NS
A	<i>Passerina cyanea</i>	Indigo Bunting				S1?B	22	10.2 ± 0.0	NS
A	<i>Uria aalge</i>	Common Murre				S1?B,S5N	1	28.2 ± 0.0	NS
A	<i>Anas acuta</i>	Northern Pintail				S1B	24	7.8 ± 7.0	NS
A	<i>Oxyura jamaicensis</i>	Ruddy Duck				S1B	1	20.3 ± 0.0	NS
A	<i>Gallinula galeata</i>	Common Gallinule				S1B	2	42.3 ± 7.0	NS
A	<i>Myiarchus crinitus</i>	Great Crested Flycatcher				S1B	26	9.9 ± 7.0	NS
A	<i>Cistothorus palustris</i>	Marsh Wren				S1B	2	68.8 ± 0.0	NS
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S1B	48	0.4 ± 7.0	NS
A	<i>Toxostoma rufum</i>	Brown Thrasher				S1B	13	14.3 ± 7.0	NS
A	<i>Vireo gilvus</i>	Warbling Vireo				S1B	20	9.9 ± 7.0	NS
A	<i>Setophaga pinus</i>	Pine Warbler				S1B	18	3.1 ± 0.0	NS
A	<i>Calidris minutilla</i>	Least Sandpiper				S1B,S3M	1288	13.2 ± 0.0	NS
A	<i>Charadrius semipalmatus</i>	Semipalmated Plover				S1B,S3S4M	1770	17.3 ± 0.0	NS
A	<i>Vespertilionidae sp.</i>	bat species				S1S2	239	2.0 ± 0.0	NS
A	<i>Lasiurus borealis</i>	Eastern Red Bat				S1S2B,S1M	1	63.7 ± 0.0	NS
A	<i>Lasiurus cinereus</i>	Hoary Bat				S1S2B,S1M	35	26.7 ± 0.0	NS
A	<i>Pluvialis dominica</i>	American Golden-Plover				S1S2M	256	24.2 ± 0.0	NS
A	<i>Vireo philadelphicus</i>	Philadelphia Vireo				S2?B	35	20.7 ± 0.0	NS
A	<i>Spatula clypeata</i>	Northern Shoveler				S2B	11	20.4 ± 0.0	NS
A	<i>Mareca strepera</i>	Gadwall				S2B	25	12.3 ± 6.0	NS
A	<i>Empidonax traillii</i>	Willow Flycatcher				S2B	30	10.5 ± 0.0	NS
A	<i>Setophaga tigrina</i>	Cape May Warbler				S2B	150	9.9 ± 7.0	NS
A	<i>Piranga olivacea</i>	Scarlet Tanager				S2B	44	0.4 ± 7.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	<i>Pooecetes gramineus</i>	Vesper Sparrow				S2B	38	14.0 ± 7.0	NS
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S2B	155	13.2 ± 13.0	NS
A	<i>Alca torda</i>	Razorbill				S2B,S4N	17	48.8 ± 0.0	NS
A	<i>Bucephala clangula</i>	Common Goldeneye				S2B,S5N	124	3.9 ± 0.0	NS
A	<i>Branta bernicla</i>	Brant				S2M	2	62.9 ± 0.0	NS
A	<i>Phalacrocorax carbo</i>	Great Cormorant				S2S3	44	14.3 ± 0.0	NS
A	<i>Asio otus</i>	Long-eared Owl				S2S3	22	9.9 ± 7.0	NS
A	<i>Spinus pinus</i>	Pine Siskin				S2S3	462	0.4 ± 7.0	NS
A	<i>Cathartes aura</i>	Turkey Vulture				S2S3B	32	10.4 ± 7.0	NS
A	<i>Rallus limicola</i>	Virginia Rail				S2S3B	17	22.7 ± 7.0	NS
A	<i>Tringa semipalmata</i>	Willet				S2S3B	1659	22.0 ± 7.0	NS
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B	250	9.6 ± 7.0	NS
A	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak				S2S3B	396	10.4 ± 7.0	NS
A	<i>Icterus galbula</i>	Baltimore Oriole				S2S3B	64	9.9 ± 7.0	NS
A	<i>Pinicola enucleator</i>	Pine Grosbeak				S2S3B,S5N	131	9.6 ± 7.0	NS
A	<i>Numenius phaeopus hudsonicus</i>	Hudsonian Whimbrel				S2S3M	255	24.2 ± 0.0	NS
A	<i>Calidris melanotos</i>	Pectoral Sandpiper				S2S3M	338	24.2 ± 0.0	NS
A	<i>Phalaropus fulicarius</i>	Red Phalarope				S2S3M	4	24.2 ± 0.0	NS
A	<i>Perisoreus canadensis</i>	Canada Jay				S3	496	0.4 ± 7.0	NS
A	<i>Poecile hudsonicus</i>	Boreal Chickadee				S3	531	0.4 ± 7.0	NS
A	<i>Sitta canadensis</i>	Red-breasted Nuthatch				S3	1203	0.4 ± 7.0	NS
A	<i>Alosa pseudoharengus</i>	Alewife				S3	22	1.0 ± 0.0	NS
A	<i>Salvelinus fontinalis</i>	Brook Trout				S3	60	15.4 ± 0.0	NS
A	<i>Salvelinus namaycush</i>	Lake Trout				S3	2	35.4 ± 0.0	NS
A	<i>Menidia menidia</i>	Atlantic Silverside				S3	1	65.0 ± 0.0	NS
A	<i>Synaptomys cooperi</i>	Southern Bog Lemming				S3	1	76.4 ± 0.0	NS
A	<i>Pekania pennanti</i>	Fisher				S3	7	60.1 ± 0.0	NS
A	<i>Calidris maritima</i>	Purple Sandpiper				S3?N	180	14.2 ± 0.0	NS
A	<i>Calcarius lapponicus</i>	Lapland Longspur				S3?N	3	22.4 ± 0.0	NS
A	<i>Falco sparverius</i>	American Kestrel				S3B	268	0.4 ± 7.0	NS
A	<i>Charadrius vociferus</i>	Killdeer				S3B	555	0.4 ± 7.0	NS
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3B	579	0.4 ± 7.0	NS
A	<i>Sterna paradisaea</i>	Arctic Tern				S3B	62	18.0 ± 7.0	NS
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B	47	14.5 ± 7.0	NS
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3B	194	14.3 ± 7.0	NS
A	<i>Dumetella carolinensis</i>	Gray Catbird				S3B	457	0.4 ± 7.0	NS
A	<i>Cardellina pusilla</i>	Wilson's Warbler				S3B	80	0.4 ± 7.0	NS
A	<i>Tringa melanoleuca</i>	Greater Yellowlegs				S3B,S3S4M	1902	7.7 ± 7.0	NS
A	<i>Rissa tridactyla</i>	Black-legged Kittiwake				S3B,S5N	8	48.8 ± 0.0	NS
A	<i>Fratercula arctica</i>	Atlantic Puffin				S3B,S5N	20	48.5 ± 0.0	NS
A	<i>Pluvialis squatarola</i>	Black-bellied Plover				S3M	1965	22.3 ± 0.0	NS
A	<i>Arenaria interpres</i>	Ruddy Turnstone				S3M	771	22.1 ± 0.0	NS
A	<i>Calidris pusilla</i>	Semipalmated Sandpiper				S3M	1615	17.4 ± 0.0	NS
A	<i>Calidris fuscicollis</i>	White-rumped Sandpiper				S3M	871	24.2 ± 0.0	NS
A	<i>Limnodromus griseus</i>	Short-billed Dowitcher				S3M	1261	24.2 ± 0.0	NS
A	<i>Calidris alba</i>	Sanderling				S3M,S2N	1380	21.9 ± 0.0	NS
A	<i>Chroicocephalus ridibundus</i>	Black-headed Gull				S3N	7	22.4 ± 0.0	NS
A	<i>Somateria mollissima</i>	Common Eider				S3S4	495	13.7 ± 0.0	NS
A	<i>Picoides arcticus</i>	Black-backed Woodpecker				S3S4	152	9.6 ± 7.0	NS
A	<i>Loxia curvirostra</i>	Red Crossbill				S3S4	208	7.0 ± 0.0	NS
A	<i>Botaurus lentiginosus</i>	American Bittern				S3S4B	178	7.0 ± 0.0	NS
A	<i>Spatula discors</i>	Blue-winged Teal				S3S4B	57	10.4 ± 7.0	NS
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B	748	0.4 ± 7.0	NS
A	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher				S3S4B	653	0.4 ± 7.0	NS
A	<i>Regulus calendula</i>	Ruby-crowned Kinglet				S3S4B	1685	0.4 ± 7.0	NS
A	<i>Catharus fuscescens</i>	Veery				S3S4B	686	0.4 ± 7.0	NS
A	<i>Catharus ustulatus</i>	Swainson's Thrush				S3S4B	1461	0.4 ± 7.0	NS
A	<i>Oreothlypis peregrina</i>	Tennessee Warbler				S3S4B	396	0.4 ± 7.0	NS

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A	<i>Setophaga castanea</i>	Bay-breasted Warbler				S3S4B	385	0.4 ± 7.0	NS
A	<i>Setophaga striata</i>	Blackpoll Warbler				S3S4B	109	12.5 ± 0.0	NS
A	<i>Passerella iliaca</i>	Fox Sparrow				S3S4B	75	9.9 ± 7.0	NS
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3S4B,S5N	121	3.6 ± 0.0	NS
A	<i>Bucephala albeola</i>	Bufflehead				S3S4N	48	11.1 ± 0.0	NS
A	<i>Lanius borealis</i>	Northern Shrike				S3S4N	1	20.9 ± 0.0	NS
A	<i>Leucophaeus atricilla</i>	Laughing Gull				SHB	11	22.3 ± 0.0	NS
A	<i>Progne subis</i>	Purple Martin				SHB	4	28.1 ± 0.0	NS
A	<i>Eremophila alpestris</i>	Horned Lark				SHB,S4S5N	11	14.5 ± 7.0	NS
A	<i>Morus bassanus</i>	Northern Gannet				SHB,S5M	19	13.7 ± 0.0	NS
A	<i>Aythya americana</i>	Redhead				SHB,SNAM	2	14.1 ± 0.0	NS
I	<i>Bombus (Psithyrus) bohemicus</i>	Gypsy Cuckoo Bumble Bee	Endangered	Endangered	Endangered	S1	27	12.9 ± 5.0	NS
I	<i>Gomphus ventricosus</i>	Skillet Clubtail	Endangered	Endangered		S1	2	21.7 ± 1.0	NS
I	<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	Endangered	S2B	370	2.3 ± 6.0	NS
I	<i>Danaus plexippus plexippus</i>	Monarch	Endangered	Special Concern		S2B	1	35.4 ± 0.0	NS
I	<i>Barnea truncata</i>	Atlantic Mud-piddock	Threatened	Threatened		S1	1	73.1 ± 1.0	NS
I	<i>Bombus suckleyi</i>	Suckley's Cuckoo Bumble Bee	Threatened			SNR	2	75.0 ± 5.0	NS
I	<i>Alasmidonta varicosa</i>	Brook Floater	Special Concern	Special Concern	Threatened	S1S2	5	40.2 ± 0.0	NS
I	<i>Bombus terricola</i>	Yellow-banded Bumblebee	Special Concern	Special Concern	Vulnerable	S3	91	11.1 ± 0.0	NS
I	<i>Coccinella transversoguttata richardsoni</i>	Transverse Lady Beetle	Special Concern		Endangered	SH	4	30.2 ± 2.0	NS
I	<i>Cicindela formosa</i>	Big Sand Tiger Beetle				S1	1	70.9 ± 1.0	NS
I	<i>Satyrium acadica</i>	Acadian Hairstreak				S1	4	78.6 ± 2.0	NS
I	<i>Erora laeta</i>	Early Hairstreak				S1	1	12.4 ± 1.0	NS
I	<i>Somatochlora brevicincta</i>	Quebec Emerald				S1	1	30.5 ± 0.0	NS
I	<i>Leptodea ochracea</i>	Tidewater Mucket				S1	4	99.3 ± 1.0	NS
I	<i>Polygonia comma</i>	Eastern Comma				S1?	19	13.4 ± 2.0	NS
I	<i>Polygonia satyrus</i>	Satyr Comma				S1?	7	13.4 ± 1.0	NS
I	<i>Strymon melinus</i>	Grey Hairstreak				S1S2	12	13.4 ± 1.0	NS
I	<i>Nymphalis l-album</i>	Compton Tortoiseshell				S1S2	17	6.2 ± 0.0	NS
I	<i>Somatochlora kennedyi</i>	Kennedy's Emerald				S1S2	3	20.3 ± 1.0	NS
I	<i>Coenagrion resolutum</i>	Taiga Bluet				S1S2	2	10.1 ± 1.0	NS
I	<i>Stylurus scudderii</i>	Zebra Clubtail				S1S2	6	24.5 ± 0.0	NS
I	<i>Lycaena hyllus</i>	Bronze Copper				S2	21	16.3 ± 0.0	NS
I	<i>Satyrium calanus</i>	Banded Hairstreak				S2	63	2.9 ± 2.0	NS
I	<i>Boloria chariclea</i>	Arctic Fritillary				S2	3	87.9 ± 2.0	NS
I	<i>Aglais milberti</i>	Milbert's Tortoiseshell				S2	20	13.3 ± 2.0	NS
I	<i>Epithea princeps</i>	Prince Baskettail				S2	13	4.2 ± 0.0	NS
I	<i>Enallagma signatum</i>	Orange Bluet				S2	6	15.0 ± 0.0	NS
I	<i>Margaritifera margaritifera</i>	Eastern Pearlshell				S2	73	29.8 ± 1.0	NS
I	<i>Pantala hymenaea</i>	Spot-Winged Glider				S2?B	6	16.3 ± 1.0	NS
I	<i>Thorybes pylades</i>	Northern Cloudywing				S2S3	5	75.0 ± 2.0	NS
I	<i>Amblyscirtes hegon</i>	Pepper and Salt Skipper				S2S3	27	2.9 ± 2.0	NS
I	<i>Satyrium liparops</i>	Striped Hairstreak				S2S3	29	3.6 ± 2.0	NS
I	<i>Euphydryas phaeton</i>	Baltimore Checkerspot				S2S3	27	2.9 ± 2.0	NS
I	<i>Ophiogomphus aspersus</i>	Brook Snaketail				S2S3	2	21.9 ± 0.0	NS
I	<i>Ophiogomphus mainensis</i>	Maine Snaketail				S2S3	6	80.3 ± 0.0	NS
I	<i>Ophiogomphus rupinsulensis</i>	Rusty Snaketail				S2S3	23	24.5 ± 0.0	NS
I	<i>Somatochlora forcipata</i>	Forcipate Emerald				S2S3	4	13.1 ± 1.0	NS
I	<i>Somatochlora franklini</i>	Delicate Emerald				S2S3	1	21.7 ± 1.0	NS
I	<i>Erythrodiplax berenice</i>	Seaside Dragonlet				S2S3	3	58.7 ± 0.0	NS
I	<i>Enallagma vesperum</i>	Vesper Bluet				S2S3	3	69.9 ± 1.0	NS
I	<i>Alasmidonta undulata</i>	Triangle Floater				S2S3	27	4.5 ± 0.0	NS
I	<i>Strophiona nitens</i>	a Longhorned Beetle				S3	2	7.5 ± 0.0	NS
I	<i>Hippodamia parenthesis</i>	Parenthesis Lady Beetle				S3	2	20.7 ± 0.0	NS
I	<i>Naemia seriata</i>	a Ladybird beetle				S3	14	22.7 ± 0.0	NS
I	<i>Chilocorus stigma</i>	Twice-stabbed Lady Beetle				S3	3	15.7 ± 0.0	NS
I	<i>Trachysida aspera</i>	a Longhorned Beetle				S3	1	12.1 ± 0.0	NS

