

# **APPENDIX B**

## WETLANDS ASSESSMENT



## **Biophysical Survey Report**

### **Wellington Connector Road**

Location: Wellington, Nova Scotia

Proponent: WOOD

50 Troop Avenue, Unit 300

Dartmouth, NS

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Report Prepared by:

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Date: October 14, 2018

## EXECUTIVE SUMMARY

McCallum Environmental Ltd. was retained by WOOD to complete vascular plant, lichen and wetland surveys in September 2018. This biophysical study was completed in support of registering a provincial Environmental Assessment (EA) for the proposed Wellington connector road by the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR). The Study encompasses a general review of desktop resources, and the completion of a field assessment to identify existing biophysical conditions (i.e. vascular plants, lichens and wetlands) to determine potential environmental constraints and sensitivities occurring within, and in close proximity to the Study Area.

Two hundred and fifteen vascular plant species were observed throughout the Study Area including a species of conservation interest - *Agalinis neoscotica* (S3S4). In addition, fifty-five lichen species were documented, five of which are of conservation interest and include: *Degelia plumbea* (SAR Special Concern, NSESA Vulnerable, S3), *Heterodermia neglecta* (S3S4), *Leptogium subtile* (S3), *Coccocarpia palmicola* (S3S4) and *Collema nigrescens* (S3).

Thirty-eight wetlands were observed and delineated within the Study Area. No wetlands observed comprised of suitable fish habitat. The wetlands identified within the Study Area consisted of 33 swamps, two fens, one bog and two bog-swamp complexes for a total of 38 wetlands within the Study Area.

Throughout all the wetlands assessed in the Study Area, functional analysis indicates, in general, that Nitrate Removal & Retention and Pollinator Habitat are the most significant functions provided by the wetlands.

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## 1.0 INTRODUCTION

The Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) has proposed a connector road between Highway 102 Aerotech Interchange (Exit 5A) and Trunk 2 at Wellington within the Halifax Regional Municipality (Figure 1, Appendix A).

McCallum Environmental Ltd. ('MEL') was retained by WOOD in September 2018, to support with baseline studies and assisting in the completion of an Environmental Assessment (EA) Registration document. The surveys have been completed to identify the baseline biophysical conditions existing within the Study Area (Figure 1, Appendix A). This was achieved by completing a review of background desktop resources in combination with field studies to identify potential environmental constraints and sensitivities.

This report outlines the methods and results of the biophysical assessments completed within the Study Area by MEL. The following sections describe the methods and results for each assessment completed. The report concludes with a summary of the study findings.

### 1.1 Biophysical Assessments

The field components of the study were surveyed September 11<sup>th</sup> – 24<sup>th</sup>, 2018 to supplement surveys conducted by WOOD in Spring/Summer of 2018 and Dr. Nick Hill and Envirosphere earlier in 2014. Studies performed were completed in accordance with the requirements of a *Class I* undertaking under Section 9(1) of the Nova Scotia Environmental Assessment Regulations. These studies were focused on highlighting the ecological linkages within the Study Area, as well as with the habitats surrounding the Study Area. The field surveys conducted by MEL included:

1. Vascular Plant Surveys;
2. Lichen Surveys;
3. Wetland Evaluations

Vascular plant and lichen surveys were completed by field ecologist John R. Gallop (BSc.) and wetland assessments were conducted by wetland delineator Louis Charron (MSc.). Field staff CVs are provided in Appendix B. Appendix D includes a photograph log of representative photos from field surveys.

### 1.2 Priority Species

Assessment of wildlife, vegetation, and habitat was completed based on the requirements outlined in the Nova Scotia Environment (NSE) *Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSE September 2009). A Priority Species list was generated in accordance with this guide. This list was used throughout the biophysical assessments to inform the field programs as it identified a broad list of species which have the potential to be present within the Study Area. The desktop priority list was based on general species habitat requirements and the broad geographic area that individual species are known to occur.

Development of a priority list of species for each taxonomic group 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 the *Federal Species-at Risk Act* (SARA 2002). All species listed as Endangered, Threatened, or of Special Concern;
- 2) *Nova Scotia Endangered Species Act* (NSESA 1999). All species listed as Endangered, Threatened, or Vulnerable; and,
- 3) Conservation Rank: All species designated as S1, S2 or S3 or any combination thereof (i.e. S3S4 is considered a Priority Species) as defined by the Atlantic Canadian Conservation Data Centre (ACCDC).
- 4) The vascular plant list found in the *Vascular Plant Survey and Identification of Wetland Areas at Wellington Station* report written and surveyed by Dr. Nick Hill, 2014 was referenced.

Collectively, this group of species is known as Priority Species. This umbrella grouping includes species of conservation interest (SOC) that are not listed species under provincial or federal legislation (such as COSEWIC species and ACCDC S1, S2 and S3 species or any combination thereof), and Species at Risk (SAR) which are listed on SARA or NSESA.

### 1.3 Study Area

The Study Area is located between Highway 102 Aerotech Interchange (Exit 5A) and Trunk 2 at Wellington within the Halifax Regional Municipality. The Study Area is located approximately 2 km southwest of the Halifax Stanfield International Airport. The closest community to the Study Area is Wellington.

The Study Area is approximately 5.5 km in length by 600m wide and comprises an area of 334 hectares. The Study Area consists of primarily mature mixedwood stands as well as residential areas, clear cuts, dirt roads, ATV trails and transmission corridors.

The Study Area is not located in any protected or conservation areas within federal, provincial, or municipal jurisdiction. The Nova Scotia Provincial Landscape Viewer identified the following:

- Two areas mapped determined to be Significant Habitat for Species at Risk (the Landscape Viewer does not identify what Species at Risk is identified) which are approximately 500 m west, and 10.5km south east of the Study Area in Wellington; and,
- Three protected areas approximately 3.7 km north, 2 km south east and 2 km south west of the Study Area.

The closest NSE Wetland of Special Significance is located approximately 360 m west of the Study Area adjacent to Grand Lake.

### 1.4 Project Team

A project team was assembled for the completion of this study. The team was selected based on level of proficiency in their respective roles. The team members and their individual roles are presented in Table 1.

**Table 1: Project Team**

Team Member	Role
Meghan Milloy, MES	Report Review
Andy Walter, BSc. (Hort)	Senior Project Manager
John Gallop, BSc.	Biologist, Vascular Plant and Lichen Surveyor, Report Writer, GIS Mapping
Louis Charron, MSc.	Biologist, Wetland Delineator, Report Writer, GIS Mapping

*Curriculum Vitae* for the above-mentioned team members are provided in Appendix B.

## 2.0 VEGETATION

### 2.1 Methodology

For the purpose of this study, vascular plant surveys focused on identifying general vegetative communities, with particular focus on identifying Priority Species following the guidance of the *Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSE, Sept 2009). Late botany surveys were completed by John R. Gallop during September 11<sup>th</sup> – 14<sup>th</sup>, 2018 and the list was used to supplement the findings of previous surveys conducted by Dr. Nick Hill in August 2014, which focused on a much smaller Study Area in the eastern extent of the current Study Area. The Priority Species list, associated ACCDC report and Dr. Nick Hill’s plant list from 2014 were consulted before completing botany surveys (ACCDC report is provided in Appendix F).

The biologist walked meandering transects and targeted land features with higher rare plant potential such as tolerant hardwood landscapes (if present), seepages and wetlands. Every wetland within the Study Area was visited and assessed for vascular plant rarities. A general species list was made of vascular plant species observed. In addition to targeting the aforementioned habitats, disturbed habitats such as clearings and road ditches were assessed as a variety of Priority Species can be known to thrive in these habitats (e.g. *Equisetum variegatum*, *Agalinis neoscotica*). All SAR and/or SOCI species observed were georeferenced, counted, photographed, and their habitat was recorded.

### 2.2 Results

The Study Area consists of residential areas, clear cuts, dirt roads, ATV trails, transmission corridors and areas of mature mixedwood stands with bedrock primarily consisting of slate. Soils are typically nutrient poor, and in areas, supporting vegetative communities primarily consisting of ericaceous shrubs, mixedwood and conifer stands. A total of 215 species were identified within the Study Area (see Appendix E for the vascular plant list). One Priority Species - Nova Scotia *Agalinis* (*Agalinis neoscotica*, S3S4), was located at multiple locations across the Study Area and is discussed in further detail in section 2.2.1.

### 2.2.1 SAR/SOCI Vascular Plant Species

Within the Study Area, one vascular priority plant species was observed. Find below a description of the species, number of individuals and locations.

#### Nova Scotia *Agalinis* (*Agalinis neoscotica*)

*Agalinis neoscotica* is a low-lying perennial herbaceous plant belonging to the figwort family (Scrophulariaceae) (Hinds H. R., 2000) and the Atlantic Coastal Plain Flora group (ACPF) (MTRI, 2011). ACPF are unique group of vascular plant species generally associated with the Atlantic Coastal region with a narrow range with its farthest extent reaching from Florida to Nova Scotia (MTRI, 2011). ACCDC has this species listed as Apparently Secure/Vulnerable (S3S4). This species is restricted to linear disturbances (i.e. transmission corridors, trails, road ditches) within the Study Area. Eighteen locations were observed ranging from 1 – 100 individuals, with a total count of 294 individuals. Table 2 provides the locations of this species including observed habitat and individual numbers. Locations of *Agalinis neoscotica* are also provided in Figure 2 (Appendix A).

**Table 2: *Agalinis Neoscotica* Locations (NAD 83 UTM 20)**

Waypoint #	Coordinates	Individual #	Habitat
AN1	0455786 4966818	5	Side of trail
AN2	0455797 4966812	15	Side of trail
AN3	0452811 4967244	16	Side of trail
AN4	0453380 4967734	5	Side of trail
AN5	0453494 4967726	15	Side of road
AN6	0453974 4967740	1	Side of trail
AN7	0454034 4967711	4	Side of trail
AN8	0454002 4967732	4	Side of trail
AN9	0453831 4967767	6	Side of trail
AN10	0453783 4968764	20	Side of trail
AN11	0453750 4967776	10	Side of trail
AN12	0453704 4967784	60	Side of trail
AN13	0453572 4967768	1	Side of trail
AN14	0453426 4967721	6	Side of trail
AN15	0452776 4967467	15	On powerline corridor/bog
AN16	0452745 4967341	1	Side of trail
AN17	04967309 4967309	100	Side of trail
AN18	0452708 4967217	10	Side of trail

## 3.0 LICHENS

### 3.1 Methodology

#### 3.1.1 Desktop Review

Prior to undertaking the field assessment, a detailed desktop review of known lichen observations and potential habitat for rare lichens within the Study Area was conducted. The desktop review process involved four components: a review of the ACCDC database results; a review of Nova Scotia Department

of Natural Resources (NSDNR) predictive habitat mapping for Boreal Felt Lichen (*Erioderma pedicellatum*); a review of the results of habitat mapping; and a review of mapped wetland habitat.

