Appendix I.2

Flora and Fauna Baseline Report

Goldboro Gold Project- Biophysical Baseline Report: Flora and Fauna

PREPARED FOR

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March 18th, 2022

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EXECUTIVE SUMMARY

McCallum Environmental Ltd. (MEL) was commissioned by Anaconda Mining Inc. (Anaconda) to complete flora and fauna assessments for the proposed Goldboro Gold Project (the Project), located in Goldboro, Nova Scotia. These assessments are to support the preparation and submission of the provincial Environmental Assessment Registration Document (EARD).

The objectives of these surveys were to complete flora and fauna inventory and document any rare flora and fauna species or species potential within the Project Area (PA). Biophysical surveys took place between 2017 - 2021. The field studies were focused on highlighting the ecological linkages within the PA, as well as adjacent habitats. The field components included:

1. Vascular and non-vascular plant surveys (June – July, 2017, August 2019, June 2021, September 2021)
2. Lichen surveys (November 2018, August 2019, November 2020)
3. Species at Risk (SAR) surveys;
    a. Mainland moose (Winter tracking - February 2021, March 2021; pellet group inventory – April 2017, April 2021)
    b. Snapping turtle (June 2021)
    c. Bat hibernaculum (June 2017, 2019, June 2021)
    d. Incidental SAR (all seasons)

The PA consists of cutovers, access roads, wetlands, watercourses, regenerative and mature forest stands. During the rare plant and lichen surveys, a total of 203 species were observed and include 113 vascular plants, 40 bryophytes and 30 lichen species. Of the vascular, non-vascular plants and lichens observed, five vascular plants and seven rare lichens were identified. Two Species at Risk (SAR) lichens; blue felt lichen and frosted glass whiskers were observed. No SAR vascular or non-vascular plants were identified during the field surveys. The rare flora species observed include:

<u>Rare Vascular Plants</u>

- Nova Scotia agalinis (*Agalinis neoscotica,* S3S4);
- northern comandra (*Geocaulon lividum,* S3);
- Wiegand's sedge (*Carex wiegandii,* S3*)*;
- variegated scouring rush (*Equisetum variegatum,* S3), and
- southern-tway blade (*Neottia bifolia,* S3).

<u>Rare Lichens</u>

- Blue felt lichen (*Pectenia plumbea,* ACCDC: S3, NSESA – Vulnerable, SARA Special Concern),
- Frosted glass whiskers (*Sclerophora peronella,* ACCDC: S1?, SARA Special Concern),
- (*Fuscopannaria cf. sorediata,* S3);
- Appressed jellyskin lichen (*Leptogium subtile,* S3);

- Peppered moon lichen (*Sticta fuliginosa*, S3);
- Corrugated shingles lichen (*Fuscopannaria cf. ahlerni*, S3); and,
- Slender monk's hood lichen (*Hypogymnia vittata*, S3S4).

Fifty occurrences of blue felt lichen and one occurrence of frosted glass whiskers were observed within the PA and were both found within forested swamps and mature upland forests adjacent to wetlands. Mature treed swamps had the highest occurrences of rare lichen species, including frosted glass whiskers and blue felt lichen. These habitats were the most common wetland type and found throughout the PA.

The PA is within moose core habitat and several observations of mainland moose were observed during the 2017 – 2021 surveys. Habitat for moose which include summer foraging, winter and summer cover, and calving areas were observed within and surrounding the PA.

No snapping turtles were observed; however, overwintering habitat was observed in WL 18. Although water depths were suitable for snapping turtles in Gold Brook Lake, the gravel substrate made it unsuitable for overwintering. Nesting habitat for snapping turtles was present within the PA along gravel roads, however, no snapping turtles or evidence of breeding were observed.

All AMOs observed were either flooded and/or collapsed and did not provide suitable bat hibernacula habitat. Mature forested stands were present within the PA which could provide suitable roosting habitat, however, no bats or evidence of roosting were observed.

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1 INTRODUCTION

McCallum Environmental Ltd. (MEL) was commissioned by Anaconda Mining Inc. (Anaconda) to complete flora and fauna assessments for the proposed Goldboro Gold Project (the Project), located in Goldboro, Nova Scotia. These assessments are to support the preparation and submission of the provincial Environmental Assessment Registration Document (EARD).

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    a. Mainland moose (Winter tracking - February 2021, March 2021; pellet group inventory – April 2017, April 2021)
    b. Snapping turtle (June 2021)
    c. Bat hibernaculum (June 2017, 2019, June 2021)
    d. Incidental SAR (all seasons)

The results of these surveys will then be carried forward to the EARD to evaluate Project impacts to flora and fauna.

1.1 Background

The Goldboro Gold Project (the Project) is located approximately 175 kilometres (km) northeast of Halifax, 60 km southeast of Antigonish, and 1.6 km northeast of the community of Goldboro on the eastern shore of Isaac's Harbour, in Guysborough County, Nova Scotia, Canada. Anaconda Mining Inc. (Anaconda) proposes to develop the Project as a 4,000-tonne per day (tpd) mine and processing facility. For the purposes of this environmental assessment, a PA was defined as the footprint of Project related infrastructure plus a buffer of 100 – 200 m. The mine plan includes two surface extraction areas (open pits), an ore processing facility, a tailings management facility (TMF), three waste rock storage areas (WRSAs), overburden and organic stockpiles, support buildings including an employee accommodation building, and associated infrastructure. The anticipated mine life for extraction of ore is approximately 11 years.

The scope of the Project includes activities associated with construction, operation, and closure. Project construction activities will include clearing and grubbing the overburden and organic stockpiles, WRSAs, pit, plant, and TMF areas, and construction of the initial lift of the TMF, plant site, secondary access roads, construction laydowns, Run-of-Mine (ROM) pad, surface water management and other site infrastructure. The operation phase will include conventional ore extraction methods (drilling, blasting,

loading, and hauling), ore processing, and waste management. ROM ore will go directly to the crusher while stockpiled high-grade and low-grade ore will be progressively processed throughout the mine life. Non-ore bearing waste rock, not used for construction or backfill, will be stockpiled at its final disposal point, managed and reclaimed in place. The closure phase will include earthworks and demolition required to return the Project Area to a safe, stable, and vegetated state, and all monitoring and treatment, if required.

The Site is primarily disturbed by historical mining activities, road construction and timber harvesting. The region is known for its historic gold deposits and about half of the parcel is currently under mineral exploration licenses including the known Goldboro (Upper Seal Harbour), Isaacs Harbour, Forest Hill, and Lower Seal Harbour deposits.

1.2 Regulatory Context

The Project has potential to interact with flora and fauna species which may be protected under several federal and provincial legislations as well as regulatory guidelines. Surveys were designed to detect species which may be listed in these documents. Legislation that may direct resource development and conservation of flora and fauna include:

Federal Legislation:

- *Species at Risk Act.*

Provincial Legislation:

- *Nova Scotia Wildlife Act*; and,
- *Nova Scotia Endangered Species Act.*

The Project is also driven by policies, guidelines and standards that provide guidance on the development of the Project and the survey design. These guidance/policies include:

- *Nova Scotia Wetland Conservation Policy (NSE 2019);*
- *The Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSECC, 2005);
- Various Nova Scotia Department of Natural Resources and Renewables (NSDNRR) *Special Management Practices* (SMP) and Environment and Climate Change (ECC) Species at Risk Management Plans.

1.3 Project Area (PA)

The biophysical surveys occurred within the PA which encompasses the immediate area of the Project with a 100 – 200 m buffer to account for potential indirect effects to Valued Components (VCs). The PA is approximately 1,221 ha and 85 ha of this area consists of open water features (Figure 1, Appendix A).

The remainder of the land comprises of forested and harvested landscapes, historical and current mine workings, access roads and trails, forested swamps and peatlands.

1.4 Project Team

A project team consisting of terrestrial ecologists proficient in vegetation, lichen and/or wildlife identification were selected to complete the field studies and reporting. Team members with integral roles in the surveying, reporting and project management are listed below (Table 1).

Table 1. Project Team

Team Member	Role and Duties
John Gallop, B.Sc., P.Biol	Terrestrial Ecologist, Senior Report Review
Chris Pepper	Terrestrial Ecologist, Lichenologist
Meaghan Quanz, B.Sc., M.E.S.	Terrestrial Ecologist, Report Writer
Emma Posluns, B.Sc., MSc	Project Coordinator
Meaghan Milloy, B.Sc., M.E.S.	Vice President and Project Manager

2 METHODOLOGY

Completion of the flora and fauna surveys was a two-part process consisting of a desktop review and field surveys. The desktop component involved a preliminary screening of the area which guided the survey design. A description of the methods used are described below.

2.1 Flora

2.1.1 Desktop Review Methodology

Prior to undertaking the flora (vegetation and lichen) field assessment, a detailed desktop review of known flora observations and potential habitat for rare lichens and vegetation within the PA was completed to support the survey design. The following databases were reviewed:

- ACCDC Database (retrieved February 2017 and February 2021);
- Atlantic Coastal Pain (ACPF) buffer database;
- Mersey Tobeatic Research Institute (MTRI) vole ears (*Erioderma mollissimum*) and boreal felt lichen (*Erioderma pedicellatum*) database;
- Nova Scotia Department of Natural Resources and Renewables (NSDNRR) Significant Habitats;
- NSDNRR Significant Habitat layers;
- SARA Critical Habitat layers;
- SARA Recovery strategies; and,
- Special Management Practice (SMPs) layers.

2.1.2 Priority Species List

A priority species list was created to support of the assessment of priority species occurrences and use of the PA. The purpose of the priority species list is to identify a broad list of species that have the potential to be present within the PA. Priority species include Species of Conservation Interest (SOCI) that are not listed species under provincial or federal legislation (i.e., Committee on the Status of Endangered Wildlife in Canada [COSEWIC] species and/or Atlantic Canada Conservation Data Center [ACCDC] S1, S2 and S3 species or any combination thereof (i.e., S3S4 is considered a SOCI)), and Species at Risk (SAR) which are listed on the Species at Risk Act (SARA) and/or the Nova Scotia Endangered Species Act (NSESA).

Development of a priority species list was completed based on a compilation of listed species from the following sources:

1. **Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and Species at Risk Act (SARA)**: All species listed as Endangered, Threatened, or Special Concern;
2. **Nova Scotia Endangered Species Act (NSESA):** All species listed as Endangered, Threatened, or Vulnerable; and,
3. **Atlantic Canada Conservation Data Centre (ACCDC) Conservation Rank:** All Species designated as S1, S2, or S3 as defined by the ACCDC.

The priority list of species was first narrowed by broad geographic area and then further narrowed by identifying specific habitat requirements for each species. For example, if a listed species on the NSESA required karst topography and no karst topography is present inside the PA, this species was not carried forward to the priority species list.

The data sets and reports described above and in section 2.1.1 were reviewed and used to develop the priority species list. The ACCDC report was one of the key documents used in the development of the priority species list, as this report summarizes known and observed occurrences of rare species in the general location of the PA.

The final list of priority species is included in Appendix B and the ACCDC report is included in Appendix C.

2.1.3 Desktop Survey Design

Prior to conducting field surveys, a preliminary desktop survey design was created using data sources described in section 2.1.1 and the priority species list to guide the survey design and approach. To understand the current habitat types within the PA and surrounding areas, and what habitats to target, the following data sources were used:

- NSDNRR Forest Inventory;
- Nova Scotia Environment and Climate Change Canada (NSECC) Wetland Inventory;
- Nova Scotia Topographic Database (NSTDB) which includes road, watercourse and topography layers;
- NSDNRR Boreal Felt Lichen Predictive Habitat Polygons;
- Mersey Tobeatic Research Institute (MTRI) vole ears (*Erioderma mollissimum*) and boreal felt lichen (*Erioderma pedicellatum*) database;
- NSECC Wet Areas Mapping (WAM) and Flow Accumulation; and,
- Aerial imagery (provided by Google Earth).

These databases were then categorized into broad habitat groups. Based on the ecologist's knowledge of the area and results from the priority species lists and the ACCDC report, the surveyors came up with a preliminary survey route targeting the habitats below:

- Mature forested softwood stands;
- Mature forested mixedwood stands;
- Mature forested softwood stands;
- Cutovers;
- Wetlands (i.e. swamps, fens, bogs);
- Anthropogenic (e.g. roads, quarries etc.);
- Open waterbodies; and,
- Areas with edge habitat.

During the desktop lichen survey design, surveyors screened for mature forested stands, wetlands and forests adjacent to lakes and watercourses as these habitats have an elevated potential for rare epiphytic lichens. Boreal felt lichen habitat polygons were reviewed and were targeted in the preliminary survey route.

The vascular rare plant survey design was less targeted than the lichen surveys and a general route intersecting all habitats listed above was developed. Although, the preliminary route did target many open bogs as the SOCI northern comandra (*Geocaulon lividum*) was identified in the desktop review and priority species list.

2.1.4 Vascular and Non-vascular Plant Field Surveys

Vascular and non-vascular plant surveys took place in 2017, 2019 and 2021 and followed the general survey route described in the desktop survey design (2.1.3). The surveys were conducted within the growing season in 2017 by GEMTEC and in 2019 – 2021 by MEL. Surveys in 2017 were completed in June and late July by GEMTEC and on June 14th – June 15th, June 23rd – June 25th, September 13th – September 16th, September 27th and September 28th, 2021. These surveys occurred in early June and were then repeated in late September to capture species with different phenological characteristics. Completing

these surveys in different periods of the growing season allows for better detection of species (Figure 2, Appendix A).

Meandering transects were completed on foot and all major habitat types (described in section 2.1.1), including wetlands, trails, upland forests and forestry trails, were assessed to create a species list of the general vascular species and vegetation communities present within the PA.

The priority species list was referenced during the surveys and species on that list were targeted. Survey efforts were focused on wetlands (specifically raised bogs within the PA) and riparian habitats as they often have an increased potential for rarities. The edges of clearings and linear disturbances were also assessed with detail as priority species such as the variegated horsetail (*Equisetum variegatum;* ACCDC:S3) and Nova Scotia agalinis (*Agalinis neoscotia;* ACCDC: S3S4) are often associated with these habitats and are known within the PA.

If a species could not be identified in the field, detailed photographs were taken to capture diagnostic features, and, if possible, specimens were collected and preserved for future identification. All priority species observed were georeferenced, counted (when possible), photographed, and their habitat was recorded. When specimens were present in tufts or in large numbers and counting the individuals became a challenge, the areas of these clumps were measured (e.g. 10 m x 10 m). The following primary references were used during the field surveys and identification process:

Vascular Plants:

- Roland's Flora of Nova Scotia (Zinck, 1998);
- Nova Scotia Plants (Munro, Newell, & Hill, 2014);
- Flora of New Brunswick (Hinds, 2000);
- Go Botany (Native Plant Trust, 2020);
- Field Manual of Michigan Flora (Voss & Reznicek, 2012);
- Sedges of Maine (Matt Arsenault, 2013); and,
- Grasses and Rushes of Maine (Glen M. Mittelhauser, 2019).

Bryophytes:

- Mosses of Eastern North America Vol. 1 & 2 (Crum & Anderson, 1981);
- Mosses and Liverworts of Britain and Ireland – a Field Guide (British Bryological Society, 2010); and,
- Common Mosses of the Northeast and Appalachians (McKnight., Rohrer, Ward, & Perdrizet, 2013).

2.1.5 Lichen Field Surveys

Surveys throughout the PA were completed by Mr. John R. Gallop on November 5th – 8th, 2018, August 14th – 15th, 2019 and November 4th – 6th, 2020, and by Mr. Chris Pepper on November 4th, 5th, 9th, 10th and

11th, 2020 (Figure 3, Appendix A). In addition, lichens were opportunistically searched for during the plant surveys. Boreal felt lichen predictive habitat polygons, mature forested swamps or mature stands adjacent to watercourses or lakes and areas subject to high humidity were targeted. In general, mature forested stands, either in poorly drained or well drained soils provide a higher likelihood to support rare epiphytic lichen species.

The following information was collected for any priority lichen species identified during field surveys: site location, date, scientific name, count, size, habitat (substrate, general habitat), location (waypoint in UTM NAD83), along with a photograph and any relevant comments. In the event lichen specimens could not be identified in the field, lichen samples were collected (when in abundance on site) in paper bags and stored for future identification. Chemical spot tests were used when necessary for identification and were completed as per methodologies described in Lichen of North America (Brodo, Sharnoff, & Sharnoff, 2001). The following primary references were used during the field surveys and identification process:

- The Macrolichens of New England (Hinds & Hinds, 2007);
- Keys to Lichens of North America – Revised and Expanded (Brodo, Sharnoff & Sharnoff, 2016); and,
- Lichens of North America (Brodo, Sharnoff, & Sharnoff, 2001).

2.2 Terrestrial Fauna

2.2.1 Desktop Review Methodology

Desktop resources were reviewed as described in section 2.1.1 to determine the presence of priority species within the PA and surrounding area. In addition to the resources described in section 2.2.1, the following resources were reviewed:

- NSDNRR mainland moose shelter patches and moose concentration areas (NSDNRR, 2012b); and,
- NSDNRR Abandoned Mine Openings (AMOS; NSDNRR, 2020).

2.2.2 Desktop Survey Design

Prior to conducting fauna field surveys, habitats were identified using the datasets described in section 2.2.1 and 2.1.3 as well as any field delineated wetlands, watercourses or habitat data collected during the biophysical field program for the project.

Mainland Moose

Twenty-six 1 km long transects (as recommended by NSDNR, 2012b and c) were established within and surrounding the PA. The survey design was as per NSDNRR *Protocol for Mainland Moose Snow Tracking Survey* and *Pellet Group Inventory Data Collection* (Nova Scotia Department of Natural

Resources, 2012b and c). The number of transects were chosen as they adequately cover appropriate habitat within and surrounding the PA. Due to mainland moose requiring a variety of different habitats, several different habitats were targeted:

- Mature forested softwood and hardwood stands which could provide cover from snow fall;
- Cutovers/regenerative stands, open wetlands and riparian habitats that provide foraging habitat; and,
- Cleared corridors and access trails.

Snapping Turtle Surveys

Lakes and gravel roads within the PA were identified in the desktop survey design and were targeted as priority areas during the field surveys. These habitats were targeted as they are potential breeding and overwintering habitat for snapping turtles.

Bat Hibernaculum Surveys

All AMOs on crownland and within 5 km of the PA were reviewed and were targeted as potential bat hibernaculum sites, as AMOs have an elevated likelihood to provide suitable habitat for bat hibernation. A five km survey radius was chosen as it is anticipated this would be the maximum extent of Project affects from blasting.

2.2.3 Field Surveys

Data collection on various fauna species occurred through a combination of targeted field surveys and incidental observations. Targeted surveys were completed for bats, mainland moose, and snapping turtles. Incidental observations were recorded for all other fauna species including other mammals, reptiles, amphibians, and invertebrates. The goal of both targeted surveys and incidental observations was to understand which species are present within the PA and how they could potentially interact with the Project, particularly species at risk and species of conservation interest.

Incidental observations of other terrestrial fauna such as mammals, amphibians and reptiles and their signs across the PA were documented and photographed during all field surveys. Signs observed included features such as dens and nests, scat, tracks, and forage evidence.

2.2.4 Mainland Moose Surveys

In total, 26 moose transects were surveyed in the 2017 – 2021 surveys. One Pellet Group (PGI) survey was conducted on April 25th – 27th, 2017 along 12-1km transects (GEMTEC, 2017), which ran through various habitat types including high moose probability habitats, such as fens, marshes and cleared corridors (GEMTEC, 2017). Following changes in the PA boundaries, additional surveys were completed

in 2021: two winter tracks surveys on February 11th – 12th, and March 22nd, 2021, and one PGI survey on April 23rd, 2021 (MEL). To maintain consistency with the previously established baseline data, the original twelve transects were used in the 2021 surveys. Due to the change in PA boundaries, an additional eight transects were included, for a total of 20 transects surveyed in 2021. An additional six transects were included during the second winter track survey and PGI survey in 2021 to provide additional coverage north of the PA. Given that mainland moose have large home ranges, moose surveys were completed within and outside of the PA to provide additional regional survey effort. The surveys conducted outside of the PA can be used as reference sites post-construction. See Figure 5 Appendix A for transect locations.

Track surveys were completed on foot by two observers experienced in recognition of moose, deer and other wildlife tracks, scat and browse. Initially, three winter tracking surveys were planned to take place in 2021, assuming suitable snow conditions were present. However, a third winter tracking survey was not possible due to milder weather conditions resulting in unsuitable tracking conditions. As such, only two winter track surveys took place on February 11th-12th and March 22nd, 2021 in snow conditions suitable for tracking, approximately 72 hours after a snowfall event. One PGI survey was conducted on April 23rd, 2021. Table 2 summarizes the dates moose surveys were completed and tracking conditions.

During the winter track surveys, all scat, tracks, signs and visual and auditory observations were recorded. All deer and moose signs were recorded, photographed, and georeferenced, as well as any priority species observations. The following literature was referenced:

- Mammal Tracks & Sign – A Guide to North American Species (Elbroch & McFarland, 2019); and,
- Tracking & the Art of Seeing: How to Read Animal Tracks and Sign. 2nd ed (Rezendes, 1999)

During the PGI surveys, the focus was on any scat present within the PA. All scat was photographed, recorded and georeferenced.

Table 2: Moose Survey Transect Information

Transect #	Survey Dates	Survey Type	Vegetation types[1]	Date of last significant snowfall	Snow conditions	Previous weather within 24 hrs	General Weather Conditions
1	April 25 - 27, 2017	Pellet Group Inventory	WC2, SH8	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation
	February 12, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny,
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
2	April 25 - 27, 2017	Pellet Group Inventory	WC2, SH8	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation
	February 12, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny,
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
3	April 25 - 27, 2017	Pellet Group Inventory	WC2, SH8, MG1	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation
	February 11, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny,
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
4	April 25 - 27, 2017	Pellet Group Inventory	WC2, SH8, PG4,	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation

Transect #	Survey Dates	Survey Type	Vegetation types[1]	Date of last significant snowfall	Snow conditions	Previous weather within 24 hrs	General Weather Conditions
	February 11, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
5	April 25 - 27, 2017	Pellet Group Inventory	SH5, PG1, PG2, WC1, Cutover	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation
	February 11, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021			March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
6	April 25 - 27, 2017	Pellet Group Inventory	Cutover, WC1, WC2, SH8, PG1	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation
	February 11, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
7	April 25 - 27, 2017	Pellet Group Inventory	WC1, PG1, SH8, Cutover	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation
	February 11, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny

Transect #	Survey Dates	Survey Type	Vegetation types[1]	Date of last significant snowfall	Snow conditions	Previous weather within 24 hrs	General Weather Conditions
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
8	April 25 - 27, 2017	Pellet Group Inventory	SH8, WC2, PG1	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation
	February 12, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
9	April 25 - 27, 2017	Pellet Group Inventory	WD2, SH8, WC1, PG1	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation
	February 12, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
10	April 25 - 27, 2017	Pellet Group Inventory	WD2, SH8, WC1, PG1	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation
	February 12, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
11	April 25 - 27, 2017	Pellet Group Inventory	Cutover, SH8, WC2	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation

Transect #	Survey Dates	Survey Type	Vegetation types[1]	Date of last significant snowfall	Snow conditions	Previous weather within 24 hrs	General Weather Conditions
	February 11, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
12	April 25 - 27, 2017	Pellet Group Inventory	WC2, SH8, PG1	N/A	N/A	3.9ºC, 0 cm precipitation	8ºC, 0 cm precipitation
	February 11, 2021	Winter Track Survey		February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny,
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
13	February 11, 2021	Winter Track Survey	Cutover, SH8	February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
14	February 12, 2021	Winter Track Survey	Road, SH8, Cutover	February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
15	February 12, 2021	Winter Track Survey	Road, SH8, Cutover	February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny

Transect #	Survey Dates	Survey Type	Vegetation types[1]	Date of last significant snowfall	Snow conditions	Previous weather within 24 hrs	General Weather Conditions
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
16	February 12, 2021	Winter Track Survey	Road, SH8, Cutover	February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
17	February 12, 2021	Winter Track Survey	Cutover, MW4	February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
18	February 12, 2021	Winter Track Survey	MW4, WC2	February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
19	February 11, 2021	Winter Track Survey	Road, SH8, WC1, WC2	February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy

Transect #	Survey Dates	Survey Type	Vegetation types[1]	Date of last significant snowfall	Snow conditions	Previous weather within 24 hrs	General Weather Conditions
20	February 11, 2021	Winter Track Survey	Road, SH8, WC1, WC2	February 8, 2021	Good	-10ºC, sunny, 0 cm precipitation	-10ºC, sunny
	March 22, 2021	Winter Track Survey		March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
21	March 22, 2021	Winter Track Survey	Road, Cutover, SH8	March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
22	March 22, 2021	Winter Track Survey	Road, Cutover, softwood stands	March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
23	March 22, 2021	Winter Track Survey	Cutover, softwood stands	March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
24	March 22, 2021	Winter Track Survey	Cutover, MW4, WC2, SH8	March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
25	March 22, 2021	Winter Track Survey	Road, Cutover, MW4, SH8	March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy
26	March 22, 2021	Winter Track Survey	Cutover	March 19, 2021	Fair - poor	5ºC, sunny	6ºC, sunny

Transect #	Survey Dates	Survey Type	Vegetation types[1]	Date of last significant snowfall	Snow conditions	Previous weather within 24 hrs	General Weather Conditions
	April 23, 2021	Pellet Group Inventory		N/A	N/A	6.6ºC, 9.7cm precipitation	2ºC, overcast, windy

[1]*Vegetation types are as per the classification systems used in the Goldboro Gold Project – Vegetation Community Assessments (MEL, 2022) biophysical report.*

2.2.5 Snapping Turtle Surveys

Snapping turtles (*Chelydra serpentina*) have been observed within 28 km of the PA (ACCDC, 2021) and suitable habitat within the PA is present, therefore, targeted, species-specific surveys were completed to assess usage of the PA by snapping turtles through roadside snapping turtle surveys. Females generally lay their eggs between late May and late June, on or near gravel banks near water where vegetation is absent or sparse. This can include roadsides, artificial dams, rocky banks, sawdust piles, disturbed soils (ECCC, 2020).

Two rounds of roadside snapping turtle surveys were conducted on June 2nd and June 16th, 2021 along gravel roadsides in proximity to waterbodies (Figure 6, Appendix A). These gravel paths were slowly driven or walked while looking for disturbed gravel, soil, or sand mounds with evidence of digging, or turtle shells. Any gravel or sandy beaches adjacent to Gold Brook Lake were also surveyed for snapping turtle activity. Binoculars were used to observe the shore of the lake. A GPS shapefile was created with various target areas that covered this type of habitat within the PA. Surveys focused on these areas, however, the entire PA was also driven and observed for snapping turtles concurrently with other biophysical surveys. Turtle observation cards were on-hand if a turtle was observed incidentally in the field.

2.2.6 Bat Hibernaculum Surveys

Abandoned mine openings (AMOs) can provide bat habitat, especially if they are open and unflooded. Several AMOs are located within the PA and within 5 km (NSDNR, 2017). Bat hibernacula and roosting assessments were conducted in June 2017 (GEMTEC). A potential bat roosting area was found in a warehouse building on site with evidence of guano, as well as at an AMO showing potential for bat hibernaculum (GEMTEC, 2017). These sites were revisited in 2019 by MEL during a dusk survey to assess for potential of bat activity (Figure 7, Appendix A).

Additional surveys were completed by MEL on June 2nd and 3rd, 2021 to observe all AMOs on Crown land inside and within 5 km of the PA for suitable bat habitat. Twenty-six AMOs were included in the survey (Figure 7, Appendix A). At each location the AMO shaft ID was recorded, a photo was taken and notes on if the AMO provided suitable bat habitat.

During all biophysical surveys within the PA, MEL biologists recorded any evidence of caves, open wells, cavities in mature trees, rock outcrops or other potential hibernacula or maternity roosting habitats, or any incidental observations of bats themselves.

3 RESULTS

Desktop and field results for the flora and fauna surveys that occurred in 2017 – 2021 are summarized below.

3.1 Flora

During the rare plant and lichen surveys, a total of 203 species were observed and include one hundred thirty-three vascular plants, 40 bryophytes and 30 lichen species. The desktop and field results of these surveys are described below.

3.1.1 Desktop Review

The ACCDC report identified four priority vascular plants and eight lichen species within 5 km of the PA (Appendix B):

- Two SAR lichen species were observed and include: boreal felt lichen (*Erioderma pedicellatum;* NSESA and SARA Endangered), blue felt lichen (*Pectenia plumbea,* NSESA: Vulnerable; SARA: Special Concern).
- Four locations of blue felt lichen were observed within the PA.
- Four SOCI vascular plant species and six SOCI lichens were also observed.

All priority flora species within 5 km of the PA are listed in Table 3 (below) and shown in Figure 4 (Appendix B).

Table 3. SAR SOCI Flora Species as listed by the ACCDC Report

Scientific Name	Common Name	COSEWIC	SARA	NSESA	S-Rank	Distance
Erioderma pedicellatum (Atlantic pop.)	**Boreal Felt Lichen – Atlantic pop.**	**Endangered**	**Endangered**	**Endangered**	**S1**	**4.4 ± 0.0**
Pectenia plumbea	**Blue Felt Lichen**	**Special Concern**	**Special Concern**	**Vulnerable**	**S3**	**0.5 ± 0.0**
Peltigera collina	Tree Pelt Lichen	-	-	-	S2?	1.6 ± 4.0
Usnea rubicunda	Red Beard Lichen	-	-	-	S2S3	3.1 ± 0.0
Fuscopannaria ahlneri	Corrugated Shingles Lichen	-	-	-	S3	4.5 ± 0.0
Moelleropsis nebulosa	Blue-gray Moss Shingles Lichen	-	-	-	S3	4.4 ± 0.0
Fuscopannaria sorediata	a Lichen	-	-	-	S3	0.3 ± 0.0
Coccocarpia palmicola	Salted Shell Lichen	-	-	-	S3S4	3.1 ± 0.0
Sparganium hyperboreum	Northern Burreed	-	-	-	S1S2	4.2 ± 0.0
Betula michauxii	Michaux's Dwarf Birch	-	-	-	S2S3	2.5 ± 0.0
Geocaulon lividum	Northern Comandra	-	-	-	S3	1.3 ± 0.0
Aalinis neoscotica	Nova Scotia Agalinis	-	-	-	S3S4	0.7 ± 0.0

Bolded species are those that have legal protection. "-" indicates no entry.

Several BFL predictive habitat polygons are present within the PA and no extant BFL was identified using the MTRI lichen database. The closest observed population of BFL is 1.5 km northwest of the PA, but is not considered extant. The closest extant population of vole ear lichen is 45 km west of the PA.

3.1.2 Vascular and Non-vascular Plant Survey Results

A total of 133 vascular plant species, 40 bryophyte species, and five priority species, including northern comandra (*Geocaulon lividum*, S3), Wiegand's sedge (*Carex wiegandii*, S3), variegated scouring rush (*Equisetum variegatum*, S3), Nova Scotia agalinis (*Agalinis neoscotia*, S3S4) and southern twayblade (*Neottia bifolia*, S3) were identified within the PA (Figure 8A – 8D, Appendix A). Within the PA, 2% (n=3) of the vascular plants are exotic, 98% (n=130) are native and of all species observed, 6% (n=8) are belonging to the Atlantic Coastal Plain Flora Group (ACPFG).

The PA is a mosaic of disturbed and intact forested communities. Disturbances within the PA are primarily from timber harvesting, roads, industrial infrastructure and natural disturbances.

Eight species belonging to the ACPFG were observed within the PA. The ACPFG is a unique group of vascular plants found in a narrow range from Florida to Nova Scotia, with a few disjunct populations along the Georgian Bay region in Ontario. Many of the SAR within Nova Scotia belong to this group. Although most ACPFG are common in NS and have no regulatory protection, they are a unique group which have a very narrow range in North America. The ACPFG species observed within the PA are: dwarf huckleberry (*Gaylussacia bigeloviana*), northern bayberry (*Morella pensylvanica*), lance-leaved violet (*Viola lanceolata)*, prickly bog sedge (*Carex atlantica*), bog fern (*Coryphopteris simulata*), blue-eyed grasses (*Sisyrinchium angustifolium*), Nova Scotia agalinis (*Agalinis neoscotia*), and southern twayblade (*Neottia bifolia*).

Of the eight ACPFG observed, only two priority species were identified – Nova Scotia agalinis (S3S4) and southern twayblade (S3).

Photo 1. Representative photo of Nova Scotia agalinis (S3S4).

Photo 2. Representative photo of southern twayblade (S3).

3.1.3 Lichen Survey Results

Thirty lichens were observed within the PA, consisting of the following seven priority lichens, which include two SAR: blue felt lichen (*Pectenia plumbea,* SARA Special Concern, NSE Vulnerable, S3) and frosted glass whiskers (*Sclerophora peronella,* SARA Special Concern, S1?), and five SOCI species: a shingle lichen (*Fuscopannaria cf. sorediata,* S3), appressed jellyskin lichen (*Leptogium subtile,* S3), peppered moon lichen (*Sticta fuliginosa,* S3), corrugated shingles lichen (*Fuscopannaria cf. ahlerni,* S3), and slender monk's hood lichen (*Hypogymnia vittata,* S3S4). For results see Figure 8A – Figure 8D, Appendix A.

Photo 3. Representative photo of *Fuscopannaria cf. sorediata.*

Photo 4. Representative photo of appressed jellyskin lichen (*Leptopgium subtile)*.

Photo 5. Representative photo of blue felt lichen (*Pectenia plumbea*).

Photo 6. Representative photo of corrugated shingles lichen (*Fuscopannaria cf. ahlerni)*.

For details on habitat requirements, rankings, and locations of the SAR and SOCI species within the PA, refer to section 4 and section 5. For a complete list of lichen species observed within the PA, refer to Appendix D.

Portions of the large wetland complexes, including Wetland 1 and Wetland 44, provided mature conifer and hardwood species which support habitat for many SAR/SOCI lichen species, such as blue felt lichen, shingle lichen (*Fuscopannaria cf. sorediata)* and other rare cyanolichens. Habitats that had the highest potential for rare lichen species within the PA were deciduous and coniferous forested swamps with mature stands and often comprised of mature red maple and balsam fir. BFL polygons were targeted and often consisted of black and red spruce which are not suitable host trees for BFL in Nova Scotia. BFL polygons that appeared to be recently harvested or were regenerative forests, were not visited as these habitats aren't suitable for BFL. BFL habitat indicator species such as *Frullania sp.*, salted shell lichen (*Coccocarpia palmicola*) and *Lobaria spp.* growing on balsam fir were not observed.

Additionally, some of the BFL polygons were within fragmented habitats and bordered by scattered historical clear cuts and existing roads. These fragmented habitats have altered sun exposure and moisture regimes leading to a drying effect on forested edges and canopies/wetlands in close proximity (Rheault, Drapeau, Bergeron, & Esseen, 2003). Many lichens dependent on humid environments (including BFL) are often greatly negatively impacted by the presence of fragmented habitats (Rheault, Drapeau, Bergeron, & Esseen, 2003). Therefore, habitat suitability was often low throughout the PA due to the presence of historically forested areas, historical mining and road networks present across the PA.

3.1.4 Species Observations, Abundance and Habitat Associations

As described in section 3.1.2 and 3.1.3, several priority lichen and vascular plant species were observed. Many of these occurrences were associated with specific habitats, such as northern comandra which was exclusively observed in the raised bog communities within the PA or blue felt lichen which was observed on red maple within or near forested swamps. Species observations and their habitat associations are described in Table 2 and 3 (below).

Table 4. Observed priority Vascular Plants and associated habitat

Common Name	Scientific Name	COSEWIC	SARA	NSE	S-Rank	Total Individuals	Occurrences within the Project Area (PA)	Habitat Description	Wetland # (if applicable)	Vegetation Type(s)[1]
Northern comandra	*Geocaulon lividum*	-	-	-	S3	20	13	Bog	WL 42, WL 44, WL 74 and WL 130	PG1
Wiegand's sedge	*Carex wiegandii*	-	-	-	S3	2	2	Upland, shrub swamp	WL 44	MW4, WC1
Variegated scouring rush	*Equisteum variegatum*	-	-	-	S3	1	1	Along Goldboro Lake in historical tailings	N/A	SH8
Nova Scotia agalinis	*Agalinis neoscotia*	-	-	-	S3S4	20	18	Side of logging roads and pipelines, floodplains	WL 1 and WL 23	CO4, MG1, MW4,WC1, WC2
Southern Twayblade	*Neottia bifolia*	-	-	-	S3	3	3	Fen, swamp	WL 17, WL 42 and WL 117	WC2

[1]*Vegetation types are as per the classification systems used in the Goldboro Gold Project – Vegetation Community Assessments (MEL, 2022) biophysical report.*

Table 5. Observed priority lichens and associated habitat

Common Name	Scientific Name	COSEWIC	SARA	NSE	S-Rank	Total Individuals	Occurrences within the Project Area (PA)	Habitat Description	Wetland # (if applicable)	Vegetation Type(s)[1]
Blue felt lichen	***Pectenia plumbea***	**SC**	**SC**	**V**	**S3**	**225**	**50**	**WL 1, WL 12, WL 17 – WL 18, WL 20, WL 48, WL 51 – WL 52, WL 57, WL 58, WL 83, WL 131, WL 158, WL 161, WL 162, WL 187, WL 196, WL 201**	**Treed swamp, forested upland**	**MW2, MW4, SH5, SH8, SP5, WC1, WC2, WC6, WD2**
Frosted glass whiskers	***Sclerophora peronella***	**SC**	**SC**	**-**	**S1?**	**100+ podetia (1 observation)**	**1**	**WL 194**	**Treed Swamp**	**WC2**
Shingle Lichen	*Fuscopannaria cf. sorediata*	-	-	-	S3S4	28	19	**WL1 and WL 17**	Treed swamp, forested upland	MW4, SH5, WC2, WC6
Appressed jellyskin lichen	*Leptogium subtile*	-	-	-	S3	6	6	**WL 16, WL 17 and WL 35**	Treed swamp, forested upland	CO4, SH8, SP7, WC2
Peppered moon	*Sticta fuliginosa*	-	-	-	S3	1	1	N/A	forested upland	SH5

Common Name	Scientific Name	COSEWIC	SARA	NSE	S-Rank	Total Individuals	Occurrences within the Project Area (PA)	Habitat Description	Wetland # (if applicable)	Vegetation Type(s)[1]
lichen										
Corrugated shingles lichen	*Fuscopannaria c.f. ahlerni*	-	-	-	S3	11	8	WL 1, WL 20, WL 237	Treed Wetlands, forested upland	CO4, MW4, SH5, SH8, SP7, WC1, WC2
Slender monk's hood lichen	*Hypogymnia vittata*	-	-	-	S3S4	2	2	WL 198	Swamp	SH5, WC1

[1]*Vegetation types are as per the classification systems used in the Goldboro Gold Project – Vegetation Community Assessments (MEL, 2022) biophysical report.*

Bolded species are Species at Risk.

3.1.5 Flora Summary

During the rare plant and lichen surveys, a total of 203 species were observed which included 133 vascular plants, 40 bryophytes and 30 lichen species. Five priority vascular plant species: Nova Scotia agalinis (*Agalinis neoscotica,* S3S4), northern comandra (*Geocaulon lividum,* S3, Wiegand's sedge (*Carex wiegandii,* S3*),* variegated scouring rush (*Equisetum variegatum,* S3), and southern-tway blade (*Neottia bifolia,* S3) and seven priority lichen species were observed. Lichen species included: blue felt lichen (*Pectenia plumbea*), and frosted glass whiskers (*Sclerophora peronella,* S1?), which are species at risk (SAR), as well as five SOCI lichens: a lichen (*Fuscopannaria cf. sorediata,* S3), appressed jellyskin lichen (*Leptogium subtile,* S3), peppered moon lichen (*Sticta fuliginosa,* S3), corrugated shingles lichen (*Fuscopannaria cf. ahlerni,* S3), frosted glass whiskers (and slender monk's hood lichen (*Hypogymnia vittata,* S3S4).

Forty-two occurrences of blue felt lichen and one occurrence of frosted glass whiskers were observed within the PA and both were found within forested swamps and mature upland forests adjacent to wetlands. Mature treed swamps had the highest occurrences of rare lichen species, including frosted glass whiskers and blue felt lichen. These habitats were the most common wetland type and found throughout the PA.

The predictive BFL habitat polygons were within fragmented habitats and bordered by scattered historical clear cuts and existing roads. Many lichens dependent on humid environments (including BFL) are often greatly negatively impacted by the presence of fragmented habitats (Rheault, Drapeau, Bergeron, & Esseen, 2003). Although mature balsam fir swamps were present within the PA, the suite of BFL habitat indicator lichen species such as salted shell lichen, and *Lobaria* species were not present. Furthermore, the heavily fragmented forested habitats and potential edge effects decreased the overall habitat suitability for BFL.

3.2 **Terrestrial Fauna**

3.2.1 Desktop Review

Fifty-two priority terrestrial fauna (including invertebrates) species were observed within 100 km of the PA as per the ACCDC and within significant habitat for overwintering habitat for deer (Figure 4, Appendix A) and Table 6. Furthermore, the little brown myotis (*Myotis lucifugus;* Endangered) has been observed within 28 km from the PA, and bat hibernaculum have been observed within 5 km (ACCDC, 2021).

The PA is located within a mainland moose concentration area and contains several special management practice (SMP) moose patches (Figure 4, Appendix A). The PA also is contained within Mainland Moose core habitat (NSDNRR, 2021). Core habitat has been identified throughout the province and is essential for the long-term survival and recovery of mainland moose. Core habitat is identified using several

attributes, including suitability of forest cover, winter and summer foraging habitat, as well as suitability for calving (NSDNRR, 2021). Currently core habitat is defined but not protected through provincial and municipal legislation, although there is possibility that core habitat areas with high moose habitat suitability may be protected in the future. High moose suitability scores are created by determining the abundance of the key habitats described above and road density within a 10 km hexagon. Although the moose core habitat layer is not available to the public, based on an image overlay of Figure 10 of the *Recovery Plan for the Mainland Moose (Alces Alces Americana) In mainland Nova Scotia* (NSDNRR, 2021), with reasonable certainty, the Project does not appear to be in an area with high HSI values and is not considered a priority area for conservation.

There are five NSDNRR significant habitat polygons within the PA and several others outside and in the general area.

- **Deer Wintering Polygons** – These polygons are located south and east outside the PA with a small portion within the southern extent of the PA;
- **Species at Risk and Species of Concern Polygons –** four polygons are within the PA with observations of 11 priority species including two SAR; Canada warbler and olive-sided flycatcher.