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I	<i>Astylopsis sexguttata</i>	A Longhorned Beetle				S3	1	9.1 ± 0.0	NS
I	<i>Callophrys henrici</i>	Henry's Elfin				S3	44	7.5 ± 9.0	NS
I	<i>Callophrys lanoraieensis</i>	Bog Elfin				S3	20	9.0 ± 2.0	NS
I	<i>Speyeria aphrodite</i>	Aphrodite Fritillary				S3	40	21.7 ± 2.0	NS
I	<i>Polygonia faunus</i>	Green Comma				S3	13	11.2 ± 2.0	NS
I	<i>Megisto cymela</i>	Little Wood-satyr				S3	11	13.6 ± 2.0	NS
I	<i>Oeneis jutta</i>	Jutta Arctic				S3	5	21.7 ± 2.0	NS
I	<i>Aeshna clepsydra</i>	Mottled Darner				S3	11	9.2 ± 1.0	NS
I	<i>Aeshna constricta</i>	Lance-Tipped Darner				S3	17	19.3 ± 1.0	NS
I	<i>Boyeria grafiana</i>	Ocellated Darner				S3	5	35.4 ± 1.0	NS
I	<i>Gomphaeschna furcillata</i>	Harlequin Darner				S3	9	11.9 ± 1.0	NS
I	<i>Somatochlora tenebrosa</i>	Clamp-Tipped Emerald				S3	14	15.2 ± 0.0	NS
I	<i>Nannothemis bella</i>	Elfin Skimmer				S3	17	4.2 ± 1.0	NS
I	<i>Enallagma vernale</i>	Vernal Bluet				S3	5	19.9 ± 1.0	NS
I	<i>Amphiagrion saucium</i>	Eastern Red Damsel				S3	2	76.2 ± 1.0	NS
I	<i>Cupido comyntas</i>	Eastern Tailed Blue				S3?	21	13.5 ± 1.0	NS
I	<i>Polygonia interrogationis</i>	Question Mark				S3B	155	3.5 ± 2.0	NS
I	<i>Erynnis juvenalis</i>	Juvenal's Duskywing				S3S4	102	2.8 ± 2.0	NS
I	<i>Amblyscirtes vialis</i>	Common Roadside-Skipper				S3S4	42	4.9 ± 0.0	NS
I	<i>Polygonia progne</i>	Grey Comma				S3S4	32	8.7 ± 0.0	NS
I	<i>Lanthus parvulus</i>	Northern Pygmy Clubtail				S3S4	4	77.9 ± 5.0	NS
I	<i>Lampsilis radiata</i>	Eastern Lampmussel				S3S4	15	39.5 ± 0.0	NS
I	<i>Sphaerophoria pyrrhina</i>	a flower fly				SH	1	75.4 ± 5.0	NS
N	<i>Erioderma pedicellatum</i> (Atlantic pop.)	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	S1	254	13.0 ± 0.0	NS
N	<i>Erioderma mollissimum</i>	Graceful Felt Lichen	Endangered	Endangered	Endangered	S1S2	16	38.8 ± 0.0	NS
N	<i>Peltigera hydrothyria</i>	Eastern Waterfan	Threatened	Threatened	Threatened	S1	83	59.0 ± 0.0	NS
N	<i>Pannaria lurida</i>	Wrinkled Shingle Lichen	Threatened	Threatened	Threatened	S1S2	139	18.2 ± 13.0	NS
N	<i>Fuscopannaria leucosticta</i>	White-rimmed Shingle Lichen	Threatened			S2S3	18	6.0 ± 0.0	NS
N	<i>Anzia colpodes</i>	Black-foam Lichen	Threatened	Threatened	Threatened	S3	53	27.7 ± 1.0	NS
N	<i>Sclerophora peronella</i> (Atlantic pop.)	Frosted Glass-whiskers (Atlantic population)	Special Concern	Special Concern		S1?	23	23.6 ± 0.0	NS
N	<i>Pectenia plumbea</i>	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S3	170	4.0 ± 1.0	NS
N	<i>Fissidens exilis</i>	Pygmy Pocket Moss	Not At Risk			S1S2	13	37.8 ± 1.0	NS
N	<i>Pseudevernia cladonia</i>	Ghost Antler Lichen	Not At Risk			S2S3	16	17.3 ± 0.0	NS
N	<i>Aloina brevirostris</i>	Short-Beaked Rigid Screw Moss				S1	1	35.9 ± 2.0	NS
N	<i>Umbilicaria vellea</i>	Grizzled Rocktripe Lichen				S1	1	13.9 ± 5.0	NS
N	<i>Usnea perplexans</i>	Powdered Beard Lichen				S1	1	58.7 ± 0.0	NS
N	<i>Scytinium dactylinum</i>	Brown-buttoned Jellyskin Lichen				S1	1	84.7 ± 0.0	NS
N	<i>Lathagrium cristatum</i>	Fingered Jelly Lichen				S1	3	43.3 ± 0.0	NS
N	<i>Ephebe perspinulosa</i>	Thread Lichen				S1	1	84.6 ± 1.0	NS
N	<i>Fuscopannaria praetermissa</i>	Moss Shingles Lichen				S1	1	40.8 ± 0.0	NS
N	<i>Scytinium schraderi</i>	Wrinkled Jellyskin Lichen				S1	1	57.0 ± 0.0	NS
N	<i>Pseudevernia consocians</i>	Common Antler Lichen				S1	1	73.1 ± 0.0	NS
N	<i>Leptogium hibernicum</i>	Hibernia Jellyskin Lichen				S1	2	32.0 ± 0.0	NS
N	<i>Peltigera lepidophora</i>	Scaly Pelt Lichen				S1	5	39.5 ± 0.0	NS
N	<i>Bryoria nitidula</i>	Tundra Horsehair Lichen				S1	2	30.0 ± 0.0	NS
N	<i>Hypogymnia hultenii</i>	Powdered Honeycomb Lichen				S1	14	34.9 ± 1.0	NS
N	<i>Calypogeia neogaea</i>	Common Pouchwort				S1?	1	56.9 ± 0.0	NS
N	<i>Moerckia hibernica</i>	Irish Ruffwort				S1?	1	58.2 ± 0.0	NS
N	<i>Aloina rigida</i>	Aloe-Like Rigid Screw Moss				S1?	4	35.9 ± 2.0	NS
N	<i>Imbricium muehlenbeckii</i>	Muehlenbeck's Bryum Moss				S1?	2	52.2 ± 0.0	NS
N	<i>Conardia compacta</i>	Coast Creeping Moss				S1?	1	32.4 ± 2.0	NS
N	<i>Tortula obtusifolia</i>	a Moss				S1?	3	73.8 ± 0.0	NS

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N	<i>Didymodon tophaceus</i>	Olive Beard Moss				S1?	1	57.7 ± 0.0	NS
N	<i>Paludella squarrosa</i>	Tufted Fen Moss				S1?	3	36.6 ± 0.0	NS
N	<i>Physcomitrium immersum</i>	a Moss				S1?	1	72.0 ± 0.0	NS
N	<i>Schistostegia pennata</i>	Luminous Moss				S1?	1	33.5 ± 0.0	NS
N	<i>Syntrichia ruralis</i>	a Moss				S1?	1	10.0 ± 0.0	NS
N	<i>Trichodon cylindricus</i>	Cylindric Hairy-teeth Moss				S1?	1	96.2 ± 3.0	NS
N	<i>Blennothallia crispa</i>	Crinkled Jelly Lichen				S1?	1	57.8 ± 0.0	NS
N	<i>Lichina confinis</i>	Marine Seaweed Lichen				S1?	4	32.5 ± 0.0	NS
N	<i>Polychidium muscicola</i>	Eyed Mossthorns Woollybear Lichen				S1?	1	78.8 ± 0.0	NS
N	<i>Parmeliella parvula</i>	Poor-man's Shingles Lichen				S1?	9	41.5 ± 0.0	NS
N	<i>Arrhenopterum heterostichum</i>	One-sided Groove Moss				S1S2	3	35.9 ± 2.0	NS
N	<i>Brachythecium turgidum</i>	Thick Ragged Moss				S1S2	2	96.2 ± 3.0	NS
N	<i>Hypnum pratense</i>	Meadow Plait Moss				S1S2	1	81.8 ± 3.0	NS
N	<i>Mnium thomsonii</i>	Thomson's Leafy Moss				S1S2	1	41.5 ± 2.0	NS
N	<i>Tortula acaulon</i>	Cuspidate Earth Moss				S1S2	1	82.8 ± 2.0	NS
N	<i>Plagiothecium latebricola</i>	Alder Silk Moss				S1S2	2	46.1 ± 5.0	NS
N	<i>Platydictya confervoides</i>	a Moss				S1S2	1	39.6 ± 0.0	NS
N	<i>Sematophyllum demissum</i>	a Moss				S1S2	2	10.8 ± 2.0	NS
N	<i>Sphagnum platyphyllum</i>	Flat-leaved Peat Moss				S1S2	2	15.2 ± 3.0	NS
N	<i>Timmia megapolitana</i>	Metropolitan Timmia Moss				S1S2	3	76.1 ± 1.0	NS
N	<i>Tortula mucronifolia</i>	Mucronate Screw Moss				S1S2	1	77.2 ± 3.0	NS
N	<i>Cyrto-hypnum minutulum</i>	Tiny Cedar Moss				S1S2	1	97.2 ± 0.0	NS
N	<i>Haplocladium microphyllum</i>	Tiny-leaved Haplocladium Moss				S1S2	1	65.6 ± 5.0	NS
N	<i>Enchylium bachmanianum</i>	Bachman's Jelly Lichen				S1S2	1	43.5 ± 0.0	NS
N	<i>Placidium squamulosum</i>	Limy Soil Stipplescale Lichen				S1S2	1	72.7 ± 6.0	NS
N	<i>Pilophorus cereolus</i>	Powdered Matchstick Lichen				S1S2	1	77.7 ± 3.0	NS
N	<i>Rhizoplaca subdiscrepans</i>	Scattered Rock-posy Lichen				S1S2	1	39.4 ± 1.0	NS
N	<i>Sticta limbata</i>	Powdered Moon Lichen				S1S2	4	34.0 ± 3.0	NS
N	<i>Candelaria concolor</i>	Elfin Candleflame Lichen				S1S2	2	9.6 ± 0.0	NS
N	<i>Umbilicaria polyrrhiza</i>	Ballpoint Rocktripe Lichen				S1S3	1	82.6 ± 0.0	NS
N	<i>Heterodermia galactophylla</i>	Branching Fringe Lichen				S1S3	1	39.6 ± 0.0	NS
N	<i>Melanelia culbersonii</i>	Appalachain Camouflage Lichen				S1S3	1	37.9 ± 0.0	NS
N	<i>Stereocaulon grande</i>	Grand Foam Lichen				S1S3	1	86.2 ± 0.0	NS
N	<i>Stereocaulon intermedium</i>	Pacific Brain Foam Lichen				S1S3	4	6.6 ± 0.0	NS
N	<i>Cystocoleus ebeneus</i>	Rockgossamer Lichen				S2	3	5.9 ± 0.0	NS
N	<i>Nephroma resupinatum</i>	a lichen				S2	11	18.3 ± 0.0	NS
N	<i>Parmotrema reticulatum</i>	Netted Ruffle Lichen				S2	6	71.0 ± 0.0	NS
N	<i>Riccardia multifida</i>	Delicate Germanderwort				S2?	1	58.7 ± 0.0	NS
N	<i>Anacamptodon splachnoides</i>	a Moss				S2?	2	12.4 ± 30.0	NS
N	<i>Weissia muhlenbergiana</i>	a Moss				S2?	5	41.5 ± 1.0	NS
N	<i>Atrichum angustatum</i>	Lesser Smoothcap Moss				S2?	2	78.8 ± 5.0	NS
N	<i>Ptychostomum pendulum</i>	Drooping Bryum				S2?	1	35.9 ± 2.0	NS
N	<i>Drepanocladus polygamus</i>	Polygamous Hook Moss				S2?	3	10.8 ± 2.0	NS
N	<i>Pseudocampyllum radiale</i>	Long-stalked Fine Wet Moss				S2?	1	81.8 ± 3.0	NS
N	<i>Dicranum condensatum</i>	Condensed Broom Moss				S2?	3	26.2 ± 0.0	NS
N	<i>Ditrichum rhynchostegium</i>	a Moss				S2?	1	5.6 ± 1.0	NS
N	<i>Fissidens taxifolius</i>	Yew-leaved Pocket Moss				S2?	8	14.7 ± 0.0	NS
N	<i>Grimmia anomala</i>	Mountain Forest Grimmia				S2?	1	55.6 ± 1.0	NS
N	<i>Kiaeria starkei</i>	Starke's Fork Moss				S2?	1	49.9 ± 10.0	NS
N	<i>Orthotrichum anomalum</i>	Anomalous Bristle Moss				S2?	1	43.1 ± 2.0	NS
N	<i>Philonotis marchica</i>	a Moss				S2?	2	83.9 ± 0.0	NS
N	<i>Physcomitrium collenchymatum</i>	a Moss				S2?	1	96.3 ± 0.0	NS
N	<i>Platydictya jungermannioides</i>	False Willow Moss				S2?	1	42.2 ± 0.0	NS
N	<i>Racomitrium affine</i>	a Moss				S2?	3	17.2 ± 2.0	NS