To develop the predictive habitat maps for Boreal Felt Lichen (“BFL”), NSDNR used an algorithm that identifies all forest stands in the provincial forestry database in which Balsam Fir (*Abies balsamea*) is listed as a primary or secondary species, and that occur within 80-metres of a mapped bog or fen. The model further confines the search to only those forest stands located within 30 kilometers of the Atlantic Coast. This database is used to predict areas with a higher potential of locating BFL. This data set was reviewed in advance of field assessment and was uploaded onto the GPS unit prior to conducting the field study. Other habitats identified by the biologist as suitable for rare lichens were surveyed for lichens as well.

### 3.1.2 Field Survey

While the specific habitat requirements of each of priority lichen species varies slightly, many require mature to over-mature forests; stand age is one of the greatest determinants of the presence of many rare epiphytic lichens (i.e. lichens which grow on other plants) (McMullin et al., 2008).

The Study Area consists of residential areas, clear cuts, transmission corridors and areas of mature mixedwood stands. Lichen surveys throughout the Study Area were focused on mature stands, particularly those located within mapped wetlands and predicted BFL habitat, as these habitats have elevated potential for identifying associative priority lichen species.

All suitable habitats within the Study Area were surveyed on September 11<sup>th</sup> – 14<sup>th</sup>, 2018 by John R. Gallop. Mature trees that are appropriate for hosting priority lichen species were visually inspected by focusing on tree trunks, branches and twigs. The following information was collected for any priority lichen species identified during field surveys: site location, date, scientific name, count, size, habitat (host tree and general habitat), location (waypoint in UTM NAD83), height of the specimen, direction that the specimen was facing, along with a photograph and any relevant comments. A general list of common lichens was also recorded with focus on macrolichens (i.e. foliose, fruticose, squamulose). Only visually distinctive incidental microlichen species were recorded.

## 3.2 Results

### 3.2.1 Desktop Review

No rare lichen species were documented within the Study Area by the ACCDC report. However, Blistered Tarpaper Lichen (*Collema nigrescens*, S3) was recorded over 1 km southwest of the Study Area boundary. Thirteen predicted BFL polygons are present within the Study Area and indicated in Figure 2 (Appendix A).

### 3.2.2 Field Surveys

During the field Surveys, 55 lichen species were observed. Five species were determined to be Priority Species including one Species at Risk: Blue Felt Lichen (*Degelia plumbea*) and four SOCI: Fringe Lichen (*Heterodermia neglecta*), Salted Shell Lichen (*Coccocarpia palmicola*), Blistered Tarpaper Lichen (*Collema nigrescens*) and Appressed Jellyskin Lichen (*Leptogium subtile*). No Boreal Felt Lichen

(*Erioderma pedicellatum*) were observed during the survey. Additional information is found in Section 3.2.3.

The lichen community observed within the Study Area consisted of primarily epiphytic species associated with mature conifer and hardwood stands, as well as terricolous and saxicolous lichens usually observed along trails, clearings and open woodlands. Sphagnum dominant swamps with mature Red Maples provided suitable habitat for *Leptogium subtile* and *Degelia plumbea* as well as other species with an affinity towards mature hardwood stands.

Mature conifer swamps were present, however, they primarily consisted of an intermixing of Spruce and Fir, surrounded by disturbances and lacked indicator species (i.e. *Coccocarpia palmicola*) of BFL habitat. For this reason, the majority of the BFL polygons within the Study Area showed low to medium habitat suitability for BFL. However, the northeast portion of the Study Area within the BFL Polygon adjacent to Wetland 3 provided suitable BFL habitat. Habitat was indicated by a mature Balsam Fir swamp, dominated by Balsam Fir covered in *Frullania tamarisci* (a liverwort thought to play a role in BFL development), sphagnum and a fairly open canopy with lichen indicator species such as *Coccocarpia palmicola* as well as other mature canopy indicators (i.e. *Degelia plumbea*) (Environment Canada, 2007). Table 3 below lists the lichens observed during the dedicated surveys.

**Table 3: Observed Lichen Species**

Scientific Name	Common Name	SAR/NSESA	SRank
<i>Coccocarpia palmicola</i>	Salted Shell Lichen		S3S4
<i>Collema nigrescens</i>	Blistered Tarpaper Lichen		S3
<i>Degelia plumbea</i>	Blue Felt Lichen	SAR: Special Concern; NSESA: Vulnerable	S3
<i>Heterodermia neglecta</i>	Fringe Lichen		S3S4
<i>Leptogium subtile</i>	Appressed Jellyskin Lichen		S3
<i>Bacidia schweinitzii</i>	Surprise Lichen		--*
<i>Baeomyces rufus</i>	Brown Beret Lichen		S4
<i>Cetrelia chicitae</i>	Frothing Seastorm Lichen		S5
<i>Cladina arbuscula</i>	Reindeer Lichen		S5
<i>Cladina rangiferina</i>	Gray Reindeer Lichen		S5
<i>Cladonia boryi</i>	Fishnet Lichen		S5
<i>Cladonia cristatella</i>	British Soldiers Lichen		S5
<i>Cladonia maxima</i>	Giant Cladonia Lichen		S5
<i>Cladonia ochrochlora</i>	Smooth-footed Powderhorn Lichen		S5
<i>Cladonia squamosa</i>	Dragon Lichen		S5
<i>Cladonia uncialis</i>	Thorn Lichen		S5
<i>Collema furfuraceum</i>	Blistered Tarpaper Lichen		S4S5
<i>Collema subflaccidum</i>	Tree Tarpaper Lichen		S5
<i>Evernia mesomorpha</i>	Boreal Oakmoss Lichen		S5
<i>Hypogymnia krogiae</i>	Freckled Tube Lichen		S5
<i>Hypogymnia physodes</i>	Monk's Hood Lichen		S5
<i>Imshaugia aleurites</i>	Salted Starburst Lichen		S4
<i>Lecanora caesiorubella</i>	Frosted-rim Lichen		--*
<i>Leptogium cyanescens</i>	Blue Jellyskin Lichen		S5
<i>Leptogium laceroides</i>	Short-bearded Jellyskin Lichen		S4



Scientific Name	Common Name	SAR/NSESA	SRank
<i>Lobaria pulmonaria</i>	Lungwort Lichen		S5
<i>Lobaria quercizans</i>	Smooth Lung Lichen		S5
<i>Lobaria scrobiculata</i>	Textured Lungwort Lichen		S5
<i>Loxospora ochrophaea</i>	Eastern ragged-rim Lichen		--*
<i>Menegazzia terebrata</i>	Magic Flute Lichen		S4
<i>Mycoblastus sanguinariodes</i>	Bloody-heart Lichen		--*
<i>Nephroma helveticum</i>	Fringed Kidney Lichen		S4S5
<i>Nephroma laevigatum</i>	Mustard Kidney Lichen		S5
<i>Pannaria conoplea</i>	Mealy-rimmed Shingle Lichen		S4
<i>Pannaria rubiginosa</i>	Brown-eyed Shingle Lichen		S4
<i>Parmelia sulcata</i>	Hammered Shield Lichen		S5
<i>Parmeliella triptophylla</i>	Black-bordered Shingles Lichen		S5
<i>Parmeliopsis capitata</i>	Powder-tipped Starburst Lichen		S5
<i>Parmotrema crinitum</i>	Salted Ruffle Lichen		S5
<i>Peltigera aphthosa</i>	Common Freckle Pelt Lichen		S5
<i>Peltigera horizontalis</i>	Flat-fruited Pelt Lichen		S5
<i>Peltigera praetextata</i>	Born-again Pelt Lichen		S4S5
<i>Pertusaria amara</i>	Bitter Wart Lichen		--*
<i>Platismatia glauca</i>	Varied Rag Lichen		S5
<i>Platismatia tuckermanii</i>	Crumpled Rag Lichen		S5
<i>Protopannaria pezizoides</i>	Brown-gray Moss-shingle Lichen		S5
<i>Pseudocyphellaria perpetua</i>	Gilded Specklebelly Lichen		S5
<i>Punctelia rudecta</i>	Rough Speckleback Lichen		S5
<i>Pyxine sorediata</i>	Mustard Lichen		S5
<i>Ropalospora chlorantha</i>	Comet Spored Lichen		--*
<i>Sphaerophorus globosus</i>	Northern Coral Lichen		S4
<i>Stereocaulon tomentosum</i>	Woolly Foam Lichen		S4S5
<i>Tuckermanopsis sp.</i>	A Wrinkle Lichen		--
<i>Usnea longissima</i>	Methuselah's Beard Lichen		S4
<i>Usnea strigosa</i>	Bushy Beard Lichen		S5

Note: Scientific names used are in accordance to the latest ACCDC species list retrieved in March 2018. Scientific names may no longer be in use, however, for consistency in this report, species names in the ACCDC species list are used.

\* Species ranking in the province has yet to be determined by the ACCDC

### 3.2.3 SAR/SOCI Lichens Species

Five SAR/SOCI lichen species were observed within the Study Area. Descriptions of the species, number of thalli (individuals) and habitat are provided below. See Figure 2 (Appendix A) for species location and for specifics regarding habitat and count numbers.

#### Blue Felt Lichen (*Degelia plumbea*)

*Degelia plumbea* is a cyanolichen (a lichen with a cyanobacteria as a photobiont) which typically grows on mature Red Maples on the edge of swamps, lakes and rivers. This species can also be found growing upland and on other hardwood species such as White Ash, Yellow Birch and Sugar Maple (COSEWIC, 2010). *Degelia plumbea* is fairly common in Nova Scotia, however, in North America the range is restricted to the north east and only found in Nova Scotia, Newfoundland and Labrador and New



Brunswick (COSEWIC, 2010). *Degelia plumbea* is listed as Vulnerable (S3) by the ACCDC and Special Concern and Vulnerable under SARA and NSESA, respectively.

In the Study Area, three locations of *Degelia plumbea* were observed and all were growing on Red Maple trees on the edges or within treed swamps. Five thalli (individuals) were observed within the Study Area.