Table 6. SAR and SOCI terrestrial fauna and invertebrate species within 100 km as listed by ACCDC

Scientific Name	Common Name	COSEWIC	SARA	NSESA	S-Rank	Distance (km)
Myotis lucifugus	**Little Brown Myotis**	**Endangered**	**Endangered**	**Endangered**	**S1**	**27.7 ± 0.0**
Glyptemys insculpta	**Wood Turtle**	**Threatened**	**Threatened**	**Threatened**	**S2**	**22.1 ± 10.0**
Chelydra serpentina	**Snapping Turtle**	**Special Concern**	**Special Concern**	**Vulnerable**	**S3**	**28.8 ± 0.0**
Chrysemys picta picta	**Eastern Painted Turtle**	**Special Concern**	**-**	**-**	**S4S5**	**45.3 ± 1.0**
Lynx canadensis	**Canadian Lynx**	**Not At Risk**	**-**	**Endangered**	**S1**	**68.2 ± 1.0**
Hemidactylium scutatum	**Four-toed Salamander**	**Not At Risk**	**-**	**-**	**S3**	**14.5 ± 0.0**
Alces americanus	**Moose**	**-**	**-**	**Endangered**	**S1**	**3.4 ± 0.0**
Danaus plexippus	**Monarch**	**Endangered**	**Special Concern**	**Endangered**	**S2B**	**13.0 ± 0.0**
Bombus terricola	**Yellow-banded Bumblebee**	**Special Concern**	**Special Concern**	**Vulnerable**	**S3**	**20.4 ± 0.0**
Vespertilionidae	Bat species	-	-	-	S1S2	3.2 ± 0.0

Scientific Name	Common Name	COSEWIC	SARA	NSESA	S-Rank	Distance (km)
sp.						
Pekania pennanti	Fisher	-	-	-	S3	40.1 ± 7.0
Neurocordulia michaeli	Broadtailed Shadowdragon	-	-	-	S1	27.1 ± 0.0
Lycaena dorcas	Dorcas Copper	-	-	-	S1?	82.5 ± 0.0
Strymon melinus	Grey Hairstreak	-	-	-	S1S2	71.3 ± 1.0
Nymphalis l-album	Compton Tortoiseshell	-	-	-	S1S2	90.3 ± 2.0
Haematopota rara	Shy Cleg	-	-	-	S1S3	85.3 ± 0.0
Lycaena hyllus	Bronze Copper	-	-	-	S2	36.1 ± 0.0
Lycaena dospassosi	Salt Marsh Copper	-	-	-	S2	97.2 ± 0.0
Satyrium calanus	Banded Hairstreak	-	-	-	S2	89.9 ± 2.0
Aglais milberti	Milbert's Tortoiseshell	-	-	-	S2	90.3 ± 2.0
Pantala hymenaea	Spot-Winged Glider	-	-	-	S2?B	36.1 ± 1.0
Thorybes pylades	Northern Cloudywing	-	-	-	S2S3	36.2 ± 0.0
Amblyscirtes hegon	Pepper and Salt Skipper	-	-	-	S2S3	32.1 ± 0.0
Satyrium liparops	Striped Hairstreak	-	-	-	S2S3	89.2 ± 1.0
Euphydryas phaeton	Baltimore Checkerspot	-	-	-	S2S3	24.0 ± 0.0
Gomphus descriptus	Harpoon Clubtail	-	-	-	S2S3	69.0 ± 0.0
Ophiogomphus aspersus	Brook Snaketail	-	-	-	S2S3	69.0 ± 0.0
Ophiogomphus mainensis	Maine Snaketail	-	-	-	S2S3	54.0 ± 0.0
Ophiogomphus rupinsulensis	Rusty Snaketail	-	-	-	S2S3	27.1 ± 0.0
Alasmidonta undulata	Triangle Floater	-	-	-	S2S3	33.9 ± 0.0
Naemia seriata	a Ladybird beetle	-	-	-	S3	54.8 ± 0.0
Iphthiminus	a Darkling	-	-	-	S3	85.8 ± 0.0

Scientific Name	Common Name	COSEWIC	SARA	NSESA	S-Rank	Distance (km)
opacus	Beetle					
Monochamus marmorator	a Longhorned Beetle	-	-	-	S3	20.3 ± 0.0
Callophrys henrici	Henry's Elfin	-	-	-	S3	2.9 ± 0.0
Callophrys lanoraieensis	Bog Elfin	-	-	-	S3	72.3 ± 1.0
Speyeria aphrodite	Aphrodite Fritillary	-	-	-	S3	44.7 ± 100.0
Polygonia faunus	Green Comma	-	-	-	S3	36.1 ± 0.0
Megisto cymela	Little Wood-satyr	-	-	-	S3	79.5 ± 1.0
Aeshna clepsydra	Mottled Darner	-	-	-	S3	46.1 ± 1.0
Aeshna constricta	Lance-Tipped Darner	-	-	-	S3	99.5 ± 1.0
Boyeria grafiana	Ocellated Darner	-	-	-	S3	27.2 ± 0.0
Gomphaeschna furcillata	Harlequin Darner	-	-	-	S3	56.6 ± 0.0
Nannothemis bella	Elfin Skimmer	-	-	-	S3	56.6 ± 0.0
Sympetrum danae	Black Meadowhawk	-	-	-	S3	7.6 ± 0.0
Enallagma vernale	Vernal Bluet	-	-	-	S3	64.1 ± 0.0
Amphiagrion saucium	Eastern Red Damsel	-	-	-	S3	85.3 ± 0.0
Cupido comyntas	Eastern Tailed Blue	-	-	-	S3?	71.5 ± 0.0
Polygonia interrogationis	Question Mark	-	-	-	S3B	17.6 ± 0.0
Erynnis juvenalis	Juvenal's Duskywing	-	-	-	S3S4	51.0 ± 1.0
Amblyscirtes vialis	Common Roadside-Skipper	-	-	-	S3S4	2.9 ± 0.0
Polygonia progne	Grey Comma	-	-	-	S3S4	34.0 ± 0.0
Lanthus parvulus	Northern Pygmy Clubtail	-	-	-	S3S4	28.6 ± 0.0

Scientific Name	Common Name	COSEWIC	SARA	NSESA	S-Rank	Distance (km)
Bolded species are those that have legal protection; "-" indicates no entry. **Species list excludes avifauna species.**						

The desktop review reveals a diversity of priority species observed within and surrounding the general area of the PA. These occurrences provides a snap-shot of what could occur within the PA. These species were carried forward to the development of the priority species list as were recorded if observed during the field program.

3.2.2 Mainland Moose Surveys

In 2017 and 2021, moose tracks and browse were observed (Figure 5, Appendix A) in upland softwood forests. No other observations of moose were observed during the targeted surveys or incidentally during the other biophysical field programs (Table 7).

Several different habitats for moose were observed within and surrounding the PA which include regenerative and cutovers which have provided suitable foraging habitat in the winter and summer months, mature forested stands which can provide winter and summer cover and open water features (i.e. Goldbrook Lake) which could have potential for calving and aquatic feeding areas in the summer months.

Table 7. Moose Survey Results

Transect #	Survey Dates	Moose Present (Y/N)	Transect #	Survey Dates	Moose Present (Y/N)
1	April 25 - 27, 2017	N	4	April 25 - 27, 2017	N
	February 12, 2021	N		February 11, 2021	N
	March 22, 2021	N		March 22, 2021	N
	April 23, 2021	N		April 23, 2021	N
2	April 25 - 27, 2017	N	5	April 25 - 27, 2017	N
	February 12, 2021	N		February 11, 2021	N
	March 22, 2021	N		March 22, 2021	N
	April 23, 2021	N		April 23, 2021	N
3	April 25 - 27, 2017	N			
6	April 25 - 27, 2017	N	13	February 11, 2021	N
	February 11, 2021	N		March 22, 2021	N
	March 22, 2021	N		April 23, 2021	N

Transect #	Survey Dates	Moose Present (Y/N)	Transect #	Survey Dates	Moose Present (Y/N)
	April 23, 2021	N	14	February 12, 2021	N
7	April 25 - 27, 2017	Y - Moose tracks and browse		March 22, 2021	N
	February 11, 2021	N		April 23, 2021	N
	March 22, 2021	N	15	February 12, 2021	N
	April 23, 2021	N		March 22, 2021	N
8	April 25 - 27, 2017	N		April 23, 2021	N
	February 12, 2021	N	16	February 12, 2021	N
	March 22, 2021	N		March 22, 2021	N
	April 23, 2021	N		April 23, 2021	N
9	April 25 - 27, 2017	N	17	February 12, 2021	N
	February 12, 2021	N		March 22, 2021	N
	March 22, 2021	N		April 23, 2021	N
	April 23, 2021	N	18	February 12, 2021	N
10	April 25 - 27, 2017	N		March 22, 2021	N
	February 12, 2021	N		April 23, 2021	N
11	April 25 - 27, 2017	N	19	February 11, 2021	N
	February 11, 2021	N		March 22, 2021	N
	March 22, 2021	N		April 23, 2021	N
	April 23, 2021	N	20	February 11, 2021	N
12	April 25 - 27, 2017	N		March 22, 2021	Y – Moose tracks
	February 11, 2021	N		April 23, 2021	N
	March 22, 2021	N	21	March 22, 2021	N
	April 23, 2021	N		April 23, 2021	N
22	March 22, 2021	N	-	-	-
	April 23, 2021	N	-	-	-
23	March 22, 2021	N	-	-	-
	April 23, 2021	N	-	-	-
24	March 22, 2021	N	-	-	-
	April 23, 2021	N	-	-	-

Transect #	Survey Dates	Moose Present (Y/N)	Transect #	Survey Dates	Moose Present (Y/N)
25	March 22, 2021	N	-	-	-
	April 23, 2021	N	-	-	-
26	March 22, 2021	N	-	-	-
	April 23, 2021	N	-	-	-

Photo 7. Moose tracks observed March 22nd, 2021

3.2.3 Snapping Turtle Surveys

No snapping turtles, sign or nests were observed during the dedicated surveys or incidentally in the 2017 – 2021 biophysical survey program.

Overwintering habitat was observed in the pond associated with WL 18. This area had depths of approximately 1 m (deep enough to prevent the water from freezing at the bottom) and mucky substrate suitable for overwintering for snapping turtles (ECCC, 2020). Suitable water depths were observed at Goldboro Lake, however substrate wasn't suitable for overwintering (i.e. cobbles and boulders).

Gravel along the roads, particularly adjacent to Goldboro Lake, could provide nesting habitat for snapping turtles however, there was no evidence of these areas being used as nesting sites.

Photo 8. Southern end of Gold Brook Lake.

Photo 9. Pond associated with WL 18

3.2.4 Bat Hibernaculum Surveys

During the 2017, 2019 and 2021 surveys, no bats were observed within the PA. No bats were observed incidentally during other biophysical surveys. In 2019, surveys of the potential bat roosting area in a nearby core shack, as well as one AMO, was determined unsuitable for bat hibernacula. The AMO had collapsed preventing entry and exit points for bats and the warehouse lacked insulation and would provide little to no protection from the cold and dry air during the winter months.

During the 2021 survey, twenty-six AMOs were surveyed within 5 km of the PA, and all were either infilled with rocks or dirt, filled with debris and/or flooded. Given this, none of the AMOs were identified as suitable bat hibernacula habitat.

Mature forested stands do exist within the PA and could provide roosting habitat however, no evidence of roosting was observed during the 2017 – 2021 surveys.

Photo 10: Example of infilled AMO.

Photo 11: Example of flooded AMO.

3.2.5 Terrestrial Fauna Summary

The PA is within moose core habitat and several observations of mainland moose were observed during the 2017 – 2021 surveys. Habitat for moose, which include summer foraging, winter and summer cover, and calving areas, was observed within and surrounding the PA.

No snapping turtles were observed however, potential overwintering habitat was observed in WL 18. Although water depths were suitable for snapping turtles in Gold Brook Lake, the gravel substrate made it unsuitable for overwintering. Nesting habitat for snapping turtles was present within the PA along gravel roads, however, no snapping turtles or evidence of breeding were observed.

All AMOs were either flooded and/or collapsed and did not provide suitable bat hibernacula habitat. Mature forested stands were present within the PA which could provide suitable roosting habitat, however, no bats or evidence of roosting were observed.

3.2.6 General Wildlife Observations

Wildlife species, including mammal species, were observed incidentally within the PA during the biophysical surveys. See Table 8 for all incidental wildlife observations confirmed either visually or by sign (scat, tracks, etc.).

Table 8: Confirmed wildlife species observed within the Project Area

Scientific Name	Common Name	S-Rank
Mammal		
Lepus americanus	Snowshoe hare	S5
Odocoileus virginianus	White tailed deer	S5

Scientific Name	Common Name	S-Rank
Mammal		
Tamiasciursus hudsonicus	American red squirrel	S5
Lynx rufus	Bobcat	S5
Ursus americanus	American black bear	S5
Erethizon dorsata	North American porcupine	S5
Castor canadensis	North American beaver	S5
Peromyscus sp.	Deer mouse	S5
Microtus pennsylvanicus	Meadow vole	S5
Lontra canadensis	North American river otter	S5
Vulpes vulpes	Red fox	S5
Canis latrans	Eastern coyote	S5
Herptofauna		
Pseudacris crucifer	Spring peeper	S5
Lithobates clamintans	Green frog	S5
Thamnophis sirtalis	Common garter snake	S5
Plethodon cinereus	Eastern red-backed salamanders	S5

Other species not encountered during field surveys that have the potential to use the Study Area habitat include the following.

Table 9: Mammalian Species with Potential Habitat within the Study Area

Common Name	Scientific Name	S-Rank
Red fox	*Vulpes vulpes*	S5
North American deer mouse	*Peromyscus maniculatus*	S5
Raccoon	*Procyon lotor*	S5
Eastern coyote	*Canis latrans*	S5
Bobcat	*Lynx rufus*	S5

4 SPECIES AT RISK (SAR) OBSERVED

Two SAR lichen species (blue felt lichen and frosted glass whiskers) were observed during the dedicated survey period as well as incidentally. Sign of one SAR mammal species (mainland moose) was observed during dedicated fauna surveys. The habitat within the PA comprises of a mosaic of softwood, mixedwood forested stands, regenerative forests, open water, treed and shrubbed wetlands and clearings which provide a wide range of habitats for other flora and fauna SAR species. Below lists the SAR species observed and their rankings.

- Blue felt lichen (Pectenia plumbea, ACCDC: S3, NSESA – Vulnerable, SARA Special Concern),
- Frosted glass whiskers (*Sclerophora peronella,* ACCDC: S1?, SARA Special Concern),
- Mainland moose (*Alces alces americana,* ACCDC: S1, NSESA: Endangered)

Blue Felt Lichen

Blue felt lichens are large, blue-grey lichens, with a prominent black-blue fungal mat and red-brown fruiting bodies. Blue felt lichen is commonly found on the trunks of old hardwood trees in moist habitats or near streams or lakes. It prefers cool, humid woodlands with mixed coniferous/hardwood or deciduous dominant swamps (COSEWIC 2010). Blue felt lichen was observed at 50 locations within the PA during both dedicated lichen surveys and incidentally. It was generally observed within forested wetland habitats or in upland habitats close to wetlands, watercourses or lakes. Forested softwood and mixedwood swamps were the most dominant habitats this species was observed and was exclusively found on mature red maples. Blue felt lichen habitat was observed throughout the PA.

Frosted Glass Whiskers

Frosted glass whiskers belong to a group known as calicioids or "stubble" lichen, due to their tiny, stalked structures, which are imbedded into substrates. They generally occur on hardwoods, usually on the exposed heartwood of living trunks, particularly red maple. It is mostly often found in mature and old-growth coniferous and deciduous forests (COSEWIC, 2005). One occurrence of frosted glass whickers was observed within the heartwood of a mature red maple within a swamp (WL194) and contained over 100 podetia (stalks). This wetland was dominated by mature balsam fir with scattered mature red maples, with high cinnamon fern cover. Although this was the only location frosted glass whiskers was observed, habitat for this species overlaps with blue felt lichen habitat and was observed throughout the PA.

Mainland Moose

Moose are associated with mature coniferous and deciduous forests. Moose require large tracts of forest for shelter, thermoregulation, and foraging. Moose are herbivores who live in boreal and mixedwood forests and are often found where there is an abundance of food (NSDNRR, 2021). Mainland moose presence was observed during targeted surveys in the southern and eastern portion of the PA in forested areas. Habitat for moose was also widespread throughout the PA. Summer and winter foraging (cutovers and regenerative stands), mature forested stands for winter and summer cover and lakes for calving were observed within the PA and surrounding areas.

5 SPECIES OF CONSERVATION INTEREST (SOCI) OBSERVED

During the 2017 – 2021 surveys, five SOCI vascular plants were observed:

- Nova Scotia agalinis (*Agalinis neoscotica,* S3S4);
- northern comandra (*Geocaulon lividum,* S3;

- Wiegand's sedge (*Carex wiegandii*, S3);
- variegated scouring rush (*Equisetum variegatum*, S3), and
- southern-tway blade (*Neottia bifolia*, S3).

Additionally, five SOCI lichens were observed:

- (*Fuscopannaria cf. sorediata*, S3);
- Appressed jellyskin lichen (*Leptogium subtile*, S3);
- Peppered moon lichen (*Sticta fuliginosa*, S3);
- Corrugated shingles lichen (*Fuscopannaria cf. ahlerni*, S3); and,
- Slender monk's hood lichen (*Hypogymnia vittata*, S3S4).

6 SUMMARY

Biophysical surveys took place between 2017 - 2021. The field studies were focused on highlighting the ecological linkages within the PA, as well as adjacent habitats. The field components included:

1. Vascular and non-vascular plant surveys (June – July, 2017, August 2019, June 2021, September 2021)
2. Lichen surveys (November 2018, August 2019, November 2020)
3. Species at Risk (SAR) surveys;
    a. Mainland moose (Winter tracking - February 2021, March 2021; pellet group inventory – April 2017, April 2021)
    b. Snapping turtle (June 2021)
    c. Bat hibernaculum (June 2017, 2019, June 2021)
    d. Incidental SAR (all seasons)

The PA consists of cutovers, access roads, wetlands, watercourses, regenerative and mature forest stands. During the rare plant and lichen surveys, a total of 203 species were observed and include 113 vascular plants, 40 bryophytes and 30 lichen species. Of the vascular, non-vascular plants and lichens observed, five vascular plants and seven rare lichens were identified. Two Species at Risk (SAR) lichens; blue felt lichen and frosted glass whiskers were observed. No SAR vascular or non-vascular plants were identified during the field surveys. The rare flora species observed include:

<u>Rare Vascular Plants</u>

- Nova Scotia agalinis (*Agalinis neoscotica*, S3S4);
- northern comandra (*Geocaulon lividum*, S3);
- Wiegand's sedge (*Carex wiegandii*, S3);
- variegated scouring rush (*Equisetum variegatum*, S3), and
- southern-tway blade (*Neottia bifolia*, S3).

Rare Lichens

- Blue felt lichen (*Pectenia plumbea,* ACCDC: S3, NSESA – Vulnerable, SARA Special Concern),
- Frosted glass whiskers (*Sclerophora peronella,* ACCDC: S1?, SARA Special Concern),
- (*Fuscopannaria cf. sorediata,* S3);
- Appressed jellyskin lichen (*Leptogium subtile,* S3);
- Peppered moon lichen (*Sticta fuliginosa,* S3);
- Corrugated shingles lichen (*Fuscopannaria cf. ahlerni,* S3); and,
- Slender monk's hood lichen (*Hypogymnia vittata,* S3S4).

Forty-two occurrences of blue felt lichen and one occurrence of frosted glass whiskers were observed within the PA and found within forested swamps and mature upland forests adjacent to wetlands. Mature treed swamps had the highest occurrences of rare lichen species, including frosted glass whiskers and blue felt lichen. These habitats were the most common wetland type and found throughout the PA.

The PA is within moose core habitat and several observations of mainland moose were observed during the 2017 – 2021 surveys. Habitat for moose which include summer foraging, winter and summer cover, and calving areas were observed within and surrounding the PA.

No snapping turtles were observed however, overwintering habitat was observed in WL 18. Although water depths were suitable for snapping turtles in Gold Brook Lake, the gravel substrate made it unsuitable for overwintering. Nesting habitat for snapping turtles was present within the PA along gravel roads, however, no snapping turtles or evidence of breeding were observed.

All AMOs observed were either flooded and/or collapsed and did not provide suitable bat hibernacula habitat. Mature forested stands were present within the PA which could provide suitable roosting habitat, however, no bats or evidence of roosting were observed.

7 LIMITATIONS

- McCallum Environmental Ltd. has relied in good faith upon the evaluation and conclusions in all third-party assessments. MEL relies upon these representations and information provided but can make no warranty as to accuracy of information provided;
- Rare plant surveys took place in late June and July, 2017, August 2019 and late September 2021 and species which develop earlier or later in the growing season may have not been detected during the time of these surveys;
- There are a potentially infinite number of methods in which human activity can influence wildlife behaviors and populations and merely demonstrating that one factor is not operative does not negate the influence of the remainder of possible factors; and,

- The biophysical report provides an inventory based on acceptable industry methodologies. A single assessment may not define the absolute status of site conditions.

8 CLOSING

This Report has considered relevant factors and influences pertinent within the scope of the assessment and has completed and provided relevant information in accordance with the methodologies described.

The undersigned has considered relevant factors and influences pertinent within the scope of the assessment and written and combined and referenced the report accordingly.

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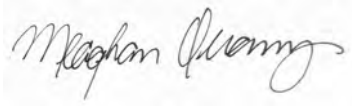

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APPENDIX A. FIGURES

Prepared For:

Anaconda Mining

FIGURE 1

Project Area (PA) Location

Goldboro, NS

EARD Project Area

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

0 0.75 1.5 3 km

1:65,000 Scale when printed @ 11" x 17"

Drawn By: MQ
Reviewed By: JG

Date: 2022-02-18

McCallum Environmental Ltd.

Document Name: 220215_PA_Location

Prepared For:

Anaconda Mining

FIGURE 2

Rare Vascular and Non-vascular Plant Survey Transects

Goldboro, NS

- Early Botany Survey Tracks
- Late Botany Survey Tracks
- NSTDB Roads
- Graminoid Dominant Wetland
- Forested Swamp Groups
- Bog/Fen
- Cutover Swamp
- Cutover Upland
- Barren
- Mixedwood Forest
- Softwood Forest
- Wetlands outside PA (NSECC)
- Waterbody
- EARD Project Area

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

0 250 500 1,000 m

1:21,000 Scale when printed @ 11" x 17"

Drawn By: MQ
Reviewed By: LP
Date: 2022-03-03

McCallum Environmental Ltd.

Document Name: 220223_FloraSurvey

Meadow Lake
Oak Hill Lake
Ocean Lake
Gold Brook Lake
Rocky Lakes
Goose Lake
Isaacs Harbour River
Isaac's Harbour
Hay Lake

5010000 5009500 5009000 5008500 5008000 5007500 5007000 5006500 5006000 5005500 5005000 5004500

604000 604500 605000 605500 606000 606500 607000 607500 608000 608500 609000 609500 610000 610500

Prepared For:

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FIGURE 3

Rare Lichen Survey Locations

Goldboro, NS

- Lichen Survey Tracks
- BFL Predictive Habitat (NSDNR 2010)
- Graminoid Dominant Wetland
- Forested Swamp Groups
- Bog/Fen
- Cutover Swamp
- Cutover Upland
- Barren
- Mixedwood Forest
- Softwood Forest
- Wetlands outside PA (NSECC)
- Waterbody
- EARD Project Area

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

0 250 500 1,000 m

1:21,000 Scale when printed @ 11" x 17"

Drawn By: MQ
Reviewed By: LP
Date: 2022-02-23

McCallum Environmental Ltd.

Document Name: 220223_LichenSurvey

Meadow Lake
Oak Hill Lake
Ocean Lake
Ocean Lake
Gold Brook Lake
Rocky Lakes
Isaacs Harbour River
Goses Lake
Hay Lake

5010500 5010000 5009500 5009000 5008500 5008000 5007500 5007000 5006500 5006000 5005500 5005000

604500 605000 605500 606000 606500 607000 607500 608000 608500 609000 609500 610000 610500 611000

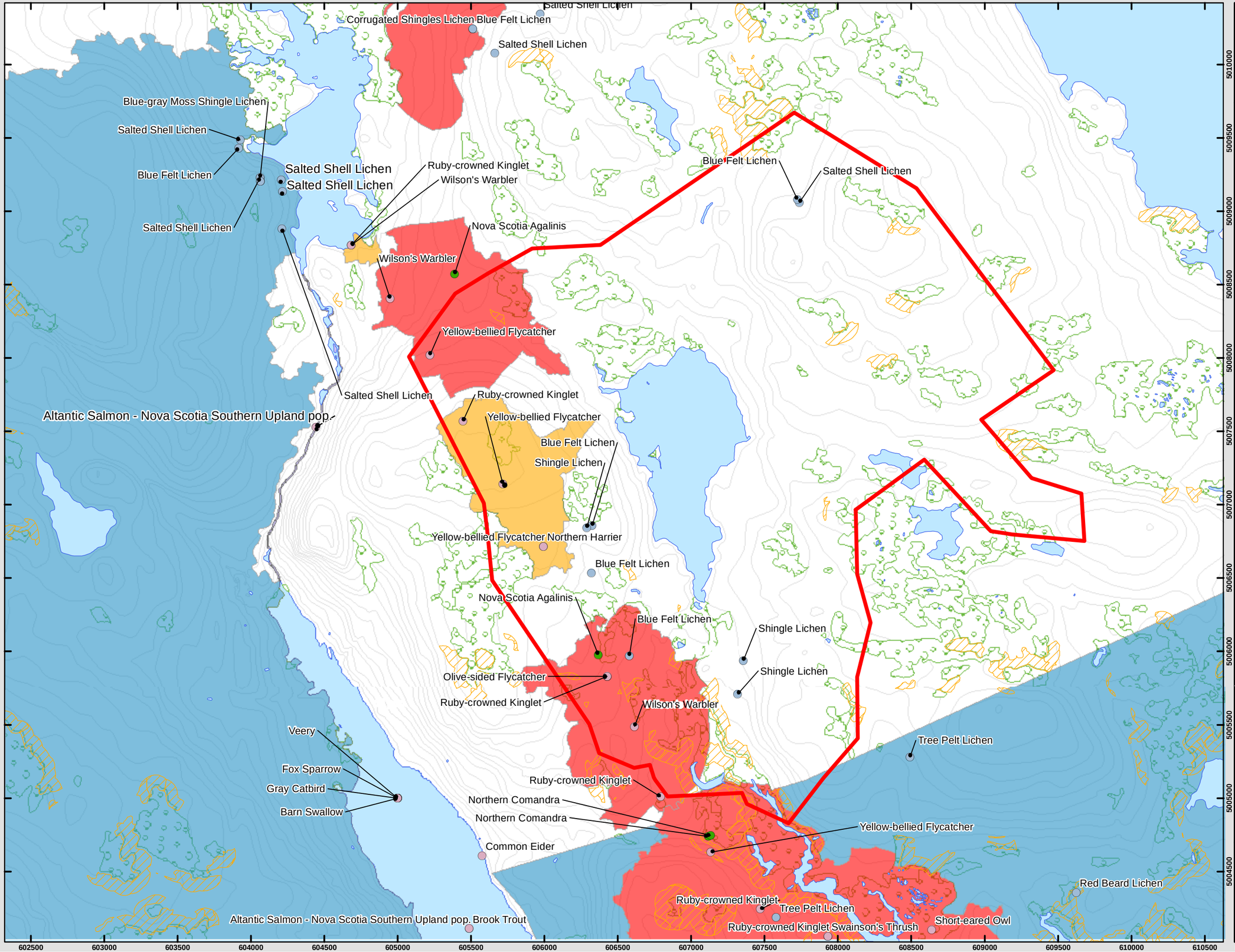
Prepared For:

Anaconda Mining

FIGURE 4

Desktop Results
Flora/Fauna

Goldboro, NS



ACCDC Observations
- Fauna
- Non-vascular Plants
- Vascular Plants
- Atlantic Salmon - Nova Scotia Southern Upland pop.
- Wetlands (NSECC)
- Waterbody
- BFL Predictive Habitat

Signigicant Habitat
- Deer Wintering
- Species at Risk
- Species of Concern
- EARD Project Area

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

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

Drawn By: JG
Reviewed By: MM
Date: 2022-03-03

McCallum Environmental Ltd.

Document Name: 220303_Figure_5

Prepared For:

Anaconda Mining

FIGURE 5

Mainland Moose Survey Transect Locations and Observations

Goldboro, NS

Meadow Lake
Oak Hill Lake
Gold Brook Lake
Rocky Lakes
Isaacs Harbour River
Isaac's Harbour

Transect 1
Transect 2
Transect 3
Transect 4
Transect 5
Transect 6
Transect 7
Transect 8
Transect 9
Transect 10
Transect 11
Transect 12
Transect 13
Transect 14
Transect 15
Transect 16
Transect 17
Transect 18
Transect 19
Transect 20
Transect 21
Transect 22
Transect 23
Transect 24
Transect 25
Transect 26

- Browse (2017)
- Tracks (2017)
- Tracks (2021)
- Watercourses (NSECC)
- Watercourses (Field Delineated)
- NSTDB Roads
- 2021 Additional Transects
- 2017 Transects
- Waterbody
- Cutover Upland
- Barren
- Mixedwood Forest
- Softwood Forest
- Graminoid Dominant Wetland
- Forested Swamp Groups
- Bog/Fen
- Cutover Swamp
- EARD Project Area

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

0 250 500 1,000 m

1:20,000 Scale when printed @ 11" x 17"

Drawn By: MQ
Reviewed By:
Date: 2022-03-15

McCallum Environmental Ltd.

Document Name: 211116_MooseTransects

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5010000 5009500 5009000 5008500 5008000 5007500 5007000 5006500 5006000 5005500 5005000

Prepared For:

Anaconda Mining

FIGURE 6

Snapping Turtle Survey Locations

Goldboro, NS

- Watercourses (Field Delineated)
- 2021 Snapping Turtle Survey Locations
- Wetlands (NSECC)
- Wetlands (Field Delineated)
- EARD Project Area

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

0 75 150 300 m

1:5,000 Scale when printed @ 11" x 17"

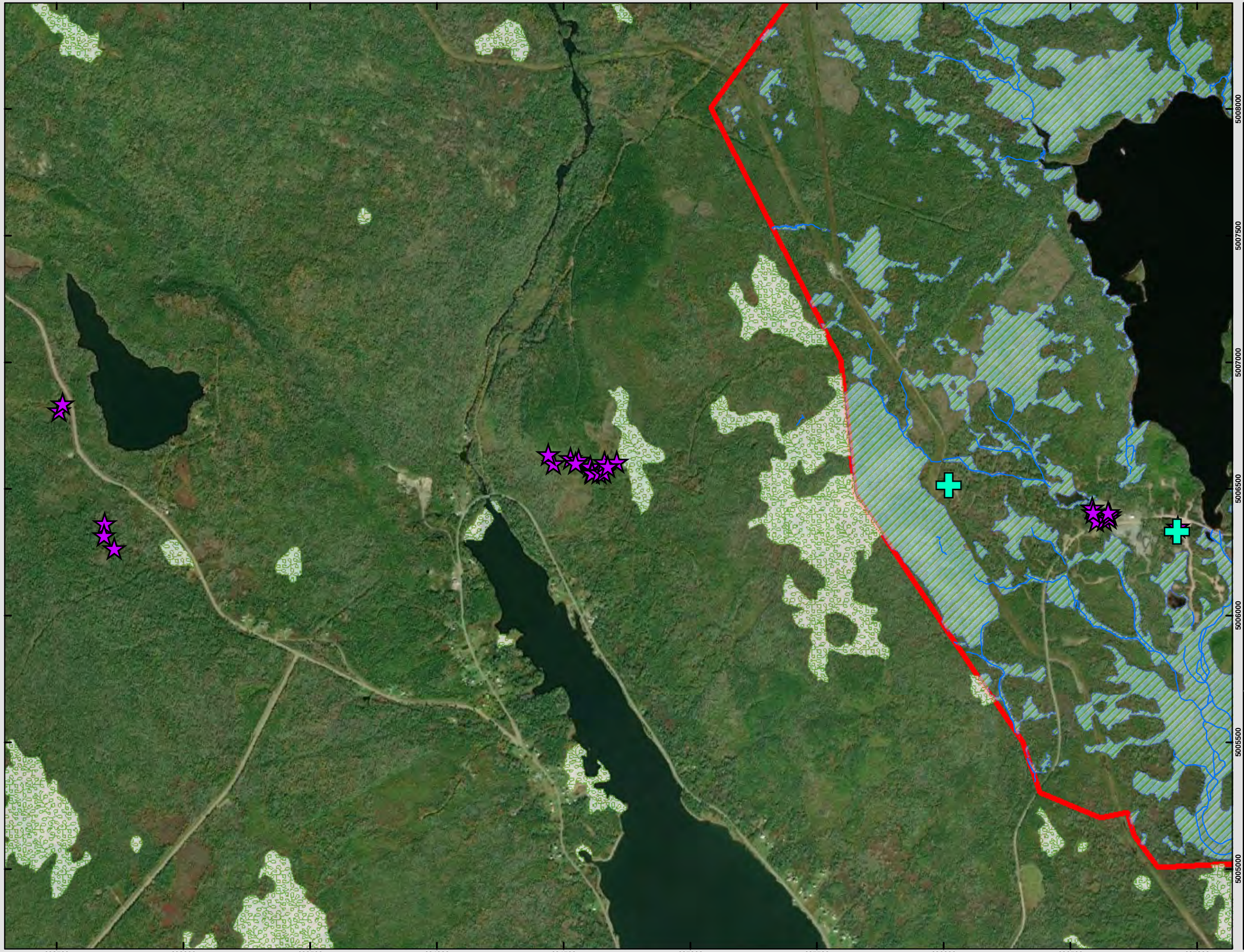
Drawn By: MQ
Reviewed By: JG
Date: 2022-02-18

McCallum Environmental Ltd.

Document Name: 220215_SNTU-Survey

606000 606500 607000 607500

5007000 5006500 5006000



Prepared For:

Anaconda Mining

FIGURE 7

Bat Hibernaculum Survey Locations

Goldboro, NS

- Bat Hibernaculum Survey Locations (2018)
- Bat Hibernaculum Survey Locations (AMOs, 2021)
- Watercourses (Field Delineated)
- Wetlands (NSE)
- Wetlands (Field Delineated)
- EARD Project Area

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

0 200 400 800 m

1:14,000 Scale when printed @ 11" x 17"

Drawn By: MQ
Reviewed By: JG
Date: 2022-02-18

McCallum Environmental Ltd.

Document Name: 220215_BatSurvey

Prepared For:

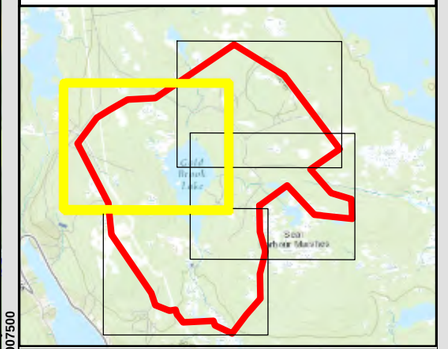
Anaconda Mining

FIGURE 8A

Priority Vascular and Lichen Species Observations

Goldboro, NS

Waterbodies (NSTDB)
Watercourses (Field Delineated)
Priority lichen Observations
Priority lichen Observations
Priority Plant Observations
Priority Plant Observations
Roads (NSTDB)
Bog/Fens
Forested Swamps
Cutover Wetlands
Cutover (Upland)
Barren
Mixedwood Forest
Softwood Forest
EARD Project Area



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

0 100 200 400 m

1:8,000 Scale when printed @ 11" x 17"

Drawn By: JG
Reviewed By: LP
Date: 2022-03-03

McCallum Environmental Ltd.

Document Name: 220303_Priority_flora_Fauna_Map_book

605000 605500 606000 606500 607000 607500

5009000 5008500 5008000 5007500 5007000

Prepared For:

Anaconda Mining

FIGURE 8B

Priority Vascular and Lichen Species Observations

Goldboro, NS

Blue felt lichen (2)
Blue felt lichen
Blue felt lichen
Blue felt lichen
Blue felt lichen
Blue felt lichen
Blue felt lichen
Blue felt lichen
Blue felt lichen
Shingles Lichen
Northern Comandra (2)
Blue felt lichen
Corrugated shingles lichen
Nova Scotia agalinis
Appressed Jellyskin Lichen
Appressed Jellyskin Lichen
Nova Scotia agalinis
Variegated horsetail
Variegated horsetail

WL 217, WL 300, WL 166, WL 195, WL 195, WL 187, WL 158, WL 157, WL 83, WL 164, WL 168, WL 191, WL 173, WL 199, WL 197, WL 203, WL 193, WL 151, WL 242, WL 245, WL 130, WL 161, WL 148, WL 170, WL 169, WL 201, WL 205, WL 144, WL 145, WL 172, WL 246, WL 244, WL 247, WL 259, WL 171, WL 237, WL 232, WL 150, WL 146, WL 142, WL 147, WL 154, WL 257, WL 139, WL 152, WL 149, WL 165, WL 155, WL 265, WL 28, WL 167, WL 94, WL 153, WL 30, WL 291, WL 27, WL 31, WL 32, WL 29, WL 243, WL 292, WL 290, WL 288, WL 133, WL 299, WL 12, WL 33, WL 26, WL 272, WL 296, WL 294, WL 286, WL 287, WL 12, WL 13, WL 14, WL 15, WL 284, WL 282, WL 278, WL 280, WL 289, WL 25, WL 5, WL 2, WL 24, WL 4, WL 3, WL 24, WL 11, WL1

607000, 607500, 608000, 608500, 609000, 609500

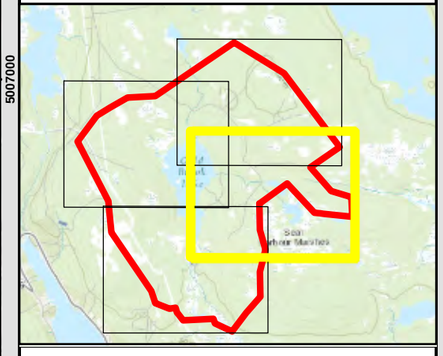
5008000, 5007500, 5007000, 5006500

Waterbodies (NSTDB)
Watercourses (Field Delineated)

Priority lichen Observations
Priority lichen Observations

Priority Plant Observations
Priority Plant Observations

Roads (NSTDB)
Gramminoid Dominant Wetland
Bog/Fens
Forested Swamps
Cutover Wetlands
Cutover (Upland)
Barren
Mixedwood Forest
Softwood Forest
EARD Project Area



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

0 100 200 400 m

1:8,000 Scale when printed @ 11" x 17"

Drawn By: JG
Reviewed By: LP
Date: 2022-03-03

McCallum Environmental Ltd.

Document Name: 220303_Priority_flora_Fauna_Map_book

Prepared For:

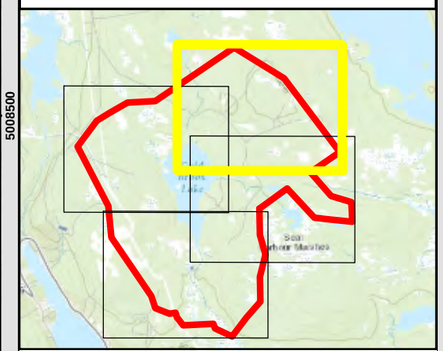
Anaconda Mining

FIGURE 8C

Priority Vascular and Lichen Species Observations

Goldboro, NS

Waterbodies (NSTDB)
Watercourses (Field Delineated)
Priority lichen Observations
Priority lichen Observations
Priority Plant Observations
Priority Plant Observations
Roads (NSTDB)
Bog/Fens
Forested Swamps
Cutover Wetlands
Cutover (Upland)
Barren
Mixedwood Forest
Softwood Forest
EARD Project Area



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

0 100 200 400 m

1:8,000 Scale when printed @ 11" x 17"

Drawn By: JG
Reviewed By: LP
Date: 2022-03-03

McCallum Environmental Ltd.

Document Name: 220303_Priority_flora_Fauna_Map_book

607000 607500 608000 608500 609000 609500

5009500 5009000 5008500 5008000

Prepared For:

Anaconda Mining

FIGURE 8D

Priority Vascular and Lichen Species Observations

Goldboro, NS

Waterbodies (NSTDB)
Watercourses (Field Delineated)
Priority lichen Observations
Priority lichen Observations
Priority Plant Observations
Priority Plant Observations
Roads (NSTDB)
Gramminoid Dominant Wetland
Bog/Fens
Forested Swamps
Cutover Wetlands
Cutover (Upland)
Barren
Mixedwood Forest
Softwood Forest
EARD Project Area

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

0 100 200 400 m

1:8,000 Scale when printed @ 11" x 17"

Drawn By: JG
Reviewed By: LP
Date: 2022-03-03

McCallum Environmental Ltd.