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N	<i>Sematophyllum marylandicum</i>	a Moss				S2?	2	10.9 ± 3.0	NS
N	<i>Sphagnum subnitens</i>	Lustrous Peat Moss				S2?	1	63.3 ± 2.0	NS
N	<i>Tetraplodon angustatus</i>	Toothed-leaved Nitrogen Moss				S2?	3	63.3 ± 2.0	NS
N	<i>Plagiomnium rostratum</i>	Long-beaked Leafy Moss				S2?	1	95.2 ± 2.0	NS
N	<i>Pseudotaxiphyllum distichaceum</i>	a Moss				S2?	2	71.6 ± 0.0	NS
N	<i>Cyrtomnium hymenophylloides</i>	Short-pointed Lantern Moss				S2?	1	12.6 ± 5.0	NS
N	<i>Platylomella lescurei</i>	a Moss				S2?	5	31.9 ± 0.0	NS
N	<i>Phyllicium demangeonii</i>	Black Rock-wafer Lichen				S2?	4	43.4 ± 0.0	NS
N	<i>Usnea flavocardia</i>	Blood-splattered Beard Lichen				S2?	1	13.6 ± 4.0	NS
N	<i>Scytinium teretiusculum</i>	Curly Jellyskin Lichen				S2?	12	20.8 ± 0.0	NS
N	<i>Rostania occultata</i>	Crusted Tarpaper Lichen				S2?	1	84.9 ± 0.0	NS
N	<i>Scytinium imbricatum</i>	Scaly Jellyskin Lichen				S2?	1	73.0 ± 0.0	NS
N	<i>Nephroma arcticum</i>	Arctic Kidney Lichen				S2?	1	24.2 ± 1.0	NS
N	<i>Placynthium flabellousum</i>	Scaly Ink Lichen				S2?	1	41.9 ± 17.0	NS
N	<i>Xanthoparmelia mougeotii</i>	Powdered Rock-shield Lichen				S2?	1	98.1 ± 0.0	NS
N	<i>Peltigera collina</i>	Tree Pelt Lichen				S2?	9	5.6 ± 0.0	NS
N	<i>Ephemerum serratum</i>	a Moss				S2S3	5	43.4 ± 5.0	NS
N	<i>Oxyrrhynchium hians</i>	Light Beaked Moss				S2S3	4	8.7 ± 5.0	NS
N	<i>Platydictya subtilis</i>	Bark Willow Moss				S2S3	2	85.5 ± 3.0	NS
N	<i>Tortula truncata</i>	a Moss				S2S3	5	60.7 ± 300.0	NS
N	<i>Scorpidium revolvens</i>	Limprichtia Moss				S2S3	2	32.8 ± 2.0	NS
N	<i>Collema leptaleum</i>	Crumpled Bat's Wing Lichen				S2S3	60	11.3 ± 1.0	NS
N	<i>Solorina saccata</i>	Woodland Owl Lichen				S2S3	10	41.8 ± 2.0	NS
N	<i>Ahtiana aurescens</i>	Eastern Candlewax Lichen				S2S3	16	23.8 ± 0.0	NS
N	<i>Usnocetraria oakesiana</i>	Yellow Band Lichen				S2S3	12	1.2 ± 0.0	NS
N	<i>Cladonia mateocyatha</i>	Mixed-up Pixie-cup				S2S3	4	8.0 ± 5.0	NS
N	<i>Cladonia parasitica</i>	Fence-rail Lichen				S2S3	3	8.7 ± 0.0	NS
N	<i>Hypotrachyna catawbiensis</i>	Powder-tipped Antler Lichen				S2S3	3	39.1 ± 0.0	NS
N	<i>Leptogium milligranum</i>	Stretched Jellyskin Lichen				S2S3	11	36.4 ± 0.0	NS
N	<i>Scytinium tenuissimum</i>	Birdnest Jellyskin Lichen				S2S3	8	6.1 ± 0.0	NS
N	<i>Melanohalea septentrionalis</i>	Northern Camouflage Lichen				S2S3	1	58.7 ± 0.0	NS
N	<i>Myelochroa aurulenta</i>	Powdery Axil-bristle Lichen				S2S3	4	65.2 ± 2.0	NS
N	<i>Parmelia fertilis</i>	Fertile Shield Lichen				S2S3	6	51.1 ± 0.0	NS
N	<i>Hypotrachyna minarum</i>	Hairless-spined Shield Lichen				S2S3	2	53.3 ± 0.0	NS
N	<i>Parmeliopsis ambigua</i>	Green Starburst Lichen				S2S3	2	15.0 ± 0.0	NS
N	<i>Racodium rupestre</i>	Rockhair Lichen				S2S3	3	4.0 ± 1.0	NS
N	<i>Umbilicaria polyphylla</i>	Petalled Rocktripe Lichen				S2S3	1	65.9 ± 2.0	NS
N	<i>Usnea cavernosa</i>	Pitted Beard Lichen				S2S3	2	58.7 ± 0.0	NS
N	<i>Usnea ceratina</i>	Warty Beard Lichen				S2S3	2	73.0 ± 0.0	NS
N	<i>Usnea mutabilis</i>	Bloody Beard Lichen				S2S3	1	58.7 ± 0.0	NS
N	<i>Usnea rubicunda</i>	Red Beard Lichen				S2S3	5	44.5 ± 0.0	NS
N	<i>Stereocaulon condensatum</i>	Granular Soil Foam Lichen				S2S3	1	89.3 ± 0.0	NS
N	<i>Physcia subtilis</i>	Slender Rosette Lichen				S2S3	1	46.7 ± 0.0	NS
N	<i>Cetraria arenaria</i>	Sand-loving Icelandmoss Lichen				S2S3	9	59.0 ± 0.0	NS
N	<i>Cladonia coccifera</i>	Eastern Boreal Pixie-cup Lichen				S2S3	4	30.4 ± 2.0	NS
N	<i>Cladonia deformis</i>	Lesser Sulphur-cup Lichen				S2S3	3	46.6 ± 4.0	NS
N	<i>Cladonia phyllophora</i>	Felt Lichen				S2S3	2	77.3 ± 4.0	NS
N	<i>Usnea flammea</i>	Coastal Bushy Beard Lichen				S2S3	1	32.4 ± 1.0	NS
N	<i>Ramalina thrausta</i>	Angelhair Ramalina Lichen				S3	11	24.8 ± 5.0	NS
N	<i>Enchylium tenax</i>	Soil Tarpaper Lichen				S3	7	36.6 ± 0.0	NS
N	<i>Collema nigrescens</i>	Blistered Tarpaper Lichen				S3	25	13.4 ± 0.0	NS
N	<i>Sticta fuliginosa</i>	Peppered Moon Lichen				S3	64	10.1 ± 0.0	NS

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N	<i>Scytinium subtile</i>	Appressed Jellyskin Lichen				S3	17	14.8 ± 0.0	NS
N	<i>Fuscopannaria ahlineri</i>	Corrugated Shingles Lichen				S3	79	14.0 ± 0.0	NS
N	<i>Heterodermia speciosa</i>	Powdered Fringe Lichen				S3	46	40.4 ± 0.0	NS
N	<i>Heterodermia squamulosa</i>	Scaly Fringe Lichen				S3	79	59.6 ± 0.0	NS
N	<i>Leptogium corticola</i>	Blistered Jellyskin Lichen				S3	75	18.2 ± 0.0	NS
N	<i>Scytinium lichenoides</i>	Tattered Jellyskin Lichen				S3	28	12.9 ± 0.0	NS
N	<i>Nephroma bellum</i>	Naked Kidney Lichen				S3	8	7.8 ± 0.0	NS
N	<i>Placynthium nigrum</i>	Common Ink Lichen				S3	1	73.8 ± 0.0	NS
N	<i>Platismatia norvegica</i>	Oldgrowth Rag Lichen				S3	1	65.1 ± 0.0	NS
N	<i>Punctelia appalachensis</i>	Appalachian Speckleback Lichen				S3	101	76.9 ± 0.0	NS
N	<i>Moelleropsis nebulosa</i> ssp. <i>frullaniae</i>	Blue-gray Moss Shingle Lichen				S3	3	56.2 ± 0.0	NS
N	<i>Moelleropsis nebulosa</i>	Blue-gray Moss Shingle Lichen				S3	48	4.0 ± 1.0	NS
N	<i>Usnea hirta</i>	Bristly Beard Lichen				S3	2	14.6 ± 0.0	NS
N	<i>Fuscopannaria soorediata</i>	a Lichen				S3	3	4.0 ± 1.0	NS
N	<i>Ephebe lanata</i>	Waterside Rockshag Lichen				S3	2	41.9 ± 17.0	NS
N	<i>Usnea macaronesica</i>	Beard Lichen				S3	3	38.3 ± 1.0	NS
N	<i>Barbula convoluta</i>	Lesser Bird's-claw Beard Moss				S3?	2	39.5 ± 0.0	NS
N	<i>Calliergon giganteum</i>	Giant Spear Moss				S3?	2	33.0 ± 3.0	NS
N	<i>Drummondia prorepens</i>	a Moss				S3?	1	41.8 ± 5.0	NS
N	<i>Anomodon tristis</i>	a Moss				S3?	9	59.4 ± 15.0	NS
N	<i>Elodium blandowii</i>	Blandow's Bog Moss				S3?	5	19.1 ± 7.0	NS
N	<i>Mnium stellare</i>	Star Leafy Moss				S3?	3	36.6 ± 0.0	NS
N	<i>Sphagnum riparium</i>	Streamside Peat Moss				S3?	2	49.4 ± 0.0	NS
N	<i>Phaeophyscia pusilloides</i>	Pompom-tipped Shadow Lichen				S3?	9	10.0 ± 0.0	NS
N	<i>Cladonia stygia</i>	Black-footed Reindeer Lichen				S3?	4	41.0 ± 0.0	NS
N	<i>Anomodon rugelii</i>	Rugel's Anomodon Moss				S3S4	3	77.0 ± 0.0	NS
N	<i>Dichelyma capillaceum</i>	Hairlike Dichelyma Moss				S3S4	3	6.8 ± 3.0	NS
N	<i>Dicranella varia</i>	a Moss				S3S4	3	39.3 ± 0.0	NS
N	<i>Dicranum leioneuron</i>	a Dicranum Moss				S3S4	1	32.0 ± 0.0	NS
N	<i>Sphagnum lindbergii</i>	Lindberg's Peat Moss				S3S4	1	77.1 ± 0.0	NS
N	<i>Splachnum ampullaceum</i>	Cruet Dung Moss				S3S4	1	48.9 ± 0.0	NS
N	<i>Thamnobryum alleghaniense</i>	a Moss				S3S4	8	68.6 ± 4.0	NS
N	<i>Schistidium agassizii</i>	Elf Bloom Moss				S3S4	3	55.6 ± 1.0	NS
N	<i>Hylocomiastrum pyrenaicum</i>	a Feather Moss				S3S4	1	15.1 ± 0.0	NS
N	<i>Arctoparmelia incurva</i>	Finger Ring Lichen				S3S4	69	10.0 ± 0.0	NS
N	<i>Hypogymnia vittata</i>	Slender Monk's Hood Lichen				S3S4	68	4.0 ± 1.0	NS
N	<i>Leptogium acadense</i>	Acadian Jellyskin Lichen				S3S4	26	9.7 ± 0.0	NS
N	<i>Cladonia floerkeana</i>	Gritty British Soldiers Lichen				S3S4	3	30.4 ± 0.0	NS
N	<i>Vahlia leucophaea</i>	Shelter Shingle Lichen				S3S4	10	93.2 ± 0.0	NS
N	<i>Melanohalea olivacea</i>	Spotted Camouflage Lichen				S3S4	2	58.7 ± 0.0	NS
N	<i>Parmeliopsis hyperopta</i>	Gray Starburst Lichen				S3S4	1	83.1 ± 0.0	NS
N	<i>Parmotrema perlatum</i>	Powdered Ruffle Lichen				S3S4	14	29.7 ± 0.0	NS
N	<i>Peltigera hymenina</i>	Cloudy Pelt Lichen				S3S4	2	30.4 ± 2.0	NS
N	<i>Physconia detersa</i>	Bottlebrush Frost Lichen				S3S4	29	14.6 ± 0.0	NS
N	<i>Sphaerophorus fragilis</i>	Fragile Coral Lichen				S3S4	7	30.4 ± 2.0	NS
N	<i>Coccocarpia palmicola</i>	Salted Shell Lichen				S3S4	375	4.0 ± 1.0	NS
N	<i>Physcia caesia</i>	Blue-gray Rosette Lichen				S3S4	2	32.4 ± 1.0	NS
N	<i>Physcia tenella</i>	Fringed Rosette Lichen				S3S4	5	9.6 ± 0.0	NS
N	<i>Anaptychia palmulata</i>	Shaggy Fringed Lichen				S3S4	114	6.6 ± 0.0	NS
N	<i>Bryoria pikei</i>	Pike's Horsehair Lichen				S3S4	3	19.1 ± 5.0	NS
N	<i>Evermia prunastri</i>	Valley Oakmoss Lichen				S3S4	29	14.7 ± 0.0	NS
N	<i>Dermatocarpon luridum</i>	Brookside Stippleback				S3S4	24	3.6 ± 5.0	NS