#### Salted Shell Lichen (*Coccocarpia palmicola*)

*Coccocarpia palmicola* is a cyanolichen which in NS, is typically associated with mature Balsam Fir in mature Fir dominant swamps and can be used as an indicator species for BFL (Environment Canada, 2007). According to the ACCDC status, *Coccocarpia palmicola* is listed as Apparently Secure/Vulnerable (S3S4) in NS. *C. palmicola* is typically associated with mature swamps and has also been reported to grow on hardwood tree species such as Red Maple and Yellow Birch. Within the Study Area, three locations of this species were observed, two of which were on mature Red Maple trees and one location on mature Balsam Fir. Nineteen thalli were observed.

#### Blistered Tarpaper Lichen (*Collema nigrescens*)

*Collema nigrescens* is a cyanolichen which is typically associated with mature Red Maples in mature swamps, however, can be found growing on hardwoods on the edge of disturbances (i.e. cutblocks). This species can be distinguished from other epiphytic Collemas in NS by the presence of conspicuous pustules (warts) and often, abundant apothecia (sexual reproductive structures of lichens) (Hinds & Hinds, 2007). The ACCDC lists this species as Vulnerable (S3) in Nova Scotia. Seventeen thalli were observed on Red Maples in a treed swamp.

#### Appressed Jellyskin Lichen (*Leptogium subtile*)

*Leptogium subtile* is a small inconspicuous cyanolichen often associated with mature hardwood trees in close proximity to streams and wetlands (Hinds & Hinds, 2007). The ACCDC has this species listed as Vulnerable (S3) in Nova Scotia. Within the Study Area, four locations were observed all of which were associated with mature Red Maples and often on the base of the tree. Five thalli were observed.

#### Fringe Lichen (*Heterodermia neglecta*)

*Heterodermia neglecta* is a small light gray-green lichen with conspicuous long black rhizines (root like structures) which is often associated with mature hardwood trees such as Red Maple, and Yellow Birch and can also grow on Balsam Fir. This species is frequently associated with wetlands and watercourses but also can be found in upland habitat. This species is listed as Apparently Secure/Vulnerable (S3S4) in NS by the ACCDC. Five locations were observed within the Study Area with approximately 17 thalli. Table 4 provides the locations and habitat in which the Priority Species lichens were observed.

**Table 4: SAR/SOCI Lichen Locations and Habitat (NAD 83 UTM 20)**

Waypoint #	Species	Coordinates	Thalli #	Host Tree	Height (ft)	Direction	Habitat	WL Association
DP1	<i>Degelia plumbea</i>	0455686 4967354	3	Red Maple	3	West	Mixedwood Treed Swamp	WL 3
DP2	<i>Degelia plumbea</i>	0453928 4967616	1	Red Maple	1	South east	Mixedwood Treed Swamp	WL 16
DP3	<i>Degelia plumbea</i>	0452674 4967513	1	Red Maple	7	North east	Mixedwood Treed Swamp	WL 34
CP1	<i>Coccocarpia palmicola</i>	0455722 4967321	15	Red Maple	3-5	North and south	Mixedwood Upland/close proximity to treed swamp	~40 m south of WL 3
CP2	<i>Coccocarpia palmicola</i>	0455660 4967301	1	Balsam Fir	5	North and east	Mixedwood Upland/close proximity to treed swamp	~40 m south of WL 3
CP3	<i>Coccocarpia palmicola</i>	0455663 4967295	3	Red Maple	5	North east	Mixedwood Upland/close proximity to treed swamp	~40 m south of WL 3
CN1	<i>Collema nigrescens</i>	0454453 4967146	10	Red Maple	6-8	South	Edge of Mixedwood Treed Swamp	WL 27
CN2	<i>Collema nigrescens</i>	0454446 4967172	4	Red Maple	6	North	Edge of Mixedwood Treed Swamp	WL 27
CN3	<i>Collema nigrescens</i>	0454441 4967175	3	Red Maple	6	North	Edge of Mixedwood Treed Swamp	WL 27

Waypoint #	Species	Coordinates	Thalli #	Host Tree	Height (ft)	Direction	Habitat	WL Association
LS1	<i>Leptogium subtile</i>	0454966 4967256	2	Red Maple	2	North	Mixedwood Treed Swamp	WL 23
LS2	<i>Leptogium subtile</i>	0452698 4967260	1	Red Maple	Base of tree	East	Mixedwood Upland/close proximity to treed swamp	~25 m south of WL 34
LS3	<i>Leptogium subtile</i>	0452663 4967338	1	Red Maple	Base of tree	South	Mixedwood Treed Swamp	WL 34
LS4	<i>Leptogium subtile</i>	0452746 4967464	1	Red Maple	Base of tree	South	Mixedwood Treed Swamp	WL 34
HN1	<i>Heterodermia neglecta</i>	0454615 4967267	1	Red Maple	6	South west	Mixedwood Treed Swamp	WL 25
HN2	<i>Heterodermia neglecta</i>	0454794 4967241	2	Red Maple	4	North	Mixedwood Treed Swamp	WL 24
HN3	<i>Heterodermia neglecta</i>	0454969 4967207	2	Red Maple	3	West	Mixedwood Treed Swamp	WL 23
HN4	<i>Heterodermia neglecta</i>	045494948 4967147	8	White Birch	6	South West	Mixedwood Treed Swamp	WL 23
HN5	<i>Heterodermia neglecta</i>	0453305 4967341	4	Red Maple	5	South west	Mixedwood/Upla nd	~ 35 m west of WL 28

## 4.0 WETLANDS

### 4.1 Methodology

#### 4.1.1 Desktop Review

The Project Team reviewed the Nova Scotia Topographic Database (NSTDB) and NSDNR Provincial Landscape Viewer to locate mapped wetlands.

The goal of the desktop evaluation was to identify where wetlands may be located based on mapped systems, topography, forest cover type and satellite imagery while also identifying where the Study Area lies within primary and secondary watersheds.

#### 4.1.2 Wetland Field Surveys

The initial wetland field Surveys were conducted by Dr. Nick Hill and Envirosphere in August 2014 and in June 2018 by WOOD. Wetlands were identified and mapped. MEL was retained in September 2018 to revisit these wetlands and conduct a formal delineation (hanging ribbon, WESP functional assessment evaluation, WL data points) on the previously identified wetlands. Any additional wetlands identified by MEL were mapped and assessed.

##### 4.1.2.1 Wetlands

The NS Environment Act defines wetlands as:

*Land referred to as a marsh, swamp, fen, or bog that either periodically or permanently has the water table at, near, or above the land surface or that is saturated with water, and sustains aquatic processes as indicated by the presence of poorly drained soils, hydrophytic vegetation, and biological activities adapted to wet conditions (Environment Act, 2006).*

Wetland delineation was completed based on micro-topography, and observed surface hydrology, vegetation and soils by a qualified wetland delineator on September 11<sup>th</sup> – 13<sup>th</sup>, 17<sup>th</sup> – 18<sup>th</sup> and September 24<sup>th</sup>, 2018. Wetland boundaries were documented using an SXBlue GPS unit and handheld field computer capable of sub 1m accuracy. Wetlands were flagged (pink tape was used to delineate wetlands) during the delineation process, walked and mapped. Observations were made on wetland types, water flow path, dominant vegetation communities, SAR/SOCI (if present), fish habitat potential and characterizations, and wetland functions.

##### 4.1.2.2 Wetland Functional Analysis

Wetland functional assessments were completed for each wetland using the Wetland Ecosystem Services Protocol - Atlantic Canada (WESP) wetland evaluation technique. The WESP process involves the completion of three forms; a desktop review portion that examines the landscape level aerial conditions within which the wetland is situated, and two field forms. The process serves as a rapid method for assessing individual wetland functions and benefits. WESP addresses 17 specific functions that wetlands may provide (Table 5). The specific wetland functions are individually allocated into grouped wetland functions and measured for “Function” and “Benefit” scores. Wetland function relates to what a wetland does naturally through physical, chemical, and/or biological processes (i.e., water storage). Wetland benefits are the importance of the functions, whether that is ecological, social, or economic importance.

The highest functioning wetlands are those that have both high ‘Function and ‘Benefit’ scores for a given function. WESP enables us to compare individual wetlands within a region to gain a sense of the importance each has in providing ecosystem services.

**Table 5: Wetland Function Parameters**

<b>Grouped Wetland Function</b>	<b>Specific Wetland Functions</b>
Hydrologic Function	Surface Water Storage
Aquatic Support	Aquatic Invertebrate Habitat
	Stream Flow Support
	Organic Nutrient Export
	Water Cooling
Water Quality	Sediment Retention & Stabilization
	Phosphorus Retention
	Nitrate Removal & Retention
	Carbon Sequestration
Aquatic Habitat	Anadromous Fish Habitat
	Resident Fish Habitat
	Waterbird Feeding Habitat
	Waterbird Nesting Habitat
	Amphibian and Turtle Habitat
Terrestrial Habitat	Songbird, Raptor, & Mammal Habitat
	Pollinator Habitat
	Native Plant Habitat

In addition to the grouped wetland functions above, WESP also measures the following groups, however these are only evaluated by their benefit scores:

- Wetland Condition; and
- Wetland Risk.

The following individual functions are assessed to determine the benefit scores associated with these groups:

- Public Use & Recognition;
- Wetland Sensitivity;
- Wetland Ecological Condition; and
- Wetland Stressors.

For each wetland evaluated the WESP process calculates the overall score for the seven grouped wetland functions and the 17 specific wetland functions listed in Table 5 above. One score each is provided for function and benefit. Scores are ranked as ‘Lower’, ‘Moderate’, or ‘Higher’, allowing for analysis of the wetland as compared to baseline wetland scores in Nova Scotia. A ‘Higher’ WESP score means that wetland has a greater capacity to support those processes as compared to other wetlands in the province. A ‘Higher’ WESP score in both the function and benefits category means the wetland supports the natural ecosystem functions and provides services potentially important to society. For example, a ‘Higher’ function and benefit score in the specific wetland function ‘Surface Water Storage’ means the wetland

effectively slows water running off of the landscape while at the same time providing flood control to communities downstream.

For our analysis, MEL weighted the WESP scores to quantitatively compare wetlands. The following weights were applied to scores for grouped wetland functions and specific wetland functions:

- Lower score = 1 point
- Moderate score = 2 points
- Higher score = 3 points

## 4.2 Results

### 4.2.1 Desktop Review

The Study Area is located within the Shubenacadie River Secondary Watershed (IDG-1) which flows towards the Bay of Fundy. There are no wetlands of special significance identified within the Study Area; however, there are two such wetlands within 1.5 km east of the Study Area and three within 1.8 km west of the Study Area (Figure 3, Appendix A).

The NSDNR Provincial Landscape Viewer identifies ten mapped wetlands within the Study Area; seven of which were identified as swamps and three were identified as unknown classification (Figure 3, Appendix A).

### 4.2.2 Field Surveys

Thirty-eight wetlands were identified in the Study Area. These features are described below.