Document Name: 220303_Priority_flora_Fauna_Map_book

606000 606500 607000 607500 608000
5006500 5006000 5005500 5005000

APPENDIX B. ACCDC

Atlantic Canada Conservation Data Centre
Centre de données sur la conservation du Canada atlantique

DATA REPORT 6802: Goldboro, NS

Prepared 23 February 2021
by C. Robicheau, Data Manager

CONTENTS OF REPORT

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	Contents
GoldboroNS_6802ob.xls	Rare or legally-protected Flora and Fauna in your study area
GoldboroNS_6802ob100km.xls	A list of Rare and legally protected Flora and Fauna within 100 km of your study area
GoldboroNS_6802ff_py.xls	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
Tel: (506) 364-2658
sean.blaney@accdc.ca

Animals (Fauna)
John Klymko, Zoologist
Tel: (506) 364-2660
john.klymko@accdc.ca

Plant Communities
Sarah Robinson, Community Ecologist
Tel: (506) 364-2664
sarah.robinson@accdc.ca

Data Management, GIS
James Churchill, Data Manager
Tel: (902) 679-6146
james.churchill@accdc.ca

Billing
Jean Breau
Tel: (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

Central: Shavonne Meyer
(902) 893-0816
Shavonne.Meyer@novascotia.ca

Central: Kimberly George
(902) 890-1046
Kimberly.George@novascotia.ca

Eastern: Harrison Moore
(902) 497-4119
Harrison.Moore@novascotia.ca

Eastern: Maureen Cameron-MacMillan
(902) 295-2554
Maureen.Cameron-MacMillan@novascotia.ca

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

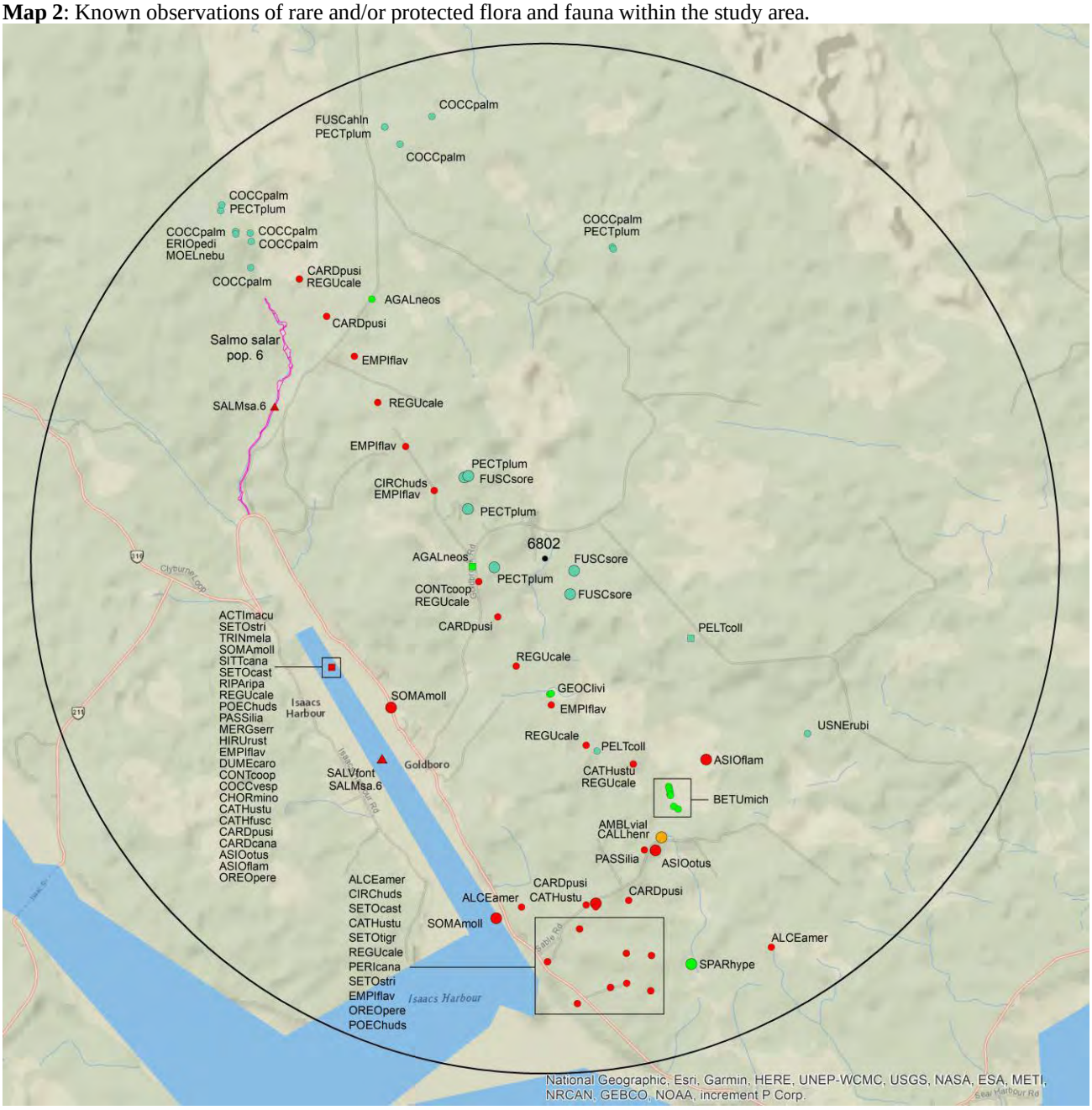
2.1 FLORA

The study area contains 13 records of 4 vascular and 25 records of 8 nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

The study area contains 81 records of 30 vertebrate and 2 records of 2 invertebrate fauna (Map 2 and attached data files - see 1.1 Data List). 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

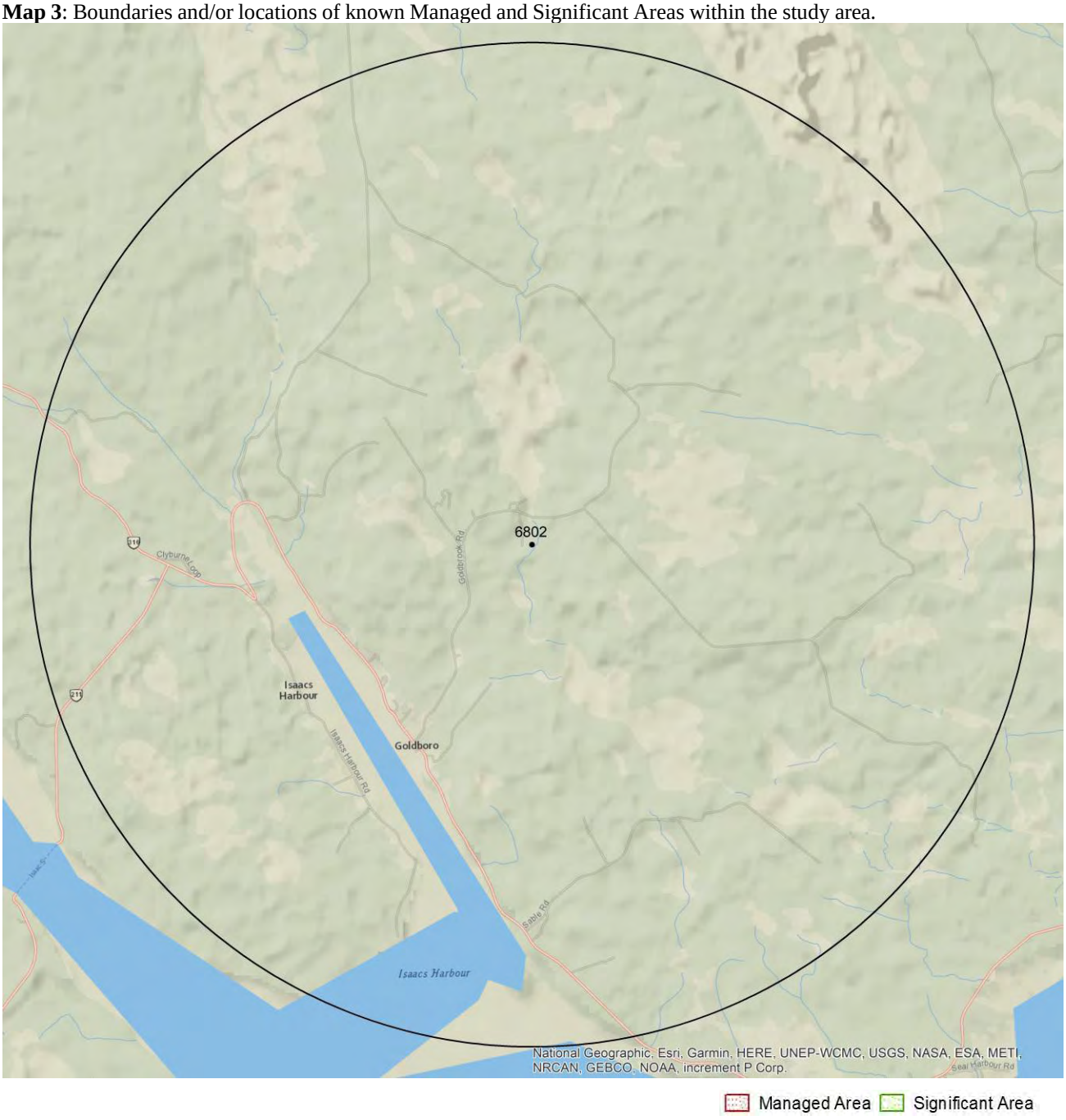
3.1 MANAGED AREAS

The GIS scan identified no managed areas in the vicinity of the study area (Map 3 and attached file: *msa.xls).

3.2 SIGNIFICANT AREAS

The GIS scan identified no biologically significant sites in the vicinity of the study area (Map 3 and attached file: *msa.xls).

Map 3: Boundaries and/or locations of known Managed and Significant Areas within the study 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 (± 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	*Erioderma pedicellatum (Atlantic pop.)*	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	S1	3	4.4 ± 0.0
N	*Pectenia plumbea*	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S3	6	0.5 ± 0.0
N	*Peltigera collina*	Tree Pelt Lichen				S2?	2	1.6 ± 4.0
N	*Usnea rubicunda*	Red Beard Lichen				S2S3	1	3.1 ± 0.0
N	*Fuscopannaria ahlneri*	Corrugated Shingles Lichen				S3	1	4.5 ± 0.0
N	*Moelleropsis nebulosa*	Blue-gray Moss Shingle Lichen				S3	1	4.4 ± 0.0
N	*Fuscopannaria sorediata*	a Lichen				S3	3	0.3 ± 0.0
N	*Coccocarpia palmicola*	Salted Shell Lichen				S3S4	8	3.1 ± 0.0
P	*Sparganium hyperboreum*	Northern Burreed				S1S2	1	4.2 ± 0.0
P	*Betula michauxii*	Michaux's Dwarf Birch				S2S3	8	2.5 ± 0.0
P	*Geocaulon lividum*	Northern Comandra				S3	2	1.3 ± 0.0
P	*Agalinis neoscotica*	Nova Scotia Agalinis				S3S4	2	0.7 ± 4.0

4.2 FAUNA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Salmo salar pop. 6*	Altantic Salmon - Nova Scotia Southern Upland pop.	Endangered			S1	2	2.5 ± 1.0
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened	Endangered	S2S3B	1	2.3 ± 7.0
A	*Hirundo rustica*	Barn Swallow	Threatened	Threatened	Endangered	S2S3B	1	2.3 ± 7.0
A	*Cardellina canadensis*	Canada Warbler	Threatened	Threatened	Endangered	S3B	1	2.3 ± 7.0
A	*Asio flammeus*	Short-eared Owl	Special Concern	Special Concern		S1S2B	2	2.3 ± 7.0
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S2B	1	2.3 ± 7.0
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S2B	2	0.7 ± 0.0
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern	Vulnerable	S3S4B,S3N	1	2.3 ± 7.0
A	*Circus hudsonius*	Northern Harrier	Not At Risk			S3S4B	2	1.3 ± 0.0
A	*Alces americanus*	Moose			Endangered	S1	3	3.4 ± 0.0
A	*Setophaga tigrina*	Cape May Warbler				S2B	1	3.9 ± 0.0
A	*Asio otus*	Long-eared Owl				S2S3	2	2.3 ± 7.0
A	*Perisoreus canadensis*	Canada Jay				S3	2	3.9 ± 0.0
A	*Poecile hudsonicus*	Boreal Chickadee				S3	3	2.3 ± 7.0
A	*Sitta canadensis*	Red-breasted Nuthatch				S3	1	2.3 ± 7.0
A	*Salvelinus fontinalis*	Brook Trout				S3	1	2.5 ± 1.0
A	*Dumetella carolinensis*	Gray Catbird				S3B	1	2.3 ± 7.0
A	*Cardellina pusilla*	Wilson's Warbler				S3B	6	0.7 ± 0.0
A	*Tringa melanoleuca*	Greater Yellowlegs				S3B,S3S4M	1	2.3 ± 7.0
A	*Somateria mollissima*	Common Eider				S3S4	4	2.1 ± 0.0
A	*Actitis macularius*	Spotted Sandpiper				S3S4B	2	2.3 ± 7.0
A	*Empidonax flaviventris*	Yellow-bellied Flycatcher				S3S4B	7	1.3 ± 0.0
A	*Regulus calendula*	Ruby-crowned Kinglet				S3S4B	13	0.7 ± 0.0
A	*Catharus fuscescens*	Veery				S3S4B	1	2.3 ± 7.0
A	*Catharus ustulatus*	Swainson's Thrush				S3S4B	10	2.2 ± 0.0
A	*Oreothlypis peregrina*	Tennessee Warbler				S3S4B	2	2.3 ± 7.0
A	*Setophaga castanea*	Bay-breasted Warbler				S3S4B	3	2.3 ± 7.0
A	*Setophaga striata*	Blackpoll Warbler				S3S4B	2	2.3 ± 7.0
A	*Passerella iliaca*	Fox Sparrow				S3S4B	2	2.3 ± 7.0

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Mergus serrator*	Red-breasted Merganser				S3S4B,S5N	1	2.3 ± 7.0
I	*Callophrys henrici*	Henry's Elfin				S3	1	2.9 ± 0.0
I	*Amblyscirtes vialis*	Common Roadside-Skipper				S3S4	1	2.9 ± 0.0

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?
Fraxinus nigra	Black Ash		Threatened	No
Emydoidea blandingii	*Blanding's Turtle - Nova Scotia pop.*	Endangered	Vulnerable	No
Glyptemys insculpta	Wood Turtle	Threatened	Threatened	No
Falco peregrinus pop. 1	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Vulnerable	No
Bat hibernaculum or bat species occurrence		**[Endangered][1]**	**[Endangered][1]**	**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
43	Bell, G. 2018. Moose, bat and bird records from Goldboro LNG Project, NS, Environmental Assessment. Amec Foster Wheeler.
34	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 407,838 recs.
13	Cameron, R.P. 2011. Lichen observations, 2011. Nova Scotia Environment & Labour, 731 recs.
11	LaPaix, R.W.; Crowell, M.J.; MacDonald, M.; Neily, T.D.; Quinn, G. 2017. Stantec Nova Scotia rare plant records, 2012-2016. Stantec Consulting.
8	iNaturalist. 2020. iNaturalist Data Export 2020. iNaturalist.org and iNaturalist.ca, Web site: 128728 recs.
4	Benjamin, L.K. (compiler). 2007. Significant Habitat & Species Database. Nova Scotia Dept Natural Resources, 8439 recs.
2	Klymko, J. 2018. Maritimes Butterfly Atlas database. Atlantic Canada Conservation Data Centre.
1	Cameron, R.P. 2009. Erioderma pedicellatum database, 1979-2008. Dept Environment & Labour, 103 recs.
1	Munro, Marian K. Nova Scotia Provincial Museum of Natural History Herbarium Database. Nova Scotia Provincial Museum of Natural History, Halifax, Nova Scotia. 2014.
1	Munro, Marian K. Tracked lichen specimens, Nova Scotia Provincial Museum of Natural History Herbarium. Atlantic Canada Conservation Data Centre. 2019.
1	Neily, T.H. & Pepper, C.; Toms, B. 2013. Nova Scotia lichen location database. Mersey Tobeatic Research Institute, 1301 records.
1	Neily, T.H. & Pepper, C.; Toms, B. 2020. Nova Scotia lichen database [as of 2020-03-18]. Mersey Tobeatic Research Institute.
1	Neily, T.H. 2010. Erioderma Pedicellatum records 2005-09. Mersey Tobiatic Research Institute, 67 recs.
1	Newell, R.E. 2000. E.C. Smith Herbarium Database. Acadia University, Wolfville NS, 7139 recs.

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 20,364 records of 143 vertebrate and 435 records of 47 invertebrate fauna; 3536 records of 227 vascular and 1819 records of 91 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 (± 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	*Myotis lucifugus*	Little Brown Myotis	Endangered	Endangered	Endangered	S1	42	27.7 ± 0.0	NS
A	*Salmo salar pop. 1*	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered		S1	1	95.9 ± 0.0	NS
A	*Salmo salar pop. 4*	Atlantic Salmon - Eastern Cape Breton pop.	Endangered			S1	10	55.7 ± 0.0	NS
A	*Salmo salar pop. 6*	Altantic Salmon - Nova Scotia Southern Upland pop.	Endangered			S1	35	2.5 ± 1.0	NS
A	*Charadrius melodus melodus*	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B	728	18.0 ± 7.0	NS
A	*Sterna dougallii*	Roseate Tern	Endangered	Endangered	Endangered	S1B	76	10.5 ± 0.0	NS
A	*Dermochelys coriacea (Atlantic pop.)*	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered		S1S2N	2	51.9 ± 0.0	NS
A	*Calidris canutus rufa*	Red Knot rufa ssp	Endangered	Endangered	Endangered	S2M	17	13.1 ± 0.0	NS
A	*Pagophila eburnea*	Ivory Gull	Endangered	Endangered		SNA	1	82.4 ± 0.0	NS
A	*Antrostomus vociferus*	Eastern Whip-Poor-Will	Threatened	Threatened	Threatened	S1?B	2	58.5 ± 7.0	NS
A	*Catharus bicknelli*	Bicknell's Thrush	Threatened	Threatened	Endangered	S1S2B	1	75.8 ± 7.0	NS
A	*Limosa haemastica*	Hudsonian Godwit	Threatened			S1S2M	5	54.6 ± 0.0	NS
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2	3865	22.1 ± 10.0	NS
A	*Anguilla rostrata*	American Eel	Threatened			S2	3	81.9 ± 0.0	NS
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Endangered	S2B,S1M	155	20.5 ± 7.0	NS
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened	Endangered	S2S3B	566	2.3 ± 7.0	NS
A	*Hirundo rustica*	Barn Swallow	Threatened	Threatened	Endangered	S2S3B	448	2.3 ± 7.0	NS
A	*Cardellina canadensis*	Canada Warbler	Threatened	Threatened	Endangered	S3B	400	2.3 ± 7.0	NS
A	*Dolichonyx oryzivorus*	Bobolink	Threatened	Threatened	Vulnerable	S3S4B	197	16.4 ± 7.0	NS
A	*Sturnella magna*	Eastern Meadowlark	Threatened	Threatened		SHB	2	24.3 ± 0.0	NS
A	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened		SUB	8	12.0 ± 7.0	NS
A	*Salmo salar pop. 12*	Atlantic Salmon - Gaspe - Southern Gulf of St Lawrence pop.	Special Concern			S1	23	43.5 ± 50.0	NS
A	*Passerculus sandwichensis princeps*	Savannah Sparrow princeps ssp	Special Concern	Special Concern		S1B	3	16.4 ± 7.0	NS
A	*Bucephala islandica (Eastern pop.)*	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern		S1N	2	90.7 ± 0.0	NS
A	*Asio flammeus*	Short-eared Owl	Special Concern	Special Concern		S1S2B	4	2.3 ± 7.0	NS
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2B	174	17.2 ± 0.0	NS
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S2B	199	2.3 ± 7.0	NS
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S2B	619	0.7 ± 0.0	NS
A	*Histrionicus histrionicus pop. 1*	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S2N	37	13.1 ± 0.0	NS
A	*Balaenoptera physalus*	Fin Whale	Special Concern	Special Concern		S2S3	2	100.0 ± 0.0	NS
A	*Morone saxatilis pop. 1*	Striped Bass- Southern Gulf of St Lawrence pop.	Special Concern			S2S3N	1	53.1 ± 1.0	NS
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	31	28.8 ± 0.0	NS
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Vulnerable	S3S4B	229	12.0 ± 7.0	NS
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern	Vulnerable	S3S4B,S3N	246	2.3 ± 7.0	NS
A	*Phocoena phocoena pop. 1*	Harbour Porpoise - Northwest Atlantic pop.	Special Concern			S4	1	52.2 ± 0.0	NS
A	*Podiceps auritus*	Horned Grebe	Special Concern	Special Concern		S4N	6	51.4 ± 0.0	NS
A	*Chrysemys picta picta*	Eastern Painted Turtle	Special Concern			S4S5	2	45.3 ± 1.0	NS
A	*Calidris subruficollis*	Buff-breasted Sandpiper	Special Concern	Special Concern		SNA	1	85.2 ± 0.0	NS
A	*Lynx canadensis*	Canadian Lynx	Not At Risk		Endangered	S1	6	68.2 ± 1.0	NS
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1?B	2	98.2 ± 0.0	NS
A	*Chlidonias niger*	Black Tern	Not At Risk			S1B	3	13.1 ± 0.0	NS
A	*Falco peregrinus pop. 1*	Peregrine Falcon - anatum/tundrius	Not At Risk	Special Concern	Vulnerable	S1B,SNAM	3	52.1 ± 7.0	NS
A	*Aegolius funereus*	Boreal Owl	Not At Risk			S2?B	5	31.4 ± 7.0	NS
A	*Hemidactylium scutatum*	Four-toed Salamander	Not At Risk			S3	11	14.5 ± 0.0	NS
A	*Megaptera novaeangliae*	Humpback Whale (NW	Not At Risk			S3	2	52.2 ± 0.0	NS

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		Atlantic pop.)							
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B	387	8.0 ± 7.0	NS
A	*Sialia sialis*	Eastern Bluebird	Not At Risk			S3B	14	12.1 ± 7.0	NS
A	*Buteo lagopus*	Rough-legged Hawk	Not At Risk			S3N	5	25.9 ± 6.0	NS
A	*Accipiter gentilis*	Northern Goshawk	Not At Risk			S3S4	55	18.0 ± 7.0	NS
A	*Lagenorhynchus acutus*	Atlantic White-sided Dolphin	Not At Risk			S3S4	4	52.3 ± 0.0	NS
A	*Circus hudsonius*	Northern Harrier	Not At Risk			S3S4B	195	1.3 ± 0.0	NS
A	*Ammospiza nelsoni*	Nelson's Sparrow	Not At Risk			S3S4B	79	8.0 ± 7.0	NS
A	*Morone saxatilis*	Striped Bass	E,SC			S2S3	1	57.7 ± 0.0	NS
A	*Alces americanus*	Moose			Endangered	S1	61	3.4 ± 0.0	NS
A	*Picoides dorsalis*	American Three-toed Woodpecker				S1?	4	22.5 ± 7.0	NS
A	*Passerina cyanea*	Indigo Bunting				S1?B	4	38.4 ± 7.0	NS
A	*Uria aalge*	Common Murre				S1?B,S5N	1	78.3 ± 0.0	NS
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1B	1	62.9 ± 7.0	NS
A	*Anas acuta*	Northern Pintail				S1B	3	38.4 ± 7.0	NS
A	*Oxyura jamaicensis*	Ruddy Duck				S1B	2	50.5 ± 7.0	NS
A	*Haematopus palliatus*	American Oystercatcher				S1B	7	51.5 ± 7.0	NS
A	*Myiarchus crinitus*	Great Crested Flycatcher				S1B	1	100.0 ± 7.0	NS
A	*Mimus polyglottos*	Northern Mockingbird				S1B	16	13.2 ± 0.0	NS
A	*Toxostoma rufum*	Brown Thrasher				S1B	4	48.2 ± 0.0	NS
A	*Vireo gilvus*	Warbling Vireo				S1B	5	53.7 ± 7.0	NS
A	*Setophaga pinus*	Pine Warbler				S1B	4	51.4 ± 0.0	NS
A	*Calidris minutilla*	Least Sandpiper				S1B,S3M	147	13.2 ± 0.0	NS
A	*Charadrius semipalmatus*	Semipalmated Plover				S1B,S3S4M	246	12.5 ± 0.0	NS
A	*Vespertilionidae sp.*	bat species				S1S2	64	3.2 ± 0.0	NS
A	*Pluvialis dominica*	American Golden-Plover				S1S2M	22	54.6 ± 0.0	NS
A	*Vireo philadelphicus*	Philadelphia Vireo				S2?B	16	13.1 ± 0.0	NS
A	*Spatula clypeata*	Northern Shoveler				S2B	1	93.9 ± 0.0	NS
A	*Mareca strepera*	Gadwall				S2B	2	49.4 ± 0.0	NS
A	*Empidonax traillii*	Willow Flycatcher				S2B	4	38.4 ± 7.0	NS
A	*Setophaga tigrina*	Cape May Warbler				S2B	73	3.9 ± 0.0	NS
A	*Piranga olivacea*	Scarlet Tanager				S2B	5	51.1 ± 7.0	NS
A	*Pooecetes gramineus*	Vesper Sparrow				S2B	6	22.5 ± 7.0	NS
A	*Molothrus ater*	Brown-headed Cowbird				S2B	31	20.5 ± 7.0	NS
A	*Bucephala clangula*	Common Goldeneye				S2B,S5N	111	7.1 ± 12.0	NS
A	*Branta bernicla*	Brant				S2M	1	36.1 ± 16.0	NS
A	*Phalacrocorax carbo*	Great Cormorant				S2S3	94	13.1 ± 0.0	NS
A	*Asio otus*	Long-eared Owl				S2S3	23	2.3 ± 7.0	NS
A	*Spinus pinus*	Pine Siskin				S2S3	220	8.0 ± 7.0	NS
A	*Cathartes aura*	Turkey Vulture				S2S3B	2	85.8 ± 0.0	NS
A	*Rallus limicola*	Virginia Rail				S2S3B	7	39.0 ± 7.0	NS
A	*Tringa semipalmata*	Willet				S2S3B	537	8.0 ± 7.0	NS
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2S3B	101	16.4 ± 7.0	NS
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S2S3B	161	8.0 ± 7.0	NS
A	*Icterus galbula*	Baltimore Oriole				S2S3B	22	37.3 ± 7.0	NS
A	*Pinicola enucleator*	Pine Grosbeak				S2S3B,S5N	78	12.0 ± 7.0	NS
A	*Numenius phaeopus hudsonicus*	Hudsonian Whimbrel				S2S3M	57	13.1 ± 0.0	NS
A	*Calidris melanotos*	Pectoral Sandpiper				S2S3M	27	13.2 ± 0.0	NS
A	*Perisoreus canadensis*	Canada Jay				S3	365	3.9 ± 0.0	NS
A	*Poecile hudsonicus*	Boreal Chickadee				S3	667	2.3 ± 7.0	NS
A	*Sitta canadensis*	Red-breasted Nuthatch				S3	486	2.3 ± 7.0	NS
A	*Alosa pseudoharengus*	Alewife				S3	19	19.1 ± 1.0	NS
A	*Salvelinus fontinalis*	Brook Trout				S3	43	2.5 ± 1.0	NS
A	*Salvelinus namaycush*	Lake Trout				S3	1	81.0 ± 0.0	NS
A	*Menidia menidia*	Atlantic Silverside				S3	2	78.6 ± 0.0	NS
A	*Pekania pennanti*	Fisher				S3	5	40.1 ± 7.0	NS

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A	*Calidris maritima*	Purple Sandpiper				S3?N	31	13.1 ± 0.0	NS
A	*Calcarius lapponicus*	Lapland Longspur				S3?N	2	59.7 ± 0.0	NS
A	*Falco sparverius*	American Kestrel				S3B	227	12.1 ± 7.0	NS
A	*Charadrius vociferus*	Killdeer				S3B	159	16.4 ± 7.0	NS
A	*Gallinago delicata*	Wilson's Snipe				S3B	239	8.0 ± 7.0	NS
A	*Sterna paradisaea*	Arctic Tern				S3B	109	8.0 ± 7.0	NS
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3B	44	22.5 ± 7.0	NS
A	*Tyrannus tyrannus*	Eastern Kingbird				S3B	73	13.1 ± 0.0	NS
A	*Dumetella carolinensis*	Gray Catbird				S3B	165	2.3 ± 7.0	NS
A	*Cardellina pusilla*	Wilson's Warbler				S3B	68	0.7 ± 0.0	NS
A	*Tringa melanoleuca*	Greater Yellowlegs				S3B,S3S4M	304	2.3 ± 7.0	NS
A	*Oceanodroma leucorhoa*	Leach's Storm-Petrel				S3B,S5M	67	13.1 ± 0.0	NS
A	*Rissa tridactyla*	Black-legged Kittiwake				S3B,S5N	2	13.4 ± 0.0	NS
A	*Fratercula arctica*	Atlantic Puffin				S3B,S5N	4	13.1 ± 0.0	NS
A	*Pluvialis squatarola*	Black-bellied Plover				S3M	190	13.0 ± 0.0	NS
A	*Tringa flavipes*	Lesser Yellowlegs				S3M	229	13.1 ± 0.0	NS
A	*Arenaria interpres*	Ruddy Turnstone				S3M	85	13.1 ± 0.0	NS
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	194	13.1 ± 0.0	NS
A	*Calidris fuscicollis*	White-rumped Sandpiper				S3M	58	59.2 ± 0.0	NS
A	*Limnodromus griseus*	Short-billed Dowitcher				S3M	122	13.1 ± 0.0	NS
A	*Calidris alba*	Sanderling				S3M,S2N	108	13.1 ± 0.0	NS
A	*Chroicocephalus ridibundus*	Black-headed Gull				S3N	18	54.2 ± 0.0	NS
A	*Somateria mollissima*	Common Eider				S3S4	553	2.1 ± 0.0	NS
A	*Picoides arcticus*	Black-backed Woodpecker				S3S4	91	8.0 ± 7.0	NS
A	*Loxia curvirostra*	Red Crossbill				S3S4	56	18.0 ± 7.0	NS
A	*Botaurus lentiginosus*	American Bittern				S3S4B	141	20.6 ± 0.0	NS
A	*Spatula discors*	Blue-winged Teal				S3S4B	71	19.1 ± 7.0	NS
A	*Actitis macularius*	Spotted Sandpiper				S3S4B	511	2.3 ± 7.0	NS
A	*Empidonax flaviventris*	Yellow-bellied Flycatcher				S3S4B	539	1.3 ± 0.0	NS
A	*Regulus calendula*	Ruby-crowned Kinglet				S3S4B	1221	0.7 ± 0.0	NS
A	*Catharus fuscescens*	Veery				S3S4B	211	2.3 ± 7.0	NS
A	*Catharus ustulatus*	Swainson's Thrush				S3S4B	954	2.2 ± 0.0	NS
A	*Oreothlypis peregrina*	Tennessee Warbler				S3S4B	159	2.3 ± 7.0	NS
A	*Setophaga castanea*	Bay-breasted Warbler				S3S4B	311	2.3 ± 7.0	NS
A	*Setophaga striata*	Blackpoll Warbler				S3S4B	89	2.3 ± 7.0	NS
A	*Passerella iliaca*	Fox Sparrow				S3S4B	87	2.3 ± 7.0	NS
A	*Mergus serrator*	Red-breasted Merganser				S3S4B,S5N	116	2.3 ± 7.0	NS
A	*Bucephala albeola*	Bufflehead				S3S4N	38	7.1 ± 12.0	NS
A	*Lanius borealis*	Northern Shrike				S3S4N	1	78.7 ± 1.0	NS
A	*Leucophaeus atricilla*	Laughing Gull				SHB	3	13.1 ± 0.0	NS
A	*Progne subis*	Purple Martin				SHB	4	13.1 ± 0.0	NS
A	*Eremophila alpestris*	Horned Lark				SHB,S4S5N	1	82.9 ± 7.0	NS
A	*Morus bassanus*	Northern Gannet				SHB,S5M	34	13.2 ± 0.0	NS
I	*Danaus plexippus*	Monarch	Endangered	Special Concern	Endangered	S2B	35	13.0 ± 0.0	NS
I	*Alasmidonta varicosa*	Brook Floater	Special Concern	Special Concern	Threatened	S1S2	8	21.0 ± 0.0	NS
I	*Bombus terricola*	Yellow-banded Bumblebee	Special Concern	Special Concern	Vulnerable	S3	2	20.4 ± 0.0	NS
I	*Neurocordulia michaeli*	Broadtailed Shadowdragon				S1	26	27.1 ± 0.0	NS
I	*Lycaena dorcas*	Dorcas Copper				S1?	19	82.5 ± 0.0	NS
I	*Strymon melinus*	Grey Hairstreak				S1S2	2	71.3 ± 1.0	NS
I	*Nymphalis l-album*	Compton Tortoiseshell				S1S2	1	90.3 ± 2.0	NS
I	*Haematopota rara*	Shy Cleg				S1S3	1	85.3 ± 0.0	NS
I	*Lycaena hyllus*	Bronze Copper				S2	2	36.1 ± 0.0	NS
I	*Lycaena dospassosi*	Salt Marsh Copper				S2	1	97.2 ± 0.0	NS
I	*Satyrium calanus*	Banded Hairstreak				S2	1	89.9 ± 2.0	NS
I	*Aglais milberti*	Milbert's Tortoiseshell				S2	1	90.3 ± 2.0	NS
I	*Margaritifera margaritifera*	Eastern Pearlshell				S2	67	20.2 ± 0.0	NS
I	*Pantala hymenaea*	Spot-Winged Glider				S2?B	1	36.1 ± 1.0	NS
I	*Thorybes pylades*	Northern Cloudywing				S2S3	19	36.2 ± 0.0	NS

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I	*Amblyscirtes hegon*	Pepper and Salt Skipper				S2S3	5	32.1 ± 0.0	NS
I	*Satyrium liparops*	Striped Hairstreak				S2S3	4	89.2 ± 1.0	NS
I	*Euphydryas phaeton*	Baltimore Checkerspot				S2S3	24	24.0 ± 0.0	NS
I	*Gomphus descriptus*	Harpoon Clubtail				S2S3	16	69.0 ± 0.0	NS
I	*Ophiogomphus aspersus*	Brook Snaketail				S2S3	5	69.0 ± 0.0	NS
I	*Ophiogomphus mainensis*	Maine Snaketail				S2S3	14	54.0 ± 0.0	NS
I	*Ophiogomphus rupinsulensis*	Rusty Snaketail				S2S3	36	27.1 ± 0.0	NS
I	*Alasmidonta undulata*	Triangle Floater				S2S3	7	33.9 ± 0.0	NS
I	*Naemia seriata*	a Ladybird beetle				S3	1	54.8 ± 0.0	NS
I	*Iphthiminus opacus*	a Darkling Beetle				S3	1	85.8 ± 0.0	NS
I	*Monochamus marmorator*	a Longhorned Beetle				S3	2	20.3 ± 0.0	NS
I	*Callophrys henrici*	Henry's Elfin				S3	2	2.9 ± 0.0	NS
I	*Callophrys lanoraieensis*	Bog Elfin				S3	1	72.3 ± 1.0	NS
I	*Speyeria aphrodite*	Aphrodite Fritillary				S3	4	44.7 ± 100.0	NS
I	*Polygonia faunus*	Green Comma				S3	7	36.1 ± 0.0	NS
I	*Megisto cymela*	Little Wood-satyr				S3	1	79.5 ± 1.0	NS
I	*Oeneis jutta*	Jutta Arctic				S3	4	39.7 ± 0.0	NS
I	*Aeshna clepsydra*	Mottled Darner				S3	3	46.1 ± 1.0	NS
I	*Aeshna constricta*	Lance-Tipped Darner				S3	1	99.5 ± 1.0	NS
I	*Boyeria grafiana*	Ocellated Darner				S3	7	27.2 ± 0.0	NS
I	*Gomphaeschna furcillata*	Harlequin Darner				S3	3	56.6 ± 0.0	NS
I	*Nannothemis bella*	Elfin Skimmer				S3	3	56.6 ± 0.0	NS
I	*Sympetrum danae*	Black Meadowhawk				S3	8	7.6 ± 0.0	NS
I	*Enallagma vernale*	Vernal Bluet				S3	4	64.1 ± 0.0	NS
I	*Amphiagrion saucium*	Eastern Red Damsel				S3	4	85.3 ± 0.0	NS
I	*Cupido comyntas*	Eastern Tailed Blue				S3?	1	71.5 ± 0.0	NS
I	*Polygonia interrogationis*	Question Mark				S3B	18	17.6 ± 0.0	NS
I	*Erynnis juvenalis*	Juvenal's Duskywing				S3S4	1	51.0 ± 1.0	NS
I	*Amblyscirtes vialis*	Common Roadside-Skipper				S3S4	16	2.9 ± 0.0	NS
I	*Polygonia progne*	Grey Comma				S3S4	20	34.0 ± 0.0	NS
I	*Lanthus parvulus*	Northern Pygmy Clubtail				S3S4	10	28.6 ± 0.0	NS
I	*Lampsilis radiata*	Eastern Lampmussel				S3S4	16	28.4 ± 0.0	NS
N	*Erioderma pedicellatum (Atlantic pop.)*	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	S1	488	4.4 ± 0.0	NS
N	*Erioderma mollissimum*	Graceful Felt Lichen	Endangered	Endangered	Endangered	S1S2	14	45.1 ± 0.0	NS
N	*Peltigera hydrothyria*	Eastern Waterfan	Threatened	Threatened	Threatened	S1	6	49.6 ± 0.0	NS
N	*Pannaria lurida*	Wrinkled Shingle Lichen	Threatened	Threatened	Threatened	S1S2	1	97.7 ± 0.0	NS
N	*Fuscopannaria leucosticta*	White-rimmed Shingle Lichen	Threatened			S2S3	5	67.6 ± 0.0	NS
N	*Anzia colpodes*	Black-foam Lichen	Threatened	Threatened	Threatened	S3	8	50.7 ± 0.0	NS
N	*Sclerophora peronella (Atlantic pop.)*	Frosted Glass-whiskers (Atlantic population)	Special Concern	Special Concern		S1?	21	11.2 ± 0.0	NS
N	*Pectenia plumbea*	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S3	146	0.5 ± 0.0	NS
N	*Fissidens exilis*	Pygmy Pocket Moss	Not At Risk			S1S2	5	42.2 ± 0.0	NS
N	*Pseudevernia cladonia*	Ghost Antler Lichen	Not At Risk			S2S3	4	10.5 ± 0.0	NS
N	*Cinclidium stygium*	Sooty Cupola Moss				S1	2	88.0 ± 0.0	NS
N	*Cladonia brevis*	Short Peg Lichen				S1	1	85.6 ± 0.0	NS
N	*Conardia compacta*	Coast Creeping Moss				S1?	1	99.8 ± 2.0	NS
N	*Oligotrichum hercynicum*	Hercynian Hair Moss				S1?	1	98.0 ± 0.0	NS
N	*Lichina confinis*	Marine Seaweed Lichen				S1?	2	89.1 ± 2.0	NS
N	*Polychidium muscicola*	Eyed Mossthorns Woollybear Lichen				S1?	2	43.9 ± 0.0	NS
N	*Parmeliella parvula*	Poor-man's Shingles Lichen				S1?	6	9.8 ± 0.0	NS
N	*Sphagnum platyphyllum*	Flat-leaved Peat Moss				S1S2	4	82.0 ± 0.0	NS
N	*Cyrto-hypnum minutulum*	Tiny Cedar Moss				S1S2	1	77.0 ± 0.0	NS
N	*Hamatocaulis vernicosus*	a Moss				S1S2	1	91.2 ± 0.0	NS
N	*Barbilophozia lycopodioides*	Greater Pawwort				S1S3	1	98.9 ± 0.0	NS
N	*Peltigera neckeri*	Black-saddle Pelt Lichen				S1S3	1	52.9 ± 0.0	NS

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N	*Riccardia multifida*	Delicate Germanderwort				S2?	1	20.3 ± 0.0	NS
N	*Anacamptodon splachnoides*	a Moss				S2?	1	44.6 ± 0.0	NS
N	*Anomodon viticulosus*	a Moss				S2?	1	99.4 ± 0.0	NS
N	*Atrichum angustatum*	Lesser Smoothcap Moss				S2?	1	54.9 ± 3.0	NS
N	*Campylium polygamum*	a Moss				S2?	2	52.9 ± 0.0	NS
N	*Campylium radicale*	Long-stalked Fine Wet Moss				S2?	1	83.5 ± 0.0	NS
N	*Fissidens taxifolius*	Yew-leaved Pocket Moss				S2?	2	99.4 ± 0.0	NS
N	*Platydictya jungermannioides*	False Willow Moss				S2?	3	59.1 ± 0.0	NS
N	*Pohlia sphagnicola*	a moss				S2?	1	36.4 ± 0.0	NS
N	*Scorpidium scorpioides*	Hooked Scorpion Moss				S2?	2	83.4 ± 0.0	NS
N	*Sphagnum subnitens*	Lustrous Peat Moss				S2?	2	94.3 ± 0.0	NS
N	*Tetraplodon angustatus*	Toothed-leaved Nitrogen Moss				S2?	3	41.9 ± 0.0	NS
N	*Tortella fragilis*	Fragile Twisted Moss				S2?	1	98.8 ± 0.0	NS
N	*Leptogium teretiusculum*	Beaded Jellyskin Lichen				S2?	4	59.1 ± 0.0	NS
N	*Cladonia labradorica*	Labrador Lichen				S2?	1	11.0 ± 0.0	NS
N	*Peltigera collina*	Tree Pelt Lichen				S2?	29	1.6 ± 4.0	NS
N	*Tetraplodon mnioides*	Entire-leaved Nitrogen Moss				S2S3	1	51.6 ± 0.0	NS
N	*Limprichtia revolvens*	a Moss				S2S3	5	81.6 ± 0.0	NS
N	*Collema leptaleum*	Crumpled Bat's Wing Lichen				S2S3	1	55.4 ± 0.0	NS
N	*Solorina saccata*	Woodland Owl Lichen				S2S3	5	53.5 ± 0.0	NS
N	*Ahtiana aurescens*	Eastern Candlewax Lichen				S2S3	4	68.2 ± 0.0	NS
N	*Cetraria muricata*	Spiny Heath Lichen				S2S3	2	5.4 ± 1.0	NS
N	*Cladonia incrassata*	Powder-foot British Soldiers Lichen				S2S3	1	50.5 ± 0.0	NS
N	*Leptogium tenuissimum*	Birdnest Jellyskin Lichen				S2S3	12	5.2 ± 0.0	NS
N	*Parmelia fertilis*	Fertile Shield Lichen				S2S3	1	91.3 ± 0.0	NS
N	*Usnea mutabilis*	Bloody Beard Lichen				S2S3	1	82.8 ± 0.0	NS
N	*Usnea rubicunda*	Red Beard Lichen				S2S3	2	3.1 ± 0.0	NS
N	*Stereocaulon condensatum*	Granular Soil Foam Lichen				S2S3	4	61.8 ± 0.0	NS
N	*Cladonia coccifera*	Eastern Boreal Pixie-cup Lichen				S2S3	3	22.2 ± 0.0	NS
N	*Collema tenax*	Soil Tarpaper Lichen				S3	1	56.4 ± 0.0	NS
N	*Collema nigrescens*	Blistered Tarpaper Lichen				S3	4	59.6 ± 0.0	NS
N	*Sticta fuliginosa*	Peppered Moon Lichen				S3	14	11.1 ± 0.0	NS
N	*Leptogium subtile*	Appressed Jellyskin Lichen				S3	5	56.4 ± 0.0	NS
N	*Fuscopannaria ahlneri*	Corrugated Shingles Lichen				S3	38	4.5 ± 0.0	NS
N	*Heterodermia speciosa*	Powdered Fringe Lichen				S3	7	29.0 ± 0.0	NS
N	*Heterodermia squamulosa*	Scaly Fringe Lichen				S3	1	46.5 ± 0.0	NS
N	*Leptogium corticola*	Blistered Jellyskin Lichen				S3	22	45.8 ± 0.0	NS
N	*Leptogium lichenoides*	Tattered Jellyskin Lichen				S3	10	50.4 ± 0.0	NS
N	*Nephroma bellum*	Naked Kidney Lichen				S3	4	60.4 ± 0.0	NS
N	*Placynthium nigrum*	Common Ink Lichen				S3	1	60.7 ± 10.0	NS
N	*Platismatia norvegica*	Oldgrowth Rag Lichen				S3	2	14.3 ± 0.0	NS
N	*Moelleropsis nebulosa*	Blue-gray Moss Shingle Lichen				S3	31	4.4 ± 0.0	NS
N	*Fuscopannaria sorediata*	a Lichen				S3	7	0.3 ± 0.0	NS
N	*Ephebe lanata*	Waterside Rockshag Lichen				S3	2	37.4 ± 0.0	NS
N	*Anomodon tristis*	a Moss				S3?	1	55.6 ± 0.0	NS
N	*Sphagnum riparium*	Streamside Peat Moss				S3?	2	90.8 ± 0.0	NS
N	*Phaeophyscia pusilloides*	Pompom-tipped Shadow Lichen				S3?	4	60.1 ± 0.0	NS
N	*Cladonia stygia*	Black-footed Reindeer Lichen				S3?	2	45.1 ± 0.0	NS
N	*Dicranella varia*	a Moss				S3S4	3	82.9 ± 0.0	NS
N	*Dicranum leioneuron*	a Dicranum Moss				S3S4	1	57.2 ± 0.0	NS
N	*Encalypta procera*	Slender Extinguisher Moss				S3S4	5	56.3 ± 0.0	NS