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N	<i>Heterodermia neglecta</i>	Lichen				S3S4	109	4.0 ± 1.0	NS
P	<i>Rhynchospora macrostachya</i>	Tall Beakrush	Endangered	Endangered	Endangered	S1	7	97.1 ± 0.0	NS
P	<i>Clethra alnifolia</i>	Coast Pepper-Bush	Endangered	Threatened	Vulnerable	S1	2	19.8 ± 0.0	NS
P	<i>Juglans cinerea</i>	Butternut	Endangered	Endangered		SNA	12	5.6 ± 0.0	NS
P	<i>Fraxinus nigra</i>	Black Ash	Threatened		Threatened	S1S2	271	4.8 ± 0.0	NS
P	<i>Liatris spicata</i>	Dense Blazing Star	Threatened	Threatened		SNA	3	14.0 ± 0.0	NS
P	<i>Bartonia paniculata</i> ssp. <i>paniculata</i>	Branched Bartonia	Threatened	Threatened		SNA	1	86.4 ± 10.0	NS
P	<i>Lilaeopsis chinensis</i>	Eastern Lilaeopsis	Special Concern	Special Concern	Vulnerable	S2	141	72.6 ± 1.0	NS
P	<i>Lachnanthes caroliniana</i>	Redroot	Special Concern	Special Concern	Vulnerable	S2	280	96.1 ± 0.0	NS
P	<i>Lophiola aurea</i>	Goldencrest	Special Concern	Special Concern	Vulnerable	S2	453	81.4 ± 1.0	NS
P	<i>Isoetes prototypus</i>	Prototype Quillwort	Special Concern	Special Concern	Vulnerable	S2	13	82.2 ± 0.0	NS
P	<i>Scirpus longii</i>	Long's Bulrush	Special Concern		Vulnerable	S3	64	90.0 ± 0.0	NS
P	<i>Floerkea proserpinacoides</i>	False Mermadweed	Not At Risk			S2	37	77.0 ± 1.0	NS
P	<i>Smilax rotundifolia</i>	Round-leaved Greenbrier	Not At Risk			S3	2	98.6 ± 0.0	NS
P	<i>Crocianthemum canadense</i>	Long-branched Frostweed			Endangered	S1	67	12.3 ± 1.0	NS
P	<i>Cypripedium arietinum</i>	Ram's-Head Lady's-Slipper			Endangered	S1	278	33.8 ± 0.0	NS
P	<i>Thuja occidentalis</i>	Eastern White Cedar			Vulnerable	S1	35	3.8 ± 0.0	NS
P	<i>Acer saccharinum</i>	Silver Maple				S1	11	75.3 ± 0.0	NS
P	<i>Osmorhiza depauperata</i>	Blunt Sweet Cicely				S1	1	65.0 ± 5.0	NS
P	<i>Sanicula odorata</i>	Clustered Sanicle				S1	10	36.0 ± 0.0	NS
P	<i>Zizia aurea</i>	Golden Alexanders				S1	38	58.1 ± 0.0	NS
P	<i>Antennaria parlinii</i> ssp. <i>fallax</i>	Parlin's Pusstoes				S1	23	35.7 ± 0.0	NS
P	<i>Andersonglossum boreale</i>	Northern Wild Comfrey				S1	5	38.9 ± 1.0	NS
P	<i>Turritis glabra</i>	Tower Mustard				S1	1	71.2 ± 0.0	NS
P	<i>Draba glabella</i>	Rock Whitlow-Grass				S1	2	78.0 ± 0.0	NS
P	<i>Lobelia spicata</i>	Pale-Spiked Lobelia				S1	8	70.6 ± 7.0	NS
P	<i>Silene antirrhina</i>	Sleepy Catchfly				S1	2	98.5 ± 0.0	NS
P	<i>Desmodium canadense</i>	Canada Tick-trefoil				S1	12	66.3 ± 1.0	NS
P	<i>Hylodesmum glutinosum</i>	Large Tick-trefoil				S1	20	38.3 ± 0.0	NS
P	<i>Ribes americanum</i>	Wild Black Currant				S1	4	38.1 ± 3.0	NS
P	<i>Trichostema dichotomum</i>	Forked Bluecurls				S1	6	95.2 ± 0.0	NS
P	<i>Fraxinus pennsylvanica</i>	Red Ash				S1	12	19.7 ± 5.0	NS
P	<i>Polygala polygama</i>	Racemed Milkwort				S1	4	13.7 ± 1.0	NS
P	<i>Persicaria careyi</i>	Carey's Smartweed				S1	1	61.2 ± 3.0	NS
P	<i>Podostemum ceratophyllum</i>	Horn-leaved Riverweed				S1	4	81.5 ± 0.0	NS
P	<i>Montia fontana</i>	Water Blinks				S1	1	15.1 ± 1.0	NS
P	<i>Lysimachia quadrifolia</i>	Whorled Yellow Loosestrife				S1	1	16.8 ± 0.0	NS
P	<i>Amelanchier nantucketensis</i>	Nantucket Serviceberry				S1	1	89.7 ± 1.0	NS
P	<i>Salix myrtilifolia</i>	Blueberry Willow				S1	1	49.9 ± 0.0	NS
P	<i>Salix serissima</i>	Autumn Willow				S1	2	49.8 ± 0.0	NS
P	<i>Scrophularia lanceolata</i>	Lance-leaved Figwort				S1	2	95.4 ± 1.0	NS
P	<i>Dirca palustris</i>	Eastern Leatherwood				S1	65	33.0 ± 0.0	NS
P	<i>Boehmeria cylindrica</i>	Small-spike False-nettle				S1	49	34.3 ± 0.0	NS
P	<i>Pilea pumila</i>	Dwarf Clearweed				S1	6	20.0 ± 0.0	NS
P	<i>Carex garberi</i>	Garber's Sedge				S1	4	85.2 ± 0.0	NS
P	<i>Carex gynocrates</i>	Northern Bog Sedge				S1	2	49.9 ± 0.0	NS
P	<i>Carex haydenii</i>	Hayden's Sedge				S1	4	71.7 ± 1.0	NS
P	<i>Carex pellita</i>	Woolly Sedge				S1	2	72.5 ± 10.0	NS
P	<i>Carex laxiflora</i>	Loose-Flowered Sedge				S1	2	76.4 ± 1.0	NS
P	<i>Carex ormostachya</i>	Necklace Spike Sedge				S1	1	84.5 ± 5.0	NS
P	<i>Carex plantaginea</i>	Plantain-Leaved Sedge				S1	4	80.1 ± 0.0	NS
P	<i>Carex prairea</i>	Prairie Sedge				S1	2	78.7 ± 1.0	NS
P	<i>Carex viridula</i> var. <i>saxilittoralis</i>	Greenish Sedge				S1	5	77.3 ± 2.0	NS
P	<i>Scirpus atrovirens</i>	Dark-green Bulrush				S1	4	38.0 ± 0.0	NS
P	<i>Schoenoplectus torreyi</i>	Torrey's Bulrush				S1	6	94.0 ± 0.0	NS
P	<i>Iris prismatica</i>	Slender Blue Flag				S1	1	76.4 ± 100.0	NS
P	<i>Sisyrinchium fuscatum</i>	Coastal Plain Blue-eyed-				S1	1	79.4 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	<i>Juncus secundus</i>	grass Secund Rush				S1	1	81.2 ± 0.0	NS
P	<i>Juncus vaseyi</i>	Vasey Rush				S1	1	85.9 ± 0.0	NS
P	<i>Allium tricoccum</i>	Wild Leek				S1	55	74.9 ± 5.0	NS
P	<i>Trillium grandiflorum</i>	White Trillium				S1	3	78.7 ± 1.0	NS
P	<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	North American White Adder's-mouth				S1	5	70.6 ± 10.0	NS
P	<i>Spiranthes casei</i> var. <i>casei</i>	Case's Ladies'-Tresses				S1	1	59.4 ± 0.0	NS
P	<i>Bromus latiglumis</i>	Broad-Glumed Brome				S1	28	69.6 ± 0.0	NS
P	<i>Dichanthelium xanthophysum</i>	Slender Panic Grass				S1	9	77.0 ± 1.0	NS
P	<i>Elymus wiegandii</i>	Wiegand's Wild Rye				S1	6	14.3 ± 7.0	NS
P	<i>Elymus hystrix</i>	Spreading Wild Rye				S1	11	35.8 ± 1.0	NS
P	<i>Torreyochloa pallida</i> var. <i>pallida</i>	Pale False Manna Grass				S1	1	98.3 ± 1.0	NS
P	<i>Adiantum pedatum</i>	Northern Maidenhair Fern				S1	11	32.0 ± 1.0	NS
P	<i>Dryopteris goldiana</i>	Goldie's Woodfern				S1	1	63.4 ± 1.0	NS
P	<i>Equisetum palustre</i>	Marsh Horsetail				S1	1	73.2 ± 5.0	NS
P	<i>Botrychium lunaria</i>	Common Moonwort				S1	8	28.1 ± 0.0	NS
P	<i>Selaginella rupestris</i>	Rock Spikemoss				S1	1	38.0 ± 0.0	NS
P	<i>Solidago hispida</i>	Hairy Goldenrod				S1?	1	14.3 ± 7.0	NS
P	<i>Suaeda rolandii</i>	Roland's Sea-Blite				S1?	5	39.2 ± 2.0	NS
P	<i>Carex pensylvanica</i>	Pennsylvania Sedge				S1?	3	19.4 ± 0.0	NS
P	<i>Dichanthelium lindheimeri</i>	Lindheimer's Panicgrass				S1?	3	76.8 ± 5.0	NS
P	<i>Rudbeckia laciniata</i>	Cut-Leaved Coneflower				S1S2	17	22.1 ± 7.0	NS
P	<i>Arabis pycnocarpa</i>	Cream-flowered Rockcress				S1S2	1	77.3 ± 0.0	NS
P	<i>Cardamine maxima</i>	Large Toothwort				S1S2	1	87.4 ± 0.0	NS
P	<i>Proserpinaca intermedia</i>	Intermediate Mermaidweed				S1S2	3	42.3 ± 0.0	NS
P	<i>Conopholis americana</i>	American Cancer-root				S1S2	15	71.5 ± 1.0	NS
P	<i>Anemone virginiana</i> var. <i>alba</i>	Virginia Anemone				S1S2	5	76.4 ± 7.0	NS
P	<i>Hepatica americana</i>	Round-lobed Hepatica				S1S2	60	32.9 ± 0.0	NS
P	<i>Ranunculus sceleratus</i>	Cursed Buttercup				S1S2	22	4.8 ± 0.0	NS
P	<i>Gratiola neglecta</i>	Clammy Hedge-Hyssop				S1S2	4	65.5 ± 2.0	NS
P	<i>Carex livida</i>	Livid Sedge				S1S2	13	1.3 ± 0.0	NS
P	<i>Juncus Greenei</i>	Greene's Rush				S1S2	5	13.7 ± 10.0	NS
P	<i>Platanthera huronensis</i>	Fragrant Green Orchid				S1S2	1	36.0 ± 10.0	NS
P	<i>Calamagrostis stricta</i> ssp. <i>stricta</i>	Slim-stemmed Reed Grass				S1S2	1	98.5 ± 7.0	NS
P	<i>Cinna arundinacea</i>	Sweet Wood Reed Grass				S1S2	55	69.8 ± 0.0	NS
P	<i>Festuca subverticillata</i>	Nodding Fescue				S1S2	13	49.9 ± 7.0	NS
P	<i>Cryptogramma stelleri</i>	Steller's Rockbrake				S1S2	3	43.8 ± 0.0	NS
P	<i>Carex vacillans</i>	Estuarine Sedge				S1S3	1	68.7 ± 0.0	NS
P	<i>Conioselinum chinense</i>	Chinese Hemlock-parsley				S2	2	46.6 ± 0.0	NS
P	<i>Osmorhiza longistylis</i>	Smooth Sweet Cicely				S2	18	38.9 ± 0.0	NS
P	<i>Erigeron philadelphicus</i>	Philadelphia Fleabane				S2	2	73.2 ± 1.0	NS
P	<i>Lactuca hirsuta</i>	Hairy Lettuce				S2	3	30.4 ± 7.0	NS
P	<i>Symphotrichum undulatum</i>	Wavy-leaved Aster				S2	109	0.2 ± 1.0	NS
P	<i>Symphotrichum ciliolatum</i>	Fringed Blue Aster				S2	19	38.3 ± 0.0	NS
P	<i>Impatiens pallida</i>	Pale Jewelweed				S2	3	64.8 ± 0.0	NS
P	<i>Caulophyllum thalictroides</i>	Blue Cohosh				S2	68	31.3 ± 7.0	NS
P	<i>Boechera stricta</i>	Drummond's Rockcress				S2	10	76.4 ± 1.0	NS
P	<i>Cardamine parviflora</i>	Small-flowered Bittercress				S2	15	28.8 ± 50.0	NS
P	<i>Draba arabisans</i>	Rock Whitlow-Grass				S2	13	76.4 ± 1.0	NS
P	<i>Stellaria humifusa</i>	Saltmarsh Starwort				S2	4	64.9 ± 0.0	NS
P	<i>Stellaria longifolia</i>	Long-leaved Starwort				S2	11	42.0 ± 5.0	NS
P	<i>Oxybasis rubra</i>	Red Goosefoot				S2	2	77.3 ± 2.0	NS
P	<i>Hudsonia ericoides</i>	Pinebarren Golden Heather				S2	156	11.9 ± 0.0	NS
P	<i>Hypericum majus</i>	Large St John's-wort				S2	4	5.3 ± 0.0	NS
P	<i>Crassula aquatica</i>	Water Pygmyweed				S2	1	33.0 ± 0.0	NS
P	<i>Myriophyllum farwellii</i>	Farwell's Water Milfoil				S2	9	20.7 ± 1.0	NS
P	<i>Myriophyllum verticillatum</i>	Whorled Water Milfoil				S2	3	41.3 ± 7.0	NS