#### 4.2.2.1 Wetlands

Field Surveys resulted in the identification of 33 swamps, two fens, one bog and two bog-swamp complexes for a total of 38 wetlands within the Study Area. Wetland classes along with characterizations are provided in Table 6 (below). Field delineated wetland locations are provided on Figure 3.

**Table 6: Wetland Characteristics**

Wetland Number	Wetland Type	Vegetation	Wetland Size (m <sup>2</sup> )	Water Flow Path	Landscape Position	Landform
1	Swamp	Treed	4,816	Isolated	Terrene	Basin
2	Swamp	Treed	11,480	Outflow – (Via Drainage)	Terrene	Basin
3	Swamp	Treed	3,458	Outflow – (Via Drainage)	Terrene	Basin
4	Swamp	Treed	13,881	Throughflow – (Via Watercourse)	Lotic/Stream entrenched	Hillslope
5	Complex	Treed Bog/Treed Swamp	19,759	Throughflow – (Via Watercourse)	Lotic/Stream entrenched	Basin
6	Swamp	Treed	4,834	Isolated	Terrene	Basin
7	Swamp	Treed	3,862	Isolated	Terrene	Basin
8	Fen	Graminoid	1,749	Throughflow – (Via Watercourse)	Lotic/Stream entrenched	Basin
9	Swamp	Treed	1522	Isolated	Terrene	Basin

Wetland Number	Wetland Type	Vegetation	Wetland Size (m2)	Water Flow Path	Landscape Position	Landform
10	Swamp	Treed	149	Isolated	Terrene	Basin
11	Swamp	Treed	957	Outflow – (Via Watercourse)	Terrene	Basin
12	Swamp	Treed	1,789	Isolated	Terrene	Basin
13	Swamp	Treed	8,572	Throughflow – (Via Watercourse)	Lotic/Stream entrenched	Basin
14	Swamp	Treed	9,708	Outflow – (Via Watercourse)	Terrene	Basin
15	Swamp	Treed	1,979	Isolated	Terrene	Basin
16	Swamp	Treed	13,212	Throughflow – (Via Watercourse)	Lotic/Stream entrenched	Sloped Basin
17	Swamp	Treed	914	Throughflow – (Via Watercourse)	Lotic/Flood Plain	Hillslope
18	Swamp	Treed	5,593	Throughflow – (Via Drainage)	Terrene	Basin
19	Swamp	Treed	1880	Isolated	Terrene	Basin
20	Swamp	Treed	968	Throughflow – (Via Watercourse/Non-contiguous)	Terrene	Basin
21	Swamp	Treed	2,036	Isolated	Terrene	Basin
22	Swamp	Treed	12,590	Throughflow – (Via Watercourse)	Lotic/Flood Plain	Basin
23	Swamp	Treed	9,925	Throughflow – (Via Watercourse)	Lotic/Flood Plain	Basin
24	Swamp	Treed	4,382	Throughflow – (Via Drainage)	Terrene	Basin
25	Swamp	Treed	19,832	Throughflow – (Via Drainage)	Terrene	Basin
26	Fen	Treed	2,765	Throughflow – (Via Drainage)	Terrene	Basin
27	Complex	Shrub Bog/Treed Swamp	3,2031	Throughflow – (Via Drainage)/Subsurface	Terrene	Basin
28	Bog	Shrub Bog	56,269	Outflow – (Via Watercourse)	Terrene	Basin
29	Swamp	Treed	1,293	Isolated	Terrene	Basin
30	Swamp	Treed	4,016	Throughflow – (Via Drainage)	Terrene	Basin
31	Swamp	Treed	8,478	Outflow – (Via Drainage)	Terrene	Hillslope
32	Swamp	Treed	1,065	Isolated	Terrene	Basin
33	Swamp	Treed	14,862	Isolated	Terrene	Basin
34	Swamp	Treed	61,423	Throughflow – (Via Drainage)	Terrene	Basin
35	Swamp	Treed	4,825	Outflow – (Via Drainage)	Terrene	Basin
36	Swamp	Treed	6,326	Isolated	Terrene	Basin



Wetland Number	Wetland Type	Vegetation	Wetland Size (m2)	Water Flow Path	Landscape Position	Landform
37	Swamp	Treed	4,381	Isolated	Terrene	Hillslope
38	Swamp	Treed	1,319	Isolated	Terrene	Basin

### Swamps

Thirty-three (33) of the 38 wetlands identified within the Study Area are classified as treed swamps.

The majority of the swamps present in the Study Area are hydrologically isolated features (i.e. they lack surface water inputs and/or outputs). Eighteen swamps observed during the Study Area have some water feature flowing through or out of the wetland. Wetlands 4, 11, 13, 14, 16, 17, 20, 22 and 23 have a watercourse either draining through it (throughflow) or has a watercourse flowing out of the wetland (outflow). Wetlands 2, 3, 18, 24, 25, 30, 31, 34 and 35 have drainage (not sufficiently channelized into a surface watercourse) either flowing through them or out of them.

All swamp wetlands were densely to moderately vegetated and commonly dominated by Black Spruce (*Picea mariana*), Balsam Fir (*Abies balsamea*), Red Maple (*Acer rubrum*), and Tamarack (*Larix laricina*) trees. The shrub strata of these wetlands are largely dominated by Speckled Alder (*Alnus incana*), Mountain Holly (*Ilex mucronata*), Balsam Fir, Black Spruce, Northern Wild Raisin (*Viburnum nudum*), and Red Maple (*Acer rubrum*). The herbaceous layer was comprised mainly of Cinnamon Fern (*Osmunda cinnamomea*), Three-seeded Sedge (*Carex trisperma*), New York Fern (*Thelypteris noveboracensis*), Sheep Laurel (*Kalmia angustifolia*), Star Sedge (*Carex echinata*), and Bunchberry (*Cornus canadensis*). These vegetative characteristics are typical of swamp habitats through Nova Scotia and in the region generally.

Hydric soils within treed swamps was indicated by an organic layer of varied depths ranging from approximately 10-40 cm, underlaid by a bedrock restrictive layer.

### Fens

Wetland 8 and 26 exist as fens (graminoid and treed, respectively). Wetland 8 is located in the southeastern extent of the Study Area and corresponds to a mapped NSE wetland (which has been classified as a swamp). Wetland 8 is dominated by grass-like species (graminoids) with a peat depth of approximately 40 cm. Vegetation primarily consists of White Beak-sedge (*Rhynchospora alba*), Tussock Sedge (*Carex stricta*) and also consists of forbs such as Bog Aster (*Oclemena nemoralis*) and Round-leaved Sundew (*Drosera rotundifolia*). Wetland 8 is a throughflow via watercourse system. Fish habitat is restricted to the watercourse and no fish access within the wetland was observed.

Wetland 26 is a treed fen with the tree layer being dominated by Black Spruce (*Picea mariana*) and Tamarack (*larix laricina*). Wetland 26 corresponds to a mapped NSE wetland which is characterized as an unknown in the database. The herbaceous layer consisted of Tussock Sedge, Broad-leaved Cattail (*Typha latifolia*) and Cinnamon Fern. Wetland 26 is a throughflow via drainage system with a peat depth of approximately 40 cm.



### Treed Bog/Treed Swamp Complex

Wetland 5 is characterized as a Treed Bog/Treed Swamp complex and corresponds to a mapped NSE wetland which is classified as a swamp. This wetland is located in the northeast portion of the Study Area and consists of Tamarack, Balsam Fir, Black Spruce, Tawny Sedge (*Eriophorum virginicum*) and Cinnamon Fern. The wetland has peat depths of 40 cm and is a throughflow system via watercourse through the swamp portion of the complex. The watercourse is entrenched which has habitat for fish, however, habitat was determined to be restricted to the watercourse. No fish habitat within the wetland was observed.

### Shrub Bog/Treed Swamp Complex

Wetland 27 is a Shrub Bog/Treed Swamp complex located in the southeastern portion of the Study Area. This wetland corresponds to a mapped NSE wetland which is classified as a swamp.

The swamp portion of the wetland consists primarily of Balsam Fir, Black Spruce and New York Fern and the bog portion primarily consists of Black Spruce, Common Juniper (*Juniperus communis*) and Huckleberry. Wetland 27 is a throughflow via watercourse system with peat accumulation of 40 cm.

### Bog

Wetland 28 has been identified as a Shrub Bog located in the eastern portion of the Study Area and corresponds to a mapped NSE wetland which has been identified as a swamp.

Wetland 28 is dominated by Tamarack, Speckled Alder, Tussock Sedge and Labrador Tea. Soils consist of peat depths greater than 40 cm and there is a watercourse flowing out of the wetland (outflow via watercourse).

#### 4.2.3 *Wetland Functional Analysis*

The WESP process calculates the overall scores for the seven wetland functional groups including a functional and benefit rating for five of the groups (Hydrologic, Water Purification, Aquatic Support, Aquatic Habitat and Terrestrial Habitat) and the benefit rating for the Wetland Condition and Wetland Risk groups. The WESP calculator utilized the responses from desktop, field and stressor questions (included in the WESP calculator) to determine whether the functions and benefits for each group are Low, Moderate or High in comparison to baseline wetland scores in Nova Scotia. In order to complete an effective, quantitative comparison of WESP results for wetlands within the Study Area, scores were weighted numerically as follows:

LOW: 1 point

MODERATE: 2 points

HIGH: 3 Points

Table C1 (Appendix C), provides the overall numerically weighted scores for the evaluation of 38 wetlands completed across the Study Area. It should be noted that function scores are not provided for the Wetland Condition and Wetland Risk Functional groups, as the WESP calculator only considers these as benefits.

Of the 38 wetlands evaluated, the average accumulated functional score per wetland was 2.0 (Moderate). Based on the same analysis, the average accumulated benefit score per wetland was 2.0 (Moderate).

WESP guidance states that the most valuable wetlands are those that possess high functions and benefits. Benefits relate to the perceived worth of the wetland function to societal needs (Adamus & Verble, 2016). Of the 38 wetlands evaluated, none of the wetlands evaluated scored in the HIGH accumulated range for both functions and benefits (see Table C1, Appendix C). The majority (37 of 38) wetlands scored in the Moderate range for function, and benefits. WL23 scored in the Moderate range for function, and High range for benefits.

Additional analysis was completed on the individual wetland functional groups being provided by the wetlands present within the Study Area. The following sections provide results of this analysis on a per wetland functional group basis.

#### 4.2.3.1 WESP Grouped Wetland Function Results

Table 7 to Table 12 outline the results of the grouped wetland functions.