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N	*Sphagnum lindbergii*	Lindberg's Peat Moss				S3S4	5	36.4 ± 0.0	NS
N	*Splachnum ampullaceum*	Cruet Dung Moss				S3S4	2	66.5 ± 0.0	NS
N	*Schistidium agassizii*	Elf Bloom Moss				S3S4	1	27.3 ± 3.0	NS
N	*Arctoparmelia incurva*	Finger Ring Lichen				S3S4	4	52.1 ± 0.0	NS
N	*Hypogymnia vittata*	Slender Monk's Hood Lichen				S3S4	123	11.0 ± 0.0	NS
N	*Leptogium acadiense*	Acadian Jellyskin Lichen				S3S4	11	12.0 ± 0.0	NS
N	*Cladonia floerkeana*	Gritty British Soldiers Lichen				S3S4	1	86.0 ± 0.0	NS
N	*Vahliella leucophaea*	Shelter Shingle Lichen				S3S4	1	60.5 ± 0.0	NS
N	*Melanohalea olivacea*	Spotted Camouflage Lichen				S3S4	1	74.8 ± 0.0	NS
N	*Parmotrema chinense*	Powdered Ruffle Lichen				S3S4	1	46.3 ± 0.0	NS
N	*Physconia detersa*	Bottlebrush Frost Lichen				S3S4	1	50.7 ± 0.0	NS
N	*Sphaerophorus fragilis*	Fragile Coral Lichen				S3S4	1	52.6 ± 0.0	NS
N	*Coccocarpia palmicola*	Salted Shell Lichen				S3S4	627	3.1 ± 0.0	NS
N	*Physcia tenella*	Fringed Rosette Lichen				S3S4	1	45.9 ± 3.0	NS
N	*Anaptychia palmulata*	Shaggy Fringed Lichen				S3S4	23	10.5 ± 0.0	NS
N	*Evernia prunastri*	Valley Oakmoss Lichen				S3S4	2	58.8 ± 0.0	NS
N	*Dermatocarpon luridum*	Brookside Stippleback Lichen				S3S4	7	14.6 ± 8.0	NS
N	*Heterodermia neglecta*	Fringe Lichen				S3S4	22	14.6 ± 0.0	NS
P	*Fraxinus nigra*	Black Ash	Threatened		Threatened	S1S2	90	35.0 ± 0.0	NS
P	*Bartonia paniculata ssp. paniculata*	Branched Bartonia	Threatened	Threatened		SNA	1	92.1 ± 10.0	NS
P	*Juncus caesariensis*	New Jersey Rush	Special Concern	Special Concern	Vulnerable	S2	71	83.4 ± 0.0	NS
P	*Floerkea proserpinacoides*	False Mermaidweed	Not At Risk			S2	9	44.1 ± 1.0	NS
P	*Thuja occidentalis*	Eastern White Cedar			Vulnerable	S1	1	50.2 ± 0.0	NS
P	*Sanicula odorata*	Clustered Sanicle				S1	3	74.6 ± 0.0	NS
P	*Zizia aurea*	Golden Alexanders				S1	19	32.3 ± 0.0	NS
P	*Arnica lonchophylla*	Northern Arnica				S1	1	68.5 ± 7.0	NS
P	*Bidens hyperborea*	Estuary Beggarticks				S1	1	54.6 ± 1.0	NS
P	*Ageratina altissima*	White Snakeroot				S1	2	53.7 ± 7.0	NS
P	*Cardamine dentata*	Toothed Bittercress				S1	1	80.8 ± 0.0	NS
P	*Cochlearia tridactylites*	Limestone Scurvy-grass				S1	12	28.4 ± 0.0	NS
P	*Stellaria crassifolia*	Fleshy Stitchwort				S1	1	88.7 ± 2.0	NS
P	*Hudsonia tomentosa*	Woolly Beach-heath				S1	6	51.5 ± 1.0	NS
P	*Desmodium canadense*	Canada Tick-trefoil				S1	10	88.2 ± 0.0	NS
P	*Fraxinus pennsylvanica*	Red Ash				S1	1	51.6 ± 0.0	NS
P	*Bistorta vivipara*	Alpine Bistort				S1	1	77.2 ± 1.0	NS
P	*Montia fontana*	Water Blinks				S1	2	51.0 ± 3.0	NS
P	*Agalinis purpurea var. parviflora*	Small-flowered Purple False Foxglove				S1	2	83.3 ± 0.0	NS
P	*Scrophularia lanceolata*	Lance-leaved Figwort				S1	1	27.8 ± 1.0	NS
P	*Pilea pumila*	Dwarf Clearweed				S1	1	74.7 ± 6.0	NS
P	*Carex alopecoidea*	Foxtail Sedge				S1	2	49.9 ± 0.0	NS
P	*Carex granularis*	Limestone Meadow Sedge				S1	11	83.7 ± 0.0	NS
P	*Carex gynocrates*	Northern Bog Sedge				S1	11	84.2 ± 0.0	NS
P	*Carex haydenii*	Hayden's Sedge				S1	2	62.1 ± 5.0	NS
P	*Carex pellita*	Woolly Sedge				S1	7	88.3 ± 0.0	NS
P	*Carex plantaginea*	Plantain-Leaved Sedge				S1	2	96.8 ± 0.0	NS
P	*Carex tenuiflora*	Sparse-Flowered Sedge				S1	3	20.8 ± 1.0	NS
P	*Carex tincta*	Tinged Sedge				S1	1	49.9 ± 1.0	NS
P	*Carex viridula var. saxilittoralis*	Greenish Sedge				S1	4	90.9 ± 0.0	NS
P	*Carex viridula var. elatior*	Greenish Sedge				S1	20	85.3 ± 0.0	NS
P	*Carex grisea*	Inflated Narrow-leaved Sedge				S1	6	49.4 ± 0.0	NS
P	*Cyperus lupulinus*	Hop Flatsedge				S1	5	51.0 ± 0.0	NS
P	*Cyperus lupulinus ssp. macilentus*	Hop Flatsedge				S1	10	51.5 ± 1.0	NS

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P	*Eleocharis erythropoda*	Red-stemmed Spikerush				S1	1	92.4 ± 0.0	NS
P	*Iris prismatica*	Slender Blue Flag				S1	2	33.3 ± 7.0	NS
P	*Luzula spicata*	Spiked Woodrush				S1	1	49.8 ± 0.0	NS
P	*Malaxis monophyllos var. brachypoda*	North American White Adder's-mouth				S1	1	39.7 ± 7.0	NS
P	*Bromus latiglumis*	Broad-Glumed Brome				S1	15	61.2 ± 0.0	NS
P	*Elymus wiegandii*	Wiegand's Wild Rye				S1	6	64.2 ± 0.0	NS
P	*Elymus hystrix*	Spreading Wild Rye				S1	1	78.7 ± 1.0	NS
P	*Potamogeton nodosus*	Long-leaved Pondweed				S1	1	36.1 ± 5.0	NS
P	*Sparganium androcladum*	Branching Bur-Reed				S1	1	51.9 ± 1.0	NS
P	*Equisetum palustre*	Marsh Horsetail				S1	8	94.7 ± 0.0	NS
P	*Solidago hispida*	Hairy Goldenrod				S1?	1	72.1 ± 7.0	NS
P	*Dichanthelium lindheimeri*	Lindheimer's Panicgrass				S1?	1	86.6 ± 0.0	NS
P	*Rudbeckia laciniata*	Cut-Leaved Coneflower				S1S2	2	37.0 ± 0.0	NS
P	*Cornus suecica*	Swedish Bunchberry				S1S2	2	53.2 ± 0.0	NS
P	*Anemone virginiana var. alba*	Virginia Anemone				S1S2	6	95.7 ± 0.0	NS
P	*Parnassia parviflora*	Small-flowered Grass-of-Parnassus				S1S2	10	74.8 ± 1.0	NS
P	*Carex livida*	Livid Sedge				S1S2	23	47.8 ± 0.0	NS
P	*Juncus greenei*	Greene's Rush				S1S2	1	51.6 ± 1.0	NS
P	*Juncus alpinoarticulatus ssp. americanus*	Northern Green Rush				S1S2	8	51.6 ± 5.0	NS
P	*Platanthera huronensis*	Fragrant Green Orchid				S1S2	2	57.3 ± 10.0	NS
P	*Cinna arundinacea*	Sweet Wood Reed Grass				S1S2	24	61.2 ± 0.0	NS
P	*Sparganium hyperboreum*	Northern Burreed				S1S2	3	4.2 ± 0.0	NS
P	*Cryptogramma stelleri*	Steller's Rockbrake				S1S2	17	97.1 ± 0.0	NS
P	*Selaginella selaginoides*	Low Spikemoss				S1S2	2	81.5 ± 0.0	NS
P	*Carex vacillans*	Estuarine Sedge				S1S3	3	49.9 ± 0.0	NS
P	*Osmorhiza longistylis*	Smooth Sweet Cicely				S2	16	41.0 ± 0.0	NS
P	*Erigeron philadelphicus*	Philadelphia Fleabane				S2	4	58.5 ± 7.0	NS
P	*Symphyotrichum ciliolatum*	Fringed Blue Aster				S2	3	22.4 ± 0.0	NS
P	*Impatiens pallida*	Pale Jewelweed				S2	7	29.1 ± 7.0	NS
P	*Caulophyllum thalictroides*	Blue Cohosh				S2	35	40.9 ± 0.0	NS
P	*Cardamine parviflora*	Small-flowered Bittercress				S2	2	94.9 ± 0.0	NS
P	*Draba arabisans*	Rock Whitlow-Grass				S2	3	97.8 ± 1.0	NS
P	*Lobelia kalmii*	Brook Lobelia				S2	72	77.1 ± 0.0	NS
P	*Stellaria humifusa*	Saltmarsh Starwort				S2	4	36.0 ± 0.0	NS
P	*Stellaria longifolia*	Long-leaved Starwort				S2	1	64.6 ± 0.0	NS
P	*Oxybasis rubra*	Red Goosefoot				S2	5	62.9 ± 7.0	NS
P	*Crassula aquatica*	Water Pygmyweed				S2	2	75.8 ± 7.0	NS
P	*Myriophyllum farwellii*	Farwell's Water Milfoil				S2	4	23.6 ± 0.0	NS
P	*Utricularia resupinata*	Inverted Bladderwort				S2	1	99.4 ± 0.0	NS
P	*Persicaria arifolia*	Halberd-leaved Tearthumb				S2	7	20.9 ± 0.0	NS
P	*Rumex triangulivalvis*	Triangular-valve Dock				S2	4	60.9 ± 6.0	NS
P	*Anemonastrum canadense*	Canada Anemone				S2	2	53.8 ± 3.0	NS
P	*Anemone quinquefolia*	Wood Anemone				S2	5	27.4 ± 0.0	NS
P	*Anemone virginiana*	Virginia Anemone				S2	31	50.4 ± 0.0	NS
P	*Caltha palustris*	Yellow Marsh Marigold				S2	3	54.0 ± 0.0	NS
P	*Galium labradoricum*	Labrador Bedstraw				S2	32	81.0 ± 0.0	NS
P	*Salix pedicellaris*	Bog Willow				S2	6	82.3 ± 0.0	NS
P	*Comandra umbellata*	Bastard's Toadflax				S2	30	50.7 ± 0.0	NS
P	*Saxifraga paniculata ssp. laestadii*	Laestadius' Saxifrage				S2	1	93.2 ± 7.0	NS
P	*Tiarella cordifolia*	Heart-leaved Foamflower				S2	2	54.2 ± 3.0	NS
P	*Viola nephrophylla*	Northern Bog Violet				S2	6	65.9 ± 0.0	NS
P	*Carex bebbii*	Bebb's Sedge				S2	10	44.8 ± 7.0	NS
P	*Carex castanea*	Chestnut Sedge				S2	15	80.9 ± 0.0	NS

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P	*Carex hystericina*	Porcupine Sedge				S2	29	50.3 ± 0.0	NS
P	*Carex tenera*	Tender Sedge				S2	3	50.4 ± 1.0	NS
P	*Carex atratiformis*	Scabrous Black Sedge				S2	2	96.7 ± 7.0	NS
P	*Eleocharis quinqueflora*	Few-flowered Spikerush				S2	10	84.8 ± 0.0	NS
P	*Juncus stygius ssp. americanus*	Moor Rush				S2	27	81.4 ± 1.0	NS
P	*Allium schoenoprasum var. sibiricum*	Wild Chives				S2	1	61.8 ± 7.0	NS
P	*Lilium canadense*	Canada Lily				S2	48	27.2 ± 1.0	NS
P	*Cypripedium parviflorum var. pubescens*	Yellow Lady's-slipper				S2	28	50.5 ± 0.0	NS
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	1	99.4 ± 0.0	NS
P	*Cypripedium reginae*	Showy Lady's-Slipper				S2	127	53.3 ± 0.0	NS
P	*Platanthera flava var. herbiola*	Pale Green Orchid				S2	1	29.7 ± 1.0	NS
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S2	31	78.4 ± 1.0	NS
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S2	1	90.8 ± 7.0	NS
P	*Potamogeton friesii*	Fries' Pondweed				S2	5	65.2 ± 0.0	NS
P	*Potamogeton richardsonii*	Richardson's Pondweed				S2	6	33.7 ± 0.0	NS
P	*Cystopteris laurentiana*	Laurentian Bladder Fern				S2	5	96.7 ± 10.0	NS
P	*Dryopteris fragrans*	Fragrant Wood Fern				S2	3	27.7 ± 0.0	NS
P	*Polystichum lonchitis*	Northern Holly Fern				S2	5	78.8 ± 5.0	NS
P	*Woodsia glabella*	Smooth Cliff Fern				S2	2	96.7 ± 7.0	NS
P	*Symphyotrichum boreale*	Boreal Aster				S2?	52	82.8 ± 0.0	NS
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S2?	6	49.7 ± 0.0	NS
P	*Epilobium coloratum*	Purple-veined Willowherb				S2?	3	56.4 ± 0.0	NS
P	*Crataegus submollis*	Quebec Hawthorn				S2?	2	64.5 ± 7.0	NS
P	*Eleocharis ovata*	Ovate Spikerush				S2?	1	17.2 ± 0.0	NS
P	*Scirpus pedicellatus*	Stalked Bulrush				S2?	3	61.7 ± 0.0	NS
P	*Senecio pseudoarnica*	Seabeach Ragwort				S2S3	18	13.4 ± 0.0	NS
P	*Betula michauxii*	Michaux's Dwarf Birch				S2S3	19	2.5 ± 0.0	NS
P	*Sagina nodosa*	Knotted Pearlwort				S2S3	6	36.3 ± 1.0	NS
P	*Sagina nodosa ssp. borealis*	Knotted Pearlwort				S2S3	2	89.5 ± 0.0	NS
P	*Hypericum x dissimulatum*	Disguised St. John's-wort				S2S3	1	20.3 ± 1.0	NS
P	*Triosteum aurantiacum*	Orange-fruited Tinker's Weed				S2S3	151	40.9 ± 0.0	NS
P	*Shepherdia canadensis*	Soapberry				S2S3	8	94.3 ± 0.0	NS
P	*Empetrum atropurpureum*	Purple Crowberry				S2S3	1	52.5 ± 3.0	NS
P	*Euphorbia polygonifolia*	Seaside Spurge				S2S3	11	51.1 ± 0.0	NS
P	*Halenia deflexa*	Spurred Gentian				S2S3	23	29.1 ± 1.0	NS
P	*Hedeoma pulegioides*	American False Pennyroyal				S2S3	2	73.6 ± 5.0	NS
P	*Polygonum aviculare ssp. buxiforme*	Box Knotweed				S2S3	1	90.6 ± 0.0	NS
P	*Polygonum oxyspermum ssp. raii*	Ray's Knotweed				S2S3	4	22.2 ± 1.0	NS
P	*Amelanchier fernaldii*	Fernald's Serviceberry				S2S3	1	21.4 ± 1.0	NS
P	*Potentilla canadensis*	Canada Cinquefoil				S2S3	1	52.2 ± 2.0	NS
P	*Galium aparine*	Common Bedstraw				S2S3	15	50.1 ± 0.0	NS
P	*Salix pellita*	Satiny Willow				S2S3	1	47.2 ± 1.0	NS
P	*Carex adusta*	Lesser Brown Sedge				S2S3	1	41.5 ± 5.0	NS
P	*Carex hirtifolia*	Pubescent Sedge				S2S3	22	41.0 ± 0.0	NS
P	*Eleocharis flavescens var. olivacea*	Bright-green Spikerush				S2S3	3	45.0 ± 0.0	NS
P	*Eriophorum gracile*	Slender Cottongrass				S2S3	8	6.7 ± 1.0	NS
P	*Cypripedium parviflorum*	Yellow Lady's-slipper				S2S3	54	50.4 ± 0.0	NS
P	*Poa glauca*	Glaucous Blue Grass				S2S3	8	97.1 ± 0.0	NS
P	*Stuckenia filiformis*	Thread-leaved Pondweed				S2S3	10	60.9 ± 0.0	NS

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P	*Botrychium lanceolatum ssp. angustisegmentum*	Narrow Triangle Moonwort				S2S3	5	79.8 ± 0.0	NS
P	*Botrychium simplex*	Least Moonwort				S2S3	3	75.7 ± 1.0	NS
P	*Angelica atropurpurea*	Purple-stemmed Angelica				S3	11	60.3 ± 0.0	NS
P	*Erigeron hyssopifolius*	Hyssop-leaved Fleabane				S3	18	50.3 ± 0.0	NS
P	*Bidens beckii*	Water Beggarticks				S3	6	44.2 ± 0.0	NS
P	*Packera paupercula*	Balsam Groundsel				S3	59	50.4 ± 0.0	NS
P	*Betula pumila*	Bog Birch				S3	1	83.0 ± 0.0	NS
P	*Campanula aparinoides*	Marsh Bellflower				S3	9	35.1 ± 0.0	NS
P	*Vaccinium boreale*	Northern Blueberry				S3	5	21.4 ± 1.0	NS
P	*Vaccinium cespitosum*	dwarf bilberry				S3	46	27.0 ± 0.0	NS
P	*Bartonia virginica*	Yellow Bartonia				S3	1	78.7 ± 0.0	NS
P	*Proserpinaca palustris*	Marsh Mermaidweed				S3	27	52.8 ± 0.0	NS
P	*Proserpinaca pectinata*	Comb-leaved Mermaidweed				S3	2	87.8 ± 1.0	NS
P	*Teucrium canadense*	Canada Germander				S3	41	47.2 ± 0.0	NS
P	*Decodon verticillatus*	Swamp Loosestrife				S3	1	82.8 ± 7.0	NS
P	*Epilobium strictum*	Downy Willowherb				S3	6	36.8 ± 0.0	NS
P	*Polygala sanguinea*	Blood Milkwort				S3	3	7.2 ± 0.0	NS
P	*Persicaria pensylvanica*	Pennsylvania Smartweed				S3	15	49.6 ± 0.0	NS
P	*Fallopia scandens*	Climbing False Buckwheat				S3	26	29.2 ± 0.0	NS
P	*Plantago rugelii*	Rugel's Plantain				S3	2	93.8 ± 0.0	NS
P	*Samolus parviflorus*	Seaside Brookweed				S3	12	49.7 ± 0.0	NS
P	*Pyrola asarifolia*	Pink Pyrola				S3	3	84.1 ± 0.0	NS
P	*Pyrola minor*	Lesser Pyrola				S3	1	97.3 ± 2.0	NS
P	*Ranunculus gmelinii*	Gmelin's Water Buttercup				S3	46	33.1 ± 2.0	NS
P	*Endotropis alnifolia*	alder-leaved buckthorn				S3	335	52.2 ± 0.0	NS
P	*Agrimonia gryposepala*	Hooked Agrimony				S3	197	35.1 ± 0.0	NS
P	*Amelanchier spicata*	Running Serviceberry				S3	5	14.6 ± 0.0	NS
P	*Galium kamtschaticum*	Northern Wild Licorice				S3	5	92.1 ± 0.0	NS
P	*Geocaulon lividum*	Northern Comandra				S3	65	1.3 ± 0.0	NS
P	*Limosella australis*	Southern Mudwort				S3	3	82.0 ± 5.0	NS
P	*Lindernia dubia*	Yellow-seeded False Pimperel				S3	11	50.1 ± 0.0	NS
P	*Laportea canadensis*	Canada Wood Nettle				S3	16	40.8 ± 3.0	NS
P	*Verbena hastata*	Blue Vervain				S3	48	40.9 ± 0.0	NS
P	*Carex cryptolepis*	Hidden-scaled Sedge				S3	7	45.9 ± 1.0	NS
P	*Carex eburnea*	Bristle-leaved Sedge				S3	23	54.7 ± 5.0	NS
P	*Carex lupulina*	Hop Sedge				S3	11	49.8 ± 6.0	NS
P	*Carex rosea*	Rosy Sedge				S3	5	35.1 ± 4.0	NS
P	*Carex tribuloides*	Blunt Broom Sedge				S3	11	17.5 ± 0.0	NS
P	*Carex wiegandii*	Wiegand's Sedge				S3	2	47.6 ± 0.0	NS
P	*Carex foenea*	Fernald's Hay Sedge				S3	1	69.5 ± 0.0	NS
P	*Schoenoplectus americanus*	Olney's Bulrush				S3	1	49.8 ± 0.0	NS
P	*Juncus subcaudatus*	Woods-Rush				S3	6	13.1 ± 0.0	NS
P	*Juncus dudleyi*	Dudley's Rush				S3	84	31.3 ± 0.0	NS
P	*Goodyera repens*	Lesser Rattlesnake-plantain				S3	8	65.8 ± 0.0	NS
P	*Neottia bifolia*	Southern Twayblade				S3	47	11.2 ± 0.0	NS
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	50	19.1 ± 10.0	NS
P	*Platanthera hookeri*	Hooker's Orchid				S3	3	46.7 ± 0.0	NS
P	*Platanthera orbiculata*	Small Round-leaved Orchid				S3	2	37.5 ± 0.0	NS
P	*Spiranthes ochroleuca*	Yellow Ladies'-tresses				S3	3	82.8 ± 0.0	NS
P	*Alopecurus aequalis*	Short-awned Foxtail				S3	5	56.2 ± 1.0	NS
P	*Dichanthelium clandestinum*	Deer-tongue Panic Grass				S3	81	27.3 ± 0.0	NS
P	*Potamogeton obtusifolius*	Blunt-leaved Pondweed				S3	11	45.1 ± 1.0	NS
P	*Potamogeton praelongus*	White-stemmed Pondweed				S3	10	29.1 ± 10.0	NS
P	*Potamogeton zosteriformis*	Flat-stemmed Pondweed				S3	1	97.2 ± 7.0	NS
P	*Sparganium natans*	Small Burreed				S3	8	26.0 ± 0.0	NS
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S3	4	46.7 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Asplenium viride*	Green Spleenwort				S3	20	62.3 ± 0.0	NS
P	*Equisetum pratense*	Meadow Horsetail				S3	14	79.3 ± 0.0	NS
P	*Equisetum variegatum*	Variegated Horsetail				S3	39	43.2 ± 0.0	NS
P	*Isoetes tuckermanii ssp. acadiensis*	Acadian Quillwort				S3	3	17.3 ± 0.0	NS
P	*Diphasiastrum sitchense*	Sitka Ground-cedar				S3	19	35.2 ± 1.0	NS
P	*Huperzia appressa*	Mountain Firmoss				S3	1	92.9 ± 1.0	NS
P	*Sceptridium dissectum*	Dissected Moonwort				S3	3	49.2 ± 1.0	NS
P	*Polypodium appalachianum*	Appalachian Polypody				S3	1	91.2 ± 0.0	NS
P	*Bidens vulgata*	Tall Beggarticks				S3?	1	80.1 ± 0.0	NS
P	*Persicaria amphibia var. emersa*	Long-root Smartweed				S3?	1	50.0 ± 0.0	NS
P	*Diphasiastrum x sabinifolium*	Savin-leaved Ground-cedar				S3?	3	58.0 ± 5.0	NS
P	*Atriplex glabriuscula var. franktonii*	Frankton's Saltbush				S3S4	1	46.1 ± 0.0	NS
P	*Suaeda calceoliformis*	Horned Sea-blite				S3S4	5	28.8 ± 0.0	NS
P	*Myriophyllum sibiricum*	Siberian Water Milfoil				S3S4	2	54.0 ± 0.0	NS
P	*Nuphar microphylla*	Small Yellow Pond-lily				S3S4	1	95.9 ± 2.0	NS
P	*Sanguinaria canadensis*	Bloodroot				S3S4	141	40.0 ± 5.0	NS
P	*Polygonum fowleri*	Fowler's Knotweed				S3S4	4	54.2 ± 0.0	NS
P	*Rumex fueginus*	Tierra del Fuego Dock				S3S4	9	88.3 ± 0.0	NS
P	*Fragaria vesca ssp. americana*	Woodland Strawberry				S3S4	18	56.2 ± 0.0	NS
P	*Salix petiolaris*	Meadow Willow				S3S4	4	82.3 ± 0.0	NS
P	*Agalinis neoscotica*	Nova Scotia Agalinis				S3S4	3	0.7 ± 4.0	NS
P	*Eriophorum russeolum*	Russet Cottongrass				S3S4	7	46.7 ± 5.0	NS
P	*Triglochin gaspensis*	Gasp ├ Arrowgrass				S3S4	23	53.8 ± 0.0	NS
P	*Juncus acuminatus*	Sharp-Fruit Rush				S3S4	3	52.0 ± 0.0	NS
P	*Luzula parviflora*	Small-flowered Woodrush				S3S4	3	46.1 ± 0.0	NS
P	*Liparis loeselii*	Loesel's Twayblade				S3S4	9	40.3 ± 0.0	NS
P	*Panicum philadelphicum*	Philadelphia Panicgrass				S3S4	1	77.2 ± 0.0	NS
P	*Trisetum spicatum*	Narrow False Oats				S3S4	1	88.3 ± 0.0	NS
P	*Cystopteris bulbifera*	Bulblet Bladder Fern				S3S4	117	46.8 ± 1.0	NS
P	*Equisetum hyemale*	Common Scouring-rush				S3S4	1	82.6 ± 0.0	NS
P	*Equisetum hyemale ssp. affine*	Common Scouring-rush				S3S4	36	44.3 ± 0.0	NS
P	*Equisetum scirpoides*	Dwarf Scouring-Rush				S3S4	64	79.8 ± 0.0	NS
P	*Diphasiastrum complanatum*	Northern Ground-cedar				S3S4	2	82.8 ± 5.0	NS
P	*Schizaea pusilla*	Little Curlygrass Fern				S3S4	9	8.3 ± 0.0	NS
P	*Viola canadensis*	Canada Violet				SH	1	97.7 ± 0.0	NS

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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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APPENDIX C. PRIORITY SPECIES LIST

Scientific Name	Common Name	SRank	COSEWIC	SARA	NSESA	Habitat Description	Reference
Avifauna							
Accipiter cooperii	Cooper's Hawk	S1?B	-	-	-	Not common in Nova Scotia but does breed in the province. Found in mature forest, open woodlands, wood edges and river groves. Nests in coniferous, deciduous and mixed woods, typically those with tall trees and with openings or edge habitat nearby. Also found among trees along rivers through open country, and increasingly in suburbs and cities where tall trees exist for nesting (e.g. parks, open fields and even backyards with feeders). Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Accipiter gentilis	Northern Goshawk	S3S4	-	-	-	Found in coniferous and mixed forests. Generally restricted to wooded areas (along riparian corridors), but may be in relatively open woods or along edges. Often more common as a breeding bird in mixed woods (e.g. mature and old-growth forests with more than 60% closed canopy). In the East, goshawks seek out nest sites in mixed-hardwood forests where beeches, birch, hemlock and maples dominate. Goshawks often build nests near breaks in the canopy, such as a forest trail, road or opening created by a downed tree and prefer sites with a creek, pond or lake nearby. Breeds between April and July. May mate for life (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Actitis macularius	Spotted Sandpiper	S3S4B	-	-	-	Common near fresh and saltwater. Habitat includes pebbly lake shores, ponds and stream sides (and seashores in the winter). Spotted Sandpipers spend the winter along the coasts of North America. During migration and winter, this species is found along the coast on mudflats, beaches and breakwaters (also found in inland habitats such as sewage ponds and irrigation ditches). Breeds near the edge of fresh water in a wide variety of settings, including lakes, ponds, rivers and streams (in either open or wooded country). Breeding territories generally need to have a shoreline, a semi-open area for the nest and patches of dense vegetation to conceal the chicks. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Aegolius funereus	Boreal Owl	S2?B	-	-	-	Year-round resident, mainly in Cape Breton (MBBA, as of July 2021). Does not migrate regularly, but is nomadic and moves outside of range when prey is scarce. Boreal Owls occur in stands of spruce, aspen, poplar, birch and fir in the boreal forest (muskeg, mixed-wood and conifer forests). They also occur in high elevation mountains with subalpine forests in Canada. In the winter, they forage in spruce-fir forests where uncrusted snow under the trees facilitates access to prey. In spring, they often forage in clear-cuts and agricultural fields where small mammals are easier to locate. Beginning in late winter or early spring, male sings at night to defend territory and attract a female (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Ammospiza nelsoni	Nelson's Sparrow	S3S4B	-	-	-	They spend most of their time on or near the ground in dense marsh vegetation. Nelson's Sparrow breed mainly in fresh and saltwater marshes in the northern Great Plains and along the northern Atlantic Coast. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Anas acuta	Northern Pintail	S1B	-	-	-	Found in marshes, prairies, fresh ponds, lakes and salt bays. Summers in wide variety of open habitats, including prairies, farmland, northern tundra and near bodies of water. Breeds in seasonal wetlands, open areas with short vegetation, wet meadows, grasslands and crop fields. During the nonbreeding season they use flooded and dry agricultural fields, lakes, reservoirs, estuaries, saltmarshes, freshwater and brackish wetlands and bays. Pintails also use different habitats depending on time of day (e.g. tend to forage in wetlands during the day). Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Asio flammeus	Short-eared Owl	S1S2B	T	SC	0	Short-eared Owls breed primarily in well-drained grasslands near coastal wetlands. In areas with extensive coastlines, some caution is warranted in summarizing breeding habitat as inland marshes and bogs are less frequently monitored and thus may be under-represented in assessments of breeding habitat (COSEWIC Assessment and Status Report).	COSEWIC. 2008. COSEWIC assessment and update status report on the Short-eared Owl Asio flammeus in Canada. Committee on the Status of Endangered Wildlife in

Scientific Name	Common Name	SRank	COSEWIC	SARA	NSESA	Habitat Description	Reference
							Canada. Ottawa. vi + 24 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
Asio otus	Long-eared Owl	S2S3	-	-	-	Known to breed throughout Nova Scotia. They occur at elevations ranging from near sea level to above 6,500 feet. May be nomadic at times, moving about in response to changing food supplies. Favored habitat includes dense trees for nesting and roosting and open country (e.g. grasslands and shrublands) for hunting. Inhabits a wide variety of such settings, including forest with extensive meadows to groves of conifers or deciduous trees. Generally avoids unbroken forest. Known to be an early breeder. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Botaurus lentiginosus	American Bittern	S3S4B	-	-	-	Found in marshes and reedy lakes. Breeds in freshwater marshes, mainly large, shallow wetlands with a large amount of tall marsh vegetation (cattails, grasses and sedges) and areas of open shallow water. Sometimes feeds in dry grassy fields. They are rarely seen out in the open, prefers vegetation cover. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Bucephala albeola	Bufflehead	S3S4N	-	-	-	Mainly stays along the mainland of Nova Scotia during the winter and Cape Breton during migration (migrates relatively late in fall and spring migration is protracted over a long period). Found in lakes, ponds, rivers and sheltered salt bays (avoiding coastlines and open areas). Bufflehead breed near ponds and lakes in boreal and aspen forest. In winter they occur mainly near the coast (although they can be found in smaller numbers inland). During spring migration they spend time on major rivers or valley lakes. Males begin courtship displays by early winter, but most pairs form in spring. Generally, breeds between April and July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Buteo lagopus	Rough-legged Hawk	S3N	-	-	-	Common across Nova Scotia during nonbreeding (winter). Spends the winter in open country, including grasslands, coastal prairies, marshes, farmland and dunes. In tree-covered areas they hunt over open bogs and other clearings. Breeds mostly on tundra, in areas having cliffs for nest sites; some breed along northern edge of coniferous forest zone. Rough-legged Hawks breed in open country of the arctic, both in North America and Eurasia. Breeds between April and July. May mate for life (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Cardellina canadensis	Canada Warbler	S3B	SC	T	E	Forest undergrowth, shady thickets. Breeds in mature mixed hardwoods of extensive forests and streamside thickets. Prefers 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 (Nova Scotia L& F, 2021).	Nova Scotia Department of Lands and Forestry. 2021. Recovery Plan for the Canada Warbler (Cardellina canadensis) in Nova Scotia [Final]. Nova Scotia Endangered Species Act Recovery Plan Series.
Cardellina pusilla	Wilson's Warbler	S3B	-	-	-	Found in thickets along wooded streams, moist tangles, low shrubs, willows, alders. Breeds in thickets, second-growth, bogs, or in alder and willow groves near streams and ponds. In migration and winter, occurs from hot lowland thickets up to cool mountain woods; always in scrubby overgrown clearings and thin woods, not in the interior of dense forest. Breeds between April and July (Cornell Lab, Audubon).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Cathartes aura	Turkey Vulture	S2S3B	-	-	-	In past was not surveyed/very rare to see Turkey Vultures in Nova Scotia, but as the climate warms they are now sighted across the province (MBBA and Nova Scotia Bird Society). Look for Turkey Vultures as they soar high over open areas. They are particularly noticeable along roadsides and at landfills. At night, they roost in trees, on rocks and other high secluded spots. Most common over open or semi-open country (including mixed farmland, forest, rangeland and even small	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide

Scientific Name	Common Name	SRank	COSEWIC	SARA	NSESA	Habitat Description	Reference
						offshore islands), especially within a few miles of rocky or wooded areas providing secure nesting sites. Generally avoids densely forested regions. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021)	The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Catharus fuscescens	Veery	S3S4B	-	-	-	Breeds across Nova Scotia, but more common on the mainland (especially Southern Nova Scotia). Migrates mostly at night. During spring and fall migration, they favour mainly deciduous forest edges and second-growth woodlands. Males tend to arrive on breeding grounds first. Veeries breed in dense, damp, mostly deciduous woodlands, often near rivers, streams and swampy areas (trees include oak, maple, cherry, aspen, birch, alder, spruce and fir, among other trees and shrubs). Veeries gravitate toward disturbed forests, where dense understory provides protected nest sites (but generally along streams and other openings). Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Catharus ustulatus	Swainson's Thrush	S3S4B	-	-	-	Breeds throughout Nova Scotia. Spring migration relatively late and spread over a long period (sometimes still migrating at the beginning of June). Breed mainly in coniferous forests, deciduous streamside woodlands, alder or willow thickets and occasionally in coastal scrub. These birds range from sea level up to about 8,500 feet in elevation. During migration, Swainson's Thrushes occupy a wide variety of habitats, seeking mainly areas with dense undergrowth. Look for migrants especially in forests (various types), canyon bottoms, young woodland, swamp forests, lake edges and parks. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Charadrius vociferus	Killdeer	S3B	-	-	-	Favours fields, sandbars, lawns, river banks, coastal estuaries, mudflats and shores. Often found on open ground, such as pastures, plowed fields and large lawns, even at a great distance from water. This species does well in areas disturbed by humans and is commonly spotted on roads, lawns, airports, parking lots, golf courses, fields and in gravel areas. Most successful nesting areas have some shallow water close by or other good feeding area for the chicks. Generally the vegetation in fields inhabited by Killdeer is no taller than one inch. You can find Killdeer near water, but unlike many other shorebirds, they are also common in dry areas. Spring migration is very early, returning to some northern areas in February or March. Breeds between March and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Chordeiles minor	Common Nighthawk	S2B	SC	T	T	Common Nighthawk breeds 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 use of a wide range of habitats makes it difficult to estimate trends in habitat availability, except in urban habitats, where their main nesting sites – flat graveled roofs – are disappearing (COSEWIC, 2018)	COSEWIC, 2018. Status Report on the Common Nighthawk. Retrieved from https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/common-nighthawk-2018.html
Circus hudsonius	Northern Harrier	S3S4B	-	-	-	Breeds in Nova Scotia but also can be a permanent resident. Breeding Northern Harriers are most common in large, undisturbed tracts of freshwater or brackish wetlands, riverside woodlands and grasslands with low, thick vegetation. During winter they use a range of habitats with low vegetation, including deserts, coastal sand dunes, pasturelands, croplands, dry plains, grasslands, old fields, estuaries, open floodplains and marshes. At least in North America, always migrates singly. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Coccothraustes vespertinus	Evening Grosbeak	S3S4B,S3N	SC	SC	V	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 (COSEWIC, 2018)	COSEWIC, 2018. Summary of Terrestrial Species. Retrieved from Species at Risk Public Registry - The COSEWIC Summaries of Terrestrial Species Eligible for Addition or Reclassification on Schedule 1 - January 2018 (sararegistry.gc.ca).

Scientific Name	Common Name	SRank	COSEWIC	SARA	NSESA	Habitat Description	Reference
Coccyzus erythropthalmus	Black-billed Cuckoo	S3B	-	-	-	Black-billed Cuckoos are birds of woodlands and thickets, including aspen, poplar, birch, sugar maple, hickory, hawthorn and willow. They tend to occur more frequently in larger and denser woodlands than the Yellow-billed Cuckoo. On their wintering grounds, they live in forest, woodlands and scrub. A long-distance migrant, going to South America for the winter. Migrates at night; sometimes heard calling in flight overhead at night during the spring. During migration, they seek any kind of dense vegetation cover (e.g. young trees or tall shrubs). Common breeder in Nova Scotia. Breeds mostly in deciduous thickets and shrubby places, often on the edges of woodland or around marshes. Also in second growth of mixed deciduous-coniferous woods, or along their brushy edges. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Contopus cooperi	Olive-sided Flycatcher	S2B	SC	T	T	Olive-sided Flycatcher has 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) (Nova Scotia L&F, 2021).	Nova Scotia Department of Lands and Forestry, 2021. Recovery Plan for the Olive-sided Flycatcher (Contopus cooperi) in Nova Scotia.
Contopus virens	Eastern Wood-Pewee	S3S4B	SC	SC	V	The Eastern Wood-pewee is mostly associated with the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in forest stands of intermediate age and in mature stands with little understory vegetation. During migration, a variety of habitats are used, including forest edges, early and successional clearings (SARA, 2017).	SARA, 2017. Species Profile (Eastern Wood-pewee). Retrieved from https://wildlife-species.canada.ca/species-risk-registry/species/speciesDetails_e.cfm?sid=1198
Coturnicops noveboracensis	Yellow Rail	SUB	SC	SC	-	Yellow rail is distributed along northern Nova Scotia. Nesting Yellow Rails are typically found in marshes dominated by sedges, true grasses, and rushes, where there is little or no standing water (generally 0-12 cm water dept), and where the substrate remains saturated throughout the summer. They can be found in damp fields and meadows, on the floodplains of rivers and streams, in the herbaceous vegetation of bogs, and at the upper levels (drier margins) of estuarine and salt marshes. Nesting habitats usually have a dry mat of dead vegetation from previous growing seasons. A greater diversity of habitat types is used during migration and winter than during the breeding season. In winter, the rails are known to use coastal wetlands and rice fields. (SARA, 2011).	SARA, 2011. Species Profile (Yellow Rail). Retrieved from https://wildlife-species.canada.ca/species-risk-registry/species/speciesDetails_e.cfm?sid=574
Dumetella carolinensis	Gray Catbird	S3B	-	-	-	Known to breed all through Nova Scotia but seems to be more common in the Southern counties. Gray Catbirds live amid dense undergrowth, shrubs, vine tangles and thickets of young trees in shrubby swamps and along forests and streams in both summer and winter (dense, low growth). Human disturbance and development often create these habitats in the form of suburban gardens, clearings, roadsides, fencerows, abandoned farmland and residential areas. Avoids unbroken forest and coniferous woods. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Empidonax flaviventris	Yellow-bellied Flycatcher	S3S4B	-	-	-	Common breeder throughout Nova Scotia. Yellow-bellied Flycatchers breed in boreal coniferous forests, bogs, swamps, and peatlands with a thick cover of moss and an understory of shrubs and saplings (e.g. muskegs). In Canada they frequent stands of black spruce with heath, blueberries, laurel and Labrador tea in the understory, but they also use wet boreal forests and deciduous patches near streams. During migration they use deciduous forests, thickets and forest edges. Spring migration is notably late, with most northbound migrants passing through in mid to late May. Almost all migration is through the east. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Empidonax traillii	Willow Flycatcher	S2B	-	-	-	Uncommon breeder throughout mainland Nova Scotia, not Cape Breton (MBBA, as of July 2021). In winter, they use shrubby clearings, pastures and woodland edges often near water. Migrates relatively late in spring and early in fall. Breeds in thickets of deciduous trees and shrubs, especially willows, or along woodland edges. Often near streams or marshes and may be found in drier habitats than the Alder Flycatcher. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org

Scientific Name	Common Name	SRank	COSEWIC	SARA	NSESA	Habitat Description	Reference
Euphagus carolinus	Rusty Blackbird	S2B	SC	SC	E	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 (COSEWIC, 2018)	COSEWIC, 2018. COSEWIC Assessment and status report on the Rusty Blackbird (Euphagus carolinus) in Canada. Retrieved from: https://species-registry.canada.ca/index-en.html#/consultations/3302
Falco sparverius	American Kestrel	S3B	-	-	-	Breeds in Nova Scotia but also can be a permanent resident. American Kestrels favor open areas with short ground vegetation and sparse trees (e.g. meadows, wood edges, grasslands, deserts, parks, farm fields, cities and suburbs). When breeding, kestrels need access to at least a few trees or structures that provide appropriate nesting cavities. American Kestrels are attracted to many habitats modified by humans, including pastures and parkland, and are often found near areas of human activity including towns and cities. In winter, females may occupy open habitats more so than males. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Gallinago delicata	Wilson's Snipe	S3B	-	-	-	Common across Nova Scotia during breeding and also known as a permanent resident in the southern areas of the province. Wilson's Snipes can be found in all types of wet, marshy settings, including wet fields, bogs, fens, swamps, wet meadows and along muddy edges of rivers and ponds. They avoid areas with tall, dense vegetation, but need patches of cover to hide in and to provide a safe lookout for predators. During the breeding season they are mainly found around fresh marshes and bogs, shrubby stream sides and northern tundra. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Haemorhous purpureus	Purple Finch	S3S4N,S4S5B	-	-	-	Found throughout the entire province year-round. Purple finches can be found in woods, groves, suburbs. Breeds mostly in coniferous and mixed woods, both in forest interior and along edges. In migration and winter, found in a wide variety of wooded and semi-open areas, including forest, suburbs, swamps, and overgrown fields. Breeding occurs from April to July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Hirundo rustica	Barn Swallow	S2S3B	SC	T	E	Barn Swallows forage 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.	
Icterus galbula	Baltimore Oriole	S2S3B	-	-	-	Baltimore Orioles are often very common in open woods and groves in summer. Found in open woods, riverside groves, elms, shade trees. Breeds in deciduous or mixed woodland, generally in open woods or edges rather than interior of dense forest. May be common in trees in towns (Audubon). Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Ixobrychus exilis	Least Bittern	SUB	T	T	0	The Least bittern has been observed in every Province in Canada. However, it is only probable to be located in Nova Scotia. The Least Bittern breeds strictly in marshes dominated by emergent vegetation surrounded by areas of open water. Most breeding grounds in Canada are dominated by cattails, but breeding also occurs in areas with other robust emergent plants and in shrubby swamps. The presence of stands of dense vegetation is essential for nesting because the nests of Least Bittern sit on platforms of stiff stems. The nests are almost always within 10 m of open water. This small heron prefers large marshes that have relatively stable water levels throughout the nesting period. Needs for wintering habitat are less specific, and appear to be met by a wide variety of wetlands—not only emergent	

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						marshes like those used for breeding, but also brackish and saline swamps (Environment Canada Recovery Strategy)	
Lanius borealis	Northern Shrike	S3S4N	-	-	-	They occur in open but brushy habitats, and on calm, sunny days they may sit up on utility wires, bushes, and trees (Cornell Lab).Nests are usually placed in a low tree or large shrub, often in spruce or willow, usually 6-15' above the ground. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Limosa haemastica	Hudsonian Godwit	S1S2M	T	Not on Schedule 1	-	Hudsonian Godwit occurs regularly during breeding or migration in all three territories and in provinces from British Columbia to Québec, as well as occasionally in the fall in all of the Atlantic provinces. Hudsonian Godwit breeds in wetland habitats (sedge meadows and muskeg) in sub-Arctic and Boreal regions. It uses a wide variety of habitats on migration, including freshwater marshes, saline lakes, flooded fields, shallow ponds, coastal wetlands and mudflats (COSEWIC Assessment and Status Report).	
Loxia curvirostra	Red Crossbill	S3S4	-	-	-	Found throughout the entire province year-round. Red Crossbills can be found in conifer forests and groves, and breeds in pines (predominately), spruce, hemlock, Douglas-fir, or other evergreens. Breeding occurs from April to July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Mimus polyglottos	Northern Mockingbird	S1B	-	-	-	Year-round resident throughout Nova Scotia, less common in Cape Breton. Found year-round in areas with open ground and shrubby vegetation (e.g. dense, low shrubs - hedges, fruiting bushes and thickets). When foraging on the ground, it prefers grassy areas, rather than bare spots. Common places include roadsides, parkland, cultivated land, suburban areas, woodland edges and in second-growth habitat at low elevations. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Myiarchus crinitus	Great Crested Flycatcher	S1B	-	-	-	Uncommon breeder throughout mainland Nova Scotia, not Cape Breton (MBBA, as of July 2021). Migrates mostly at night. Breeds mainly in deciduous forest or mixed forest, but avoids pure stands of conifers. May be found in either continuous deep forest or in more open wooded areas, around edges of clearings or abandoned orchards. Dead snags and dying trees are important sources of the cavities they need for nesting (will even search out cavities in old orchards and in woody urban areas like parks, cemeteries and golf courses). If there are enough trees, they will claim territories in pastures, along streams and rivers, and in swamps and wetlands. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Oreothlypis peregrina	Tennessee Warbler	S3S4B	-	-	-	Found in deciduous and mixed forests; in migration, groves, brush. Breeds in bogs, swamps, and forests. Prefers openings in second growth balsam-tamarack bogs, or aspen and pine woods, or edges of dense spruce forest, but can be found in many types of wooded habitats in eastern North America. Nests near slight depressions of boggy ground. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Passerella iliaca	Fox Sparrow	S3S4B	-	-	-	Found year round in Cape Breton, and throughout the migration season (late March and early November) in the rest of the province. Migrates at night. Found in wooded areas, undergrowth, brush. Breeds in brushy areas including woodland edges and clearings, streamside thickets, scrubby second growth, stunted coastal forest. Winters in similar habitats, also in brushy fields, chaparral, well-vegetated suburbs and parks. Breeds from April to July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org