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P	<i>Utricularia resupinata</i>	Inverted Bladderwort				S2	2	90.7 ± 0.0	NS
P	<i>Oenothera fruticosa</i> ssp. <i>tetragona</i>	Narrow-leaved Evening Primrose				S2	8	19.9 ± 7.0	NS
P	<i>Persicaria arifolia</i>	Halberd-leaved Tearthumb				S2	11	47.1 ± 0.0	NS
P	<i>Rumex triangulivalvis</i>	Triangular-valve Dock				S2	10	35.7 ± 0.0	NS
P	<i>Primula mistassinica</i>	Mistassini Primrose				S2	16	76.4 ± 7.0	NS
P	<i>Anemonastrum canadense</i>	Canada Anemone				S2	10	13.9 ± 0.0	NS
P	<i>Anemone quinquefolia</i>	Wood Anemone				S2	13	49.8 ± 0.0	NS
P	<i>Anemone virginiana</i>	Virginia Anemone				S2	17	35.7 ± 5.0	NS
P	<i>Anemone virginiana</i> var. <i>virginiana</i>	Virginia Anemone				S2	2	36.0 ± 7.0	NS
P	<i>Caltha palustris</i>	Yellow Marsh Marigold				S2	7	4.4 ± 0.0	NS
P	<i>Galium boreale</i>	Northern Bedstraw				S2	7	70.6 ± 7.0	NS
P	<i>Galium labradoricum</i>	Labrador Bedstraw				S2	79	47.0 ± 0.0	NS
P	<i>Salix pedicellaris</i>	Bog Willow				S2	130	41.2 ± 0.0	NS
P	<i>Salix sericea</i>	Silky Willow				S2	120	22.7 ± 1.0	NS
P	<i>Saxifraga paniculata</i> ssp. <i>laestadii</i>	Laestadius' Saxifrage				S2	4	70.6 ± 7.0	NS
P	<i>Tiarella cordifolia</i>	Heart-leaved Foamflower				S2	21	44.0 ± 0.0	NS
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S2	7	50.8 ± 1.0	NS
P	<i>Carex bebbii</i>	Bebb's Sedge				S2	24	36.1 ± 0.0	NS
P	<i>Carex capillaris</i>	Hairlike Sedge				S2	1	85.8 ± 0.0	NS
P	<i>Carex castanea</i>	Chestnut Sedge				S2	26	47.0 ± 0.0	NS
P	<i>Carex comosa</i>	Bearded Sedge				S2	7	42.3 ± 7.0	NS
P	<i>Carex hystericina</i>	Porcupine Sedge				S2	7	73.2 ± 0.0	NS
P	<i>Carex tenera</i>	Tender Sedge				S2	7	37.7 ± 0.0	NS
P	<i>Carex tuckermanii</i>	Tuckerman's Sedge				S2	27	36.1 ± 2.0	NS
P	<i>Carex atratiformis</i>	Scabrous Black Sedge				S2	3	87.9 ± 0.0	NS
P	<i>Vallisneria americana</i>	Wild Celery				S2	11	37.5 ± 1.0	NS
P	<i>Allium schoenoprasum</i>	Wild Chives				S2	4	64.6 ± 0.0	NS
P	<i>Allium schoenoprasum</i> var. <i>sibiricum</i>	Wild Chives				S2	1	76.4 ± 7.0	NS
P	<i>Lilium canadense</i>	Canada Lily				S2	64	30.7 ± 0.0	NS
P	<i>Najas gracillima</i>	Thread-Like Naiad				S2	2	27.7 ± 0.0	NS
P	<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Yellow Lady's-slipper				S2	22	10.2 ± 7.0	NS
P	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Small Yellow Lady's-Slipper				S2	13	36.1 ± 0.0	NS
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S2	49	31.3 ± 0.0	NS
P	<i>Goodyera pubescens</i>	Downy Rattlesnake-Plantain				S2	17	34.3 ± 0.0	NS
P	<i>Platanthera flava</i>	Southern Rein-Orchid				S2	32	76.5 ± 0.0	NS
P	<i>Platanthera flava</i> var. <i>flava</i>	Southern Rein Orchid				S2	9	63.8 ± 7.0	NS
P	<i>Platanthera flava</i> var. <i>herbiola</i>	Pale Green Orchid				S2	11	62.8 ± 1.0	NS
P	<i>Platanthera macrophylla</i>	Large Round-Leaved Orchid				S2	5	46.3 ± 1.0	NS
P	<i>Spiranthes lucida</i>	Shining Ladies'-Tresses				S2	13	38.5 ± 0.0	NS
P	<i>Dichanthelium linearifolium</i>	Narrow-leaved Panic Grass				S2	9	42.3 ± 7.0	NS
P	<i>Piptatheropsis canadensis</i>	Canada Ricegrass				S2	20	22.6 ± 1.0	NS
P	<i>Piptatheropsis pungens</i>	Slender Ricegrass				S2	8	65.9 ± 10.0	NS
P	<i>Potamogeton friesii</i>	Fries' Pondweed				S2	10	71.9 ± 1.0	NS
P	<i>Potamogeton richardsonii</i>	Richardson's Pondweed				S2	7	46.5 ± 0.0	NS
P	<i>Dryopteris fragrans</i>	Fragrant Wood Fern				S2	15	84.1 ± 1.0	NS
P	<i>Woodsia glabella</i>	Smooth Cliff Fern				S2	2	83.5 ± 1.0	NS
P	<i>Symphotrichum boreale</i>	Boreal Aster				S2?	7	19.9 ± 5.0	NS
P	<i>Cuscuta cephalanthi</i>	Buttonbush Dodder				S2?	1	28.9 ± 0.0	NS
P	<i>Epilobium coloratum</i>	Purple-veined Willowherb				S2?	12	5.8 ± 0.0	NS
P	<i>Rumex persicarioides</i>	Peach-leaved Dock				S2?	1	45.1 ± 0.0	NS
P	<i>Crataegus submollis</i>	Quebec Hawthorn				S2?	5	31.9 ± 7.0	NS
P	<i>Carex peckii</i>	White-Tinged Sedge				S2?	4	38.1 ± 5.0	NS
P	<i>Eleocharis ovata</i>	Ovate Spikerush				S2?	5	24.5 ± 5.0	NS
P	<i>Scirpus pedicellatus</i>	Stalked Bulrush				S2?	7	35.3 ± 0.0	NS
P	<i>Potamogeton pulcher</i>	Spotted Pondweed			Vulnerable	S2S3	14	72.3 ± 2.0	NS
P	<i>Hieracium robinsonii</i>	Robinson's Hawkweed				S2S3	2	75.6 ± 1.0	NS
P	<i>Iva frutescens</i>	Big-leaved Marsh-elder				S2S3	32	38.0 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	<i>Senecio pseudoarnica</i>	Seabeach Ragwort				S2S3	23	25.4 ± 1.0	NS
P	<i>Betula michauxii</i>	Michaux's Dwarf Birch				S2S3	64	15.9 ± 0.0	NS
P	<i>Sagina nodosa</i>	Knotted Pearlwort				S2S3	54	24.4 ± 0.0	NS
P	<i>Sagina nodosa ssp. borealis</i>	Knotted Pearlwort				S2S3	10	31.9 ± 0.0	NS
P	<i>Ceratophyllum echinatum</i>	Prickly Hornwort				S2S3	7	71.8 ± 3.0	NS
P	<i>Hypericum x dissimulatum</i>	Disguised St. John's-wort				S2S3	5	6.6 ± 10.0	NS
P	<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed				S2S3	38	34.0 ± 0.0	NS
P	<i>Shepherdia canadensis</i>	Soapberry				S2S3	101	28.1 ± 7.0	NS
P	<i>Empetrum atropurpureum</i>	Purple Crowberry				S2S3	5	14.2 ± 7.0	NS
P	<i>Euphorbia polygonifolia</i>	Seaside Spurge				S2S3	11	58.2 ± 3.0	NS
P	<i>Halenia deflexa</i>	Spurred Gentian				S2S3	3	30.5 ± 0.0	NS
P	<i>Hedeoma pulegioides</i>	American False Pennyroyal				S2S3	17	31.4 ± 5.0	NS
P	<i>Polygonum aviculare ssp. buxiforme</i>	Box Knotweed				S2S3	8	44.0 ± 0.0	NS
P	<i>Polygonum oxyspermum ssp. raii</i>	Ray's Knotweed				S2S3	4	41.7 ± 1.0	NS
P	<i>Polygonum oxyspermum</i>	Sharp-fruit Knotweed				S2S3	1	2.5 ± 0.0	NS
P	<i>Amelanchier fernaldii</i>	Fernald's Serviceberry				S2S3	1	75.8 ± 7.0	NS
P	<i>Potentilla canadensis</i>	Canada Cinquefoil				S2S3	6	1.7 ± 0.0	NS
P	<i>Galium aparine</i>	Common Bedstraw				S2S3	35	16.0 ± 0.0	NS
P	<i>Galium obtusum</i>	Blunt-leaved Bedstraw				S2S3	1	93.1 ± 0.0	NS
P	<i>Salix pellita</i>	Satiny Willow				S2S3	5	55.4 ± 4.0	NS
P	<i>Carex adusta</i>	Lesser Brown Sedge				S2S3	6	13.3 ± 5.0	NS
P	<i>Carex hirtifolia</i>	Pubescent Sedge				S2S3	31	36.0 ± 2.0	NS
P	<i>Carex houghtoniana</i>	Houghton's Sedge				S2S3	1	58.5 ± 1.0	NS
P	<i>Eleocharis flavescens var. olivacea</i>	Bright-green Spikerush				S2S3	8	11.1 ± 0.0	NS
P	<i>Eriophorum gracile</i>	Slender Cottongrass				S2S3	6	31.9 ± 7.0	NS
P	<i>Coeloglossum viride</i>	Long-bracted Frog Orchid				S2S3	13	60.3 ± 1.0	NS
P	<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper				S2S3	543	33.0 ± 1.0	NS
P	<i>Poa glauca</i>	Glaucous Blue Grass				S2S3	8	38.4 ± 1.0	NS
P	<i>Botrychium lanceolatum ssp. angustisegmentum</i>	Narrow Triangle Moonwort				S2S3	4	57.4 ± 5.0	NS
P	<i>Botrychium simplex</i>	Least Moonwort				S2S3	4	44.1 ± 1.0	NS
P	<i>Ophioglossum pusillum</i>	Northern Adder's-tongue				S2S3	5	10.2 ± 7.0	NS
P	<i>Angelica atropurpurea</i>	Purple-stemmed Angelica				S3	1	72.3 ± 0.0	NS
P	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane				S3	24	35.8 ± 7.0	NS
P	<i>Hieracium paniculatum</i>	Panicled Hawkweed				S3	24	34.2 ± 11.0	NS
P	<i>Bidens beckii</i>	Water Beggarticks				S3	8	41.8 ± 0.0	NS
P	<i>Packera paupercula var. paupercula</i>	Balsam Groundsel				S3	1	35.4 ± 0.0	NS
P	<i>Packera paupercula</i>	Balsam Groundsel				S3	88	33.7 ± 0.0	NS
P	<i>Alnus serrulata</i>	Smooth Alder				S3	133	79.7 ± 0.0	NS
P	<i>Betula pumila</i>	Bog Birch				S3	3	47.4 ± 0.0	NS
P	<i>Campanula aparinoides</i>	Marsh Bellflower				S3	18	41.8 ± 1.0	NS
P	<i>Mononeuria groenlandica</i>	Greenland Stitchwort				S3	141	1.9 ± 0.0	NS
P	<i>Empetrum eamesii</i>	Pink Crowberry				S3	93	14.2 ± 7.0	NS
P	<i>Vaccinium boreale</i>	Northern Blueberry				S3	2	55.7 ± 0.0	NS
P	<i>Vaccinium cespitosum</i>	Dwarf Bilberry				S3	55	31.3 ± 0.0	NS
P	<i>Vaccinium uliginosum</i>	Alpine Bilberry				S3	3	28.7 ± 1.0	NS
P	<i>Bartonia virginica</i>	Yellow Bartonia				S3	31	22.7 ± 7.0	NS
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	18	43.7 ± 3.0	NS
P	<i>Proserpinaca palustris</i>	Marsh Mermaidweed				S3	66	30.5 ± 0.0	NS
P	<i>Proserpinaca pectinata</i>	Comb-leaved Mermaidweed				S3	32	5.7 ± 1.0	NS
P	<i>Teucrium canadense</i>	Canada Germander				S3	58	28.9 ± 0.0	NS
P	<i>Decodon verticillatus</i>	Swamp Loosestrife				S3	1	99.4 ± 0.0	NS
P	<i>Epilobium strictum</i>	Downy Willowherb				S3	6	55.5 ± 0.0	NS
P	<i>Polygala sanguinea</i>	Blood Milkwort				S3	17	5.2 ± 0.0	NS
P	<i>Persicaria pensylvanica</i>	Pennsylvania Smartweed				S3	24	31.9 ± 7.0	NS
P	<i>Fallopia scandens</i>	Climbing False Buckwheat				S3	16	20.6 ± 0.0	NS
P	<i>Plantago rugelii</i>	Rugel's Plantain				S3	8	13.7 ± 0.0	NS
P	<i>Primula laurentiana</i>	Laurentian Primrose				S3	21	71.9 ± 7.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	<i>Samolus parviflorus</i>	Seaside Brookweed				S3	45	9.4 ± 1.0	NS
P	<i>Pyrola asarifolia</i>	Pink Pyrola				S3	9	39.3 ± 1.0	NS
P	<i>Pyrola minor</i>	Lesser Pyrola				S3	2	23.2 ± 0.0	NS
P	<i>Ranunculus gmelinii</i>	Gmelin's Water Buttercup				S3	64	31.6 ± 0.0	NS
P	<i>Endotropis alnifolia</i>	alder-leaved buckthorn				S3	162	30.7 ± 0.0	NS
P	<i>Agrimonia gryposepala</i>	Hooked Agrimony				S3	159	30.0 ± 5.0	NS
P	<i>Amelanchier spicata</i>	Running Serviceberry				S3	46	33.2 ± 3.0	NS
P	<i>Cephalanthus occidentalis</i>	Common Buttonbush				S3	473	15.0 ± 0.0	NS
P	<i>Geocaulon lividum</i>	Northern Comandra				S3	4	47.8 ± 0.0	NS
P	<i>Limosella australis</i>	Southern Mudwort				S3	10	21.2 ± 3.0	NS
P	<i>Lindernia dubia</i>	Yellow-seeded False Pimperel				S3	9	37.7 ± 0.0	NS
P	<i>Laportea canadensis</i>	Canada Wood Nettle				S3	45	33.6 ± 0.0	NS
P	<i>Verbena hastata</i>	Blue Vervain				S3	124	22.6 ± 7.0	NS
P	<i>Carex cryptolepis</i>	Hidden-scaled Sedge				S3	12	21.0 ± 6.0	NS
P	<i>Carex eburnea</i>	Bristle-leaved Sedge				S3	10	56.9 ± 1.0	NS
P	<i>Carex lupulina</i>	Hop Sedge				S3	49	20.9 ± 6.0	NS
P	<i>Carex rosea</i>	Rosy Sedge				S3	37	35.7 ± 2.0	NS
P	<i>Carex swanii</i>	Swan's Sedge				S3	4	1.4 ± 0.0	NS
P	<i>Carex tribuloides</i>	Blunt Broom Sedge				S3	13	38.2 ± 0.0	NS
P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	3	48.9 ± 0.0	NS
P	<i>Carex foenea</i>	Fernald's Hay Sedge				S3	15	9.7 ± 0.0	NS
P	<i>Eleocharis nitida</i>	Quill Spikerush				S3	11	35.5 ± 5.0	NS
P	<i>Elodea canadensis</i>	Canada Waterweed				S3	12	16.3 ± 0.0	NS
P	<i>Juncus marginatus</i>	Grassleaf Rush				S3	2	47.2 ± 0.0	NS
P	<i>Juncus subcaudatus</i>	Woods-Rush				S3	22	18.3 ± 0.0	NS
P	<i>Juncus dudleyi</i>	Dudley's Rush				S3	25	38.4 ± 0.0	NS
P	<i>Goodyera repens</i>	Lesser Rattlesnake-plantain				S3	6	49.2 ± 0.0	NS
P	<i>Neottia bifolia</i>	Southern Twayblade				S3	116	3.4 ± 0.0	NS
P	<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid				S3	73	12.4 ± 0.0	NS
P	<i>Platanthera hookeri</i>	Hooker's Orchid				S3	16	38.2 ± 1.0	NS
P	<i>Platanthera orbiculata</i>	Small Round-leaved Orchid				S3	15	32.7 ± 4.0	NS
P	<i>Spiranthes ochroleuca</i>	Yellow Ladies'-tresses				S3	28	13.8 ± 7.0	NS
P	<i>Alopecurus aequalis</i>	Short-awned Foxtail				S3	12	39.4 ± 0.0	NS
P	<i>Dichanthelium clandestinum</i>	Deer-tongue Panic Grass				S3	286	2.8 ± 0.0	NS
P	<i>Coleataenia longifolia</i>	Long-leaved Panicgrass				S3	349	89.8 ± 0.0	NS
P	<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed				S3	1	55.0 ± 0.0	NS
P	<i>Potamogeton praelongus</i>	White-stemmed Pondweed				S3	3	62.6 ± 5.0	NS
P	<i>Potamogeton zosteriformis</i>	Flat-stemmed Pondweed				S3	15	41.8 ± 0.0	NS
P	<i>Sparganium natans</i>	Small Burreed				S3	11	30.9 ± 0.0	NS
P	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort				S3	15	60.1 ± 0.0	NS
P	<i>Asplenium viride</i>	Green Spleenwort				S3	12	76.2 ± 7.0	NS
P	<i>Equisetum pratense</i>	Meadow Horsetail				S3	16	36.0 ± 0.0	NS
P	<i>Equisetum variegatum</i>	Variiegated Horsetail				S3	38	3.0 ± 0.0	NS
P	<i>Isoetes tuckermanii</i> ssp. <i>acadiensis</i>	Acadian Quillwort				S3	8	22.0 ± 0.0	NS
P	<i>Diphasiastrum sitchense</i>	Sitka Ground-cedar				S3	2	65.1 ± 1.0	NS
P	<i>Huperzia appressa</i>	Mountain Firmoss				S3	18	61.0 ± 7.0	NS
P	<i>Sceptridium dissectum</i>	Dissected Moonwort				S3	4	72.1 ± 0.0	NS
P	<i>Polypodium appalachianum</i>	Appalachian Polypody				S3	19	39.0 ± 0.0	NS
P	<i>Bidens vulgata</i>	Tall Beggarticks				S3?	6	10.7 ± 0.0	NS
P	<i>Persicaria amphibia</i> var. <i>emersa</i>	Long-root Smartweed				S3?	19	35.4 ± 0.0	NS
P	<i>Diphasiastrum x sabinifolium</i>	Savin-leaved Ground-cedar				S3?	5	75.5 ± 0.0	NS
P	<i>Solidago latissimifolia</i>	Elliott's Goldenrod				S3S4	11	78.5 ± 0.0	NS
P	<i>Atriplex glabriuscula</i> var. <i>franktonii</i>	Frankton's Saltbush				S3S4	14	44.7 ± 0.0	NS
P	<i>Suaeda calceoliformis</i>	Horned Sea-blite				S3S4	10	14.3 ± 7.0	NS
P	<i>Vaccinium corymbosum</i>	Highbush Blueberry				S3S4	3	4.8 ± 0.0	NS
P	<i>Myriophyllum sibiricum</i>	Siberian Water Milfoil				S3S4	5	75.0 ± 0.0	NS
P	<i>Rhexia virginica</i>	Virginia Meadow Beauty				S3S4	380	71.5 ± 5.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	<i>Nuphar microphylla</i>	Small Yellow Pond-lily				S3S4	1	30.9 ± 0.0	NS
P	<i>Sanguinaria canadensis</i>	Bloodroot				S3S4	103	9.5 ± 0.0	NS
P	<i>Polygonum fowleri</i>	Fowler's Knotweed				S3S4	3	72.8 ± 1.0	NS
P	<i>Rumex fueginus</i>	Tierra del Fuego Dock				S3S4	22	44.7 ± 0.0	NS
P	<i>Crataegus succulenta</i>	Fleshy Hawthorn				S3S4	1	5.2 ± 0.0	NS
P	<i>Fragaria vesca ssp. americana</i>	Woodland Strawberry				S3S4	68	31.5 ± 0.0	NS
P	<i>Salix petiolaris</i>	Meadow Willow				S3S4	19	40.2 ± 0.0	NS
P	<i>Agalinis neoscotica</i>	Nova Scotia Agalinis				S3S4	43	1.5 ± 0.0	NS
P	<i>Viola sagittata var. ovata</i>	Arrow-Leaved Violet				S3S4	23	7.5 ± 0.0	NS
P	<i>Symplocarpus foetidus</i>	Eastern Skunk Cabbage				S3S4	3	15.1 ± 0.0	NS
P	<i>Carex argyrantha</i>	Silvery-flowered Sedge				S3S4	9	45.4 ± 1.0	NS
P	<i>Eriophorum russeolum</i>	Russet Cottongrass				S3S4	9	26.6 ± 3.0	NS
P	<i>Sisyrinchium atlanticum</i>	Eastern Blue-Eyed-Grass				S3S4	20	61.3 ± 0.0	NS
P	<i>Triglochin gaspensis</i>	Gasp \bar{r} Arrowgrass				S3S4	28	30.5 ± 0.0	NS
P	<i>Juncus acuminatus</i>	Sharp-Fruit Rush				S3S4	7	5.2 ± 0.0	NS
P	<i>Luzula parviflora ssp. melanocarpa</i>	Black-fruited Woodrush				S3S4	2	74.7 ± 0.0	NS
P	<i>Liparis loeselii</i>	Loesel's Twayblade				S3S4	6	15.8 ± 5.0	NS
P	<i>Panicum philadelphicum</i>	Philadelphia Panicgrass				S3S4	9	37.7 ± 0.0	NS
P	<i>Trisetum spicatum</i>	Narrow False Oats				S3S4	16	35.7 ± 0.0	NS
P	<i>Cystopteris bulbifera</i>	Bulblet Bladder Fern				S3S4	111	34.7 ± 0.0	NS
P	<i>Equisetum hyemale ssp. affine</i>	Common Scouring-rush				S3S4	102	2.3 ± 2.0	NS
P	<i>Equisetum scirpoides</i>	Dwarf Scouring-Rush				S3S4	80	36.0 ± 0.0	NS
P	<i>Diphasiastrum complanatum</i>	Northern Ground-cedar				S3S4	13	9.5 ± 1.0	NS
P	<i>Schizaea pusilla</i>	Little Curlygrass Fern				S3S4	25	18.7 ± 1.0	NS
P	<i>Viola canadensis</i>	Canada Violet				SH	2	42.4 ± 0.0	NS
P	<i>Calamagrostis cinnoides</i>	Small Reedgrass				SH	1	12.9 ± 6.0	NS