##### Hydrologic Group

The hydrological wetland service group evaluates the effectiveness of a wetland to store or delay the downslope movement of surface water. Wetlands that have the highest functions within this group include those that do not have surface water outlets, and instead are isolated from flowing surface water. The model does not account for wetland size, and in turn, does not account for larger wetlands having the ability to store more water than smaller wetlands.

**Table 7: Hydrologic Group Wetland Scores**

Hydrologic Group		Function		
		Low	Moderate	High
Benefit	Low			
	Moderate	WL4, WL8, WL14, WL16, WL17	WL2, WL5, WL25, WL27	WL1, WL3, WL6, WL15, WL19
	High	WL11, WL13, WL22, WL23, WL26	WL7, WL18, WL24, WL28, WL29, WL30, WL31, WL32, WL34, WL35, WL37	WL9, WL10, WL12, WL20, WL21, WL33, WL36, WL 38

A high proportion of wetlands within the Study Area scored Moderate to High function largely because of their existence as isolated wetlands across the landscape, which allow them to store water. The wetlands that score low all had throughflow or outflow. However, it should be noted that most of the wetlands that scored the highest in this function are small, which reduces the storage capacity in comparison to other wetlands (although this isn't considered by WESP).

All wetlands scored Moderate to High in benefit, largely because of their high position in the watershed, and their proximity to an urban area (Wellington and the airport). In these circumstances, water storage is valuable, as it prevents flooding to the urban zones.

Water Purification Group

This wetland functional group is compiled from four different functions: Sediment Retention and Stabilization; Phosphorus Retention; Nitrate Removal; and Carbon Sequestration. The main function of this group is to evaluate each wetland’s potential to intercept, retain, and filter sediments, particulates, and organic matter. Similar to the hydrologic group, the wetlands that have the highest functions in this regard include those that do not have a surface water outlet, and instead are isolated from flowing surface water.

**Table 8: Water Purification Group Wetland Scores**

Water Purification Group		Function		
		Low	Moderate	High
Benefit	Low	WL8	WL25	WL2, WL3, WL5, WL6, WL19, WL 27
	Moderate	WL13, WL14, WL16, WL17, WL18, WL22, WL23, WL26, WL30, WL31, WL35	WL24, WL28	WL1, WL7, WL9, WL15, WL20, WL21, WL29, WL32, WL33, WL34, WL36, WL37, WL38
	High	WL4, W111		WL10, WL12

Wetlands 10 and 12 scored High/High for the Water Purification Group, demonstrating they are effective at intercepting, retaining, and filtering suspended sediments, particulates, and organic matter due to their lack of outlet. Their proximity to residential areas explains why they have a higher benefit score compared to those that scored High/Moderate.

Aquatic Support Group

The aquatic support group comprises four individual functions: Stream Flow Support; Aquatic Invertebrate Habitat; Organic nutrient export; and Water cooling. The main function of this group is to determine the wetlands ability to support ecological stream functions that promote habitat health. Therefore, wetlands lying adjacent to or containing flowing water score higher than those that do not (i.e. isolated wetlands). In addition, headwater wetlands are crucial for supporting stream flow during the dry season by contributing to water flow via groundwater input and storage capacity.

**Table 9: Aquatic Support Group Wetland Scores**

Aquatic Support Group		Function		
		Low	Moderate	High
Benefit	Low	WL1, WL3, WL9, WL10, WL15, WL20, WL21, WL33, WL36, WL38	WL6, WL7, WL12, WL19, WL 37	

Aquatic Support Group		Function		
		Low	Moderate	High
	Moderate	WL11, WL27, WL29, WL32, WL34	WL8, WL13, WL14, WL16, WL17, WL18, WL24, WL25, WL26, WL28, WL30, WL35	WL31
	High		WL2, WL5, WL22, WL23	WL4

The majority of wetlands scored in the Low-Moderate range for function since they are not associated with other flowing surface water systems. Wetland 4 is the only wetland that scored high for both functions and benefit, which can be explained by its connection to a downstream water system. Most of the wetlands in the Study Area either had no surface water or shallow (<10cm) drainage streams or watercourses.

#### Aquatic Habitat Group

The aquatic habitat group comprises of five different functions: Anadromous Fish Habitat; Resident Fish Habitat; Amphibian and Turtle Habitat; Waterbird Feeding Habitat; and Waterbird Nesting Habitat. Wetlands that have the highest functions within this group include those that are adjacent to or contain flowing water.

**Table 10: Aquatic Habitat Group Wetland Scores**

Aquatic Habitat Group		Function		
		Low	Moderate	High
Benefit	Low	WL1, WL3, WL6, WL7, WL9, WL10, WL12, WL15, WL18, WL19, WL20, LW21, WL24, WL25, WL28, WL30, WL31, WL33, WL35, WL36, WL37, WL38	WL2, WL4, WL8	
	Moderate		WL5, WL11, WL13, WL22, WL23, WL27	
	High		WL14, WL16, WL17, WL26, WL29, WL32, WL34	

Many of the on-site wetlands scored within the Low range for function due to their lack of association to other surface water features and fish habitat. None of the wetlands comprised of fish habitat. Some of the

wetlands did score Moderately for function due to their provision of other aquatic habitats support such as amphibian habitat. Benefits were generally Low to Moderate most likely due to the fact that the landscape comprises many other wetlands which can also provide high scoring aquatic habitat functions (i.e. the benefit of the wetland function increases if similar wetlands providing those functions are absent from the landscape).

### Terrestrial Habitat Group

The terrestrial habitat group comprises of three different functions: Songbird, Raptor, and Mammal Habitat; Native Plant Habitat; and Pollinator Habitat. The main function of the collective group is to evaluate the wetland’s ability to support healthy habitat for birds, mammals, and native plants.

**Table 11: Terrestrial Habitat Group Wetland Scores**

Terrestrial Habitat Group		Function		
		Low	Moderate	High
Benefit	Low		WL9, WL10, WL20, WL21, WL36, WL37	WL1, WL4, WL5, WL6, WL7, WL8, WL11, WL12, WL13, WL19, WL22, WL38
	Moderate		WL15, WL28, WL30, WL31, WL33, WL35	WL14, WL17, WL18, WL26, WL29, WL32
	High			WL2, WL3, WL16, WL23, WL24, WL25, WL27, WL34

It should be noted, scores for function fall within the Moderate or High categories for all wetland within the Study Area. In general, wetlands within the Study Area provide ideal habitat, which includes downed wood, prevalent ground cover, varied microtopography, tree and shrub cover in and around the wetlands, and naturally vegetated buffer zones. The wetlands have a variety of woody heights and diverse forms, which allows for nesting habitat, perches, and feeding grounds. In addition, the wetlands provide a diverse range of herbaceous vegetation. As such, wetlands within the Study Area generally provide habitat for songbirds, mammals and potentially rare plants. The wetlands that scored high for both function and benefit (WL2, WL3, WL16, WL23, WL24, WL25, WL27 and WL34) were all locations where rare plants (which includes lichens for this exercise) were observed, which is a key variable that defines the wetland value in this functional group.

### Wetland Condition

Wetland Condition refers to the integrity or health of a wetland as defined by its vegetative composition and richness of native species. Scores are derived from the similarity between the wetland being evaluated and reference wetlands of the same type and landscape setting (Adamus 1996).

**Table 12: Wetland Condition and Risk Benefit Scores**

		Wetland Condition	Wetland Risk
<b>Benefit</b>	<b>Low</b>	WL4, WL9, WL10, WL16, WL17, WL20, WL29, WL30, WL34, WL36, WL37, WL38	WL5, WL8, WL26
	<b>Moderate</b>	WL1, WL2, WL3, WL5, WL15, WL21, WL32, WL33	WL2, WL3, WL4, WL9, WL13, WL14, WL16, WL17, WL18, WL20, WL21, WL22, WL23, WL24, WL25, WL27, WL28, WL29, WL30, WL31, WL32, WL36, WL37, WL38
	<b>High</b>	WL6, WL7, WL8, WL11, WL12, WL13, WL14, WL18, WL19, WL22, WL23, WL24, WL25, WL26, WL27, WL28, WL31, WL35	WL1, WL6, WL7, WL10, WL11, WL12, WL15, WL19, WL33, WL34, WL35

Most wetlands scored High or moderate for Wetland Condition which indicates that currently, the wetlands indicate healthy vegetative communities. For the wetlands that scored Low, this is due to the absence of rare plants, the low plant diversity, and minimal ground irregularities (ground irregularities provide microhabitats for plant species allowing plant species with different habitat requirements to establish themselves within a wetland). None of the wetlands were recorded to have invasive vascular plant species.

#### Wetland Risk

Wetland Risk takes sensitivity and stressors into account by averaging the two. Sensitivity is the lack of intrinsic resistance and resilience of the wetland to human or naturally caused stress (Niemi et al., 1990). The model uses five metrics to measure stress: abiotic resistance, biotic resistance, site fertility, availability of colonizers, and growth rate. Stress relates to the degree to which the wetland is or has recently been altered by humans in a way that degrades its ecological condition. The model applies four stress groups: hydrologic stress, water quality stress, fragmentation stress, and general disturbance stress. Wetlands that are highly resilient may have lower risk scores despite their exposure to multiple stressors. Additionally, wetlands exposed to fewer threats, but with low resilience may have high risk scores. Wetland resilience is tied to multiple factors, but may include size, proximity to natural land cover, and presence of invasive species.

The majority of wetlands analyzed had Low-Moderate risk scores. Eleven wetlands (WL1, WL6, WL7, WL10, WL11, WL12, WL15, WL19, WL33, WL34, WL35) presented High wetland risk scores. The high-risk scores are likely attributed to the small size of these treed swamps that lack surface water. The absence of water and the fragmentation in the tree cover makes these wetlands less resilient and resistant to disturbance.

#### 4.2.3.2 WESP Specific Wetland Function Results

The results of the specific wetland function for each analyzed wetland can be found in Table C2 (Appendix C). Out of the 38 wetlands assessed, fourteen wetlands had High scores in function and benefits for at least one of the categories. Wetlands 2, 3, 16, 23, 24, 25, 27 and 34 all had High scores in function and benefit in the category “Pollinator Habitat”. These wetlands had a vegetation community with shrubs and forbs providing ideal habitat for pollinators. Wetlands 17, 26, 29, 32 and 34 all had High scores in function and benefit in the category “Songbird, Raptor, & Mammal Habitat”. These wetlands effectively support the necessary habitat for these species, and in doing so they maintain biodiversity within the region. Wetlands 10 and 12 also had High scores in function and benefit for the category “Nitrate Removal & Retention”. These treed swamps were isolated from the natural system and lie in close proximity to the urban area, which elevates its benefit significance.