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Passerina cyanea	Indigo Bunting	S1?B	-	-	-	This species favors brushy edges rather than unbroken forest. Indigo Buntings breed in brushy and weedy areas. They're common on the edges of woods and fields; along roads, streams, rivers, and powerline cuts; in logged forest plots, brushy canyons, and abandoned fields where shrubby growth is returning. They are also in clearings within deciduous woods, edges of swamps. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Perisoreus canadensis	Canada Jay	S3	-	-	-	Year-round resident throughout Nova Scotia and commonly referred to as the Gray Jay. No regular migration. On rare occasions, small invasions of Canada Jays will move a short distance out of boreal forest in winter. Prefers boreal and subalpine forests across northern North America, usually where black or white spruce trees are common (also aspen, white birch, balsam fir, sugar maple, jack pine, red spruce, eastern white cedar, etc.). Found in various kinds of coniferous and mixed forest, but rarely occurs where there are no spruce trees. Mated pairs stay together all year and defend permanent territories. Breeding and nesting for this species begins very early, during late winter, with breeding grounds still snow-covered. Breeds until, approximately, July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Petrochelidon pyrrhonota	Cliff Swallow	S2S3B	-	-	-	Breeds throughout Nova Scotia. A long-distance migrant that migrates in flocks, traveling by day. Typically nests in colonies, sometimes with hundreds of nests crowded close together. These colonies are close to a water source, open fields or pastures for foraging, and a source of mud for nest building. Nest site is usually on vertical surface with some overhead shelter. Natural sites were on cliffs. Most sites today are on the sides of buildings, under bridges, in culverts or similar places. They now live in grasslands, towns, broken forest and river edges, but avoid heavy forest and deserts (e.g. open to semi-open land, farms, river bluffs and lakes). Still unaccountably scarce or missing in some seemingly suitable areas. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Pheucticus ludovicianus	Rose-breasted Grosbeak	S2S3B	-	-	-	Look for these birds in forest edges and woodlands. Rose-breasted Grosbeaks breed in moist deciduous forests, deciduous-coniferous forests, thickets, and semi open habitats. They gravitate toward second-growth woods, suburban areas, parks, gardens, and orchards, as well as shrubby forest edges next to streams, ponds, marshes, roads, or pastures. They favor edges or openings with combination of shrubs and tall trees, rather than unbroken forest. Breeds from April to July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Picoides arcticus	Black-backed Woodpecker	S3S4	-	-	-	Known throughout Nova Scotia year-round. Not strictly migratory, but may move around in response to changing conditions (e.g. destruction of habitat). Eastern birds occasionally stage southward irruptions in winter, with scattered individuals showing up well south of breeding range. Habitat includes boreal forests of firs and spruces (pine, Douglas-fir, hemlock, tamarack and spruce, especially spruce bogs). Favours areas of dead or dying trees (coniferous and deciduous), and may concentrate at burned or flooded areas with many standing dead trees. Frequents lowlands in the North and mountains in the West. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Picoides dorsalis	American Three-toed Woodpecker	S1?	-	-	-	Not common in Nova Scotia, but has been known to be a year-round resident in the Northern counties (MBBA, as of July 2021). Irregularly may stage southward irruptions in winter, with a few moving well south of breeding range. Prefers conifer forests (spruce, pine, fir, tamarack, sometimes mixed with deciduous trees such as aspen or willow). Favors areas of old growth, mature forest with many standing dead trees (e.g. after a fire or flood or even a bog with dead or stunted trees). May concentrate in areas with big infestations of wood-boring insects. The species is very scarce or absent in logged areas. Breeds between April and July. Some pairs will be together for more than one season (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Pinicola enucleator	Pine Grosbeak	S2S3B,S5N	-	-	-	Found throughout the province year-round. Pine grosbeaks can be found in conifers; in winter, other trees. Breeds in open coniferous forest, especially of spruce and fir. In winter often found in deciduous trees (especially fruiting trees),	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide

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						also in groves of pines and other conifers. Breeding occurs from April to July (Audubon, 2021; The Cornell Lab, 2021).	The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Piranga olivacea	Scarlet Tanager	S2B	-	-	-	These birds can be found in oak forests in summer, but they often remain out of sight as they forage in the leafy upper branches. Nest site is in tree (usually deciduous), typically 20-30' above ground. Found in forests and shade trees (especially oaks). Breeds mostly in deciduous forest, predominately oaks but also in maple, beech, mixed pine-oak woods, and coniferous woods dominated by pine or hemlock. Breeding Scarlet Tanagers prefer large forest tracts with large trees. During spring and fall they use similar forest habitats as well as open spaces such as parks and gardens. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Podiceps auritus pop. 2	Horned Grebe - Western pop.	S4N	SC	SC	-	The Horned Grebe winters on the coast of Nova Scotia. It has been observed on lakes, rivers and marshes. Some birds follow coastlines as part of their migration. Horned Grebes generally winter in marine habitats, mainly estuaries and bays. Birds are found in greatest numbers in coastal habitats, including areas that offer some degree of protection. Some birds winter on inland lakes and rivers in areas where the minimum temperature in January is higher than -1°C (Species art Risk Public Registry)	SARA, 2017. https://wildlife-species.canada.ca/species-risk-registry/species/speciesDetails_e.cfm?sid=1045
Poecile hudsonicus	Boreal Chickadee	S3	-	-	-	Year-round resident throughout Nova Scotia. Occasional small southward invasions in fall, with a few appearing south of breeding range (similar to Black-capped Chickadees invasions). Boreal Chickadees inhabit mostly mature coniferous forests (sometimes mixed forests), usually spruce and balsam fir, often near water. During late fall and winter irruptions, they tend to be found mostly in areas dominated by coniferous trees. Occurs in low stunted spruces as far North as treeline (e.g. spruce bogs). May mate for life, the birds remaining together all year. Nests in a hole in a tree, either a natural cavity or one they created (or from another species). Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Regulus calendula	Ruby-crowned Kinglet	S3S4B	-	-	-	Breeds throughout Nova Scotia. Migrates a little earlier in fall and later in spring compared to the Golden-crowned Kinglet. In many areas, peak migration periods are October and April. In summer, Ruby-Crowned Kinglets are common in spruce-fir forests (also fir and pine). They also live in mixed woods, isolated trees in meadows, coniferous and deciduous forests, mountain-shrub habitat and floodplain forests of oak, pine, spruce or aspen. These birds nest high in trees, and so prefer older, taller and denser stands. During migration and winter they are common in various woods and thickets (e.g. open deciduous woods, also in coniferous and mixed woods, mesquite brush and streamside thickets). Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Riparia riparia	Bank Swallow	S2S3B	T	T	E	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies. 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 (The Cornell Lab, 2021).	The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Setophaga castanea	Bay-breasted Warbler	S3S4B	-	-	-	Bay-breasted warblers are found in woodlands, conifers in summer. Usually breeds in northern coniferous forest, in thick stands of spruce and fir. They are predators of spruce budworm, and are abundant in spruce forests during outbreaks. Where spruce is not found, will nest in deciduous or mixed second-growth woods of birches, maples, firs, and pines. Breed from April to July, typically in the latter half of the breeding window (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Setophaga pinus	Pine Warbler	S1B	-	-	-	Pine Warblers live in pine or mixed pine-deciduous forest. Also sometimes in cedar or cypress. Various observations throughout Nova Scotia, generally in the southern portion of the province. Breeds April to July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide

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							The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Setophaga striata	Blackpoll Warbler	S3S4B	-	-	-	The blackpoll warbler can be found in conifers; broadleaf trees in migration. Breeds in low northern spruce forest. In migration, moves through forests, parks and gardens, they stop over in scrubby thickets and mature evergreen and deciduous forests. Found in the southern half of Nova Scotia during migration and the northern half during the breeding season. Breeding occurs from April to July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Setophaga tigrina	Cape May Warbler	S2B	-	-	-	The Cape May Warbler can be found in spruce forest; other trees in migration. Breeds in spruce forest, especially during spruce budworm outbreaks, either in pure stands or mixed with firs or other trees, generally in more open woods or near the forest edge. During migration often favors conifers, but also forages in deciduous trees and thickets. Breeding occurs from April to July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Sialia sialis	Eastern Bluebird	S3B	-	-	-	Uncommon breeder throughout Nova Scotia. In the north, arrives quite early in spring, and lingers late in fall. These birds live in semi-open country with scattered trees, but with little understory and sparse ground cover. Original habitats probably included open, frequently burned pine savannas, beaver ponds, mature (but open) woods and forest clearings/openings. Today, they are most common along pastures, roadsides, agricultural fields, suburban parks, backyards and golf courses. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Sitta canadensis	Red-breasted Nuthatch	S3	-	-	-	Year-round resident throughout Nova Scotia. Red-breasted Nuthatches live mainly in coniferous forests of spruce, fir, pine, hemlock, larch and western red cedar. Eastern populations use more deciduous woods, including aspen, birch, poplar, oak and maple. During irruptive winters, nuthatches may use habitats such as orchards, scrub, parks, plantations and shade trees. Winter range varies from year to year, especially in the East (but conifers always chosen if available). Big Southward invasions occur in fall of some years, perhaps mainly when cone crops are poor in the North (but will remain year-round on nesting territory during years with good food supply). Nesting habitat almost always has many conifers, such as spruce, fir and hemlock, either in pure stands or mixed with deciduous trees. Mature forest preferred, due to old decaying wood for nest sites. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Spatula clypeata	Northern Shoveler	S2B	-	-	-	Migrates through all parts of Nova Scotia, except Cape Breton (uncommon for this species to breed in Nova Scotia). Migratory period is quite prolonged in both spring and fall, with many birds moving late in spring and early in fall. Northern Shovelers use shallow wetlands with submerged vegetation during the breeding season, nesting along the margins and in the neighboring grassy fields. Outside of the breeding season they forage in saltmarshes, estuaries, lakes, flooded fields, wetlands, agricultural ponds and wastewater ponds (and fields in vicinity of shallow water) with extensive muddy margins, including stagnant or polluted waters not much favored by other ducks. Pair formation begins in winter and continues during spring migration. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Spatula discors	Blue-winged Teal	S3S4B	-	-	-	Found mainly in fresh ponds and marshes. In summer they use shallow freshwater marshes and ponds in open country, as well as brackish marshes near coast. In migration and winter they forage and stop in any kind of shallow waters, whether inland or coastal. Flocks in migration are sometimes seen over ocean, many miles offshore. They are flightless during their late summer molt, and they spend this time in prairie potholes or large marshes. Blue-winged Teal nest among grasses or herbaceous vegetation. Pair formation begins in early winter and continues during spring migration. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org

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Spinus pinus	Pine Siskin	S2S3	-	-	-	Found throughout the province year-round. Pine Siskins can be found in conifers, mixed woods, alders, weedy areas. Breeds mostly in coniferous and mixed woods, often around edges or clearings; sometimes in deciduous woods, isolated conifer groves. In migration and winter occurs in many kinds of semi-open areas, woodland edges, weedy fields. Breeding occurs from April to July (Audubon, 2021; The Cornell Lab, 2021)	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Toxostoma rufum	Brown Thrasher	S1B	-	-	-	Not common and rarely seen in Nova Scotia, with no recorded sightings in Cape Breton (MBBA, as of July 2021). In eastern North America, Brown Thrashers nest in thickets, brush, shrubbery, hedgerows, forest edges and overgrown clearings in deciduous forest. On rare occasions they breed in backyards and gardens with shrubs and hedges (but in general - areas of dense low growth, especially thickets around edges of deciduous or mixed woods, shrubby edges of swamps or undergrowth in open pine woods). Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Tringa flavipes	Lesser Yellowlegs	S3M	T	No Status	-	Common migrant throughout Nova Scotia. Occurs widely in migration, including coastal estuaries, salt and fresh marshes, mudflats, shores/edges of lakes and ponds; typically more common on freshwater habitats. Often in same places as Greater Yellowlegs, but may be less frequent on tidal flats. Wetland habitats ranging from tidal flats to sewage ponds to flooded fields; often in the company of other shorebird species. Breeds in open boreal forests and meadows interspersed with marshes and bogs. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Tringa melanoleuca	Greater Yellowlegs	S3B,S3S4M	-	-	-	Common migrant in Nova Scotia (migrates in flocks). During migration and throughout the winter, Greater Yellowlegs use a wide variety of fresh and brackish wetlands, including mudflats, estuaries, beaches, marshes, lake and pond edges, wet meadows, sewage ponds and flooded agricultural fields. Breeds in boggy and marshes places within northern coniferous forest. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Tringa semipalmata	Willet	S2S3B	-	-	-	Willets inhabit open beaches, wet meadows, bay shores, marshes, mudflats and rocky coastal zones. During the breeding season, these birds seek saltmarshes, barrier islands and barrier beaches for breeding. Often nests in colonies, especially along Atlantic Coast (prefers to nest in extensive salt marsh habitat). Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Tringa solitaria	Solitary Sandpiper	S3S4M,SUB,	-	-	-	Common migrant in Nova Scotia. A long-distance migrant that mostly migrates alone and at night. They are rarely seen on mudflats or saltmarshes with other shorebirds and will frequent areas with little water in almost any setting, from inner city to forest interior (e.g. fields, ditches, swamps, wooded wetlands at higher elevation, etc.). This bird often stops at lakes, ponds, or streams similar to their nesting habitat (areas with bog habitat and spruce trees), especially where there are extensive muddy margins. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Turdus migratorius	American Robin	S3N,S5B,	-	-	-	Common in most of Nova Scotia as a year-round resident and for breeding in the very Northern part of the province (mainly Cape Breton). This species occupies many habitat types, such as lawns, farmland, fields and city parks, as well as in more wild places like woodlands, forests, mountains up to near treeline, recently burned forests and tundra. During winter many robins move to moist woods where berry-producing trees and shrubs are common. Males arrive first in the breeding season. Nests where there are trees and mud for nest-making material. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Tyrannus tyrannus	Eastern Kingbird	S3B	-	-	-	Common breeder throughout Nova Scotia. A long-distance migrant that uses many habitats and migrates in flocks. Unlike many of the migratory songbirds, kingbirds may travel mostly by day. The Eastern Kingbird usually breeds in fields with	Audubon, 2021. Bird Guide. Retrieved from:

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						scattered shrubs and trees, in orchards and along forest edges (also clearings, roadsides, parks, newly burned forest, beaver ponds, golf courses and urban environments with tall trees and scattered open spaces). It is drawn to water, often nesting densely in trees that overhang rivers or lakes. In summer, requires open space for hunting. Often common around edges of marshes, farmland and native tallgrass prairie. Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Vireo gilvus	Warbling Vireo	S1B	-	-	-	Occurs in deciduous and mixed woods, aspen groves, poplars, shade trees. Breeds in open deciduous or mixed woodland; also in orchards, shade trees of towns (Audubon). They stay high in deciduous treetops (Cornell Lab). Breeds between April and July (Audubon, 2021; The Cornell Lab, 2021).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide The Cornell Lab, 2021.- All About Birds. Retrieved from: https://www.allaboutbirds.org
Vireo philadelphus	Philadelphia Vireo	S2?B	-	-	-	Occurs in second growth; poplars, willows, alders. Breeds in deciduous and mixed woodlands, especially near their edges, or in the young growth of overgrown pastures. Also nests in willows and alders along streams, lakes, and ponds. Breeds between April and July (Audubon).	Audubon, 2021. Bird Guide. Retrieved from: https://www.audubon.org/bird-guide
Fish							
Anguilla rostrata	American Eel	S2	T	Not on Schedule 1	-	In freshwater habitats, preferred habitat can be found in both lentic and lotic waters including all waters extending from the high-water mark down to at least 10 m depth for all reaches currently or formerly used by the American Eel. During their oceanic migrations, eels occupy salt water and in their continental phase (growth in continental waters), they use all salinity zones (COSEWIC Assessment and Status Report, 2012).	COSEWIC, 2012. COSEWIC assessment and status report on the American Eel Anguilla rostrata in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 109 pp.
Couesius plumbeus	Lake Chub	S5	T	No Status	-	Lake Chub appear to prefer lakes but can also occupy streams, particularly towards the northern extent of their range, existing in both clear and muddy waters. However, it is apparent that they prefer clear, cool water with clean cobble or gravel substrate. Lake Chub were most common in the shallow water of lakes at the mouths of tributary rivers and were rarely collected in deep water or very far from the river mouth. Lake Chub appears to be the most cold-adapted of the minnows in North America. It apparently requires low winter temperatures (COSEWIC Assessment and Status Report, 2018).	COSEWIC. 2018. COSEWIC assessment and status report on the Lake Chub Couesius plumbeus, Liard Hot Springs populations and Atlin Warm Springs populations,in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiv + 50 pp. (Species at Risk Public Registry).
Culaea inconstans	Brook Stickleback	S3	-	-	-	Inhabits clear, cold, densely vegetated waters of small streams and spring-fed ponds, and is found along the swampy margins of beach ponds of larger lakes. They are tolerant of salt water for short periods of time. Spawning occurs in shallow water from late April to July, depending on the water temperature (Scott and Crossman, 1973)	Scott and Crossman, 1973. Freshwater fishes of Canada
Margariscus nachtriebi	Northern Pearl Dace	S3	-	-	-	Cool, clear headwater streams in the south, bog drainage streams, ponds and small lakes in the north, and in stained, peaty waters of beaver ponds.. Spawning occurs in clear water over sand or gravel in weak or moderate current (Scott and Crossman 1973).	Scott and Crossman, 1973. Freshwater fishes of Canada
Salvelinus fontinalis	Brook Trout	S3	-	-	-	Most common in cool well-oxygenated waters of lakes and streams. In autumn, brook trout move into smaller, shallower streams and require free passage along streams to move between areas of use. Spawning occurs from October - early December (Gilhen, 1974)	Gilhen, J. 1974. The fishes of Nova Scotia's lakes and streams
Herpetofauna							
Chelydra serpentina	Snapping Turtle	S3	SC	SC	V	They are common in southwestern Nova Scotia and less common on the northeastern mainland. Although Snapping Turtles occupy a wide variety of habitats, 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. turtles appear to prefer the	Environment and Climate Change Canada. 2016. Management Plan for the Snapping Turtle (Chelydra serpentina) in Canada [Proposed]. Species at Risk Act

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						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.	Management Plan Series. Ottawa, Environment and Climate Change Canada, Ottawa, iv + 39 p
Chrysemys picta picta	Eastern Painted Turtle	S4S5	SC	SC	-	Eastern Painted Turtle is found in New Brunswick, Nova Scotia, and the Atlantic coastal states east of the Appalachian Mountains. 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. These turtles are found in association with submergent aquatic plants, which are used for cover and feeding. 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).	COSEWIC. 2018. COSEWIC assessment and status report on the Midland Painted Turtle Chrysemys picta marginata and the Eastern Painted Turtle Chrysemys picta picta in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 107 pp. (http://www.registrelepsararegistry.gc.ca/default.asp?lang=en&n=24F7211B-1).
Glyptemys insculpta	Wood Turtle	S2	T	T	T	Wood Turtles are strongly associated with meandering, shallow rivers with sand, gravel, and/or cobble bottoms; these rivers are typically clear, with moderate current and frequent oxbows. Wood Turtles hibernate aquatically in streams and rivers (October to April, depending on location). Overwintering sites are usually on the bottom of deep pools, often with fallen debris that provides structure and prevents dislodging during high flow events. Found throughout the Province with concentrations in Guysborough and Annapolis Counties. Local plants include alders, chokecherry, hawthorn and mixed wood stands of deciduous and coniferous trees. Females lay their eggs in sandy bars along rivers and other gravel areas (driveways, roadsides, borrow pits) in June.	Species at Risk in Nova Scotia: Identification & Information Guide
Hemidactylium scutatum	Four-toed Salamander	S3	-	-	-	Four-toed salamanders have specialized habitat requirements which require suitable breeding wetlands within or adjacent to mature forests. They prefer mature, mesic forests with dense canopy cover to preserve body moisture, an abundance of downed woody debris for cover and foraging opportunities, and vernal pools, ponds, bogs, shallow marshes, or other fishless bodies of water for nesting and larval success. Wooded wetlands such as seepage swamps or cedar swamps with many moss mats are ideal. Male adults can be located under leaves, bark, and logs in the upland forest, while females are most often found during the breeding season nesting in moss mats which overhang pools of water. (Harding 1997).	Harding, J. 1997. *Amphibians and Reptiles of the Great Lakes Region*. Ann Arbor, Michigan: University of Michigan Press. [online]https://animaldiversity.org/accounts/Hemidactylium_scutatum/
Invertebrate							
Bombus suckleyi	Suckley's Cuckoo Bumble Bee	SNR	T	Not on Schedule 1	-	Suckley's Cuckoo Bumble Bee occurs in most Canadian ecozone including the Atlantic Maritimes. Suckley's Cuckoo Bumble Bee occurs in diverse habitats including open meadows and prairies, farms and croplands, urban areas, boreal forest, and montane meadows. Records are from sea level to 1200 m although the species could potentially occur at higher elevations where its host(s) occur. In the early spring, hosts typically establish nests in abandoned underground rodent burrows or other dry natural hollows; because Suckley's Cuckoo Bumble Bee is a nest parasite these same host residence sites also serve as its habitat. Adults have been recorded feeding on pollen and nectar from many flowers (COSEWIC Assessment and Status Report).	COSEWIC. 2019. COSEWIC assessment and status report on the Suckley's Cuckoo Bumble Bee Bombus suckleyi in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 70 pp. (Species at risk public registry).
Bombus terricola	Yellow-banded Bumblebee	S3	SC	SC	V	Habitat generalist within open coniferous, deciduous and mixed-wood forests, wet and dry meadows and prairie grasslands, meadows bordering riparian zones, and along roadsides, urban parks, gardens and agricultural areas, subalpine habitats and more isolated natural areas (COSEWIC, 2015).	COSEWIC. 2015. COSEWIC assessment and status report on the Yellow-banded Bumble Bee Bombus terricola in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 60 pp. (www.registrelep-

Scientific Name	Common Name	SRank	COSEWIC	SARA	NSESA	Habitat Description	Reference
							sararegistry.gc.ca/default_e.cfm).
Coccinella transversoguttata	Transverse Ladybird Beetle	SH	SC	SC	E	The Transverse Lady Beetle is reported to be a habitat generalist occurring within agricultural areas, suburban gardens, parks, coniferous forests, deciduous forests, prairie grasslands, meadows, sand dune edges and riparian area (NS L&F, 2020).	Nova Scotia Department of Lands and Forestry. 2020. Recovery Plan for the Transverse Lady Beetle (Coccinella transversoguttata) in Nova Scotia [Final]. Nova Scotia Endangered Species Act Recovery Plan Series.
Coccinella transversoguttata richardsoni	Transverse Lady Beetle	SH	SC	No Status	-	The Canadian range of the Transverse Lady Beetle stretches from St. John's, Newfoundland and Labrador, west to Vancouver Island. The Transverse Lady Beetle is a habitat generalist and known to occur within agricultural areas, suburban gardens, parks, coniferous forests, deciduous forests, prairie grasslands, meadows, and riparian areas. The Transverse Lady Beetle can also be found in a wide variety of non-agricultural vegetation including birch, pine, spruce, maple, mountain ash, poplar, willow, sage, cherry, alder, thistles, grasslands, and scruff pea plants along the edge of sand dunes. Overwintering adults tend to aggregate in well ventilated microhabitats such as under stones, rock crevices, in grass tussocks, in leaf litter, or in tree bark (Nova Scotia L&F, 2020).	Nova Scotia Department of Lands and Forestry. 2020. Recovery Plan for the Transverse Lady Beetle (Coccinella transversoguttata) in Nova Scotia [Final]. Nova Scotia Endangered Species Act Recovery Plan Series.
Danaus plexippus plexippus	Monarch	S2B	E	SC	E	The breeding habitat of the Eastern and Western populations in Canada is confined to where milkweeds grow, since leaves of these plants are the sole food of the caterpillars. The different species of milkweeds grow in a variety of environments, including meadows in farmlands, along roadsides and in ditches, open wetlands, dry sandy areas, short and tall grass prairie, river banks, irrigation ditches, arid valleys, and south-facing hillsides. Milkweeds are also often planted in gardens. The Monarch is known to breed on native milkweeds within their natural ranges. The most commonly used other sources of nectar are goldenrods (Solidago spp.), asters (Doellingeria, Eurybia, Oclemena, Symphyotrichum and Virgulus), the introduced Purple Loosestrife (Lythrum salicaria), and various clovers (Trifolium spp. and Melilotus spp.) (SARA, 2010)	Sara, 2010. https://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Monarch_0810_e.pdf
Gomphus ventricose	Skillet Clubtail	S1	E	E	-	In Nova Scotia there are only two historical records of collection of this species. One from Mount Uniacke in Hants County and the second from Shubenacadie River in Halifax County. the fact that specimens are not available to verify the Nova Scotia reports, appears to be a satisfactory reason to exclude these from range calculations. Small to large turbid rivers with at least a partly muddy bottom but good water quality. Sometimes clean lakes with sand or sand-marl (calcium-rich) bottoms (COSEWIC Assessment and Status Report)	COSEWIC. 2010. COSEWIC assessment and status report on the Skillet Clubtail Gomphus ventricosus in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 32 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
Lichen							
Anzia colpodes	Black-foam Lichen	S3	T	T	T	Anzia colpodes requires mature deciduous tree habitats with high humidity and high light levels. The required humidity is supplied by wetlands, nearby brooks, lakes or by the host's position on upland slopes above a water body. Host tree trunks are usually free of dense undergrowth and the lichen usually occurs at or above the height of the undergrowth (in swamps and fens). A few of the Anzia collections from are reported to be from the canopy of Red Maple trees. Recent searches have found that A. colpodes occurs from 20 cm above the ground to 2 m up the tree trunks.	COSEWIC. 2015. COSEWIC assessment and status report on the Black-foam Lichen Anzia colpodes in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 47 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).
Erioderma mollissimum	Graceful Felt Lichen	S1S2	E	E	E	As of January 2012, Vole Ears Lichen was known from two populations at 29 sites along the Atlantic Coast of Nova Scotia totaling 153 adults and 23 juveniles. Vole Ears Lichen is often found in, or very near to, wetlands. It is found at the following specific sites: Blandford, Bon Mature Lake, Canada Hill/Mackenzies Barren, Clyde River Road1, Clyde River Road2, Duck Hole, Four Mile Brook, Fresh Water Brook, Haley Lake, Johnstons Pond, Jones Harbour, Jordan River, Lake John	Environment Canada. 2014. Recovery Strategy for the Vole Ears Lichen (Erioderma mollissimum) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series.

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						Road, Martin Brook, Misery Lake, Misery Lake Brook, Oakhill, Port L'Herbert, Pumpkinvine Brook, Robarts Pond, Robs Lake, Thomas Radall, Provincial Park, and Tidney.	Environment Canada, Ottawa. v + 27 pp.
Erioderma pedicellatum (Atlantic pop.)	Boreal Felt Lichen - Atlantic pop.	S1	E	E	E	The existing boreal felt lichen occurs within 25 km of the sea coast at an elevation of up to 300 m above sea level and they are found in forested habitats with low open crown closure. Boreal Felt Lichens are typically found in balsam fir stands, on north-facing trunks of mature and overmature trees. Habitat preference for boreal felt lichen is cool and moist and remains relatively constant throughout the year. They are often located on or at the base of slopes with northern or northeastern exposure (Nova Scotia L&F, 2020).	Nova Scotia Department of Lands and Forestry. 2020. Recovery Plan for Boreal Felt Lichen (Erioderma pedicellatum) in Nova Scotia [Final]. Nova Scotia Endangered Species Act Recovery Plan Series.
Fuscopannaria leucosticta	White-rimmed Shingle Lichen	S2S3	T	Not on Schedule 1	-	The second subpopulation in Nova Scotia occurs mainly on the east coast of southwestern Nova Scotia (in Shelburne and Queens counties), with sporadic sites throughout the eastern mainland. Common understorey associates of Fuscopannaria leucosticta include ferns in the genus Osmunda strum, hollies, and ash, with peat mosses dominating the ground cover in depressions and feathermosses dominating on hummocks. Fuscopannaria leucosticta grows on the bark of Red Maple trees in Nova Scotia (COSEWIC Assessment and Status Report, 2019).	COSEWIC. 2019. COSEWIC assessment and status report on the White-rimmed Shingle Lichen Fuscopannaria leucosticta in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 85 pp. (Species at Risk Public Registry).
Pectenia plumbea	Blue Felt Lichen	S3	SC	SC	V	The Blue Felt Lichen is usually found on the trunks of old broad-leaved trees growing in moist habitats or close to streams and lake margins. 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.	SARA, 2017. Species Profile (Blue Felt Lichen) - Species at Risk Public Registry (canada.ca)
Peltigera hydrothyria	Eastern Waterfan	S1	T	T	T	Eastern Waterfan grows attached to rocks at or below water level in clear, cool, partially shaded streams. Small waterfalls, exposed boulders and sinuous stream configurations create quiet or protected backwaters where the lichen grows outside the main current. In summer, this lichen is often partially or completely exposed during low water flow periods. Partial shade may be needed to help keep humidity high and temperatures low during summer months (SARA)..	SARA. Species Profile (Eastern Waterfan) - Species at Risk Public Registry (canada.ca)
Mammal							
Alces americanus	Moose	S1	-	-	E	Moose are herbivores who live in boreal and mixed-wood forests. They are often found where there is an abundance of food (twigs, stems, and foliage of young deciduous trees and shrubs). In spring, islands and peninsulas are often used by cows when giving birth. In summer, access to wetlands (and aquatic vegetation) is important (MTRI, 2008.	MTRI, 2008. Species at Risk in Nova Scotia: Identification & Information Guide. http://www.speciesatrisk.ca/SARGuide/download/SAR%20Guide.pdf
Lasionycteris noctivagans	Silver-haired Bat	S1M,SUB	-	-	-	Most commonly found in boreal or coniferous and deciduous forests near bodies of water. Summer day roosts are typically under loose bark in trees such as, willows, maple, ash and dead trees. Maternity colonies can be found in cavities in these trees. Uncommonly, they use human structures (garages, sheds, etc.). During the winter, these bats have been found in caves and other rocky areas that provide shelter, in tree cavities, and in buildings (Animal Diversity, nd).	Animal Diversity Web: https://animaldiversity.org/accounts/Lasionycteris_noctivagans/
Lasiurus borealis	Eastern Red Bat	S1S2B,S1M	-	-	-	Lives in forests, forest edges, and hedgerows. It roosts among foliage, usually in deciduous trees, but sometimes roosts in coniferous trees. Rare in heavily urbanized area (Nature Works, nd)	Nature Works: https://nhpbs.org/natureworks/redbat.htm Animal Diverity: https://animaldiversity.org/accounts/Lasiurus_borealis/

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Lasiurus cinereus	Hoary Bat	S1S2B,S1M	-	-	-	They prefer deciduous and coniferous trees at the edge of clearings, but have been found in trees in heavy forests, open wooded glades, and shade trees along urban streets and in city park (Animal Diversity, nd)	Animal Diversity Web: https://animaldiversity.org/accounts/Lasionycteris_noctivagans/
Myotis lucifugus	Little Brown Myotis	S1	E	E	E	Little Brown Myotis is one of the few bat species that uses buildings and other anthropogenic structures (e.g., bat boxes, bridges, and barns) to roost (particularly for maternity roosting), but it will also use cavities of canopy trees, foliage, tree bark, crevices on cliffs, and other structures (Nova Scotia L&F, 2020).	Nova Scotia Department of Lands and Forestry. 2020. Recovery Plan for Little brown myotis (Myotis lucifugus) in Nova Scotia [Final]. Nova Scotia Endangered Species Act Recovery Plan Series.
Myotis septentrionalis	Northern Long-eared Myotis	S1	E	E	E	Northern Myotis may hibernate in cooler sections of a cave. Northern Myotis will generally return to the same hibernaculum, but not always in consecutive years. Northern Myotis roost singly or in small groups and favour tree roosts (under raised bark and in tree cavities and crevices), but they can also be found in anthropogenic structures (e.g., under shingles). Northern Myotis' maternity roosts are strongly associated with forest cover, streams, and tree characteristics (e.g., species, height, diameter, age, and decay). Females prefer to roost in tall, large diameter trees in early- to mid-stages of decay. Maternity colonies in Nova Scotia were generally in larger-than-average trees. Males generally roost alone under raised bark or within cavities of trees in mid-stages of decay.	Nova Scotia Department of Lands and Forestry. 2020. Recovery Plan for Northern Myotis (Myotis septentrionalis) in Nova Scotia [Final]. Nova Scotia Endangered Species Act Recovery Plan Series.
Pekania pennanti	Fisher	S3	-	-	-	They are often found in deciduous and mixed wood forest stands in the forested region. They can also be found in wetland vegetation types including shrubby swamps, shrubby bogs, and marshes. There is a higher likelihood to find them in harvested stands compared to naturally regenerating stands of similar age (ABMI)	Alberta Biodiveristy Monitoring Institute: https://abmi.ca/home/data-analytics/biobrowser-home/species-profile?tsn=99007289
Sorex maritimensis	Maritime Shrew	S3	-	-	-	Often found in marshes and wet meadows The most favoured habitat is the edges of freshwater swamps and marshes which have become overgrown with tangled grass and rushe (CWF, McAlpine, 2012)	Canadian Wildlife Federation: https://cwf-fcf.org/en/news/articles/the-tracking-of-the-shrew.html, Biogeographic and Conservation Significance of the Occurrence of the Canadian Endemic Sorex maritimensis (Maritime Shrew) in Northern New Brunswick (D. McAlpine)
Sorex palustris	American Water Shrew	S3S4	-	-	-	Mostly aquatic, the water shrew lives beneath the overhanging banks and in rock crevices along the edges of swiftly flowing mountain streams. Rhododendron and yellow birch are usually the dominant vegetation in these area (Discover Life, nd)	Discover Life: https://www.discoverlife.org/nh/tx/Vertebrata/Mammalia/Soricidae/Sorex/palustris/
Synaptomys cooperi	Southern Bog Lemming	S3	-	-	-	They are often found in sphagnum bogs and low moist places, but they are also found in grasslands, mixed deciduous/coniferous forests, spruce-fir forests, freshwater wetlands, marshes, and meadows. They prefer areas with a thick mat of herbaceous and shrubby vegetation (Animal Diversity, nd).	Animal Diversity: https://animaldiversity.org/accounts/Synaptomys_cooperi/
Mollusc							
Alasmidonta undulata	Triangle Floater	S2S3	-	-	-	They prefer small, steady-flowing streams close to headwaters. It is sometimes found in lakes or ponds, and most often found in gravelly sand, mud, or between large stones. (Vermont Atlas, 2021a)	Vermont Atlas of Life, 2021a. Accessed at: https://val.vtecostudies.org/projects/vermont-freshwater-mussel-atlas/alasmidonta-undulata/

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Alasmidonta varicosa	Brook Floater	S1S2	SC	SC	T	Found in rivers, streams, and lakes. They prefer watercourses with a moderate to high water flow with rocks, cobble and sand-pocket areas and may also be found in certain lakes in Nova Scotia. They are typically found clustered in sand-pocket areas behind boulders and stream banks, likely as a means of protection in high-flow velocity. The Brook Floater occurs in a relatively small number of rivers, including the Annapolis, LaHave, Gays, Wallace, East St. Marys and Salmon Rivers in Nova Scotia.	DFO, nd. Accessed at https://www.dfo-mpo.gc.ca/species-especes/profiles-profils/brookfloater-alasmidonte-eng.html
Lampsilis radiata	Eastern Lampmussel	S3S4	0	0	0	They can be found in sand and gravel substrates of rivers, streams, lakes, and ponds in cool or warmwater habitats. Rarely found in small, cold water streams. (Vermont Atlas, 2021b)	Vermont Atlas of Life, 2021b. Access at: https://val.vtecostudies.org/projects/vermont-freshwater-mussel-atlas/lampsilis-radiata/
Margaritifera margaritifera	Eastern Pearlshell	S2	-	-	-	The mussels live buried or partly buried in coarse sand and fine gravel in clean, oligotrophic, fast-flowing and unpolluted rivers and streams (Skinner et al., 2003).	Skinner,A,Young M & Hastie L (2003). Ecology of the Freshwater Pearl Mussel. Conserving Natura 2000 Rivers Ecology Series No. 2 English Nature, Peterborough.mussel[1].pdf
Strophitus undulatus	Creeper	S1	-	-	-	Shallow freshwater. Riffles, moderate-low gradient, creek, pool (Nature Serve Explorer, 2021).	Nature Serve Explorer, 2021. Accessed at: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.107752/Strophitus_undulatus
Vascular Plants							
Acer saccharinum	Silver Maple	S1	-	-	-	Generally found near flowing water and in wetlands. In Nova Scotia, it has been found along the Cornwallis River, Kings Co. (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Agalinis purpurea	Purple False-Foxglove	S1	-	-	-	Bogs, calcareous and mafic fens, open floodplain swamps, depression ponds, interdune swales, tidal freshwater marshes and swamps; more numerous in a variety of wet to mesic, open, disturbed habitats, including old fields, clearings, and roadsides. Flowers in late summer to early fall (Digital Atlas of Virginia Forest, nd).	Digital Atlas of Virginia Flora, nd. Retrieved from: http://vaplantatlas.org/index.php?do=plant&plant=617
Agalinis purpurea var. parviflora	Small-flowered Purple False Foxglove	S1	-	-	-	Sandy soils of stream and lake margins, bogs, and barren (NatureServe, 2021)	Nature Serve Explorer, 2021. Retrieved from https://explorer.natureserve.org/Taxon/
Ageratina altissima	White Snakeroot	S1	-	-	-	Grows in moist soils at the edge of fields and forests. Flowers late summer, August and September. Known from Mill Brook, McGahey Brook and a brook near Refugee Cove, all in Cape Chignecto Provincial Park; older collection from Antigonish County. (Munro, Newell and Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Ageratina altissima var. altissima	White Snakeroot	S1	-	-	-	Grows in moist soils at the edge of fields and forests. Flowers late summer, August and September. Known from Mill Brook, McGahey Brook and a brook near Refugee Cove, all in Cape Chignecto Provincial Park; older collection from Antigonish County. (Munro, Newell and Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Allium schoenoprasum	Wild Chives	S2	-	-	-	Wet meadows, rocky or gravelly stream banks and lake shores. Flowering June to August (Flora North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Allium schoenoprasum var. sibiricum	Wild Chives	S2	-	-	-	Wet meadows, rocky or gravelly stream banks and lake shores. Flowering June to August (Flora North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Allium tricoccum var. burdickii	Narrow-leaved Wild Leek	S1?	-	-	-	DISTRIBUTION NOT KNOWN IN NS. Dry soil in upland woods. Flowering early June (Flora North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Amelanchier fernaldii	Fernald's Serviceberry	S2S3	-	-	-	Thickets, open barrens, shores, and ravines. Occurs mostly in calcareous areas. Grows in riparian and shrub wetlands (Nature Serve Explorer, nd). Flowers June - August (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).

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Amelanchier spicata	Running Serviceberry	S3	-	-	-	Man-made or disturbed habitats, cliffs, balds, ledges, forest edges, grassland, meadows and fields, woodlands (GoBotany, nd). Flowers in the spring (NC State Extension, nd)	GoBotany, nd. Retrieved from https://gobotany.nativeplanttrust.org North Carolina Extension, nd Retrieved from: https://plants.ces.ncsu.edu/plants/amelanchier-spicata/
Andersonglossum boreale	Northern Wild Comfrey	S1	-	-	-	A generalist. along the borders of woods and thickets, along trails and pathways through woods, and within upland deciduous woods. It appears to prefer circumneutral or even calcareous areas. The soils are usually sandy or rocky (New York Natural Heritage Program 2005).	New York Natural Heritage Program, 2005. https://guides.nynhp.org/northern-wild-comfrey/#habitat
Angelica atropurpurea	Purple-stemmed Angelica	S3	-	-	-	Grows in swamps, meadows, in ditches and along streams. Flowers late May until September. Very abundant in northern Cape Breton (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Antennaria rosea	Rosy Pussytoes	S1	-	-	-	The rosy-coloured flowers are distinctive and like no others of the genus in NS. It has very recently been confirmed at Cape d'Or (Munro, Newell and Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Antennaria rosea ssp. arida	Rosy Pussytoes	S1	-	-	-	The rosy-coloured flowers are distinctive and like no others of the genus in NS. It has very recently been confirmed at Cape d'Or (Munro, Newell and Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Asplenium viride	Green Spleenwort	S3	-	-	-	Limestone and other basic rocks (Flora of North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Bartonia virginica	Yellow Bartonia	S3	-	-	-	Flowers July to September. Dry barrens, sandy or peaty soils, bogs, lakeshores. Common in the southwestern counties becoming scarcer east to Annapolis and Halifax; St. Peter's area of Cape Breton (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Betula michauxii	Michaux's Dwarf Birch	S2S3	-	-	-	Limited to peat bogs. It flowers later than many, in July and August. Scattered localities from Brier Island, Digby Co., east to Guysborough, Cape Breton and Inverness counties (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Bidens beckii	Water Beggarticks	S3	-	-	-	Found in shallows of sluggish streams and ponds. Flowers during August and September. Scattered throughout but more abundant from Pictou northward. (Munro, Newell and Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Botrychium lanceolatum	Triangle Moonwort	S2S3	-	-	-	Kentville Ravine (Kings County); Colchester, Cumberland and a few sites in western Cape Breton. Rare where found and of limited distribution in the Northern counties. Found where there are fertile soils on wooded hillsides. Bogs, fens, forests, meadows, fields, swamps and edges of wetlands. This species releases its spores later than most moonworts (July to August) (Minnesota Wildflowers, nd, Go Botany, nd., and Munro et al., 2014).	Nova Scotia Plants - Munro et al., 2014, Minnesota Wildflowers, nd. Retrieved from https://www.minnesotawildflowers.info/, Go Botany, nd. Retrieved from https://gobotany.nativeplanttrust.org/
Botrychium lanceolatum ssp. angustisegmentum	Narrow Triangle Moonwort	S2S3	-	-	-	Kentville Ravine (Kings County); Colchester, Cumberland and a few sites in western Cape Breton. Rare where found and of limited distribution in the Northern counties. Found where there are fertile soils on wooded hillsides. Bogs, fens, forests, meadows, fields, swamps and edges of wetlands. This species releases its spores later than most moonworts (July to August) (Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Botrychium lunaria	Common Moonwort	S1	-	-	-	Known from Conrad's Beach, Halifax County and from New Campbellton and Indian Brook in northern Cape Breton. Found on open slopes, sand or gravel; shores and meadows. Basic soils. Anthropogenic habitats (man-made or disturbed habitats), fields and edges of wetlands. Spores are produced throughout the summer (Go Botany, nd., and Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Botrychium simplex	Least Moonwort	S2S3	-	-	-	Scattered locations from Yarmouth County to Cape Breton: Cedar Lake (Digby-Yarmouth border), West Berlin (Queens County), Petpeswick and in Antigonish, Victoria and Inverness Counties. Reported from various habitats, usually involving damp or mossy streambanks or lakeshores. Also anthropogenic habitats (man-made or disturbed habitats), meadows and fields.	Nova Scotia Plants by Munro, Newell & Hill (2014).