5.1 SOURCE BIBLIOGRAPHY (100 km)

The recipient of these data shall acknowledge the AC CDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

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16	Basquill, S.P. 2012. 2012 rare vascular plant field data. Nova Scotia Department of Natural Resources, 37 recs.
16	Edsall, J. 2007. Personal Butterfly Collection: specimens collected in the Canadian Maritimes, 1961-2007. J. Edsall, unpubl. report, 137 recs.
16	Manthorne, A. 2019. Incidental aerial insectivore observations. Birds Canada.
16	Pepper, C. 2021. Rare bird, plant and mammal observations in Nova Scotia, 2017-2021.
16	Richardson, D., Anderson, F., Cameron, R, Pepper, C., Clayden, S. 2015. Field Work Report on the Wrinkled Shingle lichen (<i>Pannaria lurida</i>). COSEWIC.
15	Archibald, D.R. 2003. NS Freshwater Mussel Fieldwork. Nova Scotia Dept Natural Resources, 213 recs.
15	Basquill, S.P. 2011 vascular plant field data. Nova Scotia Department of Natural Resources, 37 recs.
15	Holder, M. 2003. Assessment and update status report on the Eastern <i>Lilaeopsis</i> (<i>Lilaeopsis chinensis</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada, 16 recs.
15	Klymko, J.J.D. 2018. 2017 field data. Atlantic Canada Conservation Data Centre.
15	Walker, J. 2017. Bird inventories at French River, NS, and Memramcook, NB, for Nature Conservancy of Canada. Pers. comm. to AC CDC.
14	Cameron, R.P. 2014. 2013-14 rare species field data. Nova Scotia Department of Environment, 35 recs.
14	Keddy, C.J. 1989. Habitat securement for redroot, golden crest and Long's bulrush in Ponhook Lake, NS. World Wildlife Fund (Canada), 131 recs.
14	Neily, T.H. & Pepper, C.; Toms, B. 2020. Nova Scotia lichen database [as of 2020-05-25]. Mersey Tobeatic Research Institute, 668 recs.
14	Powell, B.C. 1967. Female sexual cycles of <i>Chrysemys picta</i> & <i>Clemmys insculpta</i> in Nova Scotia. Can. Field-Nat., 81:134-139. 26 recs.
14	Robinson, S.L. 2015. 2014 field data.
13	Goltz, J.P. & Bishop, G. 2005. Confidential supplement to Status Report on Prototype Quillwort (<i>Isoetes prototypus</i>). Committee on the Status of Endangered Wildlife in Canada, 111 recs.
13	Nova Scotia Nature Trust. 2014. Ladyslipper records from Saint Croix Nova Scotia, JLC Ed. Nova Scotia Nature Trust.
13	Wilhelm, S.I. et al. 2019. Colonial Waterbird Database. Canadian Wildlife Service.
12	McLean, K. 2020. Wood Turtle observations. Clean Annapolis River Project.
12	Newell, R.E. 2019. <i>Crocyanthemum canadense</i> records compiled for provincial status report. pers. comm. from Ruth Newell to AC CDC.
11	Bredin, K.A. 2002. NS Freshwater Mussel Fieldwork. Atlantic Canada Conservation Data Centre, 30 recs.
10	Basquill, S.P., Porter, C. 2019. Bryophyte and lichen specimens submitted to the E.C. Smith Herbarium. NS Department of Lands and Forestry.
10	Belliveau, A.G. & Vail, Cole; King, Katie. 2020. New <i>Allium tricoccum</i> locations. Cornwallis River. Chapman, C.J. (ed.) Acadia University.
10	Cameron, R.P. 2013. 2013 rare species field data. Nova Scotia Department of Environment, 71 recs.
10	Klymko, J.J.D.; Robinson, S.L. 2014. 2013 field data. Atlantic Canada Conservation Data Centre.
10	McLean, K. 2020. Species occurrence records from Clean Annapolis River Project fieldwork in 2020. Clean Annapolis River Project, 206 records.
10	McNeil, J.A. 2011. Ribbonsnake (<i>Thamophis sauritus</i>) sightings, 2010. Parks Canada, 148 recs of 70+ individuals.
10	Neily, T. H. 2018. Lichen and Bryophyte records, AEI 2017-2018. Tom Neily; Atlantic Canada Conservation Data Centre.
10	Webster, R.P. Atlantic Forestry Centre Insect Collection, Maritimes butterfly records. Natural Resources Canada. 2014.
9	Cameron, R.P. 2006. <i>Erioderma pedicellatum</i> 2006 field data. NS Dept of Environment, 9 recs.
9	Cameron, R.P. 2017. 2017 rare species field data. Nova Scotia Environment, 64 recs.
9	Gilhen, J. 1984. Amphibians & Reptiles of Nova Scotia, 1st Ed. Nova Scotia Museum, 164pp.
9	Haughian, S.R. 2018. Description of <i>Fuscopannaria leucosticta</i> field work in 2017. New Brunswick Museum, 314 recs.
8	Adams, J. & Herman, T.B. 1998. Thesis, Unpublished map of <i>C. insculpta</i> sightings. Acadia University, Wolfville NS, 88 recs.
8	Cameron, R.P. 2005. <i>Erioderma pedicellatum</i> unpublished data. NS Dept of Environment, 9 recs.
8	Chapman, C.N. (Cody). 2020. Nova Scotia Black Ash (<i>Fraxinus nigra</i>) field observations by Confederacy of Mainland Mi'kmaq. Forestry Program, Confederacy of Mainland Mi'kmaq.
8	Downes, C. 1998-2000. Breeding Bird Survey Data. Canadian Wildlife Service, Ottawa, 111 recs.
8	Klymko, J. Butterfly records at the Nova Scotia Museum not yet accessioned by the museum. Atlantic Canada Conservation Data Centre. 2017.
8	McNeil, J.A. 2018. Snapping Turtle records, 2018. Mersey Tobeatic Research Institute.
8	Olsen, R. Herbarium Specimens. Nova Scotia Agricultural College, Truro. 2003.
8	Patrick, Allison. 2021. Animal and plant records from NCC properties from 2019 and 2020. Nature Conservancy Canada.
8	Phinney, Lori; Toms, Brad; et. al. 2016. Bank Swallows (<i>Riparia riparia</i>) in Nova Scotia: inventory and assessment of colonies. Merser Tobeatic Research Institute, 25 recs.
8	Sollows, M.C., 2008. NBM Science Collections databases: mammals. New Brunswick Museum, Saint John NB, download Jan. 2008, 4983 recs.
7	Boyne, A.W. & Grecian, V.D. 1999. Tern Surveys. Canadian Wildlife Service, Sackville, unpublished data. 23 recs.
7	Cameron, B. 2006. <i>Hepatica americana</i> Survey at Scotia Mine Site in Gays River, and Discovery of Three Yellow-listed Species. Conestoga-Rovers and Associates, (a consulting firm), october 25. 7 recs.
7	Holder, M.L.; Kingsley, A.L. 2000. Kinglsey and Holder observations from 2000 field work.
7	MacKinnon, D.S. & O'Brien, M.K.H.; Cameron, R.P. 2002. Fieldwork 2000. Dept of Environment & Labour, Protected Areas Branch, 252 recs.
6	Benjamin, L.K. 2006. <i>Cyripedium arietinum</i> . Pers. comm. to D. Mazerolle. 9 recs, 9 recs.
6	Blaney, C.S.; Spicer, C.D. 2001. Fieldwork 2001. Atlantic Canada Conservation Data Centre. Sackville NB, 981 recs.
6	Brazner, J.; Hill, N. 2018. Plant observations along the Cornwallis River, Nova Scotia. Nova Scotia Department of Lands and Forestry.
6	Cameron, R.P. 2009. Nova Scotia nonvascular plant observations, 1995-2007. Nova Scotia Dept Natural Resources, 27 recs.
6	Cameron, R.P. 2012. Additional rare plant records, 2009. , 7 recs.
6	Clayden, S.R. 2005. Confidential supplement to Status Report on Ghost Antler Lichen (<i>Pseudevernia cladonia</i>). Committee on the Status of Endangered Wildlife in Canada, 27 recs.
6	Gallop, John. 2021. Sheet Harbour rare lichen observations. McCallum Environmental.
6	Hall, R. 2008. Rare plant records in old fieldbook notes from Truro area. Pers. comm. to C.S. Blaney. 6 recs, 6 recs.
6	Klymko, J.J.D. 2012. Odonata specimens & observations, 2010. Atlantic Canada Conservation Data Centre, 425 recs.
6	Matthew Smith. 2010. Field trip report from Avon Caving Club outlining the discovery of <i>Cyripedium arietinum</i> and <i>Hepatica nobilis</i> populations. Public Works and Government Services Canada.
6	Neily, T.H. & Anderson, F. 2011. Lichen observations from NRC site at Sandy Cove. , 97.
6	White, S. 2019. Notable species sightings, 2018. East Coast Aquatics.