In general, wetlands present within the Study Area had high functionality in “Nitrate Removal & Retention” and “Pollinator Habitat”. The former specific wetland function describes the ability to retain particulate matter and either allow for particle settling or the release of gas into the atmosphere (which aids in water filtration). The Pollinator Habitat function describes the wetland’s ability to support habitats used by pollinating insects, thus enhancing plant biodiversity.

The wetlands generally had high benefit scores in “Wetland Storage and Delay”. This result indicates that many of the wetlands are slowing and storing water, which are highly valued to prevent flooding situation in the urban areas in close proximity.

## 5.0 SUMMARY

MEL was retained by WOOD to complete vascular plant, lichen and wetlands surveys. This biophysical study was completed in support of registering a provincial Environmental Assessment (EA) for the proposed Wellington connector road by the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR). The Study encompasses a general review of desktop resources, and the completion of a field assessment to identify existing biophysical conditions (vascular plants, lichens and wetlands) to determine potential environmental constraints and sensitivities occurring within, and in close proximity to, the Study Area.

The following summary of results is provided:

Two hundred and fifteen vascular plant species were observed throughout the Study Area including a species of conservation interest - *Agalinis neoscotica* (S3S4). In addition, fifty-five lichen species were documented, five of which are of conservation interest and include: *Degelia plumbea* (SAR Special Concern, NSESA Vulnerable, S3), *Heterodermia neglecta* (S3S4), *Leptogium subtile* (S3), *Coccocarpia palmicola* (S3S4) and *Collema nigrescens* (S3).

Thirty-eight wetlands were observed and delineated within the Study Area. No wetlands observed comprised of suitable fish habitat. The wetlands identified within the Study Area consisted of 33 swamps, two fens, one bog and two bog-swamp complexes for a total of 38 wetlands within the Study Area.

Throughout all the wetlands assessed in the Study Area, functional analysis indicates, in general, that Nitrate Removal & Retention and Pollinator Habitat are the most significant functions provided by the wetlands within the Study Area.

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.



Andy Walter  
Senior Project Manager  
McCallum Environmental Ltd.



## 6.0 REFERENCES

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## **Appendix A. FIGURES**



**FIGURE 1**

**Project Location**  
**Proposed Connector Road**  
**Wellington, NS**

- Roads
- ▭ Study Area



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



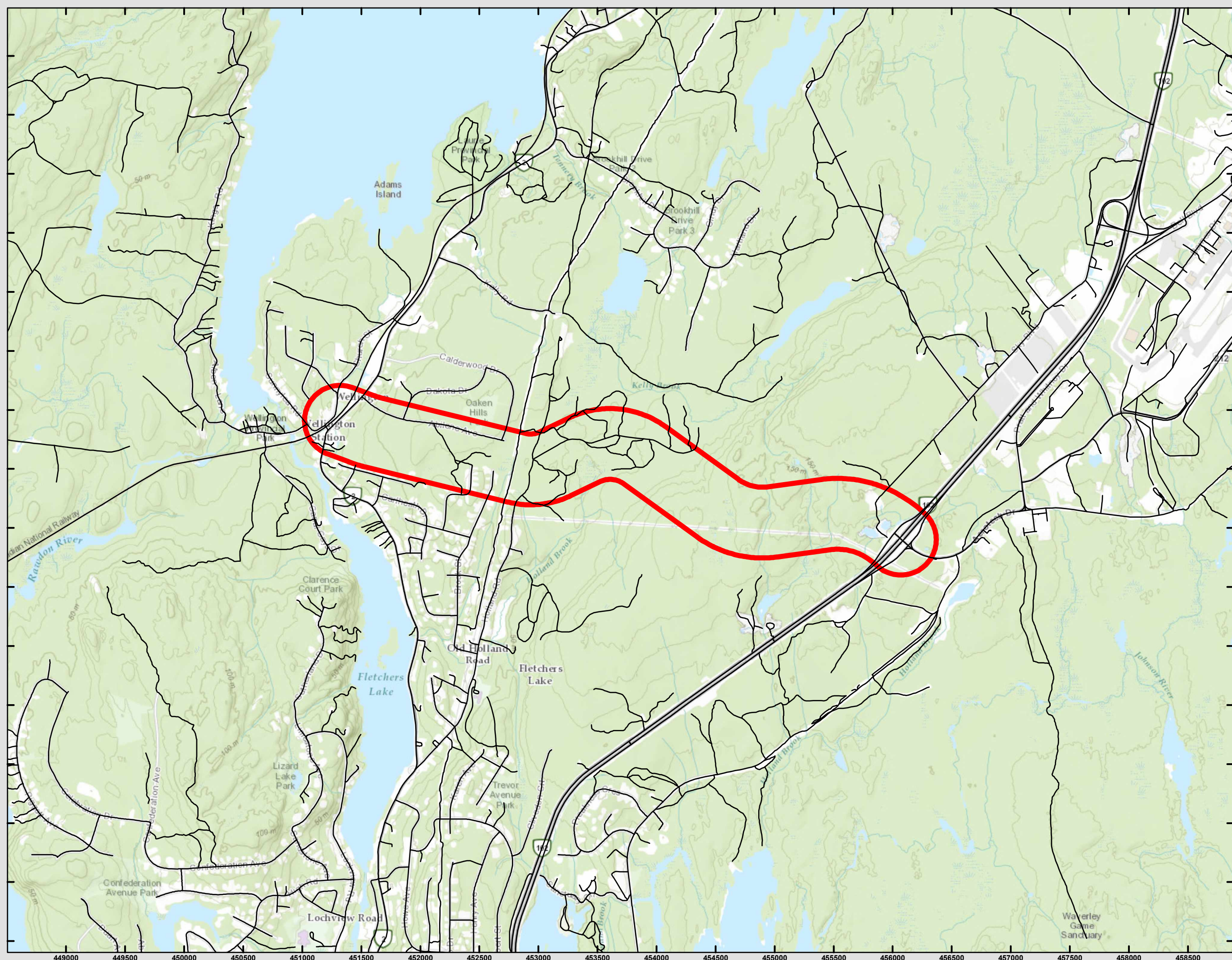
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1:30,000 Scale when printed @ 11" x 17"

Drawn By: John R. Gallop Date: 2018-10-11



**McCallum Environmental Ltd.**





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





FIGURE 2

SAR/SOCI Vascular Plants and Lichen Results 2018

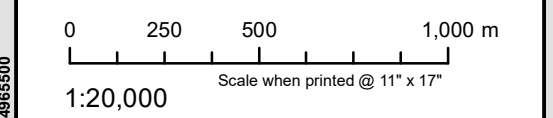
Proposed Connector Road

Wellington, NS

-  *Agalinis neoscotica* (ACCDC: S3S4)
-  *Leptogium subtile* (ACCDC: S3)
-  *Coccocarpia palmicola* (ACCDC: S3S4)
-  *Heterodermia neglecta* (ACCDC: S3S4)
-  *Collema nigrescens* (ACCDC: S3)
-  NSDNR BFL Predictive Layer 2010
-  Field Delineated Wetlands 2018
-  *Degelia plumbea* (SAR: SC; NSESA: V; ACCDC S3)
-  Study Area



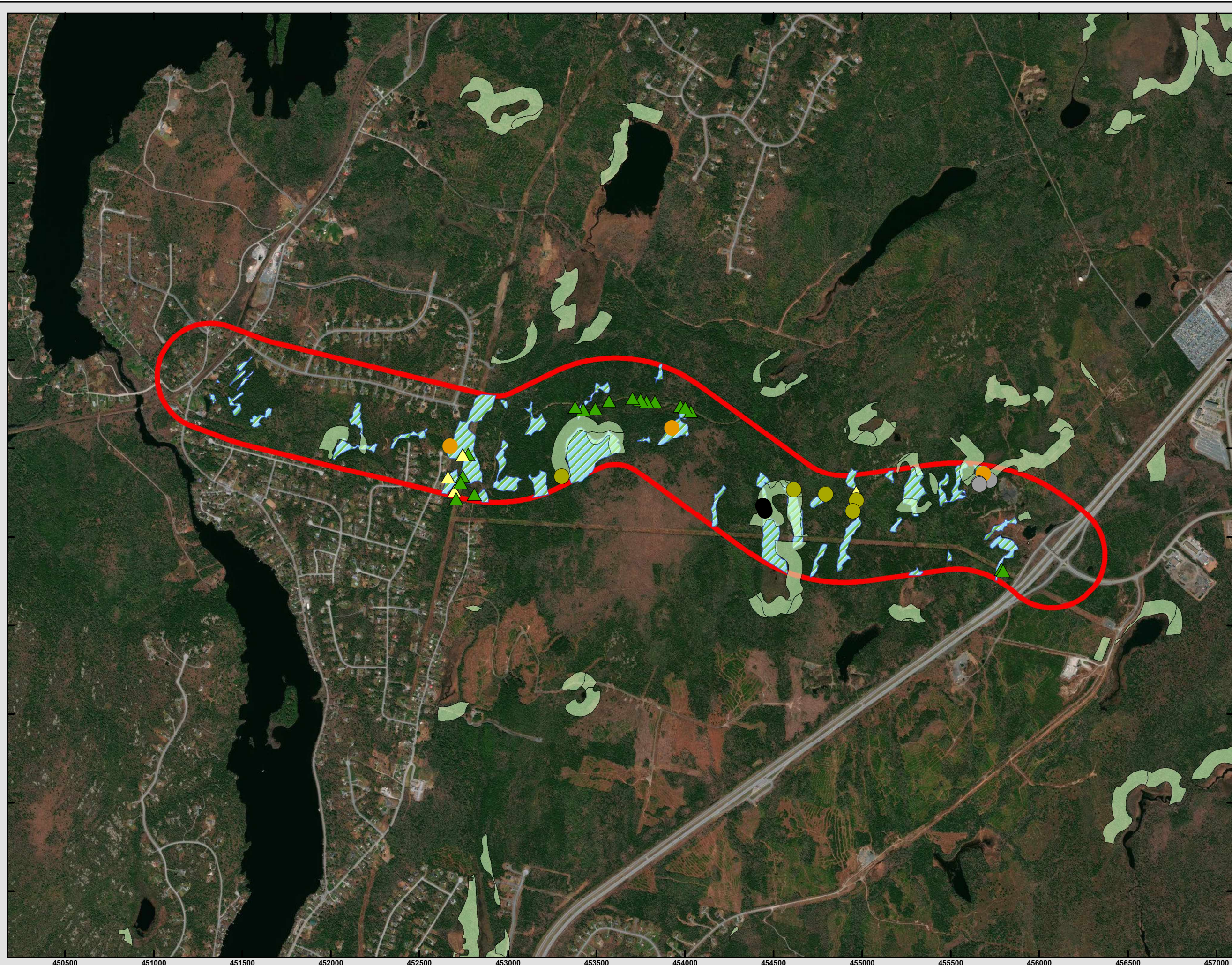
Coordinate System: NAD 1983 UTM Zone 20N  
Projection: Transverse Mercator  
Datum: North American 1983  
Units: Meter



Drawn By: John R. Gallop Date: 2018-10-11



McCallum Environmental Ltd.