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						Subspecies: occurs primarily in open sites, including prairies, wetlands, and abandoned mine sites. Spores produced in late May and June (Munro et al., 2014).	
Botrychium simplex var. simplex	Least Moonwort	S2S3	-	-	-	Scattered locations from Yarmouth County to Cape Breton: Cedar Lake (Digby-Yarmouth border), West Berlin (Queens County), Petpeswick and in Antigonish, Victoria and Inverness Counties. Reported from various habitats, usually involving damp or mossy streambanks or lakeshores. Also anthropogenic habitats (man-made or disturbed habitats), meadows and fields. Subspecies: occurs primarily in open sites, including prairies, wetlands, and abandoned mine sites. Spores produced in late May and June (Minnesota DNR, Go Botany, nd., and Munro et al., 2014).	Nova Scotia Plants - Munro et al., 2014, Go Botany, nd. https://gobotany.nativeplanttrust.org/, Minnesota DNR, nd. https://www.dnr.state.mn.us/
Bromus latiglumis	Broad-Glumed Brome	S1	-	-	-	Floodplain (River or stream floodplains), forest, shores of rivers or lakes (Go Botany, nd.,)	Go Botany, nd.,: https://gobotany.nativeplanttrust.org
Cardamine dentata	Toothed Bittercress	S1	-	-	-	rare species of calcareous swamps and fens (GoBotany, nd)	Go Botany, nd.,: https://gobotany.nativeplanttrust.org
Cardamine maxima	Large Toothwort	S1S2	-	-	-	rich, moist forests. Floodplain (river or stream floodplains), forests, talus and rocky slopes (GoBotany, nd)	Go Botany, nd.,: https://gobotany.nativeplanttrust.org
Carex foenea	Fernald's Hay Sedge	S3	-	-	-	dry, sandy rocky soils as on barrens. Scattered distribution across province. Flowers late spring to mid-summer (Minnesota Wildflowers, nd)	Minnesota Wildflowers, nd. Retrieved froim https://www.minnesotawildflowers.info/
Carex grisea	Inflated Narrow-leaved Sedge	S1	-	-	-	floodplain forest and deciduous woods (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Carex houghtoniana	Houghton's Sedge	S2S3	-	-	-	sandy soils, along roadsides. Sandy disturbed area.	
Carex lapponica	Lapland Sedge	S1?	-	-	-	Sphagnum bogs, wet, nutrient-poor areas, mostly lowlands. Fruiting early summer. (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Carex normalis	a Sedge	S1	-	-	-	Open, often wet, woods, thickets, meadows and roadsides. Fruiting early summer (Flora of North America, nd)	Flora of North America, nd. Retrieved from http://www.efloras.org
Carex pensylvanica	Pennsylvania Sedge	S1?	-	-	-	Grows in dry, rocky soils as in dry open woodlands. Flowers and fruits produced early to mid-May (Munro, Newell & Hill 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Carex plantaginea	Plantain-Leaved Sedge	S1	-	-	-	Rich, moist, deciduous or mixed deciduous-evergreen forests, on slopes along streams or along edges of moist depressions, southward in mountain gorges. Fruiting in spring (Flora of North America, nd)	Flora of North America, nd. Retrieved from http://www.efloras.org
Carex rosea	Rosy Sedge	S3	-	-	-	Grows in dry soils beneath deciduous forests and thickets. Flowers from May to early July.	
Carex tenera	Tender Sedge	S2	-	-	-	Found in meadows, forests, moist or dry clearings, woodland vernal pools. Flowering from May - August (Munro, Newell & Hill 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Carex viridula ssp. brachyrrhyncha	Greenish Sedge	S1	-	-	-	Found along river and lake shores (Go Botany, nd.,).	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Cerastium arvense ssp. strictum	Mouse-ear Chickweed	S1?	-	-	-	flowers May until frost. Cliffs, talus slopes, quarries, rocky beaches, coastal headlands, and in high-pH and serpentine communities. Compacted soils, especially on moist lawns and other arable land (GoBotany, nd)	Go Botany, nd.,: https://gobotany.nativeplanttrust.org
Ceratophyllum echinatum	Prickly Hornwort	S2S3	-	-	-	Marshes. A plant more typical of the shallows of acidic water bodies than its congener (GoBotany, nd)	Go Botany, nd.,: https://gobotany.nativeplanttrust.org
Coleataenia longifolia	Long-leaved Panicgrass	S3	-	-	-	Marshes, meadows and fields, shores of rivers or lakes (GoBotany).	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org

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Coleataenia longifolia ssp. longifolia	Coastal Plain Panicgrass	S3	-	-	-	Marshes, meadows and fields, shores of rivers or lakes (GoBotany).	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Comandra umbellata ssp. umbellata	Bastard's Toadflax	S2	-	-	-	Found in swamps and bogs, rich mesic sites, dry, sandy or rocky soils, savannas, early successional forests. Flowers March - August (Flora of North America, nd)	Flora of North America, nd. Retrieved from http://www.efloras.org
Conioselinum chinense	Chinese Hemlock-parsley	S2	-	-	-	Found in treed swamps, mossy coniferous forest, seepy coastal slopes. Flowers from August to October. Common on Saint Paul Island and infrequent elsewhere (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Crataegus submollis	Quebec Hawthorn	S2?	-	-	-	Anthropogenic (man-made or disturbed habitats), forest edges, meadows and fields, shrublands or thickets. Flowers in June (GoBotany, nd).	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Crataegus succulenta	Fleshy Hawthorn	S3S4	-	-	-	Forest edges, forests, meadows and fields. Also found in abandoned farmland, along streams and in forest openings. Flowers in late spring (Natural Resources Canada, nd).	Natural Resources Canada: Retrieved from https://tidcf.nrcan.gc.ca/en/trees/factsheet/427
Crataegus succulenta var. succulenta	Fleshy Hawthorn	S3S4	-	-	-	Forest edges, forests, meadows and fields. Also found in abandoned farmland, along streams and in forest openings. Flowers in late spring (Natural Resources Canada, nd).	Natural Resources Canada: Retrieved from https://tidcf.nrcan.gc.ca/en/trees/factsheet/427
Cyperus lupulinus ssp. macilentus	Hop Flatsedge	S1	-	-	-	Various well-drained, open places. Fruiting summer (Flora North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Cypripedium parviflorum var. makasin	Small Yellow Lady's-Slipper	S2	-	-	-	Mesic to wet fens, prairies, meadows, thickets, open coniferous, and mixed forest. Flowering in May to August (Flora of North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Cystopteris bulbifera	Bulblet Bladder Fern	S3S4	-	-	-	Specifically in Kings and Cumberland counties to eastern Cape Breton. Found in fertile or calcareous soils, where it forms dense colonies in forested gypsum sinkholes. Spores produced from June to September (Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Dichanthelium clandestinum	Deer-tongue Panic Grass	S3	-	-	-	Found in open areas of alluvial soil. Flowering and fruiting from July to November (Munro, et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Dichanthelium lindheimeri	Lindheimer's Panicgrass	S1?	-	-	-	It is most commonly associated with sandy, ephemerally wet soils. Typical habitat include prairies, glades, streambanks, floodplains, and lake shores. Fruits from May to November (Royal Botanic Gardens).	Dichanthelium lindheimeri (Nash) Gould | Plants of the World Online | Kew Science
Diphasiastrum complanatum	Northern Ground-cedar	S3S4	-	-	-	Infrequent, scattered through the Cobequid hills southwest to the Annapolis Valley and east to Cape Breton. Deciduous forests and brushy hillsides spreading out into abandoned fields. Anthropogenic (man-made or disturbed habitats) habitats, forest edges, forests, meadows and fields. Flowers from July to October (Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Eleocharis erythropoda	Red-stemmed Spikerush	S1	-	-	-	Non-calcareous or calcareous fresh or brackish shores. Fruiting occurs in the summer (Flora North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Eleocharis flavescens var. olivacea	Bright-green Spikerush	S2S3	-	-	-	Bogs, cold springs, dry stream banks, lake and pond margins, maritime mud flats, marshes, moist meadows, swamps. Fruiting summer-winter (June-November) (Flora North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Epilobium coloratum	Purple-veined Willowherb	S2?	-	-	-	Scattered from Digby to Guysborough counties - Found in low grounds and seepy soils - Flowers from July through October (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Epilobium strictum	Downy Willowherb	S3	-	-	-	Scattered through throughout Cape Breton Island, infrequently elsewhere - Found in bogs and other peatlands - Flowers July to September (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Equisetum hyemale	Common Scouring-rush	S3S4	-	-	-	Scattered, mostly from Digby County, through the Annapolis Valley, northward to Cape Breton. Grows in sandy, gravelly soil, on banks or in low areas; often in calcareous regions. Anthropogenic habitats (man-made or disturbed habitats such a ditches), swamps, floodplains shores of rivers or lakes (subspecies: similar - sandy slopes and roadsides, riverbanks, and borrow pits). No sources that state specific	Nova Scotia Plants by Munro, Newell & Hill (2014).

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						spore production time, most likely during the general growing season in Nova Scotia: June to September (Go Botany, nd., and Munro et al., 2014).	
Equisetum hyemale ssp. affine	Common Scouring-rush	S3S4	-	-	-	Scattered, mostly from Digby County, through the Annapolis Valley, northward to Cape Breton. Grows in sandy, gravelly soil, on banks or in low areas; often in calcareous regions. Anthropogenic habitats (man-made or disturbed habitats such a ditches), swamps, floodplains shores of rivers or lakes (subspecies: similar - sandy slopes and roadsides, riverbanks, and borrow pits). No sources that state specific spore production time, most likely during the general growing season in Nova Scotia: June to September (Go Botany, nd., and Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Equisetum pratense	Meadow Horsetail	S3	-	-	-	Known to be in several streams in Hants, Colchester and Cumberland counties, in addition to Victoria and Inverness Counties. Uncommon and limited to alluvial thickets, pastures and treed streamsides, including gravelly bars. Flowers mid to late spring (Minnesota Environment and Natural Resources Trust Fund and Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Equisetum scirpoides	Dwarf Scouring-Rush	S3S4	-	-	-	Not often seen in the Atlantic counties. Annapolis County to Cumberland County and northern Cape Breton. Wooded banks and mossy slopes. Typical of alkaline habitats and often overlooked. Forests, shores of rivers or lakes, swamps and edges of wetlands. Flowers in summer (Minnesota Environment and Natural Resources Trust Fund, Go Botany, nd., and Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Equisetum variegatum	Variegated Horsetail	S3	-	-	-	Wide-ranging in NS, with disjunct localities: Halifax County, Cumberland County and Victoria County. Found in wetlands or wet seeps. Anthropogenic habitats (man-made or disturbed habitats), shores of rivers or lakes. Flowers in summer (Minnesota Environment and Natural Resources Trust Fund, Go Botany, nd., and Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Equisetum variegatum ssp. variegatum	Variegated Scouring-rush	S3	-	-	-	Wide-ranging in NS, with disjunct localities: Halifax County, Cumberland County and Victoria County. Found in wetlands or wet seeps. Anthropogenic habitats (man-made or disturbed habitats), shores of rivers or lakes. Flowers in summer (Minnesota Environment and Natural Resources Trust Fund, Go Botany, nd., and Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Eriophorum gracile	Slender Cottongrass	S2S3	-	-	-	Grows in wet peat and inundated shores. Flowers and fruits during early summer. (Munro, et al. 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Eriophorum gracile ssp. gracile	slender cottongrass	S2S3	-	-	-	Grows in wet peat and inundated shores. Flowers and fruits during early summer. (Munro, et al. 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Fallopia scandens	Climbing False Buckwheat	S3	-	-	-	Uncommon and local, from Digby to Richmond counties on the northern side of the province - Grows on low ground in riparian zones - Flowers mid-August to October (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Fimbristylis autumnalis	Slender Fimbry	S1	-	-	-	Moist to wet sands, peats, slits, or clays primarily of disturbed, sunny ground such as seeps, ditches, savanna, stream banks, reservoir drawdowns, and pond shores (Flora of North America)	Flora of North America, nd. Retrieved from http://www.efloras.org
Fragaria vesca	Woodland Strawberry	S3S4	-	-	-	Forming dense patches in shady forests, ravines. Flowers in June. A white-berried form of this species persists in a number of locations within the province: White Rock, Wolfville, Grand Pré and Barrington. (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Fragaria vesca ssp. americana	Woodland Strawberry	S3S4	-	-	-	Forming dense patches in shady forests, ravines. Flowers in June. A white-berried form of this species persists in a number of locations within the province: White Rock, Wolfville, Grand Pré and Barrington. (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Fraxinus nigra	Black Ash	S1S2	T	Not on Schedule 1	T	Black ash is typically found in poorly drained areas that are often seasonally flooded. It is most common on peat and muck soils, but also grows on fine sands over sands and loams. Although this species can tolerate still semi-stagnant conditions, there is a preference for swampy woodland stream and river banks with moving water. It is often associated with species such as Red maple, Speckled alder, Balsam poplar, and Black spruce. The species is shade intolerant, and seedlings, saplings and sprouts tend to regenerates only in partially opened forest canopies.	Recovery and Action Plan for Black ash (Fraxinus nigra) in Nova Scotia.
Fraxinus pennsylvanica	Red Ash	S1	-	-	-	Flowers May - June. Found in riparian and upland forest and shelter belts (Minnesota Wildflowers, nd)	Minnesota Wildflowers, nd. Retrieved froim https://www.minnesotawildflowers.info/

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Galium aparine	Common Bedstraw	S2S3	-	-	-	Composts, ballast and waste soils. Flowers from May until July (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Gentianella amarella ssp. acuta	Northern Gentian	S1	-	-	-	Open and forested river banks, subalpine gullies and brook sides, occurring in regions of high-pH bedrock and/or till (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Goodyera repens	Lesser Rattlesnake-plantain	S3	-	-	-	Shady, moist, coniferous or mixed woods, on mossy or humus-covered ground. Sometimes it is found in bogs or cedar swamps. Flowering early July-early September (Flora North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Halenia deflexa	Spurred Gentian	S2S3	-	-	-	Exposed shorelines and headlands along the coast. Rare and local on the mainland: Hall's Harbour, Kings Co.; Sherbrooke, Guysborough Co. Common in northern Cape Breton, and eastward to Scatarie Island. Flowers from July to September	Nova Scotia Plants by Munro, Newell & Hill (2014).
Hordeum brachyantherum	Meadow Barley	S1	-	-	-	Grows in pastures and along streams and lake shores (Flora of North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Hordeum brachyantherum ssp. brachyantherum	Meadow Barley	S1	-	-	-	Grows in pastures and along streams and lake shores (Flora of North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Humulus lupulus var. lupuloides	Common Hop	S1?	-	-	-	Anthropogenic (man-made or disturbed habitats), floodplain (river or stream floodplains), forests, shrublands or thickets	Nova Scotia Plants by Munro, Newell & Hill (2014).
Hypericum x dissimulatum	Disguised St. John's-wort	S2S3	-	-	-	Wet mucky soils in lacustrine habitats. Historically collected from Digby to Halifax Co. with a single specimen from each of Pictou and Guysborough counties (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Impatiens pallida	Pale Jewelweed	S2	-	-	-	Alluvial soils as along intervales and in thickets. Flowers during July and August. More frequent in the eastern portion of the province (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Isoetes tuckermanii ssp. acadiensis	Acadian Quillwort	S3	-	-	-	Scattered from Yarmouth County to northern Cape Breton. Very common in Lake Kejimkujik, near exit of Grafton Brook. In water up to depth of 1m, bordering lakes, ponds or along rivers. No sources that state specific flowering time, most likely during the general growing season in Nova Scotia: June to September (Go Botany, nd., and Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Juncus anthelatus	Greater Poverty Rush	S1?	-	-	-	Exposed or partially shaded sites in moist or seasonally wet sandy or clay soils. Flowering and fruiting in spring (Flora North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Juncus stygius ssp. americanus	Moor Rush	S2	-	-	-	Wet moss, bogs and bog-pools. Flowering and fruiting in mid to late summer (Go Botnay, nd).	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Liparis loeselii	Loesel's Twayblade	S3S4	-	-	-	Cool, moist ravines, bogs, or fens, wet peaty or sandy meadows, and exposed sand along edges of lakes, often colonizing previously open and disturbed habitats during early and middle stages of reforestation. Flowering May-August (Go Botany, nd.,).	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Lobelia kalmii	Brook Lobelia	S2	-	-	-	Flowers from July through September. Limited to dripping cliffs, meadows and bogs in calcareous soils. fens, wet meadows, shores	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Lorinseria areolata	netted chain fern	S3	-	-	-	Bogs, meadows and fields, swamps, wetland margins (edges of wetlands) (Go Botany, nd.,).	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Luzula parviflora ssp. melanocarpa	Black-fruited Woodrush	S3S4	-	-	-	uncommon in damp coniferous or mixed woods, cool ravines and banks (Hinds, 2000)	Hinds H.R. 2000. Flora of New Brunswick: Second Edition. Biology Department University of New Brunswick.
Lysimachia quadrifolia	Whorled Yellow Loosestrife	S1	-	-	-	Anthropogenic (man-made or disturbed habitats), grassland, woodlands, fens, moist prairies (GoBotany, n.d.). Flowers from July - August (LBJ Wildflower Centre, nd).	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org

Scientific Name	Common Name	SRank	COSEWIC	SARA	NSESA	Habitat Description	Reference
							Lady Bird Johnson Wildflower Center https://www.wildflower.org/plants/result.php?id_plant=LYQU2
Malaxis monophyllos	White Adder's-mouth	S1	-	-	-	Found in Fens, ridges or ledges, swamps with northern white-cedar. Flowering in summer (GoBotany).	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Malaxis monophyllos var. brachypoda	North American White Adder's-mouth	S1	-	-	-	Found in swamps and bogs. Flower in summer (Flora of North America).	Flora of North America, nd. Retrieved from http://www.efloras.org
Nabalus racemosus	Glaucous Rattlesnakeroot	S1	-	-	-	Favours calcareous riverbanks, shores and damp prairies (Maine Department of Agriculture, Conservation & Forestry, nd).	Maine Department of Agriculture, Conservation & Forestry: https://www.maine.gov/dacf/mnap/features/nabrac.html.
Neottia bifolia	Southern Twayblade	S3	-	-	-	Bogs and swamps (Go Botany, nd.,)	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Nuphar microphylla	Small Yellow Pond-lily	S3S4	-	-	-	Ponds, lakes, sluggish streams, sloughs, ditches and occasionally tidal waters. Flowers summer - early fall (Flora of North America, nd)	Flora of North America, nd. Retrieved from http://www.efloras.org
Oenothera fruticosa	Narrow-leaved Evening Primrose	S2	-	-	-	Scattered from Yarmouth to the Northumberland Strait - Found in dry open soil habitats such as old fields, edges of thickets and roadsides - Flowers from June to August (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Oenothera fruticosa ssp. tetragona	Narrow-leaved Evening Primrose	S2	-	-	-	Scattered from Yarmouth to the Northumberland Strait - Found in dry open soil habitats such as old fields, edges of thickets and roadsides - Flowers from June to August (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Ophioglossum pusillum	Northern Adder's-tongue	S2S3	-	-	-	Known from Yarmouth and Digby Counties; scattered east to Halifax and Amherst; a single Cape Breton record from George River. Found in sterile soils, swamps and sandy or cobbly lakeshores. Anthropogenic habitats (man-made or disturbed habitats), marshes, meadows, fields and edges of wetland margins. Spores produced May to August (Go Botany, nd., and Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Osmorhiza longistylis	Smooth Sweet Cicely	S2	-	-	-	Intervale soils where fertility is high; deciduous forests. Flowers Late June to July. Scattered along the North Mountain in Annapolis and Kings counties to Cumberland Cobequids, infrequent in Cape Breton (Munro, Newell and Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Panicum dichotomiflorum ssp. puritanorum	Spreading Panicgrass	S1?	-	-	-	Flowering and fruiting from June through October (GoBotany, nd)	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Parnassia parviflora	Small-flowered Grass-of-Parnassus	S1S2	-	-	-	Rocky seeps. Flowers August to September (Jepson Herbarium, 2021)	The Jepson Herbarium: https://ucjeps.berkeley.edu/eflora
Pedicularis palustris	Marsh Lousewort	S1	-	-	-	Wet substrates as in marshes or meadows. Flowers in July. Rare and local: Bay St. Lawrence, Baleine and Sydney area. Reported from Guysborough Co. (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Pedicularis palustris ssp. palustris	Marsh Lousewort	S1	-	-	-	Wet substrates as in marshes or meadows. Flowers in July. Rare and local: Bay St. Lawrence, Baleine and Sydney area. Reported from Guysborough Co. (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Persicaria amphibia var. emersa	Long-root Smartweed	S3?	-	-	-	Bloom on moist soil and are terrestrial-adapted. Flower June - September (Flora of North America)	Flora of North America, nd. Retrieved from http://www.efloras.org
Persicaria arifolia	Halberd-leaved Tearthumb	S2	-	-	-	Found inf shaded swamps, ponds, tidal marshes along rivers, wet ravine in forests. Flowers July - October (Flora of North America, nd)	Flora of North America, nd. Retrieved from http://www.efloras.org

Goldboro Gold Mine Priority Species List

Scientific Name	Common Name	SRank	COSEWIC	SARA	NSESA	Habitat Description	Reference
Persicaria careyi	Carey's Smartweed	S1	-	-	-	Low thickets, swamps, bogs, moist shorelines, clearings, recent burns, cultivated ground. Flowering July - October (Flora of North America, nd)	Flora of North America, nd. Retrieved from http://www.efloras.org
Persicaria pensylvanica	Pennsylvania Smartweed	S3	-	-	-	Moist, disturbed places, ditches, riverbanks, cultivated fields, shorelines of ponds and reservoirs. Flowers May - December (Flora of North America, nd)	Flora of North America, nd. Retrieved from http://www.efloras.org
Plantago rugelii	Rugel's Plantain	S3	-	-	-	Grows in anthropogenic (man-made or disturbed habitat), grassland, meadows, fields (GoBotany, nd)	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Platanthera flava var. herbiola	Pale Green Orchid	S2	-	-	-	Known from a variety of habitats: sandy, gravelly or peaty shorelines of lakes or streams; bogs, swamps and meadows. Found along the Tusket River, Yarmouth Co., Medway River, Queens County and north to Kings and Colchester Co. (Kemptown) (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Platanthera hookeri	Hooker's Orchid	S3	-	-	-	Scattered in most of the province, local in the southwestern counties. So far absent from the eastern shore. Grows in open dry forests of mixed conifers. Flower appear from May to August (Munro, et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Platanthera huronensis	Fragrant Green Orchid	S1S2	-	-	-	No good record found. Habitat are known from streamsides, in wetlands, even forests. Flowers throughout the summer (Munro, et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Podostemum ceratophyllum	Horn-leaved Riverweed	S1	-	-	-	Medium to fast flowing river bottoms with ledge, cobble or sand substrate (GoBotany, nd)	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Polygonum aviculare ssp. neglectum	Narrow-leaved Knotweed	S3?	-	-	-	Found in disturbed areas. Flowers June - November (Flora of North America, nd)	Flora of North America, nd. Retrieved from http://www.efloras.org
Proserpinaca palustris	Marsh Mermaidweed	S3	-	-	-	Found in lakeshore fens and streamsides. It is only known in Lunenburg and Yarmouth counties, but it may be more widespread. The variation creba is abundant from southwestern NS to Cumberland, and less frequent in Cape Breton. Flowers July to September	Nova Scotia Plants by Munro, Newell & Hill (2014).
Ranunculus gmelinii	Gmelin's Water Buttercup	S3	-	-	-	Riverine (in rivers or streams), swamps, slow streams, evergreen swamps and ditches in areas of high-pH bedrock (GoBotany, n.d.). Flowers July - August (Minnesota Wildflowers, n.d.)	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Ranunculus pensylvanicus	Pennsylvania Buttercup	S1	-	-	-	Found in wet fields, ditches, marshes, along shores. Flowers June - August (Minnesota Wildflowers, nd)	Minnesota Wildflowers, nd. Retrieved froim https://www.minnesotawildflowers.info/
Ranunculus sceleratus	Cursed Buttercup	S1S2	-	-	-	Anthropogenic (man-made or disturbed habitats), fresh tidal marshes or flats, marshes, swamps (GoBotany, n.d.). Flowers May - September (Minnesota Wildflowers, nd)	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Ranunculus sceleratus var. sceleratus	Cursed Buttercup	S1S2	-	-	-	Ponds, riverbanks. Flowers from April - June, October (Jepson Herbarium, 2021)	The Jepson Herbarium: https://ucjeps.berkeley.edu/eflora/
Rosa acicularis ssp. sayi	Prickly Rose	S1	-	-	-	Across its range, it grows in a wide variety of forested and open habitats, with a wide variety of soil and moisture conditions. Flowers in the spring (Schori, 2003)	Schori, A. (2003). Rosa acicularis Lindley ssp. sayi (Schwein.) W. H. Lewis Bristly, Needle-spine, or Prickly Rose file:///C:/Users/Andy%20Walter/Downloads/Rosaacicularis%20(1).PDF
Rudbeckia laciniata	Cut-Leaved Coneflower	S1S2	-	-	-	Grows in wet fertile soils along the edge of swamps, swales or streams. Often colonial. Flowers in August. Common in Kings Co., isolated colonies from Annapolis and Cumberland counties to Guysborough (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).

Scientific Name	Common Name	SRank	COSEWIC	SARA	NSESA	Habitat Description	Reference
Rumex fueginus	Tierra del Fuego Dock	S3S4	-	-	-	Alluvial, riparian, and ruderal habitats, shores, marshes, bogs, wet meadows, dry streambeds. Flowering late spring - early fall (Flora of North America, nd)	Flora of North America, nd. Retrieved from http://www.efloras.org
Rumex triangulivalvis	Triangular-valve Dock	S2	-	-	-	Grows in moist areas and disturbed habitats, meadows and fields (GoBotany, nd)	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Sanguinaria canadensis	Bloodroot	S3S4	-	-	-	Rare in Kings and Hants, common in Colchester, and scattered from Cumberland to Cape Breton - Found streamside or on alluvial terraces, in the shade, just above high water - Flowers in early May (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Saxifraga cernua	Nodding Saxifrage	S1	-	-	-	Imperfectly drained moist areas (near creeks and lakeshores, on moist ledges and in exposed dry sites); acidic, or calcareous, or nitrophilous (often near Thule sites and human habitation), or circum-neutral. Spring to summer flowering time (Aiken et al. 2007)	Flora of the Canadian Arctic Archipelago, S.G. Aiken, M.J. Dallwitz, L.L. Consaul, C.L. McJannet, R.L. Boles, G.W. Argus, J.M. Gillett, P.J. Scott, R. Elven, M.C. LeBlanc, L.J. Gillespie, A.K. Brysting, H. Solstad, and J.G. Harris.. https://nature.ca/aaflora/data/www/sxsxcn.htm
Schizaea pusilla	Little Curlygrass Fern	S3S4	-	-	-	Scattered throughout the Atlantic counties and frequent in the northern plateau of Cape Breton. Found in sphagnous wet areas, upper peaty lakeshores and undrained depressions. Spores produced throughout the summer, from July (Munro et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Scrophularia lanceolata	Lance-leaved Figwort	S1	-	-	-	Limited to open forest and thickets, dryish soils. Rare and known only from Harmony, Kings Co.; Boylston, Guysborough Co. and Baddeck, Victoria Co. Flowers June and July (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Solidago latissimifolia	Elliott's Goldenrod	S3S4	-	-	-	Favours clearings, thickets and bogs, swales and lakeshores. Flowers in August and September. Common in Yarmouth Co., east to Halifax Co. (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Sparganium androcladum	Branching Bur-Reed	S1	-	-	-	Found in lakes, ponds, rivers or streams or the shore of rivers or lakes (Go Botany, nd.,).	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Sparganium hyperboreum	Northern Burreed	S1S2	-	-	-	Rare in CB. On the mainland, collected from Drumhead and New Harbour, Guysborough Co. Peaty Pools (Munro, et al., 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Symphyotrichum boreale	Boreal Aster	S2?	-	-	-	Favours lacustrine gravels, streamsides and edges of peatlands. Flowers during August and September . Scattered from Yarmouth to Cape Breton uncommon (Munro, Newell & Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).
Toxicodendron vernix	Poison Sumac	S1	-	-	-	Usually found in swamps or marshes. Flowers from May to July. Only known in Telfer Lake and Apple Tree Lake in Queens county (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Triosteum aurantiacum var. aurantiacum	Orange-fruited Tinker's Weed	S2S3	-	-	-	Dry-mesic to mesic forests, woodlands, and forest borders	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Utricularia ochroleuca	Yellowish-white Bladderwort	S1	-	-	-	Shallow (generally <30cm) acidic waters. Flowers June - September (Jepson Herbarium, 2021)	Jepson Herbarium, 2021. https://ucjeps.berkeley.edu/eflora/
Vaccinium ovalifolium	Oval-leaved Bilberry	S1	-	-	-	Flowers late, from July to September. Habitat preferences include coniferous woods from sea-level to 2100msl, throughout its range. Moist or mesic coniferous woods, transitional habitats adjacent to these coniferous stands, cut-over coniferous woods, verges of road cuts, margins of coniferous woods, peaty slopes	Go Botany, nd., Retrieved from https://gobotany.nativeplanttrust.org
Verbena hastata	Blue Vervain	S3	-	-	-	Limited to mucky fertile soils, as along floodplains. Flowers during August - September (Munro, Newell & Hill, 2014)	Nova Scotia Plants by Munro, Newell & Hill (2014).
Veronica catenata	Pink Water-Speedwell	S1	-	-	-	Shores of rivers or lakes, wetland margins (edges of wetlands) (GoBotany, nd). Flowers May - September (Minnesota Wildflowers, nd)	Go Botany, nd, https://gobotany.nativeplanttrust.org

Scientific Name	Common Name	SRank	COSEWIC	SARA	NSESA	Habitat Description	Reference
							Minnesota Wildflowers, nd. Retrieved froim https://www.minnesotawildflowers.info/
Viola sagittata var. ovata	Arrow-Leaved Violet	S3S4	-	-	-	Open woods and thickets, disturbed ground, roadsides, powerline rights-of-way. Flowers April - June (Flora of North America, nd)	Flora of North America, nd. Retrieved from http://www.efloras.org
Zizia aurea	Golden Alexanders	S1	-	-	-	Found in meadows, shores, thickets and wooded swamps. Flowers May and June. Occasionally reported in: Pomquet and South River, Antigonish County, Upper Musquodoboit, Halifax County (Munro, Newell and Hill, 2014).	Nova Scotia Plants by Munro, Newell & Hill (2014).

APPENDIX D. LICHEN AND PLANT SPECIES LIST

Scientific Name	Common Name	SARA	NSESA	S-Rank
Vascular				
Carex wiegandii	**Wiegand's sedge**	-	-	**S3**
Equisetum variegatum	**Variegated horsetail**	-	-	**S3**
Geocaulon lividum	**Northern comandra**	-	-	**S3**
Neottia bifolia	**Southern twayblade**	-	-	**S3**
Agalinis neoscotica	**Nova Scotia agalinis**	-	-	**S3S4**
Abies balsamea	Balsam fir	-	-	S5
Acer rubrum	Red maple	-	-	S5
Achillea millefolium	Common yarrow	-	-	SNA
Alnus alnobetula	Green alder	-	-	S5
Alnus incana	Grey alder	-	-	S5
Amelanchier spp		-	-	-
Anaphalis margaritacea	Pearly everlasting	-	-	S5
Andromeda polifolia	Bog rosemary	-	-	S5
Anthoxanthum odoratum	Sweet vernal grass	-	-	SNA
Aralia hispida	Bristly sarsaparilla	-	-	S5
Aralia nudicaulis	Wild sarsaparilla	-	-	S5
Arethusa bulbosa	Dragon's mouth	-	-	S4
Aronia melanocarpa	Black chokeberry	-	-	S5
Avenella flexuosa	Wavy hair-grass	-	-	S5
Bartonia paniculata	Branched Bartonia	-	-	S4S5
Betula papyrifera	Paper birch	-	-	S5
Brachyelytrum erectum	Bearded Shorthusk	-	-	SNA
Brasenia schreberi	Water-shield	-	-	S5
Calamagrostis canadensis	Canada bluejoint	-	-	S5
Calamagrostis pickeringii	Pickering's reed grass	-	-	S4S5
Calopogon tuberosus	Tuberous Pink Gras	-	-	S4
Carex albicans	White-tinged sedge	-	-	S4
Carex atlantica	Prickly bog sedge	-	-	S4
Carex billingsii	Billing's sedge	-	-	S4
Carex brunnescens	Brownish sedge	-	-	S5
Carex canescens	Silvery sedge	-	-	S5
Carex communis	Fibrous-root sedge	-	-	S5
Carex debilis	White-edged sedge	-	-	S5
Carex deflexa	Northern sedge	-	-	S4
Carex echinata	Star sedge	-	-	S5
Carex exilis	Coastal sedge	-	-	S4
Carex folliculata	Northern long sedge	-	-	S5
Carex intumescens	Greater bladder sedge	-	-	S5
Carex magellanica	Boreal bog sedge	-	-	S5
Carex novae-angliae	New England sedge	-	-	S5
Carex pauciflora	Few-flowered sedge	-	-	S4S5
Carex scabrata	Eastern rough sedge	-	-	S5
Carex stricta	Tussock sedge	-	-	S5

Scientific Name	Common Name	SARA	NSESA	S-Rank
Carex trisperma	Three-seeded sedge	-	-	S5
Chamaedaphne calyculata	Leatherleaf	-	-	S5
Claytosmunda claytoniana	Interrupted fern	-	-	S5
Clintonia borealis	Blue-bead lily	-	-	S5
Coptis trifolia	Threeleaf goldthread	-	-	S5
Cornus canadensis	Creeping dogwood	-	-	S5
Cypripedium acaule	Pink lady's slipper	-	-	S5
Danthonia spicata	Poverty oat grass	-	-	S5
Dennstaedtia punctilobula	Hay-scented fern	-	-	S5
Dichanthelium boreale	Northern panic grass	-	-	S5
Diervilla lonicera	Northern bush honeysuckle	-	-	S5
Doellingeria umbellata	Flat-topped aster	-	-	S5
Drosera intermedia	Oblong leaved sundew	-	-	S5
Drosera rotundifolia	Round-leaved sundew	-	-	S5
Dryopteris intermedia	Intermediate wood fern	-	-	S5
Empetrum nigrum	Black crowberry	-	-	S5
Epigaea repens	Trailing arbutus	-	-	S5
Equisetum sylvaticum	Wood horsetail	-	-	S5
Eriophorum angustifolium	Common cottongrass	-	-	S5
Eriophorum vaginatum	Hare's-tail cottongrass	-	-	S5
Eupatorium perfoliatum	Common boneset	-	-	S5
Fallopia cilinodis	Fringed bindweed	-	-	S5
Fragaria virginiana	Virginia strawberry	-	-	S5
Gaultheria hispidula	Creeping snowberry	-	-	S5
Gaultheria procumbens	Eastern teaberry	-	-	S5
Gaylussacia baccata	Black huckleberry	-	-	S5
Gaylussacia bigeloviana	Dwarf huckleberry	-	-	S5
Glyceria striata	Fowl manna grass	-	-	S5
Hypericum perforatum	Perforate St John's-wort	-	-	SNA
Hypericum virginicum	Virginia marsh-St John's wort	-	-	S5
Ilex mucronata	Mountain holly	-	-	S5
Iris versicolor	Northern blue flag	-	-	S5
Juncus balticus	Baltic rush	-	-	S5
Juncus effusus	Soft rush	-	-	S5
Juncus tenuis	Path rush	-	-	S5
Juniperus communis	Common juniper	-	-	S5
Kalmia angustifolia	Sheep laurel	-	-	S5
Kalmia polifolia	Bog laurel	-	-	S5
Larix laricina	Tamarack	-	-	S5
Leucanthemum vulgare	Oxeye daisy	-	-	SNA

Scientific Name	Common Name	SARA	NSESA	S-Rank
Linnaea borealis	Twinflower	-	-	S5
Luzula multiflora	Common woodrush	-	-	S5
Dendrolycopodium dendroideum	Round-branched Tree-clubmoss	-	-	S5
Lysimachia borealis	Starflower	-	-	S5
Lysimachia terrestris	Swamp candles	-	-	S5
Maianthemum canadense	Canada mayflower	-	-	S5
Maianthemum trifolium	Three-leaved false Solomon's seal	-	-	S5
Menyanthes trifoliata	Bog buckbean	-	-	S5
Mitchella repens	Partridgeberry	-	-	S5
Morella pensylvanica	Northern bayberry	-	-	S5
Muhlenbergia uniflora	Bog Muhly	-	-	S5
Neottia cordata	Lesser twayblade	-	-	S4
Nuphar variegata	Variegated Pond Lily	-	-	S5
Oclemena acuminata	Whorled wood aster	-	-	S5
Oclemena nemoralis	Bog aster	-	-	S5
Oclemena x blakei	a hybrid White Panicled American-Aster	-	-	S5
Osmundastrum cinnamomeum	Cinnamon fern	-	-	S5
Parathelypteris noveboracensis	New York fern	-	-	S5
Coryphopteris simulata	Bog Fern	-	-	S4
Picea glauca	White spruce	-	-	S5
Picea mariana	Black spruce	-	-	S5
Plantago major	Broadleaf plantain	-	-	SNA
Poa pratensis	Kentucky bluegrass	-	-	S5
Potentilla simplex	Common cinquefoil	-	-	S5
Pteridium aquilinum	Bracken fern	-	-	S5
Ranunculus repens	Creeping buttercup	-	-	SNA
Rhododendron canadense	Rhodora	-	-	S5
Rhododendron groenlandicum	Labrador tea	-	-	S5
Rubus chamaemorus	Cloudberry	-	-	S4
Rumex acetosa	Common sorrel	-	-	SNA
Sarracenia purpurea	Northern Pitcher Plant	-	-	S5
Scirpus atrocinctus	Black-girdled woolgrass	-	-	S5
Scirpus cyperinus	Common Wooley-Bulrush	-	-	S5

Scientific Name	Common Name	SARA	NSESA	S-Rank
Sisyrinchium angustifolium	Narrowleaf blue-eyed grass	-	-	S4
Solidago rugosa	Wrinklelleaf goldenrod	-	-	S5
Solidago uliginosa	Bog goldenrod	-	-	S5
Sorbus americana	American mountain ash	-	-	S5
Spiraea tomentosa	Steeplebush	-	-	S5
Streptopus lanceolatus	Rose twisted-stalk	-	-	S5
Thelypteris palustris	Marsh fern	-	-	S5
Typha latifolia	Bulrush	-	-	S5
Utricularia cornuta	Horned bladderwort	-	-	S5
Utricularia geminiscapa	Mixed bladderwort	-	-	S4
Vaccinium angustifolium	Lowbush blueberry	-	-	S5
Vaccinium macrocarpon	Large cranberry	-	-	S5
Vaccinium myrtilloides	Common blueberry	-	-	S5
Vaccinium oxycoccos	Small cranberry	-	-	S5
Viburnum nudum	Smooth witherod	-	-	S5
Viola lanceolata	Lance-leaved violet	-	-	S5
Viola macloskeyi	Small white violet	-	-	S5
Non-vascular				
Aulacomnium palustre	Ribbed bog moss	-	-	S5
Bryum pseudotriquetrum	Common Green Bryum Moss	-	-	S5
Dicranum montanum	Mountain Broom Moss	-	-	S5
Dicranum polysetum	Wavy-leaved moss	-	-	S5
Dicranum undulatum	A Dicranum moss	-	-	S5
Gymnocolea inflata	Inflated Notchwort	-	-	S4S5
Hypnum imponens	Pellucid Plait Moss	-	-	S5
Mnium hornum	Swan's-neck Leafy Moss	-	-	S5
Mnium spinulosum	a Moss	-	-	SU
Neckera pennata	Feathery Neckera moss	-	-	S5
Oncophorus wahlenbergii	Wahlenberg's Spur Moss	-	-	S5
Pleurozium schreberi	Schreber’s moss	-	-	S5
Pogonatum pensilvanicum	a Moss	-	-	S4S5
Polytrichum commune	Common Haircap Moss	-	-	S5
Polytrichum strictum	Bog Haircap Moss	-	-	S5
Ptilium crista-castrensis	Knight's Plume Moss	-	-	S5
Racomitrium heterostichum	Yellow green Rock Moss	-	-	S5
Scorpidium revolvens	Rusty Hook-Moss	-	-	-
Sphagnum strictum	Atlantic Peat Moss	-	-	S5

Scientific Name	Common Name	SARA	NSESA	S-Rank
Sphagnum affine	a Peatmoss	-	-	S5
Sphagnum austinii	Austin's Peat Moss	-	-	S5
Sphagnum capillifolium	Northern Peat Moss	-	-	S5
Sphagnum centrale	Central Peat Moss	-	-	S4?
Sphagnum cuspidatum	Feathery Peat Moss	-	-	S5
Sphagnum fallax	Flat-top Peat Moss	-	-	S5
Sphagnum fimbriatum	Fringed Peat Moss	-	-	S5
Sphagnum flavicomans	a Peatmoss	-	-	S5
Sphagnum girgensohnii	Green Peat Moss	-	-	S5
Sphagnum magellanicum	Magellan's Peat Moss	-	-	S5
Sphagnum palustre	Blunt-leaved Peat Moss	-	-	S5
Sphagnum pulchrum	Beautiful Peat Moss	-	-	S5
Sphagnum pylaesii	Simple Peat Moss	-	-	S5
Sphagnum rubellum	Red Peat Moss	-	-	S5
Sphagnum russowii	Russow's Peat Moss	-	-	S5
Sphagnum tenellum	Soft Peat Moss	-	-	S5
Sphagnum torreyanum	a Peat Moss	-	-	S5
Thuidium delicatulum	Delicate Fern Moss	-	-	S5
Trematodon ambiguus	Ambiguous Longneck Moss	-	-	S5
Ulota coarctata	A Moss	-	-	S5
Ulota crispa	Crisped Pincushion Moss	-	-	S5

Notes: Bolded species indicate priority species. "-" represents no federal or provincial designation

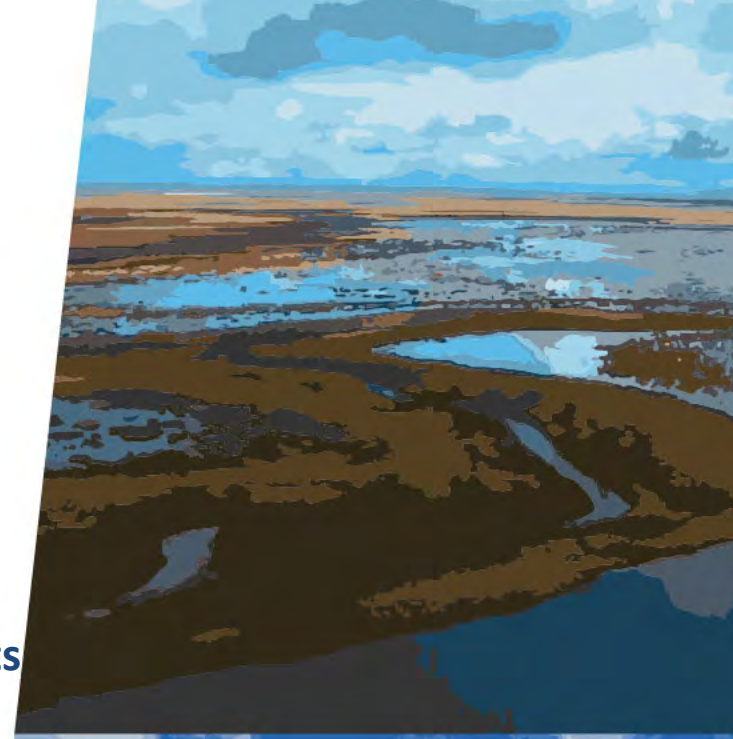
Scientific Name	Common Name	SARA	NSESA	S-Rank
Sclerophora peronella (Atlantic pop.)	**Frosted Glass-whiskers (Atlantic population)**	**SC**	**-**	**S1?**
Pectenia plumbea	**Blue Felt Lichen**	**SC**	**V**	**S3**
Fuscopannaria ahlneri	**Corrugated Shingles Lichen**	**-**	**-**	**S3**
Fuscopannaria sorediata	**a Lichen**	**-**	**-**	**S3**
Hypogymnia vittata	**Slender Monk's Hood Lichen**	**-**	**-**	**S3S4**
Leptogium subtile	**Appressed Jellyskin Lichen**	**-**	**-**	**S3**
Sticta fuliginosa	**Peppered Moon Lichen**	**-**	**-**	**S3**
Cladonia boryi	Fishnet Lichen	-	-	S5
Cladonia cristatella	British Soldiers Lichen	-	-	S5
Cladonia maxima	Giant Cladonia Lichen	-	-	S5
Cladonia maxima	Giant Cladonia Lichen	-	-	S5
Cladonia multiformis	Sieve Lichen	-	-	S5
Cladonia rangiferina	Gray Reindeer Lichen	-	-	S5
Cladonia spp.		-	-	-
CladOnIa stellaris	Star-tipped Reindeer Lichen	-	-	S5
Cladonia uncialis	Thorn Lichen	-	-	S5
Dibaeis baeomyces	Pink Earth Lichen	-	-	S5
Evernia mesomorpha	Boreal Oakmoss Lichen	-	-	S5
Hypogymnia incurvoides	Lattice Tube Lichen	-	-	S4S5
Hypogymnia physodes	Monk's Hood Lichen	-	-	S5
Hypogymnia tubulosa	Powder-headed Tube Lichen	-	-	S5
Lobaria pulmonaria	Lungwort Lichen	-	-	S5
Lobaria quercizans	Smooth Lung Lichen	-	-	S5
Lobaria scrobiculata	Textured Lungwort Lichen	-	-	S5
Loxospora cismonica	a Lichen	-	-	SNR
Pannaria conoplea	Mealy-rimmed Shingle Lichen	-	-	S4
Pannaria rubiginosa	Brown-eyed Shingle Lichen	-	-	S4
Parmelia squarrosa	Bottlebrush Shield Lichen	-	-	S5
Parmeliella triptophylla	Black-bordered Shingles Lichen	-	-	S5
Ramalina dilacerata	Punctured Ramalina Lichen	-	-	S5

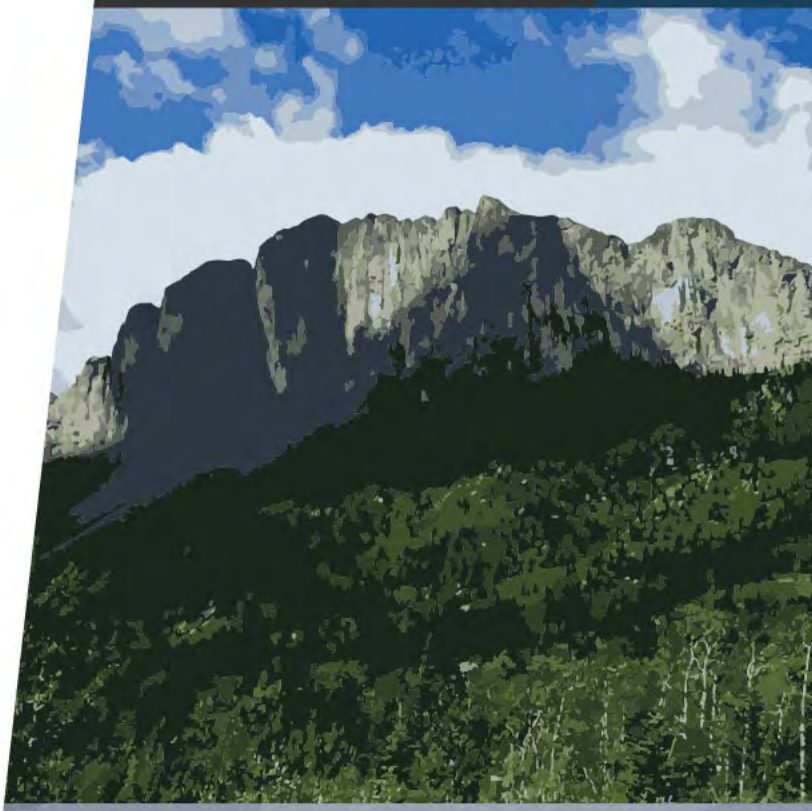
Notes 1: Bolded species are priority species, underlined species are Species at Risk, "-" denotes no federal or provincial designation, SC = Special Concern, V = Vulnerable

Appendix I.3

Vegetation Communities Assessments Baseline Reports

Goldboro Gold Project-
Vegetation Community Assessments





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EXECUTIVE SUMMARY

McCallum Environmental Ltd. (MEL) was retained by Anaconda Mining Inc. (Anaconda) to complete a vegetation community assessment for the proposed Goldboro Gold Project (the Project), located in Goldboro, Nova Scotia. These assessments are to support the preparation and submission of the provincial Environmental Assessment Registration Document (EARD).