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5	Benjamin, L.K. 2012. NSDNR fieldwork & consultant reports 2008-2012. Nova Scotia Dept Natural Resources, 196 recs.
5	Brunelle, P.-M. (compiler). 2010. ADIP/MDDS Odonata Database: NB, NS Update 1900-09. Atlantic Dragonfly Inventory Program (ADIP), 935 recs.
5	Carter, Jeff; Churchill, J.; Churchill, I.; Churchill, L. 2020. Bank Swallow colony Scots Bay, NS. Atlantic Canada Conservation Data Centre.
5	Chaput, G. 2002. Atlantic Salmon: Maritime Provinces Overview for 2001. Dept of Fisheries & Oceans, Atlantic Region, Science Stock Status Report D3-14. 39 recs.
5	McKendry, Karen. 2016. Rare species observations, 2016. Nova Scotia Nature Trust, 19 recs.
5	McNeil, J.A. 2015. Blandings Turtle (<i>Emydoidea blandingii</i>), Eastern Ribbonsnake (<i>Thamnophis sauritus</i>), and Snapping Turtle (<i>Chelydra serpentina</i>) sightings, 2015. Mersey Tobeatic Research Institute.
5	McNeil, J.A. 2019. Eastern Painted Turtle trapping records, 2017. Mersey Tobeatic Research Institute.
5	Porter, K. 2013. 2013 rare and non-rare vascular plant field data. St. Mary's University, 57 recs.
5	Towell, C. 2014. 2014 Northern Goshawk and Common Nighthawk email reports, NS. NS Department of Natural Resources.
5	Whittam, R.M. 1999. Status Report on the Roseate Tern (update) in Canada. Committee on the Status of Endangered Wildlife in Canada, 36 recs.
4	Cameron, R.P. 2012. Rob Cameron 2012 vascular plant data. NS Department of Environment, 30 recs.
4	Christie, D.S. 2000. Christmas Bird Count Data, 1997-2000. Nature NB, 54 recs.
4	Clayden, S.R. 1998. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, 19759 recs.
4	Cody, W.J. 2003. Nova Scotia specimens of <i>Equisetum pratense</i> at the DAO herbarium in Ottawa. Pers. comm. to C.S. Blaney. 4 recs.
4	Forsythe, B. 2006. <i>Cypripedium arietinum</i> at Meadow Pond, Hants Co. Pers. comm. to C.S. Blaney. 4 recs, 4 recs.
4	Klymko, J. Dataset of butterfly records at the New Brunswick Museum not yet accessioned by the museum. Atlantic Canada Conservation Data Centre. 2016.
4	McNeil, J.A. 2017. Eastern Ribbonsnake (<i>Thamnophis sauritus</i>) sightings, 2017. Mersey Tobeatic Research Institute, 36 recs.
4	Mills, Pamela. 2007. <i>Iva frutescens</i> records. Nova Scotia Dept of Natural Resources, Wildlife Div. Pers. comm. to S. Basquil, 4 recs.
4	Neily, T.H. & Pepper, C. 2020. Nova Scotia SMP lichen surveys 2020. Mersey Tobeatic Research Institute.
4	Newell, R. & Neily, T.; Toms, B.; Proulx, G. et al. 2011. NCC Properties Fieldwork in NS: August-September 2010. Nature Conservancy Canada, 106 recs.
4	Oldham, M.J. 2000. Oldham database records from Maritime provinces. Oldham, M.J.; ONHIC, 487 recs.
4	Plissner, J.H. & Haig, S.M. 1997. 1996 International piping plover census. US Geological Survey, Corvallis OR, 231 pp.
3	Bagnell, B.A. 2001. New Brunswick Bryophyte Occurrences. B&B Botanical, Sussex, 478 recs.
3	Basquill, S.P. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre, Sackville NB, 69 recs.
3	Basquill, S.P. 2009. 2009 field observations. Nova Scotia Dept of Natural Resources.
3	Bateman, M.C. 2001. Coastal Waterfowl Surveys Database, 1965-2001. Canadian Wildlife Service, Sackville, 667 recs.
3	Benjamin, L.K. 2009. Boreal Felt Lichen, Mountain Avens, Orchid and other recent records. Nova Scotia Dept Natural Resources, 105 recs.
3	Benjamin, L.K. 2009. NSDNR Fieldwork & Consultants Reports. Nova Scotia Dept Natural Resources, 143 recs.
3	Blaney, C.S. 2019. Sean Blaney 2019 field data. Atlantic Canada Conservation Data Centre, 4407 records.
3	Bradford, R. 2004. <i>Coregonus huntsmani</i> locations. Dept of Fisheries & Oceans, Atlantic Region, Pers. comm. to K. Bredin. 4 recs.
3	Chapman, Cody. Unreported Species at Risk Records across Nova Scotia. Chapman, Cody, 5 records.
3	Churchill, J.L.; Walker, J. 2017. Species at Risk Surveys at Correctional Services Canada Properties in Nova Scotia and New Brunswick. Atlantic Canada Conservation Data Centre.
3	Doubt, J. 2013. Email to Sean Blaney with Nova Scotia records of <i>Fissidens exilis</i> at Canadian Museum of Nature. pers. comm., 3 records.
3	Frittation, C. 2012. NSNT 2012 Field Observations. Nova Scotia Nature Trust, Pers comm. to S. Blaney Feb. 7, 34 recs.
3	Hill, N. and D. Patriquin. 2013. 2013 rare plant observations in Williams Lake Backlands area. Fern Hill Institute of Plant Conservation, Berwick, Nova Scotia, 3 records.
3	Neily, T.H. Tom Neily NS Sphagnum records (2009-2014). T.H. Neily, Atlantic Canada Conservation Data Centre. 2019.
3	Newell, R. E., MacKinnon, C. M. & Kennedy, A. C. 2006. Botanical Survey of Boot Island National Wildlife Area, Nova Scotia, 2004. Canadian Wildlife Service, Atlantic Region, Technical Report Series Number 450. 3 recs.
3	Nova Scotia Department of Lands and Forestry. 2018. Wood Turtle observations in, or near, the cornwallis River watershed. NS DLF, pers. comm. to AC CDC.
3	Sabine, M. 2016. NB DNR staff incidental Black Ash observations. New Brunswick Department of Natural Resources.
3	Thompson, R. 2018. Williamsdale Quarry Expansion Project, NS. Environmental Assessment rare plants. Dexter Construction Company Limited.
2	Amiro, Peter G. 1998. Atlantic Salmon: Inner Bay of Fundy SFA 22 & part of SFA 23. Dept of Fisheries & Oceans, Atlantic Region, Science Stock Status Report D3-12. 4 recs.
2	Basquill, S.P. 2011. Field observations & specimen collections, 2010. Nova Scotia Department of Natural Resources, Pers. comm. , 8 Recs.
2	Basquill, S.P. 2018. Various specimens, NS DNR field work. NS Department of Natural Resources, 10.
2	Benedict, B. Connell Herbarium Specimens, Digital photos. University New Brunswick, Fredericton. 2005.
2	Blaney, C.S. 1999. Fieldwork 1999. Atlantic Canada Conservation Data Centre. Sackville NB, 292 recs.
2	Bridgehouse, Derek. 2020. <i>Callophrys henrici</i> records from the Pockwock Watershed Area. Klymko, J. (ed.) Bridgehouse, Derek, pers. comm.
2	Cameron, B. 2005. <i>C. palmicola</i> , <i>E. pedicellatum</i> records from Sixth Lake. Pers. comm. to C.S. Blaney. 3 recs, 3 recs.
2	Clerc, P. 2011. Notes on the genus <i>Usnea</i> Adanson (lichenized Ascomycota). III. <i>Bibliotheca Lichenologica</i> , 106, 41-51.
2	Gilhen, J., Jones, A., McNeil, J., Tanner, A.W. 2012. A Significant Range Extension for the Eastern Ribbonsnake, <i>Thamnophis sauritus</i> , in Nova Scotia, Canada. <i>The Canadian Field-Naturalist</i> , 126(3): 231-233.
2	Hill, N.M. 2013. email communications to Sean Blaney and David Mazerolle regarding the discovery of <i>Listera australis</i> populations at Black River Lake and Middlewood. , 2.
2	Hill, N.M. 2019. Observation of <i>Crocianthemum canadense</i> near Auburn, Annapolis Co. NS on May 29, 2019. Fern Hill Institute, 2 recs.
2	Kennedy, B. & Cron, C.; Patriquin, D. 2018. Email to Sean Blaney on observations of <i>Trichostema dichotomum</i> at Shingle Lake, Nova Scotia. , 2 records.
2	Klymko, J. 2019. Atlantic Canada Conservation Data Centre zoological fieldwork 2018. Atlantic Canada Conservation Data Centre.
2	Klymko, J.J.D. 2011. Insect fieldwork & submissions, 2010. Atlantic Canada Conservation Data Centre. Sackville NB, 742 recs.
2	LaPaix, R.; Parker, M. 2013. email to Sean Blaney regarding <i>Listera australis</i> observations near Kearney Lake. East Coast Aquatics, 2.
2	Lock, A.R., Brown, R.G.B. & Gerriets, S.H. 1994. Gazetteer of Marine Birds in Atlantic Canada. Canadian Wildlife Service, Atlantic Region, 137 pp.
2	Manning, I. 2020. Peregrine Falcon nest site observations. pers. comm. to J. Churchill.
2	McAlpine, D.F. 1998. NBM Science Collections databases to 1998. New Brunswick Museum, Saint John NB, 241 recs.

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2	McLean, K. 2019. Species At Risk observations. Clean Annapolis River Project.
2	McNeil, J.A. 2019. Snapping Turtle records, 2017. Mersey Tobeatic Research Institute.
2	Munro, M. 2003. <i>Caulophyllum thalictroides</i> & <i>Carex hirtifolia</i> at Herbert River, Brooklyn, NS. , Pers. comm. to C.S. Blaney. 2 recs.
2	Munro, M. 2003. <i>Dirca palustris</i> & <i>Hepatica nobilis</i> var. <i>obtusata</i> at Cogmagun River, NS. , Pers. comm. to C.S. Blaney. 2 recs.
2	NatureServe Canada. 2018. iNaturalist Butterfly Data Export. iNaturalist.org and iNaturalist.ca.
2	Neily, T.H.; Smith, C.; Whitman, E. 2011. NCC Logging Lake (Halifax Co. NS) properties baseline survey data. Nature Conservancy of Canada, 2 recs.
2	Newell, R.E. 2006. Rare plant observations in Digby Neck. Pers. comm. to S. Blaney, 6 recs.
2	O'Neil, S. 1998. Atlantic Salmon: Eastern Shore Nova Scotia SFA 20. Dept of Fisheries & Oceans, Atlantic Region, Science. Stock Status Report D3-10. 4 recs.
2	Phinney, L. 2019. Little Brown Myotis maternal colony counts and birdSAR, 2019. Mersey Tobeatic Research Institute.
2	Shafer, A.B.A., D.T. Stewart. 2006. A Disjunct Population of <i>Sorex dispar</i> (Long-Tailed Shrew) in Nova Scotia. <i>Northeastern Naturalist</i> , 13(4): 603-608.
2	Standley, L.A. 2002. <i>Carex haydenii</i> in Nova Scotia. , Pers. comm. to C.S. Blaney. 4 recs.
2	White, S. 2018. Notable species sightings, 2016-2017. East Coast Aquatics.
2	Williams, M. Cape Breton University Digital Herbarium. Cape Breton University Digital Herbarium. 2013.
1	Amirault, D.L. 2003. 2003 Peregrine Falcon Survey. Canadian Wildlife Service, Sackville, unpublished data. 7 recs.
1	Amirault, D.L. 2005. 2005 Peregrine Falcon Survey. Canadian Wildlife Service, Sackville, unpublished data. 27 recs.
1	Amiro, Peter G. 1998. Atlantic Salmon: Southern Nova Scotia SFA 21. Dept of Fisheries & Oceans, Atlantic Region, Science. Stock Status Report D3-11. 1 rec.
1	Anon. Dataset of butterfly records for the Maritime provinces. Museum of Comparative Zoology, Harvard University. 2017.
1	Austin-Smith, P. 2014. 2014 Common Nighthawk personal communication report, NS. NS Department of Natural Resources.
1	Basquill, S. P. 2008. Nova Scotia Dept of Natural Resources.
1	Basquill, S.P. 2004. <i>C. americana</i> and <i>Sedum</i> sp records, 2002. Pers. comm. to C.S. Blaney. 2 recs, 2 recs.
1	Basquill, S.P. 2012. 2012 Bryophyte specimen data. Nova Scotia Department of Natural Resources, 37 recs.
1	Basquill, S.P.; Quigley, E. 2006. New <i>Minuartia groenlandica</i> record for NS. Pers. comm. to C.S. Blaney, Oct 6, 1 rec.
1	Basset, I.J. & Crompton, C.W. 1978. The Genus <i>Suaeda</i> (Chenopodiaceae) in Canada. <i>Canadian Journal of Botany</i> , 56: 581-591.
1	Belliveau, A.G. E.C. Smith Herbarium Specimen Database 2019. E.C. Smith Herbarium, Acadia University. 2019.
1	Benedict, B. Connell Herbarium Specimens (Data) . University New Brunswick, Fredericton. 2003.
1	Benjamin, L.K. 2003. <i>Cyripedium arietinum</i> in Cogmagun River NS. Pers. comm. to S. Blaney, 1 rec.
1	Berg, L. 2020. Canada Warbler observations, Birch Lake, NS. pers. comm. to J. Churchill.
1	Blaney, C.S. 2017. Atlantic Canada Conservation Data Centre Fieldwork 2017. Atlantic Canada Conservation Data Centre.
1	Brach, A.R. 2019. Correspondence to Sean Blaney regarding <i>Calamagrostis cinnoides</i> specimen from Halifax NS. pers. comm., Harvard University Herbaria, 1 record.
1	Breen, A. 2017. 2017 Atlantic Whitefish observation. Coastal Action.
1	Bridgehouse, Derek Email to John Klymko detailing records of butterflies collected by Derek Bridgehouse in July 2017. Bridgehouse, Derek. 2017.
1	Bridgehouse, Derek. 2018. Record of <i>Calophrys henrici</i> from Nova Scotia, emailed to J. Klymko 31 May 2018. Pers. comm.
1	Bruce, J. 2014. 2014 Wood Turtle email report, Nine Mile River, NS. NS Department of Natural Resources.
1	Butterflies and Moths of North America. 2016. <i>Satyrus liparops</i> record from Nova Scotia gleaned from BAMONA. Lotts, Kelly (ed.) BAMONA.
1	Clayden, S.R. 2006. <i>Pseudevernia cladonia</i> records. NB Museum. Pers. comm. to S. Blaney, Dec, 4 recs.
1	Clayden, S.R. 2020. Email to Sean Blaney regarding <i>Pilophorus cereus</i> and <i>P. fibula</i> at Fidele Lake area, Charlotte County, NB. pers. comm., 2 records.
1	COSEWIC (Committee on the Status of Wildlife in Canada). 2013. COSEWIC Assessment and Status Report on the Eastern Waterfan <i>Peltigera hydrothyria</i> in Canada. COSEWIC, 46 pp.
1	Crowell, A. 2004. <i>Cyripedium arietinum</i> in Weir Brook, Hants Co. Pers. comm. to S. Blaney, 1 rec.
1	Crowell, M. 2013. email to Sean Blaney regarding <i>Listera australis</i> at Bear Head and Mill Cove Canadian Forces Station. Jacques Whitford Environmental Ltd., 2.
1	deGooyer, K. 2019. Snapping Turtle and Eastern White Cedar observations. Nova Scotia Environment.
1	Eastman, A. 2019. Snapping Turtle observation at Brookfield, Colchester Co. NS. Halifax Field Naturalists Nova Scotia Nature Archive Facebook Page, 1 record.
1	Eastman, Ai. 2019. Bronze Copper observation at Brookfield Wetlands, NS. Halifax Field Naturalists Nova Scotia Nature Archive Facebook Page, 1 rec.
1	Edge, Thomas A. 1984. Status report on the Atlantic Whitefish (<i>Coregonus huntsmani</i>). Committee on the Status of Endangered Wildlife in Canada.
1	Golder Associates Ltd. 2021. Black Ash location from Goff's Quarry Expansion Environment Assessment, 2017. Golder Associates Ltd., 1 record.
1	Haughian, S. 2019. <i>Pannaria lurida</i> observations in Nova Scotia and New Brunswick. Nova Scotia Museum.
1	Herman, T.B. & Power, T.D., Eaton, B. 1995. Population status of Blanding's Turtle (<i>Emydoidea blandingii</i>) in Nova Scotia. <i>Can. Field-Nat.</i> , 109: 182-191. 79 recs.
1	Hill, N.; Manning, I. 2020. Wild Leek observation, Cornwallis River, NS, floodplain. pers. comm. to J. Churchill.
1	Jacques Whitford Ltd. 2003. Cananda Lily location. Pers. Comm. to S. Blaney. 2pp, 1 rec, 1 rec.
1	Klymko, J.J.D. 2010. Miscellaneous observations reported to ACCDC (zoology). Pers. comm. from various persons, 3 recs.
1	Klymko, J.J.D. 2012. Insect field work & submissions. Atlantic Canada Conservation Data Centre, 852 recs.
1	Klymko, J.J.D. 2012. Insect fieldwork & submissions, 2011. Atlantic Canada Conservation Data Centre. Sackville NB, 760 recs.
1	Lautenschlager, R.A. 2010. Miscellaneous observations reported to ACCDC (zoology). Pers. comm. from various persons, 2 recs.
1	MackKinnon, D.; Wright, P.; Smith, D. 2014. 2014 Common Tern email report, Eastern Passage, NS. NS Department of Environment.
1	MackKinnon, D.S. 1998. Ponhook Lake survey map & notes. Dept of Environment and Labour, Protected Areas Branch, 13 recs.
1	MackKinnon, D.S. 2002. Fieldwork 2002. Dept of Environment & Labour, Protected Areas Branch, 1 rec.
1	Majka, C.G. & McCorquodale, D.B. 2006. The <i>Coccinellidae</i> (Coleoptera) of the Maritime Provinces of Canada: new records, biogeographic notes, and conservation concerns. <i>Zootaxa</i> . <i>Zootaxa</i> , 1154: 49-68. 7 recs.
1	Manning, I. 2020. Peregrine Falcon observation. Pers. comm. to J.L. Churchill.
1	McNeil, J.A. 2013. Ribbonsnake (<i>Thamnophis sauritus</i>) sightings, 2012 . Parks Canada, 63 records of 26+ individuals.
1	McNeil, J.A. 2017. Updates to Blanding's Turtle database, 1984-2014. Mersey Tobeatic Research Institute.