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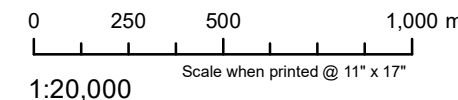
**FIGURE 3**

**Wetland Field Results 2018  
Proposed Connector Road  
Wellington, NS**

- NS Watercourse Inventory
- NS Wetlands of Special Significance
- NSE Wetland Inventory
- Field Delineated Wetlands 2018
- Study Area



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



Drawn By: John R. Gallop Date: 2018-10-11





## **Appendix B. PROJECT TEAM MEMBERS' CVs**

**Years in Practice**  
**18**

### 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 leadership for Federal and provincial environmental assessment processes. 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 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 three Canadian Environmental Assessment Agency (CEAA) environmental impact statements (EIS) for three mining projects in Nova Scotia.

Ms. Milloy regularly completes applications for wetland and watercourse alteration and development across Atlantic Canada, and has developed and implemented wetland compensation programs and wetland restoration projects. Ms. Milloy is a trained wetland evaluator, biologist, and restoration professional.

### Project Experience

- Project Manager and Team Lead for three Environmental Impact Statements (EIS) for submission to the Canadian Environmental Assessment Agency (CEAA) (2017-2018).
- Provision of biophysical project management and coordination of field surveys to support the Canadian Environmental Assessment Act (CEAA) 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 a new rock quarry (2017/2018) to meet requirements under the provincial environmental assessment process.
- Completion of provincial environmental assessment for a quarry expansion in Nova Scotia (2016).
- 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 three provincial environmental assessments for community wind projects in Nova Scotia from 2013-2016.
- Completion of environmental baseline surveys for three Nova Scotian quarry expansion projects in 2012-2013.
- 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,

**Meghan Milloy, BSc. (Bio), MES**  
[meghan@mccallumenvironmental.com](mailto:meghan@mccallumenvironmental.com)

**Vice President**

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.



## Years in Practice

10

## Certifications

Nova Scotia Advanced Wetlands Delineator and Evaluator

## Memberships

Nova Scotia Wetlands Delineation, Maritime College of Forest Technology

## Education

- BSc. (Horticulture), Essex University (UK), 2003-2005

## Training

- Wetland Functional Assessment Training Workshop, NSE 2013
- Urban Wetland Restoration: A Watershed Approach, 2012
- Nova Scotia Advanced Wetlands Delineation and Evaluation Course, 2010;
- Water Management and Wetland Restoration Training Course, 2014;
- Identifying and Delineating Wetlands for Nova Scotia, 2009
- Watercourse Alteration Certification (Nova Scotia Environment) (2008)
- Saint John Ambulance Emergency First Aid, AED, CPR(C). 2016

## Summary

Mr. Walter is a trained biologist and wetland specialist, and has extensive experience managing technical biophysical projects within Atlantic Canada. Mr. Walter is knowledgeable in federal, provincial, and municipal environmental regulations and guidelines applicable to Atlantic Canada, and works closely with all necessary regulatory agencies to facilitate project implementation. As senior project manager, Mr. Walter ensures biophysical field programs are tailored to the needs of the client and project, while meeting regulatory standards. Mr. Walter has provided environmental support to the planning process in a wide range of project types including residential development, industrial projects (mining, pit and quarry), transmission line and hydro dam infrastructure and highway construction to name a few. Mr. Walter has managed the environmental processes associated with multiple wind energy developments in Nova Scotia, including compilation of provincial environmental assessment (EA) documents, and implementation of associated EA biophysical field surveys, as well as acquiring pertinent environmental information required for regulatory permitting.

As a trained field biologist, Mr. Walter has completed terrestrial and stream habitat assessments, and flora and fauna surveys, including desktop reviews and characterization of biophysical environments. Mr. Walter also completes numerous fish habitat/watercourse assessments for effects monitoring, watercourse alteration, and HADD authorization projects. Assessments have also included water quality sampling, benthic sampling, and biophysical characterization (channel depth and width, stream velocity, fish habitat assessment) of water bodies.

As a qualified wetland delineator and wetland function evaluator for Atlantic Canada, Andy has completed delineation of hundreds of wetlands. Projects often involve the completion of species at risk assessments, functions assessments, and detailed wetland characterization in support of provincial wetland alteration applications. In addition, Mr. Walter assists in the identification of potential wetland restoration and creation sites for wetland and fish habitat alterations, reviews databases, mapping, and aerial imagery, completes ground truthing and consults with local environmental groups and government to identify potential sites. Following alteration approval, Mr. Walter supervises construction activities for numerous construction projects in wetland habitat ensuring that erosion and sedimentation control measures are implemented prior to construction, and monitors activities during construction to ensure wetland protection measures are effective.

## Project Experience

- Managing, and currently in the process of implementing a new wetland functional assessment tool for use in Nova Scotia. This Project included the collection of baseline wetland information across Nova Scotia by completing 120 wetland functional assessments using the Wetland Ecosystem Services Protocol (WESP). Ongoing collaboration with Nova Scotia Environment to support the rolling out of this method to wetland practitioners.
- Management and implementation of a 18 hectare agricultural wetland restoration project in Middle Stewiacke, NS.
- Management and completion of terrestrial habitat mapping, wetland delineation and vegetation surveys in support of EA and regulatory permitting for the South Canoe Wind Project (80MW wind Project in Nova Scotia) 2011-2014.

**Andy Walter, BSc. (Hort)**  
[andy@mccallumenvironmental.com](mailto:andy@mccallumenvironmental.com)  
**Senior Project Manager**

- Management of a multi-faceted avian study in support of a provincial EA at Aulds Cove, NS.
- Completion of six provincial environmental assessments and baseline surveys for community wind projects in Nova Scotia in 2012-2014.
- Terrestrial habitat mapping, wetland delineation and vegetation surveys in support of a 65km distribution transmission line in central Nova Scotia.
- Wetland delineation, species at risk, watercourses and flora surveys at the site of a proposed quarry in Nova Scotia. Subsequent facilitation of wetland alteration permit to alter in excess of 20 hectares of wetland.
- Implemented the passive wetland restoration strategy at a disturbed wetland on NSDNR property. Completed regular monitoring of vegetation, soil, and hydrology conditions and developed project recommendations accordingly (2009-2011).
- Wetland delineation, species at risk, watercourses and flora surveys at the site of a proposed 22km railway line and shipping container terminal in eastern Nova Scotia (2012-2014).
- Completion of wetland delineation and watercourse identification and associated regulatory permitting at multiple developments in Nova Scotia (2009-2016).

## **Work Experience**

### **Strum Environmental Services Ltd., Nova Scotia 2008-2015**

Environmental Specialist/Project Manager- provided project management expertise for development clients across Atlantic Canada. Projects included environmental assessment, large scale commercial, residential and wind power developments, wetland and watercourse alteration projects, wetland compensation planning and implementation, wetland restoration and creation projects, avian studies, and regulatory consultation.

## Years in Practice

5

## Education

B.Sc. (Honours, Biology),  
Waterloo University,  
2009-2011.

## Training

- ◆ Saint John Ambulance  
Standard First Aid,  
AED, CPR(C), 2015
- ◆ Wildlife Awareness  
training and ATV  
training – 2015
- ◆ W.H.M.I.S – 2015
- ◆ H2S Alive - 2015

## Summary

Mr. Gallop has been in the environmental consulting profession since 2011. He has worked on both project related and research related field assessments in Nova Scotia, Alberta and Saskatchewan.

Mr. Gallop is responsible for completing biophysical assessments, including flora 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 5 environmental baseline programs for mining, quarry development and energy sector development projects in Nova Scotia and Saskatchewan in advance of environmental assessment registration.

## Selected Project Experience

- Completion of migratory bird surveys for a large scale renewable energy project.
- Completion of ungulate and other wildlife surveys for a variety of Natural Resource projects.
- Completion of environmental baseline surveys for the federal environmental assessment process for proposed development of two gold mines in eastern Nova Scotia in 2016-2018 across 2500 hectares of landscape in Nova Scotia
  - Wetland delineation and functional assessment
  - Fish habitat surveys and electrofishing
  - Rare plant surveys
  - Wildlife surveys
  - Avian surveys
  - Lichen surveys
- Completion of wetland delineation, watercourse identification and vegetation assessments of two large scale developments in Saskatchewan and Nova Scotia in 2015 and 2016.
- Responsible for collecting baseline data for the calibration of the Wetland Ecosystems Services Protocol (WESP) for the Province of Nova Scotia.

## Experience

### **McCallum Environmental Ltd., Halifax, Nova Scotia**

#### Biologist and Environmental Specialist:

April 2016-Present

- Completing biophysical assessments, including flora 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.

## Years in Practice

3

## Education

B.Sc. (Biology), Laval University, 2009-2012.

M.Sc. (Biology), Memorial University of Newfoundland and Labrador, 2013-2016.

## Training

- ◆ Backpack Electrofishing, Canadian River Institute, 2018
- ◆ Wilderness and Remote First Aid, Canadian Red Cross, 2017
- ◆ The experimental fish (Animal care training), Canadian Aquaculture Institute, 2015
- ◆ Canadian Firearms Safety Courses, RCMP, 2012

## Summary

Mr. Charron has been in the environmental consulting profession since seasonally since 2010. He has worked on both, project related and research related field assessments in Nova Scotia, Newfoundland and Quebec.

Mr. Charron is responsible for completing biophysical assessments, including wetland delineation, wetland monitoring, flora and fauna surveys, aquatic surveys and species at risk evaluations, primarily for clients in the energy, mining, and commercial development sector. Mr. Charron has been responsible for the management of field data for multiple, large-scale initiatives in Nova Scotia, including a mining development.

## Selected Project Experience

- Delineated wetlands, completed watercourse identification and vegetation assessments for two large-scale developments in Nova Scotia in 2016 and 2017.
- Completed ungulate and other wildlife surveys for a variety of Natural Resource projects.
- Surveyed environmental baseline data for the federal environmental assessment process for a proposed development of a gold mine in eastern Nova Scotia in 2017.
- Collaborated with communities, local resource users, and First Nations to implement solutions.
- Coordinated spatial data organization, performed GIS analysis, and created dynamic maps for a variety of projects.