The objective of the vegetation community assessments were to note any uncommon communities, identify habitats that may support Species at Risk (SAR) or Species of Conservation Interest (SOCI) and quantify habitats within the Project Area (PA). The results of these assessments will then be carried forward to the EARD to predict habitat loss by the Project and discussed in an effects assessment.

To identify vegetation communities found within the PA, several resources were referenced. Although Nova Scotia has resources of documented and classified forested and barren communities, literature is lacking for many of the non-forested communities (e.g. shrub bogs, marshes, fens etc.). Several classification systems were used when specific community types were observed. The following community classification guides were used:

- Forest Ecosystem Classification System (Neily et al., 2010);
- Natural Landscapes of Maine (Susan Gawler & Andrew Cutko, 2018); and,
- Classification of Heathlands and Related Plant Communities on Barrens Ecosystem in Nova Scotia (Porter, Basquill, & Lundholm, 2020).

Vegetation Community assessments were completed by MEL Terrestrial Ecologists and occurred throughout the months of November 9th – 12th, 2018 and May - September 2021 and were concurrent with the wetland delineation and rare flora inventory programs.

The data collected in the field was used to delineate the approximate boundary of the documented vegetation communities. Quantum Geographic Information System (QGIS) software was used to delineate the boundaries into discrete polygons.

Twenty-one natural vegetation types and nine vegetation groups were observed. The most abundant vegetation types within the PA belong to Wet Coniferous Forest Group accounting for 20% (239.2 ha) of the total area of all vegetation groups observed within the PA. The most abundant upland forest group was the Mixedwood Forest Group (MW), accounting for approximately 192.4 ha (16%). Cutovers were also prevalent and account for 14% (167.7 ha) of the total area of all vegetation types observed within the PA.

During the surveys, the upland vegetation groups – Coastal Forests (CO), Shrubland and Barren Group (S), Spruce-Hemlock Forest Group (SH), Spruce-Pine Forest Group (SP) and Mixedwood Forest Group (MW) were observed. The wetland vegetation groups include: Wet Coniferous Forest Group (WC), Wet

Deciduous Forest Group (WD), Peatland Group (PG) and the Marsh Group (MG). All other human-disturbed landscapes were grouped in the Cutover group.

All vegetation types observed were considered common in Nova Scotia. However, there are some vegetation types, although common, that are restricted to coastal and near-coastal areas. These vegetation types include: all vegetation types observed belonging to the Coastal Forest Group (CO) and Huckleberry – crowberry bog (PG1) and the Coastal Sedge Fen (PG3).

Although habitat requirements are species-specific, general trends on SAR and SOCI habitat suitability were noted and summarized below:

- Mature stands of vegetation types belonging to the Wet Coniferous (WC) and Wet Deciduous (WD) forest groups often provide suitable habitat for rare cyanolichens, including the SAR blue felt lichen and frosted-glass whiskers. These habitats had the highest likelihood to support rare cyanolichens within the PA. This forest group also provided habitat for southern twayblade (*Neottia bifolia*; ACCDC: S3) and was observed in several locations.

- Forested wetlands belonging to WD and WC forest groups with a well-developed shrub layer and heterogeneity provided habitat for Canada warbler (*Cardellina canadensis*). Olive-sided flycatcher (*Contopus cooperi*) habitat is also provided in these forest groups along the edges of open wetland communities (e.g. vegetation types of the Peatland Group) or cutovers.

- The PGI – Huckleberry – crowberry bog vegetation type had the highest potential to support northern comandra (*Geocaulon lividum*; ACCDC: S3), and this species was exclusively observed within this vegetation type.

- Mature upland forests belonging to the Mixedwood (MW), Spruce-Pine (SP) and Spruce-hemlock (SH) with a closed canopy (>=60%) provided suitable winter and summer refuge for mainland moose (*Alces alces americana*). These forest groups often provide habitat for a whole suite of woodland bird species.

- Cutovers often provide suitable breeding and foraging habitat for the SAR common nighthawk (*Chordeiles minor*) and hunting habitat for many predatory bird species as well as summer and winter forage for mainland moose.

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1 INTRODUCTION

McCallum Environmental Ltd. (MEL) was retained by Anaconda Mining Inc. (Anaconda) to complete a vegetation community assessment for the proposed Goldboro Gold Project (the Project), located in Goldboro, Nova Scotia. This assessment supports the preparation and submission of the provincial Environmental Assessment Registration Document (EARD).

The objectives of these surveys were to identify vegetation communities within the Project Area (PA), note any uncommon communities, identify habitats that may support Species at Risk (SAR) or Species of Conservation Interest (SOCI) and quantify habitats within the PA. The results of these assessments will then be carried forward to the EARD to evaluate habitat loss and Project impacts to flora and fauna.

1.1 Background

The Goldboro Gold Project (the Project) is located approximately 175 kilometres (km) northeast of Halifax, 60 km southeast of Antigonish, and 1.6 km northeast of the community of Goldboro on the eastern shore of Isaac's Harbour, in Guysborough County, Nova Scotia, Canada. Anaconda Mining Inc. (Anaconda) proposes to develop the Project as a 4,000-tonne per day (tpd) mine and processing facility. For the purposes of this environmental assessment, a Project Area (PA) was defined as the footprint of Project related infrastructure plus a buffer of 100 – 200 m. The mine plan includes two surface extraction areas (open pits), an ore processing facility, a tailings management facility (TMF), three waste rock storage areas (WRSAs), overburden and organic stockpiles, support buildings including an employee accommodation building, and associated infrastructure. The anticipated mine life for extraction of ore is approximately 11 years.

The scope of the Project includes activities associated with construction, operation, and closure. Project construction activities will include clearing and grubbing the overburden and organic stockpiles, WRSAs, pit, plant, and TMF areas, and construction of the initial lift of the TMF, plant site, secondary access roads, construction laydowns, Run-of-Mine (ROM) pad, surface water management and other site infrastructure. The operation phase will include conventional ore extraction methods (drilling, blasting, loading, and hauling), ore processing, and waste management. ROM ore will go directly to the crusher while stockpiled high-grade and low-grade ore will be progressively processed throughout the mine life. Non-ore bearing waste rock, not used for construction or backfill, will be stockpiled at its final disposal point, managed and reclaimed in place. The closure phase will include earthworks and demolition required to return the Project Area to a safe, stable, and vegetated state, and all monitoring and treatment, if required.

The Site is primarily disturbed by historical mining activities, road construction and timber harvesting. The region is known for its historic gold deposits and about half of the parcel is currently under mineral exploration licenses including the known Goldboro (Upper Seal Harbour), Isaacs Harbour, Forest Hill, and Lower Seal Harbour deposits.

1.2 Regulatory Context

Vegetation community assessments were completed to determine potential impacts to species habitat which may be protected under the following *Acts*:

1. *Species at Risk Act*;
2. *Nova Scotia Environment Act;*
3. *Migratory Bird Convention Act; and,*
4. *Nova Scotia Wildlife Act.*

Vegetation community mapping was also completed to address key topics regarding species habitat as discussed in *The Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSECC, 2005).

1.3 Project Area (PA)

The PA is an area that encompasses the Project infrastructure with a 100 – 200 m buffer to account for potential indirect effects to Valued Components (VCs). The PA is approximately 1,221 ha and 85 ha of this area are open water features (i.e., lakes and ponds). The remainder of the land is comprised of forested and harvested landscapes, historical and current mine workings, access roads and trails, forested swamps and peatlands.

1.4 Biophysical Setting

The PA is within the Eastern Interior and the Eastern Shore Ecodistricts, which are within the Eastern and Atlantic Coastal Ecoregion, respectively (NSDNRR,2005) (Figure 1; Appendix A).

The Eastern Interior Ecodistrict is one of the largest Ecodistricts in the province and extends from Pockwock Lake to the town of Guysborough (NSDNRR,2005). Soil depths vary and often, along the coast, bedrock is highly visible. Depending on the soil depths, a variety of different climax forest communities can be found. Within shallow, acidic soils, often closer to the coast, the forest community is dominated by softwood tree species such as balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), red spruce (*P. rubens*) and white spruce (*P. glauca*). In contrast, areas with deeper soils often on hills and drumlins can support tolerant hardwood species, such as yellow birch (*Betula alleghaniensis*), sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), and shade intolerant species such as red maple (*Acer rubrum*).

The Eastern Shore Ecodistrict exists from the east side of the Halifax peninsula and extends to the Chedabucto peninsula. The topography, geology and soils vary within this Ecodistrict and is heavily influenced by the Atlantic Coast which creates conditions which support boreal-like forest communities (NSDNRR,2005). This area consists of granite outcrops, greywackes and slates of the Goldenville

formation. Soils are generally nutrient poor, acidic and tree cover is primarily dominated by balsam fir, black spruce, red spruce and white spruce (NSDNRR,2005).

1.5 Project Team

A project team consisting of terrestrial ecologists proficient in vegetation identification and community classification were selected to complete the field studies and reporting for these surveys. Team members with integral roles in the surveying, reporting and project management are listed below (Table 1).

Table 1. Project Team

Team Member	Role and Duties
John Gallop, B.Sc., P.Biol	Terrestrial Ecologist and Report Writer
Sam Gildiner, B. Sc. F., M.E.M.	Terrestrial Ecologist, Field Lead
Meaghan Quanz, B.Sc., M.E.S.	Terrestrial Ecologist
Emma Posluns, B.Sc., MSc	Biologist and Project Coordinator
Meghan Milloy, B.Sc., M.E.S.	Vice President and Project Manager

2 METHODOLOGY

Completion of vegetation community assessments is a two-part process consisting of field assessments and a desktop delineation. The desktop component involved a preliminary screening of the area prior to the surveys, followed by delineation of the field data collected. See below for details of the methodologies used.

2.1 Desktop Review

Prior to completing field assessments, several geospatial datasets were reviewed to inform the surveyors of the landscape. These datasets include:

1. Project Area Spatial Boundary
2. Nova Scotia Forest Inventory
3. Nova Scotia Environment and Climate Change (NSECC) Wetland Inventory
4. Nova Scotia Topographic Database (NSTDB)
5. Nova Scotia Department of Natural Resources and Renewables (NSDNRR) Ecological Land Classification (ELC)
6. Nova Scotia Old Forestry Policy Polygons
7. Aerial Imagery

Aerial imagery and spatial files of wetland features were invaluable in the desktop review as indicators of different soil regimes often reflect changes in vegetation community structures. The aerial imagery allowed the surveyor, at a high-level, to identify areas of interest.

2.2 Field Program Methodology

Vegetation community assessments were completed by MEL Terrestrial Ecologists listed in Table 1 and occurred throughout the months of November 9th – 12th, 2018 and in May - September 2021 and were concurrent with the wetland delineation and rare flora inventory programs. The assessments were largely completed within the growing season (June 1st – September 30th), with some surveys occurring in snow free conditions outside the growing season. The survey areas that occurred outside the growing season were forested communities dominated by woody perennial species, which are readily identifiable year-round.

Several resources were referenced to identify vegetation communities found within the PA. Although Nova Scotia has resources of documented and classified forested and barren communities, literature is lacking for many of the non-forested communities (e.g. shrub bogs, marshes, fens etc.). Several classification systems (Table 2) were used when specific community types were observed. By using several different classification systems, communities which were not defined in the available Nova Scotia guides were able to be classified. By merging these classifications, the communities within the PA can be accurately described. If Nova Scotia guides were only used, then there would be a biased towards forested and barren communities and many non-forested wetlands communities and their abundance and frequency within the PA would not be accurately documented. Table 2 summarizes the classification systems used during the field program and the community types that they describe.

Table 2. Classification System Guides Used in the Surveys

Classification System	Author(s)	Vegetation Community Types Defined
Forest Ecosystem Classification System (FEC)	Neily et al., 2010	Forested uplands, forested wetlands and woodlands.
Natural Landscapes of Maine (NLM)	Susan Gawler & Andrew Cutko, 2018	Defines forested and non-forested communities. This was used to define non-forested wetland communities within the PA.
Classification of Heathlands and Related Plant Communities on Barrens Ecosystem in Nova Scotia	Porter, Basquill, & Lundholm, 2020	Described barrens, heathlands and shrublands.

The Natural Landscape of Maine (NLM) classification was referenced and used as a guideline because Nova Scotia does not have any published non-forested wetland classification systems. Due to the geographical location of Maine and its proximity to Nova Scotia, many parallels exist between the two locations. Nova Scotia and Maine are both within the Acadian Forest region which is characterized by temperate broadleaf and mixedwood forests which are subject to coastal influences. Many of the community types described in the NLM are found in Nova Scotia and attributed to the climatic and

geographic similarities between these two provinces/states. Therefore, the use of NLM to describe communities in Nova Scotia is a suitable classification system to use for these surveys.

When community types were observed and did not meet the definition of any of the above-mentioned classification systems, MEL biologists applied a name which best described the community type. For example, if an upland vegetation community dominated by the shrub species mountain ash (*Sorbus americana*) and wild raisin (*Viburnum nudum*) were encountered, the name Mountain Ash - Wild Raisin Shrubland was applied. The classification names cite the dominant species which are characteristic of the community type. In the event two species were dominant within the same strata a dash (-) is applied, while a slash (/) is applied to dominant species of different strata. This naming convention is then followed by a descriptor of the community such as shrubland, barren, forest etc.

In certain circumstances, particularly when there was a recent disturbance (e.g. a clear cut within five years) and vegetation types were still in the early successional stages in both uplands and wetlands, the habitat type "cutover" was applied and dominant species in that community type were recorded.

All vegetation community types encountered within the PA were georeferenced using a handheld Garmin and the following information was collected:

1. Dominant tree, shrub and herbaceous species;
2. Presence of a disturbance;
    a. Anthropogenic (e.g. cut-over)
    b. Natural (e.g. windthrow)
    c. None
3. Approximate stand age;
    a. Regenerative
    b. Mature
4. Representative photographs;
5. Approximate boundary of the habitat types (if not clearly visible from aerial imagery); and
6. Vegetation community and classification.

The intent of these surveys was to not only document the locations of vegetation communities, but to delineate the approximate boundary of these communities. Surveyors opportunistically georeferenced and classified community types and their boundaries whenever a new community type was encountered. This data was then used in the desktop component described in section 2.3 to delineate and quantify these vegetation types.

2.3 Vegetation Community Delineation

The data collected in the field (described in section 2.2) was used to delineate the approximate boundaries of the documented vegetation communities. Vegetation types were delineated using orthophotos at a

1:10,000 scale on QGIS software. The interpreter reviewed the aerial imagery and vegetation community point data, and the polygon tool was used to create the approximate boundary of each community type. When possible, the interpreter used differences in vegetation community physiognomy (graminoid, shrubbed, tree etc.) as a proxy to identify vegetation type boundaries.

When vegetation types could not be clearly delineated by the orthophotos, and often when the physiognomy was the same (e.g. two softwood forest vegetation types) the polygons were assigned to a broader group. For example, if there were field data points for vegetation types SH2 and SH5, but the interpreter could not see a clear boundary between the two vegetation types, the polygon was assigned the forest group it belongs to (i.e. SH Forest Group). Once all the vegetation community polygons were created, the area of each vegetation type was calculated in hectares.

3 RESULTS

The PA comprises of a mosaic of cutovers, regenerative stands, historical mine workings, roads, trails, and intact, mature conifer and mixedwood stands, and open and forested wetlands. Within the PA, nine natural vegetation community groups and 21 vegetation types were observed. The most abundant upland forest group was the Mixedwood Forest Group (MW), accounting for approximately 192.4 ha (16%) of the PA. The most abundant wetland group was the Wet Coniferous Forest group (WC) and accounted for 239.2 ha (20%) of the PA. Cutovers accounted for 167.7 ha (14%) of the PA.

During the surveys, the upland vegetation groups – Coastal Forests (CO), Shrubland and Barren Group (S), Spruce-Hemlock Forest Group (SH), Spruce-Pine Forest Group (SP) and Mixedwood Forest Group (MW) were observed. The wetland vegetation groups include Wet Coniferous Forest Group (WC), Wet Deciduous Forest Group (WD), Peatland Group (PG) and the Marsh Group (MG). All other human-disturbed landscapes were grouped in the cutover group.

Table 3 (below) lists all the natural vegetation community groups and types observed and Figure 2, Figure 3 and Figure 5a – 5e (Appendix A) show the vegetation community results.

Table 3. Vegetation Groups and Vegetation Types observed within the PA.

Community Type	Vegetation Group	Vegetation Type (VTs)	Successional Stage	Area within the PA		Classification System
				%[1]	ha	
Upland Communities	Coastal Forest Group	• CO1 – Black spruce – Balsam fir / Foxberry/Plume moss	Edaphic Climax	2	25.6	FEC
		• CO4 – Balsam fir / Foxberry – Twinflower	Mid to Late-successional	10	119.6	
	Coastal Forest Group Total			**12**	**145.2**	
	Spruce-Hemlock Forest Group	• SH5 – Red spruce – Balsam fir / Schreber's moss	Mid-successional	5	56.15	FEC
		• SH6 – Red spruce – Balsam fir / Stair-step moss – Sphagnum	Mid-successional	4	45.7	
		• SH8 – Balsam fir / Wood fern / Schreber's moss	Early to mid-successional	4	46.5	
	Spruce-Hemlock Forest Group Total			**13**	**148.35**	
	Spruce - Pine Forest Group	• SP5 – Black spruce / Lambkill / Bracken	Early to late-successional	6	78.40	FEC
		• SP6 – Black spruce – Red maple / Bracken - Sarsaparilla	Early to mid-successional	<1	2.70	
		• SP7 – Black spruce / False holly / Ladies' tresses Sphagnum	Early to mid-successional	7.5	88.0	
	Spruce-Pine Forest Group Total			**14**	**169.1**	

Community Type	Vegetation Group	Vegetation Type (VTs)	Successional Stage	Area within the PA		Classification System
				%[1]	ha	
	Mixedwood Forest Group	• MW2 – Red spruce – Red maple – White birch / Goldthread	Mid-successional	<1	8.9	FEC
		• MW4 – Balsam fir – Red maple / Wood sorrel - Goldthread	Early to Mid-successional	15	183.5	
	Mixedwood Forest Group Total			**16**	**192.4**	
	Shrubland and Barren Group	• S3 – Mixed Tall Shrubland	Early to Mid-successional	2	25	C. Porter et al., 2021
		• S5 – Sheep Laurel Inland Heath	Early to Mid-successional	<1	7	
	Shrubland and Barren Group Total			**2**	**32**	
Wetland Communities	Wet Coniferous Forest Group	• WC1 – Black spruce / Cinnamon fern / Sphagnum	Edaphic climax	5	58	FEC
		• WC2 – Black Spruce / Lambkill – Labrador tea / Sphagnum	Edaphic climax	15	177.5	
		• WC6 – Balsam fir / Cinnamon fern – Three seeded sedge / sphagnum	Edaphic climax	<1	3.7	
	Wet Coniferous Forest Group Total			**20**	**239.2**	
	Wet Deciduous Forest Group	• WD2 – Red maple / Cinnamon Fern / Sphagnum	Edaphic climax	<1	9.7	FEC
	Wet Deciduous Forest Group Total			**<1**	**9.7**	

Community Type	Vegetation Group	Vegetation Type (VTs)	Successional Stage	Area within the PA		Classification System
				%[1]	ha	
	Peatland Group	• PG1 -Huckleberry – Crowberry Bog	Mid to Late-successional	5	55.5	NLM adapted
		• PG2 - Sweetgale Mixed Shrub Fen	Mid to Late-successional	<1	3.8	
		• PG3 - Coastal Sedge Fen	Mid to Late-successional	<1	0.92	
		• PG4 – Sheep Laurel Dwarf Shrub Bog	Mid to Late-successional	<1	2.5	
	Peatland Group Total			**5**	**62.7**	
	Marsh Group	• MG1 – Horsetail – Tall Meadow Rue / Ribbed bog moss Marsh	Early to Mid-successional	<1	9	MEL[2]
	Marsh Group Total			**<1**	**9**	

1 This calculation was determined by dividing the area (ha) of the vegetation type by the total area of all observed vegetation types (including cutovers).
2Neither the FEC or NLM systems accurately describe these vegetation community types, therefore, MEL biologists characterized the vegetation community by dominant species observed as described in section 2.2.

3.1 Vegetation Community and Classification – Upland Communities

3.1.1 Coastal Forest Group (CO)

The Coastal Forest Group are forested communities which are influenced by high winds, cool, moist conditions associated with the Atlantic Coastal ecoregion and the Bay of Fundy Shore (Neily et al., 2010). These forested groups often are dominated by coniferous tree species, such as black spruce (*Picea mariana*), white spruce (*Picea glauca*), and balsam fir (*Abies balsamea*) with scattered hardwood species such as red maple (*Acer rubrum*). Often within this group, and a direct result of high winds, windswept growth forms of trees, termed Tuckamores occur. This vegetation group accounts for approximately 12% (145.2 ha) of the PA. Two vegetation types belonging to this group were observed.

CO1 – Black Spruce – Balsam Fir / Foxberry/ Plume Moss

The vegetation type CO1 - Black spruce – Balsam fir / Foxberry/ Plume Moss is a common climax vegetation community along the coastal region of the province with fresh-moist, nutrient poor soils (Neily et al., 2010). This community consists of an overstory predominantly of black spruce and balsam fir, with a sparse herbaceous and shrub layer consisting of mountain ash, bunchberry (*Cornus canadensis*), starflower (*Lysimachia borealis*) and typically with the forest floor blanketed with Schreber's moss (*Pleurozium* schreberi) and plume moss (*Ptilium crista-castrensis*). This vegetation type accounted for 2% (25.6 ha) of the communities observed.

Photo 1. CO1 Black spruce – Balsam fir / foxberry / Plume moss typical vegetation community composition dominated by black spruce, scattered balsam fir and extensive moss cover observed within the PA.

CO4 – Balsam fir / Foxberry – Twinflower

The vegetation type CO4 -Balsam fir / Foxberry – Twinflower is a common forest type found on fresh/moist soils with nutrient poor to medium richness along the Atlantic coast of Nova Scotia (Neily et al., 2010). The canopy cover is predominantly balsam fir with black spruce and tamarack (*Larix laricina*) and scattered hardwood species such as red maple and white birch. The herbaceous layer diversity and cover is usually low consisting of bunchberry, twinflower and lily-of-the-valley (*Maianthemum*

canadense), and like the vegetation type CO1 - Black Spruce – Balsam Fir / Foxberry/ Plume Moss, moss cover is extensive. This vegetation type, like all associated with this vegetation group, is prone to wind disturbances associated with the coast. This vegetation type was predominant in both mature and regenerative stands in western portions of the PA and account for 10% (119.6 ha) of the vegetation types observed.

Photo 2. CO4 – Balsam fir / Foxberry – Twinflower typical vegetation community composition dominated by balsam fir and predominant herbaceous layer of bunchberry.

3.1.2 Spruce Hemlock Forest Group (SH)

This vegetation group is widespread throughout Nova Scotia and consists of mid to late successional Vegetation Types (Neily et al., 2010). This vegetation group is dominated by a canopy consisting of shade tolerant softwoods such as balsam fir, red spruce and eastern hemlock. The shrub layer often consists of regenerating conifers and soils which are often derived from glacial till (Neily et al., 2010). Three vegetation types within this group were observed and account for 13% (148.35 ha) of the PA.

SH5- Red spruce – Balsam fir / Schreber's moss and SH6 – Red Spruce – Balsam Fir / Stair-step Moss - Sphagnum

The SH6 – Red Spruce – Balsam Fir / Stair-step Moss – Sphagnum is dominated by red spruce and balsam fir. The herbaceous layer typically was poorly developed on all locations within the PA, with the most prominent species being bunch berry (*Cornus canadensis*), sheep laurel (*Kalmia angustifolia*), bracken fern (*Pteridium aquilinum*) and American wintergreen (*Gaultheria procumbens*). The bryoid layer in this vegetation type was predominantly Schreber's moss (*Pleuorzium schreberi*) and *Sphagnum* species such as *S. girgensohnii* and *S. capillifolium* in depressions and isolated hummocks. The SH5 vegetation type is similar but is often associated with dryer moisture regimes and Schreber's moss dominates the bryoid layer.

Photo 3. Representative photo of the SH6 vegetation type (mature and intact) stand.

SH8 – Balsam Fir / Wood Fern / Schreber's Moss

The SH8 – Balsam Fir / Wood Fern / Schreber's Moss vegetation type is an early to mid-successional community type which is dominated by balsam fir and often indicative of disturbances such as harvesting, insect infestation and windthrow (Neily et al., 2010). This vegetation type was observed in mature and

regenerative stands. The herbaceous layer is often variable within this vegetation type and in some instances the canopy cover is so dense that very little herbaceous cover is present. As seen within the PA, the herbaceous layer consisted of Canada bunchberry and star flower (*Lysimachia borealis*). The bryoid layer consisted of wavy-leaved moss (*Dicranum polysetum.*), hypnum mosses (*Hypnum spp.*) and *Bazzania spp.*

The regenerative portions of this vegetation type provides suitable habitat for refuge and foraging for hare and foraging for moose and passerines. Rare vascular flora and lichen potential for this vegetation type is low. The SH8 vegetation types accounts for 4% (46.5 ha) all vegetation types observed.

Photo 4. Representative photo of the SH8 vegetation type (regenerative stand).

3.1.3 Spruce-Pine Forest Group (SP)

The Spruce-Pine forest group consist of vegetation types that are associated with nutrient poor soils which are often associated with forest disturbances (Neily et al., 2010). Within this group conifer species, primarily spruce and pine are often dominant. Within this forest group and a result of the nutrient poor acidic soils, ericaceous species are often present within this group. Three vegetation types within this group were observed and account for 14% (169.1 ha) of vegetation groups observed.

SP5 – Black spruce / Lambkill / Bracken and SP6 – Black spruce – Red maple / Bracken - Sarsparilla
The SP5-Black Spruce / Lambkill / Bracken vegetation type observed within the PA was dominated by black spruce with an understory consisting of black spruce saplings, sheep laurel and bracken fern. This vegetation type within the PA often had a well-developed shrub and herbaceous layer. The bryoid layer consisted primarily of Schreber's and stair-step moss. The SP6 vegetation type is similar to the SP5 but co-dominated by red maple and higher cover of sarsaparilla.
This vegetation type consists of nutrient poor soils with a very low potential to support vascular plant rarities. Due to the predominant tree species being black spruce, the potential to support many SAR lichen species is low. This vegetation type supports foraging and breeding for many passerine bird species and foraging for moose and deer.

Photo 5. Representative photo of the SP5 vegetation type.

3.1.4 Mixedwood Forest Group (MW)

This forest group comprises of early to late successional vegetation types, and these vegetation types can be difficult to characterize due to variation of tree species composition. This forest group is dominated by a mixture of hardwood and softwood species and occur in an upland setting. Early successional stages often consist of red maple, white birch and balsam fir and late successional stages comprise of yellow birch, red spruce and/or hemlock. Herb and bryophyte diversity is often high and extensive. The

mixedwood forest group accounts for 16% (192.4 ha) of the vegetation groups observed. The vegetation types observed are listed below:

- MW2 – Red spruce – Red maple – White birch / Goldthread
- MW4 – Balsam fir – Red maple / Wood sorrel – Goldthread

Photo 6. MW4 – Balsam fir – Red maple / Wood sorrel – Goldthread Vegetation Type.

3.1.5 Shrubland and Barren Group (S)

Barren ecosystems are characterized by harsh climatic and/or edaphic conditions and by low shrub communities (Porter et al, 2021). These communities are largely associated with shrubs from the heath family (*Ericeacea*), shallow soils and often exposed bedrock. These communities can occur in a coastal setting (<500 m from the coastline) or inland (>500m from the coastline). Barrens are divided into herbaceous, dwarf shurblands and shrubland associations. Within the PA, two vegetation types belonging to the shrubland associations were observed. This Shrubland and Barren Group accounts of 2% (32 ha) of all vegetation groups observed.

S3 – Mixed Tall Shrubland

This vegetation type is characterized by high shrub cover, often comprising of false holly (*Ilex mucronata*), speckled alder (*Alnus incana*) and wild raisin (*Viburnum nudum*). This community is successionally dynamic, and dominant shrub species can vary between sites. Soils are often shallow and the herbaceous layer is usually sparse and consists of various species, some include cinnamon fern and bracken fern. The bryoid layer often consisted of many of the broom moss species (*Dicranum spp.*), Schreber's moss and stair-step moss. This vegetation type has been reported to often be associated with fires (porter et al., 2021), however, no evidence of historical fires was observed during the surveys.

Photo 7. S3 – Mixed Tall Shrubland.

S5 – Sheep Laurel Inland Heath

This vegetation type is characterized by sparse spruce and balsam fir tree cover, shallow humus over bedrock with a shrub and lichen layer consisting of sheep laurel and reindeer lichens (*Cladonia spp.*). This vegetation type has many similarities to the Open Woodland group described in the FEC, with the most distinguishing feature being the S5 – sheep laurel inhland heath has a lower tree cover. This vegetation type has many similarities to bog communities (e.g. ericaceous dominant, presence of sphagnum etc.) but lacks hydric soils. The S5 vegetation type was often observed immediately adjacent to

bog communities and often formed small pockets surrounded by other forested or bog communities. This is a wide-spread community in NS and is frequently observed in the southwest of NS (Porter et al., 2021).

Photo 8. S5 – Sheep Laurel Inland Heath.

3.2 Vegetation Community and Classification – Wetland Communities

Wetland vegetation communities observed within the PA are discussed below. For further details on wetland types, classification, landscape position and overall wetland functions, see details described in the Wetland Biophysical Report associated with the Goldboro Gold Mine Environmental Assessment Registration Document (EARD).

3.2.1 Wet Coniferous Forest Group (WC) and Wet Deciduous Forest Group (WD)

The Wet Coniferous and Wet Deciduous Forest Groups are wet forested ecosystems which often have water at or near the surface of the soil for most of the year (Neily et al., 2010). These forested vegetation groups are typically found within swamps in Nova Scotia. Stand cover of trees is often moderate to high, often with extensive sphagnum cover and acidic and nutrient poor soils. Fern species, such as cinnamon fern (*Osmundastrum cinnamomeum*) and sedges such as the three-seeded sedge (*Carex trisperma*) are often associated with this vegetation community group. Common sphagnum species associated with this

vegetation group are *S. palustre, S. capillifolium* and *S. girgensohnii.* These two wetland community groups were the most frequented and accounted for the most area of all wetland communities observed in the PA. In total, the WC and WD group accounted for 21% (249 ha) of all vegetation groups within the PA.

Vegetation Types within this group, especially with the presence of mature hardwoods, often supported habitat for a variety of rare cyanolichens, including the Species at Risk (SAR) blue felt lichen (*Pectenia plumbea*) and frosted glass whiskers (*Sclerophora peronella*).

WC1 – Black spruce / Cinnamon fern / Sphagnum

The WC1 – Black spruce / Cinnamon fern / Sphagnum vegetation type is a common climax community found on wet, nutrient poor soils. The canopy of this vegetation type is predominantly black spruce and balsam fir with extensive cover of cinnamon fern and a variety of sphagnum species including *S. squarrosum*, *S. capillifolium* and *S. palustre*. Often spruce specimens within this vegetation type had intermediate characteristics between black and red spruce (*Picea rubens*), which is indicative of hybridization. Low to medium shrub cover is present within this vegetation type which is often comprising of black spruce and balsam fir saplings, mountain holly (*Ilex mucronata*), three seeded sedge and goldthread (*Coptis trifolia*). The WC1 vegetation type is widespread throughout the PA.

Photo 9. WC1 – Black Spruce / Cinnamon Fern / Sphagnum Vegetation Type.

WC2 – Black Spruce / Lambkill – Labrador tea / Sphagnum

The WC2 – Black spruce / lambkill – Labrador tea / Sphagnum is a common vegetation type throughout Nova Scotia and was the most abundant wetland vegetation type within the PA. This vegetation type typically has high shrub and Sphagnum moss cover. Within the PA, there was some variation between species composition but generally, the canopy was dominated by black spruce, three-seeded sedge, followed by bunchberry, Labrador tea and lambkill. The shrub layer also consisted of black spruce saplings. The distinguishing difference between the vegetation type and the WC – Black Spruce / Cinnamon Fern / Sphagnum vegetation type is the sparse and, in some instances, lack of a well-developed herbaceous layer often consisting of cinnamon fern.

Photo 10. WC2 – Black spruce / lambkill – Labrador tea / Sphagnum vegetation type.

WC6 – Balsam fir / Cinnamon fern – Three seeded sedge / sphagnum

The WC6 – Balsam fir / Cinnamon fern – Three seeded sedge / sphagnum vegetation type is characterized by balsam fir being the dominant tree species with extensive sphagnum and cinnamon fern cover. Within the PA, this vegetation type was found on wet soils, however, this community can also occur on imperfectly drained soils (Neily et al., 2010). The shrub layer is often variable and can range from low to high, which often comprise of mountain holly and speckled alder. The dominant

graminoid and bryophyte species in this vegetation type is three seeded sedge and sphagnum. This vegetation type, if present with a suite of lichen indicator species and mature balsam fir stands, can often provide suitable habitat for the SAR boreal felt lichen (*Erioderma pedicellatum*). Due to extensive forestry practices within the PA, boreal felt lichen habitat was limited.

Photo 11. WC6 Balsam fir / Cinnamon fern – Three seeded sedge – Sphagnum vegetation type with a developed shrub layer.

WD2 – Red Maple / Cinnamon fern / Sphagnum

The WD2 – Red Maple / Cinnamon fern / Sphagnum vegetation type is common throughout coastal and inland Nova Scotia and found within treed swamps. Red maple is the dominant hardwood treed species with scattered balsam fir and black spruce. Cinnamon fern cover is extensive and often form dense clumps which cover the forest floor completely. In this vegetation type, sphagnum cover is extensive and species such as mountain holly, three-seeded sedge, wild raisin, speckled alder and bunchberry are commonly found. This vegetation type, like many within this forest group, provide suitable habitat for many rare lichen species when mature red maple stands are present. This vegetation type often has an increased likelihood to support many rare lichen species associated with mature red

maples as compared to many of the softwood dominant vegetation types within this forest group. This increased likelihood is attributed to the increased number of hardwood trees as compared to softwood dominant stands.

Photo 12. WD2 – Red Maple / Cinnamon fern / Sphagnum vegetation type which is common in the Nova Scotia landscape.

3.2.2 Peatland Vegetation Group (PG)

For the purpose of this report, all vegetation types associated with peatlands (i.e. bogs and fens) have been grouped together. This vegetation community group often consists of extensive sphagnum moss cover, graminoids (sedges and grasses), sparse tree cover and often with the presence of carnivorous plant species. This vegetation group accounts for 5% (62.7 ha) of the total area of all vegetation groups observed within the PA.

PG1 - Huckleberry – Crowberry Bog

The huckleberry – Crowberry vegetation type was the most common peatland vegetation type within the PA. This community is characterized by extensive shrub cover (typically <60 cm in height), presences of

ericaceous shrubs predominantly dwarf huckleberry (*Gaylussacia bigeloviana*), black huckleberry (*Gaylussacia baccata*), leatherleaf and sheeplaurel. Sedge species such as deer-hair sedge (*Trichophoum cespitosum*) and coastal sedge (*Carex exilis*) were common, additionally, within the PA, cloudberry (*Rubus chamaemorus*), a boreal plant species, was prominent within this vegetation type. Sphagnum cover is extensive and includes species such as *S. magillanicum, S. rubellum and S. fuscum.* This habitat is nutrient poor, receives its water source from precipitation and like all bogs, supports several carnivorous plant species such as sundews (*Drosera spp.*), pitcher plant (*Serracenia purpurea*) and bladderworts (*Utricularia spp*.). This vegetation type is restricted to along the coast and regions of the Cape Breton Highlands within Nova Scotia (S. Basquill, 2020, personal Communication, 10 September). This vegetation type is suitable habitat for northern comandra (*Geocaulon lividum*; ACCDC: S3) and southern twayblade (*Neottia bifolia*; ACCDC: S3), which is known to be in the general area of the PA. Several northern comandra observations were made exclusively within this vegetation type during the rare plant surveys.

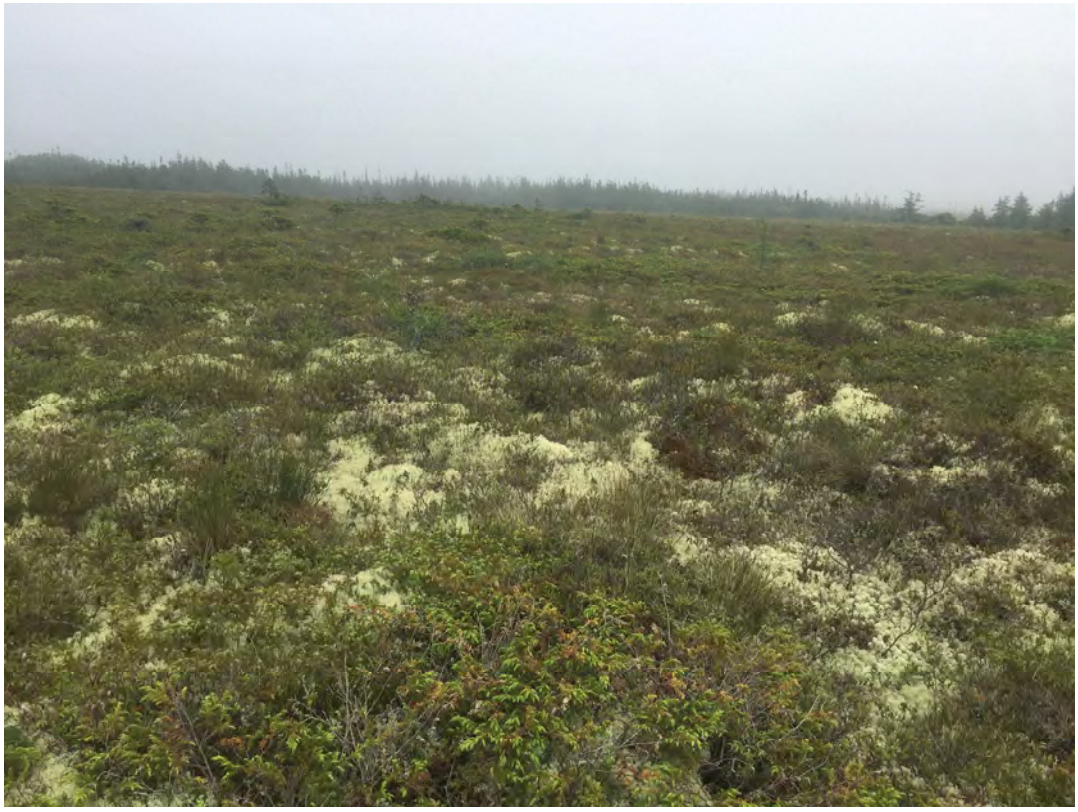

Photo 13. Huckleberry – Crowberry Community extensively covered by dwarf huckleberry and leatherleaf.

PG2 - Sweetgale Mixed Shrub Fen

The Sweetgale mixed shrub fen vegetation type is typically found bordering lakes and ponds and often associated with larger wetland complexes. Out of all the vegetation types within the Peatland Group observed within the PA, the PG2 is the most widespread within Nova Scotia (S. Basquill, 2020, personal Communication, 10 September). This vegetation type is characterized by the high shrub cover consisting of sweetgale and leatherleaf. Within this vegetation type, graminoid cover was low, and consisted primarily of Pickering's reed grass (*Calamagrostis pickingerii)*, although, according to NLM, bluejoint grass (*C. canadensis*) is also characteristic of this vegetation type. Cotton grass and sedges such as tussock sedge (C*arex stricta)* are common within this vegetation type. Trees are often not present and in areas with low shrub cover, sphagnum moss cover is present often comprising of *S. rubellum* and *S. fallax.*

Photo 14. Sweetgale Mixed Shrub Fen vegetation type.

PG3 - Coastal Sedge Fen

The Coastal Sedge vegetation type definition has been adapted from the NLM. The NLM defines this as a community often found in bogs, however, within the PA, this community type was

restricted to fens, often which had standing water and were in the lagg of large bog/fen complexes. This vegetation type was always observed associated with the PG1 – Huckleberry – Crowberry bog vegetation type.