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1	McNeil, J.A. 2020. Blanding's Turtle records, 2020. Mersey Tobeatic Research Institute.
1	Neily, P.D. Plant Specimens. Nova Scotia Dept Natural Resources, Truro. 2006.
1	Neily, T.H. 2004. <i>Hepatica nobilis</i> var. <i>obtusa</i> record for Falmouth NS. Pers. comm. to C.S. Blaney, 1 rec.
1	Neily, T.H. 2012. 2012 <i>Erioderma pedicellatum</i> records in Nova Scotia.
1	Newell, R.E. 2004. <i>Hepatica nobilis</i> var. <i>obtusa</i> record. Pers. comm. to S. Blaney, 1 rec.
1	Niel, K. & Majka, C. 2008. New Records of Tiger Beetles (Coleoptera: Carabidae: Cicindelinae) in Nova Scotia. <i>Journal of the Acadian Entomological Society</i> , 4: 3-6.
1	Payzant, P. 2018. Satyr Comma record from Bible Hill, NS. https://novascotiabutterflies.ca .
1	Riley, J. 2019. Digby County lichen observations. Pers. comm. to J.L. Churchill, 50 recs.
1	Robinson, S.L. 2016. 2016 field data. Atlantic Canada Conservation Data Centre.
1	Scott, F.W. 1988. Status Report on the Southern Flying Squirrel (<i>Glaucomys volans</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada, 2 recs.
1	Skevington, Jeffrey H. 2020. Syrphid records used for the Field Guide to the Flower Flies of Northeastern North America. Canadian National Collection of Insects.
1	Sollows, M.C., 2009. NBM Science Collections databases: Coccinellid & Cerambycid Beetles. New Brunswick Museum, Saint John NB, download Feb. 2009, 569 recs.
1	Sollows, M.C., 2009. NBM Science Collections databases: molluscs. New Brunswick Museum, Saint John NB, download Jan. 2009, 6951 recs (2957 in Atlantic Canada).
1	Sollows, M.C. 2008. NBM Science Collections databases: herpetiles. New Brunswick Museum, Saint John NB, download Jan. 2008, 8636 recs.
1	Stewart, P. 2013. email to Sean Blaney regarding the discovery of a <i>Listera australis</i> population at Blockhouse. EnviroSphere Consultants Limited, 1.
1	Timmons, M. 2019. Telephone report of <i>Polygala polygama</i> at Aylesford Mountain, Kings Co., NS by Megan Timmons to C.S. Blaney. , 1 record.
1	Toms, Brad. 2011. Species at Risk data from 2011 field surveys. Mersey Tobeatic Research Institute, 17 recs.
1	Wilson, G. 2013. 2013 Snapping Turtle email report, Wentworth, NS. Pers. comm.



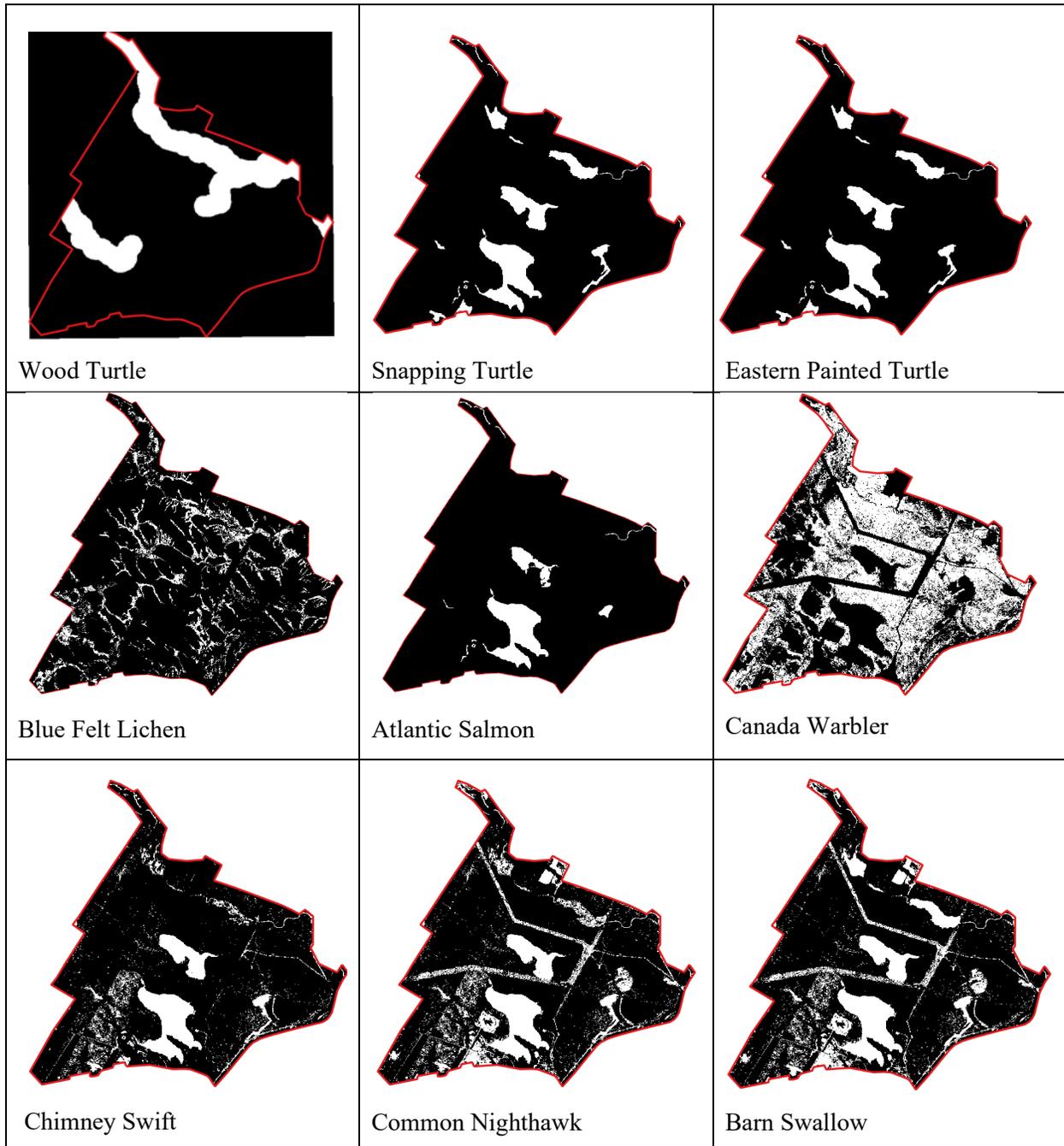
SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

Appendix B: Final Layers



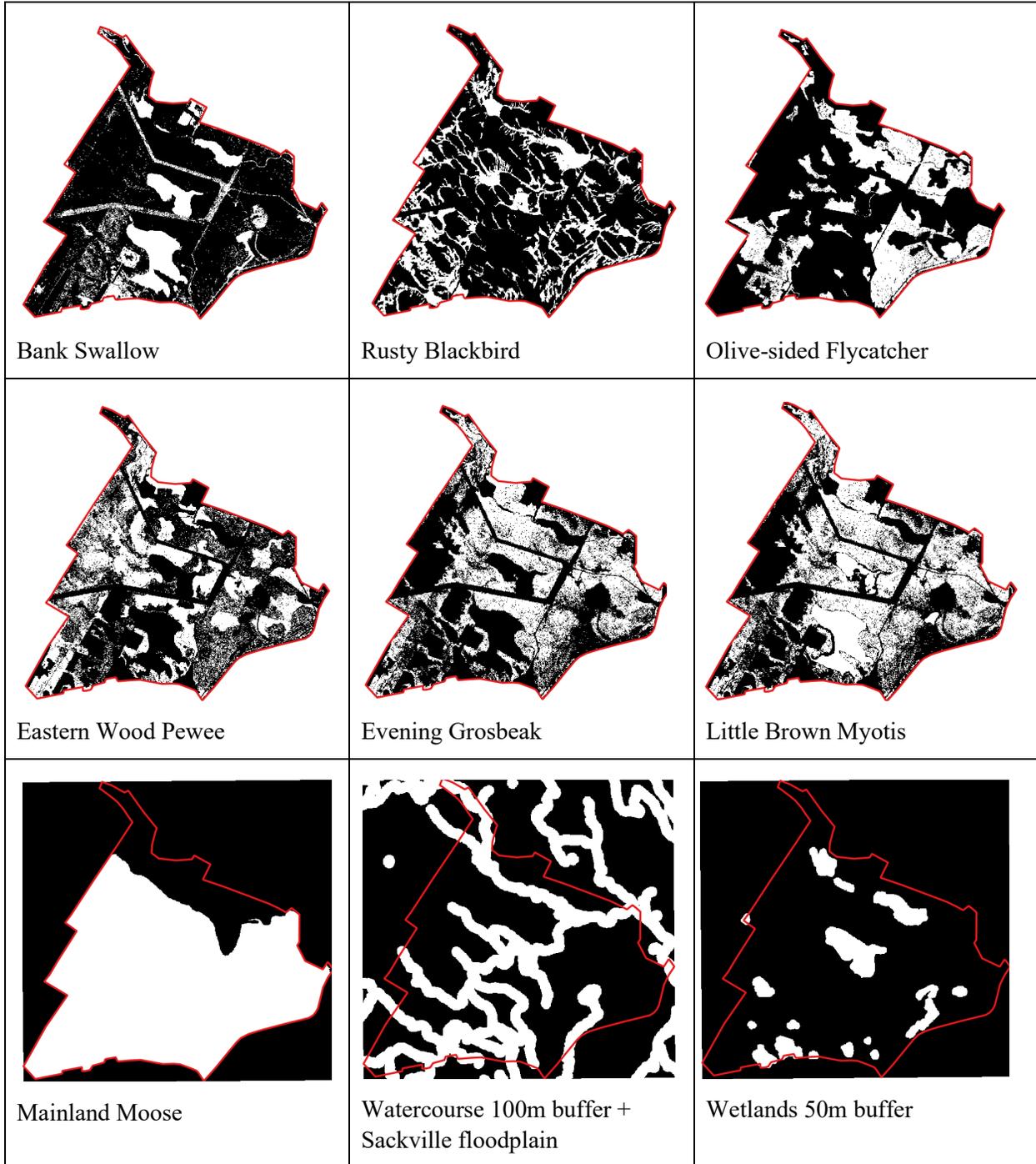
SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

Ecological Features used in model (white=present, black=absent within study area)





SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT





SANDY LAKE ECOLOGICAL FEATURES ASSESSMENT