The Coastal Sedge vegetation type is characterized by very little shrub cover and with a herbaceous layer of over 20%, often consisting of deer-hair sedge and/or coastal sedge (*Carex exilis*) (Gawler & Cutko, 2018). Within this vegetation group, ericaceous shrubs such as black crowberry, dwarf huckleberry and/or leather leaf are present. Forbs such as bog golden rod (*Solidago uliginosa*) and the carnivorous plants horned bladderwort (*Utricularia cornuta*), hidden fruit bladderwort (*Utricularia geminiscapa*), round leaved sundew and purple pitcher plant were observed. The bryoid layer is sphagnum dominant, consisting of extensive mats of S. pulchum, *S. recuvum s.l.* and *S. tenellum.* This vegetation type has the strongest northern affinity of the four vegetation types within the PG group and is found along fens on the Cape Breton plateau and along the coast (S. Basquill, 2020, personal Communication, 10 September).

Photo 15. Coastal Sedge vegetation type.

PG4 – Sheep Laurel Dwarf Shrub Bog

The PG4 – Sheep Laurel Dwarf Shrub Bog vegetation type is a prototypical bog community, dominated by sheep laurel and stunted black spruce and larch (Gawler & Cutko, 2018). Other dwarf shrubs include sweetgale and leather leaf. The herbaceous layer consists of deer hair sedge and scattered bog golden rod. Other trademark bog species such as purple pitcher plant and round-leaved sundew were observed. This vegetation type is similar to the PG1 - Huckleberry – Crowberry bog community but differs primarily by the absence and/or trace amounts of huckleberry and increased cover of sheep laurel and sweetgale. Black spruce and larch cover were also more abundant in this vegetation type then compared to the PG1 vegetation type.

Photo 16. PG4 - Sheep Laurel Dwarf Shrub Bog vegetation type.

3.2.3 Marsh Group

Marshes are wetland communities dominated by herbaceous vegetation, often with standing water and comprise of mineral or mucky soils. Common vegetation species consist of cattails (Typha sp.,), grasses and sedges. This community group was only observed along the floodplain of Wetland 1 and account for <1% (9 ha) of the community groups observed within the PA.

MG1 – Horsetail – Tall Meadow Rue / Ribbed bog moss Marsh

The MG 1 – Horsetail – Tall Meadow Rue / Ribbed bog moss Marsh community group is marshland dominated by herbaceous vegetation and observed on floodplains. This community type was peculiar as it was not described in any of the vegetation community classification guides used. This vegetation type appeared to be subject to disturbances (periodic inundation and drying) which resulted in an abundance of pioneer species such as golden rods (Solidago spp.), horsetails (*equisetum spp.*) and woolgrass (*scirpus cyperinus*). Nova Scotia agalinis, which is a priority species, was also found in abundance within this vegetation type.

Photo 17. MG1 vegetation type observed in Wetland 1.

3.2.4 Cutovers

Although all the vegetation community classification guides used focus on 'natural' communities and do not describe human-disturbed landscapes as they are often dynamic and unpredictable. Vegetation communities in disturbed landscapes such as cutblocks, ROW clearings etc. were placed in the cutover group. It is important to note these communities as they are wide-spread throughout the PA and speak to the level of disturbance found in the area. The community structure usually varied but often dominated by species such as woolgrass, soft rush (*Juncus effusus*) three-seeded sedge, bent grasses (*Agrostis spp.*) and a variety of different members of the aster family (Asteracea). Regenerative shrub and tree species such as black spruce, red spruce, balsam fir and red maple were common in these communities. These communities occurred both in an upland and wetland setting and account for 14% (167.7 ha) of the total areas of all vegetation groups observed.

Photo 18. Typical cutover observed within the PA.

4 VEGETATION TYPES SUMMARY

Nine vegetation groups and twenty-one natural vegetation types were observed within the PA. The most abundant vegetation groups belong to Wet Coniferous Forest Group accounting for 20% (239.2 ha) of the total area of all vegetation groups observed within the PA. The most abundant upland forest group was the Mixedwood Forest Group (MW), accounting for approximately 192.4 ha (16%). Cutovers were also prevalent and account for 14% (167.7 ha) of the total area of all vegetation groups observed within the

PA. The most abundant upland vegetation type was MW4 accounting for approximately 184 ha (15%) of the PA and the most abundant natural wetland vegetation type was WC2 and accounts for 178 ha (~15%).

Provincial rankings for vegetation communities currently do not exist within Nova Scotia, and not all communities found in Nova Scotia have been described and researched. These lack of data and rankings make it difficult to designate a community as rare. However, based on the Project Team's expertise, discussions with researchers and available literature, all communities with the PA are common and widespread throughout Nova Scotia. Some vegetation types present are restricted to coastal and near-coastal areas. These vegetation types include all vegetation types observed belonging to the Coastal Forest Group (CO), Huckleberry – crowberry bog (PG1) and the Coastal Sedge Fen (PG3).

4.1 Vegetation Communities That Support SAR and SOCI

The vegetation community assessments completed herein have been used to describe habitat suitability for Species at Risk (SAR) and Species of Conservation Interest (SOCI). These assessments, including quantification of vegetation communities will be carried forward to the provincial EARD to discuss predicted habitat loss and project-species interactions. Although habitat requirements are species-specific, general trends on SAR and SOCI habitat suitability were noted and summarized below:

- Mature stands of vegetation types belonging to the Wet Coniferous (WC) and Wet Deciduous (WD) forest groups often provide suitable habitat for rare cyanolichens, including the SAR blue felt lichen and frosted-glass whiskers. These habitats had the highest likelihood to support rare cyanolichens within the PA. This forest group also provided habitat for southern twayblade (*Neottia bifolia*; ACCDC: S3) and was observed in several locations.

- Forested wetlands belonging to WD and WC forest groups with a well-developed shrub layer and heterogeneity provided habitat for Canada warbler (*Cardellina canadensis*). Olive-sided flycatcher (*Contopus cooperi*) habitat is also provided in these forest groups along the edges of open wetland communities (e.g. vegetation types of the Peatland Group) or cutovers.

- The PGI – Huckleberry – crowberry bog vegetation type had the highest potential to support northern comandra (*Geocaulon lividum*; ACCDC: S3), and this species was exclusively observed within this vegetation type.

- Mature upland forests belonging to the Mixedwood (MW), Spruce-Pine (SP) and Spruce-hemlock (SH) with a closed canopy (>=60%) provided suitable winter and summer refuge for mainland moose (*Alces alces americana*).

- Cutovers often provide suitable breeding and foraging habitat for the SAR common nighthawk (*Chordeiles minor*) and hunting habitat for many predatory bird species as well as summer and winter forage for mainland moose.

More information on rare cyanolichens, flora, fauna and avifauna species within the PA are provided in the Flora and Fauna Biophysical Report and Avifauna Biophysical Report associated with the Goldboro Gold Mine EARD.

5 LIMITATIONS

- 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.
- 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.
- 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'.
- Although surveys primarily occurred in the growing season (June 1st – September 30th), surveys also occurred outside the growing season when many herbaceous vegetation were not present. Although many of the vegetation types are defined by woody perennial species which are identifiable year-round, collecting data on the herbaceous layer within this time was limited to last year's growth and remnant foliage, and therefore, affect the accuracy of the classification.
- 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 points.

6 CLOSING

This Report has considered relevant factors and influences pertinent within the scope of the assessment and has completed and provided relevant information in accordance with the methodologies described.

The undersigned has considered relevant factors and influences pertinent within the scope of the assessment and written and combined and referenced the report accordingly.

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Intermediate Environmental Scientist
McCallum Environmental Ltd.

Lee Pominville, MREM, P.Biol.
Project Coordinator
McCallum Environmental Ltd.

7 REFERENCES

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APPENDIX A. FIGURES

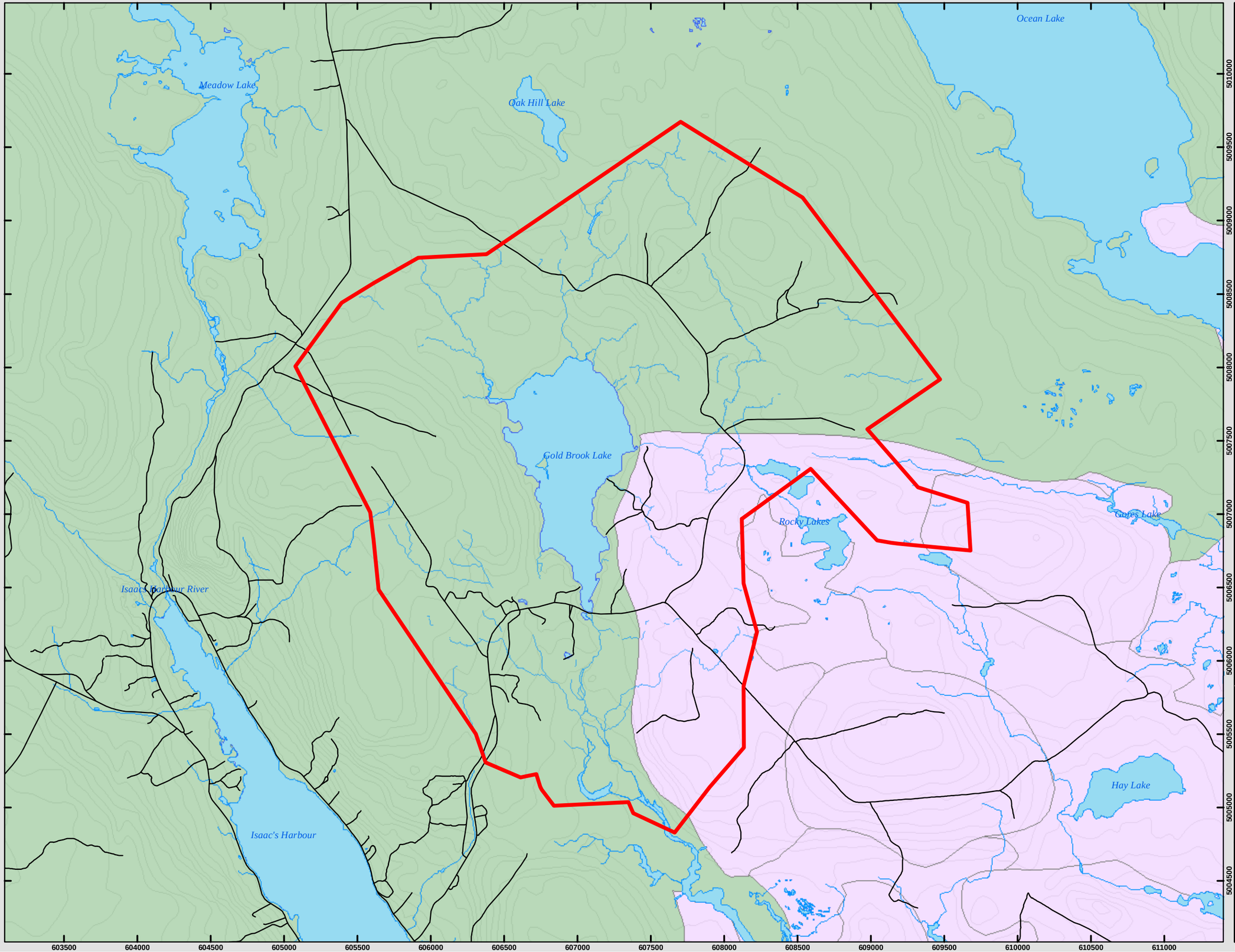
Prepared For:

Anaconda Mining

FIGURE 1

Ecodistricts within EARD Project Area

Goldboro, NS



Ecodistricts

- Eastern Interior
- Eastern Shore
- EARD Project Area

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

0 250 500 1,000 m

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

Drawn By: JG
Reviewed By: LP
Date: 2022-03-02

McCallum Environmental Ltd.

Document Name: 220117_Figure_1_Ecoregions

Prepared For:

Anaconda Mining

FIGURE 2

Upland and Wetland Vegetation Types

Goldboro, NS

Roads (NSTDB)
Watercourses (NSTDB)
Waterbodies (NSTDB)
Wetland Vegetation Types
Upland Vegetation Types
Wetlands outside PA (NSECC)
EARD Project Area

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

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1:19,000 Scale when printed @ 11" x 17"

Drawn By: JG
Reviewed By: LP
Date: 2022-03-02

McCallum Environmental Ltd.

Document Name: 220117_Figure_2_Vegetation Groups

Oak Hill Lake
Gold Brook Lake
Rocky Lakes
Isaacs Harbour River

5009500
5009000
5008500
5008000
5007500
5007000
5006500
5006000
5005500
5005000

604000 604500 605000 605500 606000 606500 607000 607500 608000 608500 609000 609500 610000 610500

Prepared For:

Anaconda Mining

FIGURE 3

Upland Vegetation Groups

Goldboro, NS

Upland Vegetation Groups

- Coastal Forest Group (CO)
- Mixedwood Forest Group (MW)
- Shrubland and Barren Group (S)
- Spruce-Hemlock Forest Group (SH)
- Spruce-Pine Forest Group (SP)
- Cutover
- Roads (NSTDB)
- Watercourses (NSTDB)
- Wetland Vegetation Types
- Waterbodies (NSTDB)
- EARD Project Area

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

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1:19,000 Scale when printed @ 11" x 17"

Drawn By: JG
Reviewed By: LP
Date: 2022-03-02

McCallum Environmental Ltd.

Document Name: 220117_Figure_2_Vegetation Groups overview

Oak Hill Lake
Gold Brook Lake
Rocky Lakes
Isaacs Harbour River
Isaac's Harbour

5009500 5009000 5008500 5008000 5007500 5007000 5006500 5006000 5005500 5005000

604000 604500 605000 605500 606000 606500 607000 607500 608000 608500 609000 609500 610000 610500

Prepared For:

Anaconda Mining

FIGURE 4

Wetland Vegetation Groups

Goldboro, NS

Wetland Vegetation Groups

- Marsh Group (MG)
- Peatland Group (PG)
- Wet Coniferous Forest Group (WC)
- Wet Deciduous Forest Group (WD)
- Cutover
- Roads (NSTDB)
- Watercourses (NSTDB)
- Waterbodies (NSTDB)
- Upland Vegetation Types
- Wetlands outside PA (NSECC)
- EARD Project Area

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

0 250 500 1,000 m

1:19,000 Scale when printed @ 11" x 17"

Drawn By: JG
Reviewed By: LP
Date: 2022-03-02

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Document Name: 220117_Figure_4_Vegetation Groups overview Wetlands

Prepared For:

Anaconda Mining

FIGURE 5A

Vegetation Types

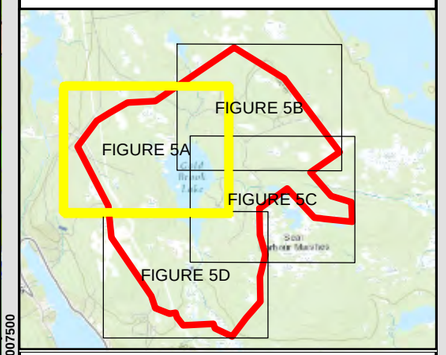
Goldboro, NS

Wetland Vegetation Group

- Peatland Group (PG)
- Forested Wetland (WC, WD)
- Cutover (Wetland)

Upland Vegetation Groups

- Coastal Forest Group (CO)
- Mixedwood Forest Group
- Shrubland and Barren Group (S)
- Spruce-Pine Forest Group (SP)
- Spruce-Hemlock Forest Group (SH)
- Cutover (upland)
- Roads (NSTDB)
- Waterbodies (NSTDB)
- EARD Project Area



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Units: Meter

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Drawn By: JG
Reviewed By: LP
Date: 2022-03-02

McCallum Environmental Ltd.

Document Name: 220117_Figure_5_Hab types

605000 605500 606000 606500 607000 607500

5009000 5008500 5008000 5007500 5007000

Prepared For:

Anaconda Mining

FIGURE 5B

Vegetation Types

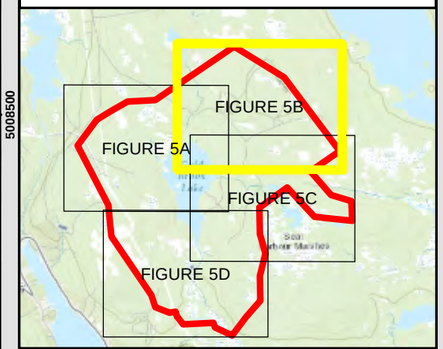
Goldboro, NS

Wetland Vegetation Groups

- Peatland Group (PG)
- Forested Wetland (WC, WD)
- Cutover (Wetland)

Upland Vegetation Groups

- Mixedwood Forest Group
- Shrubland and Barren Group (S)
- Spruce-Pine Forest Group (SP)
- Spruce-Hemlock Forest Group (SH)
- Cutover (upland)
- Roads (NSTDB)
- Waterbodies (NSTDB)
- EARD Project Area



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Reviewed By: LP
Date: 2022-03-02

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Prepared For:

Anaconda Mining

FIGURE 5C

Vegetation Types

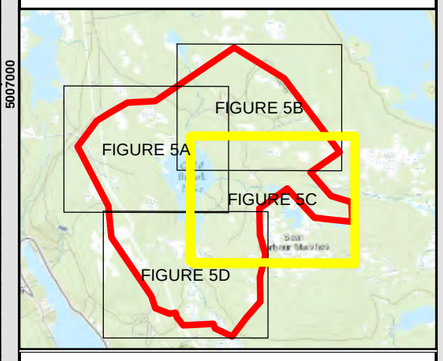
Goldboro, NS

Wetland Vegetation Groups

- Marsh Group (MG)
- Peatland Group (PG)
- Forested Wetland (WC, WD)
- Cutover (Wetland)

Upland Vegetation Groups

- Coastal Forest Group (CO)
- Mixedwood Forest Group
- Shrubland and Barren Group (S)
- Spruce-Pine Forest Group (SP)
- Spruce-Hemlock Forest Group (SH)
- Cutover (upland)
- Roads (NSTDB)
- Waterbodies (NSTDB)
- EARD Project Area



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Document Name: 220117_Figure_5_Hab types

Prepared For:

Anaconda Mining

FIGURE 5D

Vegetation Types

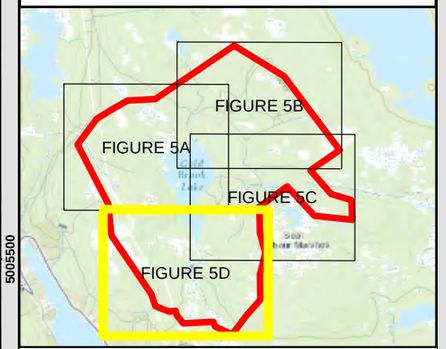
Goldboro, NS

Wetland Vegetation Groups

- Marsh Group (MG)
- Peatland Group (PG)
- Forested Wetland (WC, WD)
- Cutover (Wetland)

Upland Vegetation Groups

- Coastal Forest Group (CO)
- Mixedwood Forest Group
- Shrubland and Barren Group (S)
- Spruce-Pine Forest Group (SP)
- Spruce-Hemlock Forest Group (SH)
- Cutover (upland)
- Roads (NSTDB)
- Waterbodies (NSTDB)
- EARD Project Area



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Drawn By: JG
Reviewed By: LP
Date: 2022-03-02

McCallum Environmental Ltd.

Document Name: 220117_Figure_5_Hab types

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APPENDIX B. PROJECT TEAM MEMBERS' *CURRICULUM VITAE*

McCallum Environmental Ltd.

John R Gallop, B.Sc. P. Biol
john@mccallumenvironmental.com

Years in Practice
8

Education
B.Sc. (Honours, Biology), Waterloo University, 2008-2011.

Designations
A professional Biologist (P.Biol) with the Alberta Society of Professional Biologists (ASPB)

Training
- Old Growth Forest Lichens and Allied Fungi, with a Focus on Calicioid Lichens
- Common Lichens of North East North America
- Alberta Wetlands: From Classification to Policy by Aquality Environmental Consulting
- Saint John Ambulance Standard First Aid, AED, CPR(C), 2021

Summary

Mr. Gallop has been in the environmental consulting profession since 2014. He has worked on both project related and research related field assessments in Nova Scotia, Alberta and Saskatchewan and is a proficient wetland and flora (vascular plants and lichens) surveyor.

Mr. Gallop is responsible for completing biophysical assessments, including flora (vascular and non-vascular plants and lichens) and fauna surveys, aquatic surveys (wetlands, watercourses and fish surveys), avian surveys, and species at risk evaluations, primarily for clients in the energy sector, mining sector, and commercial development sector. Mr. Gallop has been responsible for the implementation of several environmental baseline programs for mining, quarry development and energy development projects in Nova Scotia and Saskatchewan in advance of environmental assessment registration.

Mr. Gallop is the leading lichen surveyor for McCallum Environmental and has been conducting rare lichen and biodiversity surveys for four years around the Atlantic provinces. When John isn't working, he is generally found in the Nova Scotia landscape collecting and identifying vascular flora, lichens and bryophytes. He is also the founder and administrator of the *Lichens of Atlantic Canada* citizen science project which documents lichen diversity and distribution throughout the Atlantic provinces.

Selected Project Experience

- Lead author on the first proposed blue felt lichen (*Pectenia plumbea*) translocation plan for Nova Scotia. Lead author on several Species at Risk (SAR) lichen monitoring plans for proposed gold mines and highway developments across Nova Scotia.
- Five years experience surveying rare lichens and lichen diversity for industry and not for profit organizations.
- Seven years of experience delineating wetlands throughout Atlantic Canada and Western Canada.
- Responsible for predictive wetland and watercourse mapping for large scale projects.
- Completion of environmental baseline surveys for the federal environmental assessment process for proposed development of several gold mine projects in eastern Nova Scotia in 2016 - 2018 in Nova Scotia
    - Lichen surveys
    - Rare plant surveys
    - Wetland delineation and functional assessment
    - Fish habitat surveys and electrofishing
    - Wildlife surveys
    - Avian surveys

McCallum Environmental Ltd.

John R Gallop, B.Sc. P. Biol
john@mccallumenvironmental.com

Experience

McCallum Environmental Ltd., Halifax, Nova Scotia

Environmental Scientist:

April 2016-Present

- Completing biophysical assessments, including flora (vascular plants and lichens) and fauna surveys, with emphasis on species at risk. Completing wetland and watercourse delineations and assessments and coordinating migratory bird monitoring. Communicating field survey results and methodologies for Environmental Assessments and other Provincial regulatory applications.

Basin Environmental Ltd., - Edmonton, Alberta.

Environmental Technologist

September 2014 – February 2016.

- Utilized the Alberta Wetland Classification system to assess wetlands and the Wetland Rapid Evaluation Tool to determine compensation required for impacts to classified wetlands.
- Aerially interpreted and delineated wetlands.
- Conducted species at risk background searches and field visits.
- Conducted pre-disturbance assessments for oil and gas activities, road improvements and residential developments, including: watercourses/waterbodies, soil profiling, vegetation, wildlife, eco-sites and timber volumes.
- Prepared reports for a variety of assessments, including: wetlands, pre-disturbance, bio-physicals, fish habitats for access road watercourse crossings, EAP/EFR supplements and applications.
- Monitored the water quality of horizontal directional drilling on fish bearing permanent watercourses.
- Assisted surveyors and construction engineers on-site in the design of oil and gas well leases and facilities, pipelines and access roads to ensure compliance with EAP Standards and Guidelines.

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John R Gallop, B.Sc. P. Biol
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Publications

- Troy McMullin, Frances Anderson, Harold Clapp, Jacqueline Edwards, John Gallop, Tom Neily, Chris Pepper, Matthew Smith, Brad Toms and Niels van Miltenberg. *Results from a rare Lichen Survey at Kejimkujik Seaside National Park in Nova Scotia, Canada.* 2019. Parks Canada.

Affiliations

- Administrator and founder of the *Lichens of Atlantic Canada* INaturalist citizen science project. This project consists of over 73 observers who share their lichen findings across Atlantic Canada. Professional ecologists, lichenologists and enthusiasts alike, peer review findings and offer advice on identifying and expanding the understanding on lichen diversity and distribution throughout Atlantic Canada. In total, 381 species have been recorded throughout the Atlantic provinces with just under 5000 species observations.
- Administrator and founder of the *Grasses of Atlantic Canada* citizen science project. This project entails over 50 observers who share their findings throughout Atlantic Canada. The purpose of this project is to document grass species though out Atlantic Canada and were professionals and enthusiasts can discuss identification techniques. The goal is to hopefully increase interests in this often intimidating taxa.
- Designated as a Professional Biologist (P.Biol) in good standing affiliated with the Alberta Society of Professional Biologists (ASPB)

Project Work

- *Wellington Connector Road* – Lead ecologist responsible for rare vascular flora and lichen surveys to support the Environmental Assessment (EA) approval process. Lead author and first ecologist in Nova Scotia to translocate blue felt lichen.
- *Fifteen Mile Stream Gold Mine* – Rare lichen and vascular flora surveys, wetland delineation/functional assessments, watercourse assessments, EIS reporting.
- *Beaver Dam Haul Road* – Development of a SAR Lichen monitoring plan (currently in draft) which involves over 50 proposed lichen monitoring stations throughout a 5-year monitoring period. The lichen monitoring plan also proposes the translocation

John R Gallop, B.Sc. P. Biol
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for multiple blue felt lichen occurrences. Other surveys on this project include rare lichen and vascular flora surveys, wetland delineation/ functional assessments, watercourse assessments, spring migration.

- *Touquoy Gold Mine* – Conducted rare plant, lichens and habitat surveys within the study area. Lead author of a lichen monitoring plan (draft) which is planned to occur for the life of the project.
- *Cochrane Hill Mine Site* - Rare lichen and vascular flora surveys, wetland delineation/ functional assessments, watercourse assessments, spring migration and EIS reporting.
- *Gillis Quarry Expansion Project* – Rare lichen (including Boreal Felt Lichen ('BFL') surveys) and vascular flora surveys, wetland delineation/ functional assessments, watercourse assessments and spring migration.
- *Scozinc Mine Site* – Rare lichen and vascular flora surveys, wetland delineation/ functional assessments, watercourse assessments, and breeding bird surveys.
- *Wellington Connector Road* - Rare lichen (includes BFL surveys) and vascular flora surveys, wetland delineation/ functional assessments and watercourse assessments.
- *Kejimkujik Seaside National Park Surveys* – Rare lichen surveys with Dr. Troy McMullin at the Kejimkujik Seaside National Park
- *Round Bay Rare Lichen Surveys* -Rare Lichen surveys with Frances Anderson and Tom Neily (local lichen experts) on an NCC property in Shelburne County.

Related Course Work

Old Growth Forests Lichens and Allied Fungi with a Focus on Calicioid Lichens, Eagle Hill Institute – A weeklong course hosted at the Eagle Hill Institute located at Steuben, Maine, US. This course was taught by leading lichenologists: Dr. Troy McMullin (Research Scientist in Lichenology at the Canadian Museum of Nature in Ottawa) and Dr. Steven Selva (Professor Emeritus in Biology and Environmental Studies at University of Maine). Course topics include:

- Morphological and anatomical characteristics important for lichen identification including instructions on microscopy
- The use of chemical spot tests and thin-layer Chromatography (TLC)
- Introduction of lichen habitat and microhabitats
- A review of calicioid lichen morphology and systematics
- Several field trips within Maine targeting old growth forest lichen communities which involved the collection, identification and processing of collected specimens

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Common Lichens of North Eastern America – An introductory one day lichen course taught by lichen expert Frances Anderson. This course had emphasis on foliose and fruticose macro lichens which involved a tutorial on conducting chemical spot tests, using field keys and collecting specimens in the field.

McCallum Environmental Ltd.

Emma Halupka MSc.
EHalupka@mccallumenvironmental.co

Years in Practice
3

Education

M.Sc. Ecological Restoration, 2017-2019
Simon Fraser University & BC Institute of Technology

B.Sc. Hons. Environmental Science, 2011-2015
Dalhousie University

Training

- St John's Ambulance, Wilderness First Aid level 3. (2019)
- ATV Training Course (2019)
- Pleasure Craft Operator Card
- WHMIS (GHS) Training (2019)
- Cornell Lab of Ornithology: Duck & Waterfowl Identification certificate (2021)
- Class 2 Electrofishing Recertification (2017)
- Turtle handling, care, and incubation.

Summary

Emma is an environmental professional with a wide range of skills in tree and vegetation surveys, habitat restoration, and species at risk conservation planning. She has a background in non-profit work, designing restoration strategies for birds and reptiles, and working with the public to organize citizen science projects and promote environmental stewardship. Emma studied Ecological Restoration in graduate school, with a focus in forest restoration. She has a wide variety of field work experience and understands the different biotic and abiotic ecological components required to support wildlife populations.

Selected Project Experience

- **Haliburton Habitat Health Check-up Program.**

  Developed an assessment and mentorship program to help private landowners improve the quality of wildlife habitat on their properties.

- **Deas Island Regional Park wetland construction: A habitat enhancement plan**
  Worked with a team to produce a technical restoration report completed in conjunction with BCIT and Metro Vancouver Regional Parks.

- **Restoring habitat heterogeneity to former floodplain farmland: Wetland construction at Colony Farm Regional Park, Coquitlam, B.C.**
  Produced technical restoration plan with a team at BCIT

- **Restoring Old-Growth Attributes: Quantifying physical attributes in two CWHdm site series in the Fraser Valley, British Columbia**
  MSc applied research project in partnership with UBC's Malcolm Knapp Research Forest and BC Parks. Conducted a literature review, methods design, data collection and analysis, and report with forest management recommendations.

McCallum Environmental Ltd.

Emma Halupka MSc.
EHalupka@mccallumenvironmental.co

Experience

McCallum Environmental Ltd. Halifax, NS.
Junior Environmental Scientist
April 2021-Present.

- Wetland delineation and functional assessments
- Flow monitoring in freshwater streams
- Electrofishing, fish rescues, and fish habitat assessments.

The Land Between Charity. Haliburton, ON.
Project Manager and Conservation Technician
November 2019 – October 2020.

- Helped to develop and implement regional conservation strategies for species at risk in Central Ontario, especially birds and turtles. Projects included citizen science programs, public educational events, field work, webinars, and direct population recovery.
- Managed partnerships with Birds Canada, the Kawartha Land Trust, Couchiching Conservancy, post-secondary researchers, and volunteers.
- Led educational tours and presentations for kids and the general public.
- Encouraged local stewardship by developing a Habitat Health Check-up program to help interested landowners manage their property in an ecologically-friendly manner.

Toronto and Region Conservation Authority. Vaughn, ON.
Restoration Field Crew
September 2019 – November 2019.

- Worked with a field crew to implement restoration initiatives on the ground throughout the Rouge, Humber, and Don River watersheds.
- Followed moisture and nutrient codes to plant a range of native vascular plants in appropriate microsites.
- Gained an understanding of native species and ecosystems in Southern Ontario and the challenges of ecological work in urban areas.

Alberta Biodiversity Monitoring Institute. Lac La Biche, AB.
Vegetation Field Technician
May 2019 – August 2019

- Followed government-issued protocols to establish plots and track biodiversity in remote sites across Northern Alberta.
- Assessed vascular plant coverage, moss and lichen diversity, measured trees, and collected soil cores within one-hectare plots.
- Navigated to sites via helicopter, truck, and ATV, and navigated to remote locations using GPS units. Set up plots using compass and measuring tape.
- Practiced in-lab taxonomic classification for several bryophyte genera and species.

Emma Posluns, MSc.
emma@mccallumenvironmental.com

Years in Practice
6

Education

B.Sc. (Geography), University of Victoria, 2005-2009.

M.Sc. (Environmental Science), Memorial University of Newfoundland and Labrador, 2010-2013.

Training

- Gender Based Analysis+ Training, 2020
- Watercourse Identification, 2019
- Technical Writing, 2019
- Backpack Electrofishing Certification, 2018
- At-Risk Landbird Identification Workshop, 2018
- Saint John Ambulance Standard First Aid, AED, CPR(C), 2017
- Wildlife Awareness training – 2015
- W.H.M.I.S – 2015
- Geographic Information System (GIS) Training, ESRI – 2013
- Facilitation Skills for Technical Professionals, Dalhousie University – 2017

Summary

Ms. Posluns has been in the environmental consulting profession since 2015. She has worked on both project related and research related field assessments in Nova Scotia.

Ms. Posluns is responsible for completing biophysical assessments, including species at risk assessments, wetland delineation, characterization, and functional assessment, flora and fauna surveys, avian surveys, aquatic surveys, and wetland monitoring. She coordinates the dissemination and organization of biophysical spatial data for projects within Nova Scotia. Ms. Posluns has been responsible for the management of field data for multiple, large-scale initiatives in Nova Scotia, including a provincial infrastructure project and multiple mining developments.

Selected Project Experience

- Identified and analyzed environmental constraints based on GIS spatial files, to inform project activities.
- Responsible for technical writing for multiple federal and provincial level Environmental Assessments.
- Conducted species at risk searches, migratory bird surveys, and winter wildlife assessments for federal and provincial infrastructure projects.
- Coordinated spatial data organization, performed GIS analysis, and created dynamic maps for a variety of projects.
- Lead wetland delineation programs, conducted functional wetland assessments, completed watercourse identification and vegetation assessments for multiple large-scale developments in Nova Scotia.
- Trained incoming staff in the use of provincially recognized wetland functional assessment tool, WESP-AC.

Experience

McCallum Environmental Ltd., Halifax, Nova Scotia

Environmental Scientist:
June 2017-Present

- Leading wetland and watercourse delineations and functional assessments and coordinating data management and Geographical Information Systems (GIS).
- Completing avian surveys and other biophysical assessments, with emphasis on species at risk.
- Communicating field survey results and methodologies for federal and provincial Environmental Assessments and provincial regulatory applications.
- Preparing Phase 1 Environmental Site Assessments.

Emma Posluns, MSc.
emma@mccallumenvironmental.com

CBCL LTD., Halifax, Nova Scotia
Environmental Scientist
September 2015 – April 2017.

- Completed migratory bird point count surveys and nocturnal owl surveys, while efficiently and effectively following protocols.
- Created GIS maps for over 20 projects, including six 100-page map books, effectively visualizing contaminated sites, ecologically sensitive habitats, and urban development.
- Aerially interpreted and delineated wetlands.
- Conducted species at risk background searches and field visits.
- Prepared reports for a variety of assessments, including permit applications and Environmental Management Plans.
- Assisted with marine water quality sampling.

OceanCanada Partnership, Halifax, Nova Scotia
Environmental Scientist
September 2015 – April 2017.

- Facilitated community meetings and provided expertise to help a group with local area development planning.
- Conducted interviews and community-wide surveys of a rural fishing village to create a database of local assets.
- Summarized findings of community assets into an accessible written document.
- Lead a marine-monitoring program in an ecologically sensitive bay, coordinating 15 volunteers in fieldwork, identifying and assessing eelgrass health and distribution, sample collection, and data entry.
- Investigated social, ecological, and economic changes within coastal communities to make suggestions on future development.

Saint Mary's University, Halifax, Nova Scotia
Professor of Geography
August 2015 – April 2016.

- Explained technical environmental information clearly and concisely to Canadian and International students, ensuring all students had a supportive learning atmosphere.
- Designed new course material that engaged students and enhanced their learning experience.
- Worked with students one-on-one to solve conflicts.

Regional District of North Okanagan, Vernon, British Columbia
Water Sustainability Coordinator
2013 – 2014.

- Worked under the BC Water Act and maintained a comprehensive understanding of provincial and local policy, regulations, and bylaws.
- Compiled and analysed large datasets, assessing trends, and informing local policy.
- Effectively communicated with team members.

Meaghan Quanz, B.Sc. M. Env. Studies
meaghan.q@mccallumenvironmental.com

Years in Practice
2

Education
Master of Environmental Studies, *Dalhousie University,* 2019

B.Sc. Major in Ecology, *University of Waterloo,* 2016

Diploma in Ecological Restoration and Rehabilitation *University of Waterloo,* 2016

Training
- Standard First Aid AED CPR "C", Red Cross, Jan. 2020
- WHMIS, CCOHS, Jan. 2020
- Pleasure Craft Operator, Jan. 2014

Experience

Ms. Meaghan Quanz has been in the environmental consulting profession since January 2020, after completing a master's degree in Environmental Studies in 2019. She primarily performs environmental monitoring for a variety of large and small-scale development, construction and exploration initiatives, as well as project related field assessments across Nova Scotia, Canada.

Ms. Quanz has worked as a research assistant on projects throughout Ontario and Alberta. Ms. Quanz has conducted surveys including; wetland flora surveys, groundwater and surface water chemistry, aquatic macroinvertebrate surveys, and carbon flux monitoring.

McCallum Environmental Ltd., Halifax, NS
Junior Environmental Scientist
January 2020 - Present
- Environmental monitoring of resource exploration programs and construction projects
  - Regulatory advising, spill response, erosion/sediment control, wildlife monitoring, water quality monitoring, and reporting on construction activity.
- Report writing
  - Monitoring reports, Crown Land use applications, wetland alteration applications, water withdrawal applications
- Conducted fauna surveys, winter wildlife surveys, water quality sampling and surface water flow sampling
- Delineated wetlands, conducted functional wetland assessments, completed watercourse identification and vegetation assessments for multiple developments in Nova Scotia
- Utilization of the WESP-AC wetland functional assessment tool in 5 wetlands across Nova Scotia in support of regulatory wetland alteration permitting, provincial and federal environmental assessment and wetland monitoring (2020 – 2021)

Dalhousie University, Halifax, NS
Thesis Research
2017-2019
- Collected sediment, surface water and dragonfly larvae tissue from wetlands surrounding a wastewater treatment facility for analysis of select contaminants

- Followed the CABIN Wetland protocol to analyze wetland macroinvertebrate communities
- Analyzed data in Minitab® and RStudio® and created graphs of the data in SigmaPlot®

University of Waterloo, Waterloo, ON
Research Assistant
2013- 2015

- Involved in projects centered around wetland restoration and creation in the oil sands regions of Fort McMurray, Alberta, and river geochemistry in Waterloo Region, Ontario
- Completed upland vegetation surveys, natural saline fen vegetation surveys, groundwater chemistry and transect vegetation surveys
- Conducted daily transect data collection on soil moisture, ground temperature, frost depth and water table height, as well as monthly leaf area index collection at the Suncor fen creation site and surrounding reference wetlands
- Collected and tested surface water and groundwater samples for parameters such as phosphorus, nitrate, and dissolved gases, and studying changes due to anthropogenic influences

Exp, Brampton, ON
Environmental Scientist
2015

- Sampled various media, including water and sediment, for Phase I and II environmental assessment projects in the Greater Toronto Area
- Input data and completed writing for sections of final reports

McCallum Environmental Ltd.

Meghan Milloy, BSc. (Bio), MES
meghan@mccallumenvironmental.com
Vice President

Years in Practice
21

Certifications

Nova Scotia Advanced Wetlands Delineator and Evaluator

Memberships

Nova Scotia Wetlands Delineation, Maritime College of Forest Technology

Education

- Master in Environmental Studies (MES), York University, Toronto, Ontario, 1997-1999
- BSc. (Biology), Dalhousie University, 1992-1997
- BA (Political Science), Honours, Dalhousie University, 1992-1997

Training

- Wetland Construction: Principles, Planning and Design, Rutgers, 2016
- Wetland Functional Assessment Training Workshop, NSE 2013
- Urban Wetland Restoration: A Watershed Approach, 2012
- Nova Scotia Advanced Wetlands Delineation and Evaluation Course, 2009;
- Water Management and Wetland Restoration Training Course, 2009;
- Identifying and Delineating Wetlands for Nova Scotia, 2008
- Saint John Ambulance Standard First Aid, AED, CPR(C). 2013

Summary

Ms. Milloy oversees, manages, and executes regulatory and environmental projects. She provides project management for Federal and provincial environmental assessment processes and is an experienced EA practitioner. She manages and completes environmental baseline surveys including habitat surveys, species at risk and wildlife surveys, botany and bird surveys, wetland and watercourse delineations, characterizations and functional assessment, fish habitat evaluation, HADD authorizations, and bat hibernacula identification. Ms. Milloy also completes watershed evaluations, and guides clients through the environmental and permitting stages of mining, industrial, alternative energy, and development projects.

Ms. Milloy supports clients through provincial and federal environmental assessment requirements and supports project teams to identify and evaluate project environmental risk. Ms. Milloy has completed several Federal and Provincial environmental assessment registration documents in the past two years and is currently preparing two Impact Assessment Agency of Canada (IAAC) environmental impact statements (EIS) for two mining projects in Nova Scotia. Ms. Milloy consults regularly with federal and provincial regulatory agencies, First Nation communities and local landowners and stakeholder groups.

Ms. Milloy regularly completes applications for wetland, watercourse alteration and HADD authorizations across Atlantic Canada, and has developed and implemented wetland compensation programs, fish habitat offsetting projects, and wetland and fish habitat restoration projects. Ms. Milloy is a trained wetland evaluator, biologist, and restoration professional. Ms. Milloy regularly implements species at risk, habitat and biodiversity mitigation planning, permitting, monitoring plans and offsetting.

Project Experience

- Project Manager and Team Lead for two Environmental Impact Statements (EIS) for submission to the Impact Assessment Agency of Canada (IAAC) (2017-2021).
- Biophysical Lead for Nova Scotia Environmental Assessment Registration Document (EARD) for a gold mining project in Nova Scotia, with planned submission in 2021.
- Provision of biophysical project management and coordination of field surveys to support the IAAC environmental assessment process for three proposed mining projects in Nova Scotia (2014-current).
- Completion of biophysical field surveys to support expansion efforts for several mines in Nova Scotia (2014-2017) and aggregate quarries (2017-2020) to meet requirements under the provincial environmental assessment process.
- Completion of provincial environmental assessments for multiple quarry expansions in Nova Scotia (2016-2020).
- Completion of environmental baseline surveys for the provincial environmental assessment process for a proposed re-development of a gold mine in eastern Nova Scotia in 2013.
- Completion of four provincial environmental assessments for community wind projects in Nova Scotia from 2013-2018.

Meghan Milloy, BSc. (Bio), MES
meghan@mccallumenvironmental.com
Vice President

- Watershed evaluation for wetlands and watercourses at a 500 hectares golf and residential development and associated wetland alteration permitting, compensation planning, wetland restoration activities, and enhancement of several wetlands to increase functionality.
- Surface water assessment and functional assessment, wetland permitting, watercourse permitting, and compensation planning and implementation at an 18 hole golf course and residential development along the south shore of Nova Scotia in 2014. Provision of environmental project management and regulatory lead role for the Project.
- Completed the Provincial Environmental Assessment for the 80 MW Glen Dhu South Wind Power Project, Nova Scotia, for Shear Wind Inc.
- Project Management of regulatory permitting and environmental assessments for a 50 MW Wind Power Project in Nova Scotia for Sprott Power Corp.
- Evaluation of the Musquodoboit River Watershed for wetland restoration opportunities (GIS based and ecology/field based study).
- Evaluation of the Sackville River Watershed for wetland restoration opportunities (GIS based and ecology/field based study).
- Completion of 35-45 projects involving watershed evaluation, land use classification, wetland delineation and alteration and infill, and compensation planning for numerous residential and commercial large-scale developments across Nova Scotia and New Brunswick.

Work Experience

McCallum Environmental Ltd., Nova Scotia, 2010-Present

Vice President/Senior Project Manager - Provides project management expertise for site and/or route selection, constraints mapping, regulatory consultation, environmental assessments, environmental baseline surveys, wetland alteration and restoration planning, environmental protection plan development, regulatory applications, construction monitoring, and reclamation for small and large scale industrial projects. Other responsibilities include marketing, budget management, report preparation and client service.

Strum Environmental Services Ltd., Nova Scotia 2000-2010

Project Manager- From 2000- 2010, provided project management expertise for development clients across Atlantic Canada. Projects included environmental assessment, large scale commercial and residential developments, wetland alteration projects, wetland compensation planning and implementation, wetland restoration and creation projects, phased site assessments, and risk assessment and management.

Environmental Sciences Group, Kingston, ON 1998

Environmental Scientist- in 1998, provided contaminant and project management expertise to Department of National Defense in the Canadian Arctic in support of remediation of several remote military sites. Identified areas required for remediation and completed associated boundary soil and sediment confirmatory sampling and analysis.