## Experience

### McCallum Environmental Ltd., Halifax, Nova Scotia

#### Environmental Scientist:

May 2018-Present

- Completing biophysical assessments, including flora and fauna surveys, with emphasis on species at risk. Completing wetland and watercourse delineations and assessments and coordinating data management and Geographical Information Systems (GIS). Communicating field survey results and methodologies for Environmental Assessments and other Provincial regulatory applications.

### Self-employed consultant, St John's, Newfoundland

#### Biology Consultant

January 2016 – April 2018.

Louis Charron, MSc.

[louis@mccallumenvironmental.com](mailto:louis@mccallumenvironmental.com)

- Management and analyses of large-scale data pertaining to biological, geographical, medical and sociological research, such as 20 years of moose browsing data from Terra Nova National Park.
- Statistical analyses and modelling of the data to inform management decisions
- Communication of the statistical methodology and results in reports and peer-reviewed papers

**Memorial University of Newfoundland and Labrador, St John's, Newfoundland**

Research assistant

July 2015 – April 2016.

- Completion of river habitat assessment and electrofishing for salmonids reintroduction efforts.
- Completion of salmon egg incubation experiment and experimental planting in river for successful reintroduction.
- Supervision of research program team and development of an experimental program on spatial distribution of tree species at various sites across Newfoundland.

**Mistaken Point Ecological Reserve, Portugal Cove South, Newfoundland**

Interpretation technician

April 2016 – April 2018.

- Communication to the general public about the fossils found at Mistaken Point Ecological Reserve – UNESCO World Heritage Site.
- Supervision of the interpretation team and development of interpretation material to be presented.
- Worked closely with local community members, government representatives and researchers to develop the reserve and the area as a international touristic hotspot.

**Laval University, Quebec city, Quebec**

Field technician

2010 – 2012 (temporary contract).

- Completing botanical field assessment, wetland characterization, experimental set-up and data collection for project related to revegetation of exploited wetlands, cultivation of ramp (*Allium Triccocum*) and characterization of grapes chemical profile.

## **Appendix C. WETLAND FUNCTIONAL ASSESSMENT RESULTS**

Table 1: WESP Evaluation Results - Grouped Wetland Functions

WL ID	HYDROLOGICAL group		WATER QUALITY group		AQUATIC SUPPORT group		AQUATIC HABITAT group		TRANSITION HABITAT group		WETLAND CONDITION		WETLAND RISK		Average Function	Average Benefits
	Function	Benefit	Function	Benefit	Function	Benefit	Function	Benefit	Function	Benefit	Function	Benefit	Function	Benefit		
1	3	2	3	2	1	1	1	1	3	1	N/A	2	N/A	3	2.2	1.7
2	2	2	3	1	2	3	2	1	3	3	N/A	2	N/A	2	2.4	2.0
3	3	2	3	1	1	1	1	1	3	3	N/A	2	N/A	2	2.2	1.7
4	1	2	1	3	3	3	2	1	3	1	N/A	1	N/A	2	2.0	1.9
5	2	2	3	1	2	3	2	2	3	1	N/A	2	N/A	1	2.4	1.7
6	3	2	3	1	2	1	1	1	3	1	N/A	3	N/A	3	2.4	1.7
7	2	3	3	2	2	1	1	1	3	1	N/A	3	N/A	3	2.2	2.0
8	1	2	1	1	2	2	2	1	3	1	N/A	3	N/A	1	1.8	1.6
9	3	3	3	2	1	1	1	1	2	1	N/A	1	N/A	2	2.0	1.6
10	3	3	3	3	1	1	1	1	2	1	N/A	1	N/A	3	2.0	1.9
11	1	3	1	3	1	2	2	2	3	1	N/A	3	N/A	3	1.6	2.4
12	3	3	3	3	2	1	1	1	3	1	N/A	3	N/A	3	2.4	2.1
13	1	3	1	2	2	2	2	2	3	1	N/A	3	N/A	2	1.8	2.1
14	1	2	1	2	2	2	2	3	3	2	N/A	3	N/A	2	1.8	2.3
15	3	2	3	2	1	1	1	1	2	2	N/A	2	N/A	3	2.0	1.9
16	1	2	1	2	2	2	2	3	3	3	N/A	1	N/A	2	1.8	2.1
17	1	2	1	2	2	2	2	3	3	2	N/A	1	N/A	2	1.8	2.0
18	2	3	1	2	2	2	1	1	3	2	N/A	3	N/A	2	1.8	2.1
19	3	2	3	1	2	1	1	1	3	1	N/A	3	N/A	3	2.4	1.7
20	3	3	3	2	1	1	1	1	2	1	N/A	1	N/A	2	2.0	1.6
21	3	3	3	2	1	1	1	1	2	1	N/A	2	N/A	2	2.0	1.7
22	1	3	1	2	2	3	2	2	3	1	N/A	3	N/A	2	1.8	2.3
23	1	3	1	2	2	3	2	2	3	3	N/A	3	N/A	2	1.8	2.6
24	2	3	2	2	2	2	1	1	3	3	N/A	3	N/A	2	2.0	2.3
25	2	2	2	1	2	2	1	1	3	3	N/A	3	N/A	2	2.0	2.0
26	1	3	1	2	2	2	2	3	3	2	N/A	3	N/A	1	1.8	2.3
27	2	2	3	1	1	2	2	2	3	3	N/A	3	N/A	2	2.2	2.1
28	2	3	2	2	2	2	1	1	2	2	N/A	3	N/A	2	1.8	2.1
29	2	3	3	2	1	2	2	3	3	2	N/A	1	N/A	2	2.2	2.1
30	2	3	1	2	2	2	1	1	2	2	N/A	1	N/A	2	1.6	1.9
31	2	3	1	2	3	2	1	1	2	2	N/A	3	N/A	2	1.8	2.1
32	2	3	3	2	1	2	2	3	3	2	N/A	2	N/A	2	2.2	2.3
33	3	3	3	2	1	1	1	1	2	2	N/A	2	N/A	3	2.0	2.0
34	2	3	3	2	1	2	2	3	3	3	N/A	1	N/A	3	2.2	2.4
35	2	3	1	2	2	2	1	1	2	2	N/A	3	N/A	3	1.6	2.3
36	3	3	3	2	1	1	1	1	2	1	N/A	1	N/A	2	2.0	1.6



Table 1: WESP Evaluation Results - Grouped Wetland Functions

WL ID	HYDROLOGICAL group		WATER QUALITY group		AQUATIC SUPPORT group		AQUATIC HABITAT group		TRANSITION HABITAT group		WETLAND CONDITION		WETLAND RISK		Average Function	Average Benefits
	Function	Benefit	Function	Benefit	Function	Benefit	Function	Benefit	Function	Benefit	Function	Benefit	Function	Benefit		
37	2	3	3	2	2	1	1	1	2	1	N/A	1	N/A	2	2.0	1.6
38	3	3	3	2	1	1	1	1	3	1	N/A	1	N/A	2	2.2	1.6
Total average (All Wetlands)	2	3	2	2	2	2	1	2	3	2	N/A	2	N/A	2	2.0	2.0



**Table 2: WESP Evaluation Results - Specific Wetland Functions**

Wetland	7		8		9		10		11		12	
	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating
<b>Individual Wetland Services</b>												
Water Storage & Delay (WS)	2	3	1	2	3	3	3	3	1	3	3	3
Stream Flow Support (SFS)	1	1	3	2	1	1	1	1	1	2	1	1
Water Cooling (WC)	1	1	2	2	1	1	1	1	2	1	1	1
Sediment Retention & Stabilisation (SR)	1	2	1	1	2	3	1	3	1	3	2	3
Phosphorus Retention (PR)	1	2	1	1	1	3	1	3	1	3	1	3
Nitrate Removal & Retention (NR)	3	2	1	1	3	2	3	3	1	3	3	3
Carbon Sequestration (CS)	2	N/A	1	N/A	3	N/A	2	N/A	1	N/A	2	N/A
Organic Nutrient Export (OE)	2	N/A	2	N/A	2	N/A	1	N/A	2	N/A	2	N/A
Anadromous Fish Habitat (FA)	1	1	1	1	1	1	1	1	1	1	1	1
Resident Fish Habitat (FR)	1	1	1	1	1	1	1	1	1	1	1	1
Aquatic Invertebrate Habitat (INV)	2	1	1	2	3	1	1	1	1	2	3	1
Amphibian & Turtle Habitat (AM)	1	1	2	2	1	1	1	1	2	2	1	1
Waterbird Feeding Habitat (WBF)	1	1	2	1	1	1	1	1	2	2	1	1
Waterbird Nesting Habitat (WBN)	1	1	2	1	1	1	1	1	2	2	1	1
Songbird, Raptor, & Mammal Habitat (SBM)	2	1	3	1	2	1	2	1	2	2	2	1
Pollinator Habitat (POL)	3	1	3	1	2	1	2	1	3	1	3	1
Native Plant Habitat (PH)	2	1	1	1	2	1	1	1	2	1	2	1
Public Use & Recognition (PU)	N/A	2	N/A	2	N/A	2	N/A	2	N/A	2	N/A	2
Wetland Sensitivity (Sens)	N/A	3	N/A	1	N/A	2	N/A	3	N/A	3	N/A	3
Wetland Ecological Condition (EC)	N/A	3	N/A	3	N/A	1	N/A	1	N/A	3	N/A	3
Wetland Stressors (STR)	N/A	2	N/A	2	N/A	2	N/A	3	N/A	3	N/A	2

**Table 2: WESP Evaluation Results - Specific Wetland Functions**

Wetland	13		14		15		16		17	
	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating
Individual Wetland Services										
Water Storage & Delay (WS)	1	3	1	2	3	2	1	2	1	2
Stream Flow Support (SFS)	2	2	2	2	1	1	1	1	2	2
Water Cooling (WC)	2	2	2	1	1	1	3	1	3	1
Sediment Retention & Stabilisation (SR)	1	2	1	2	2	2	1	2	1	2
Phosphorus Retention (PR)	1	2	1	2	1	2	1	2	1	2
Nitrate Removal & Retention (NR)	1	2	1	2	3	2	2	2	1	2
Carbon Sequestration (CS)	1	N/A	1	N/A	3	N/A	1	N/A	1	N/A
Organic Nutrient Export (OE)	2	N/A	3	N/A	2	N/A	2	N/A	2	N/A
Anadromous Fish Habitat (FA)	1	1	1	1	1	1	1	1	1	1
Resident Fish Habitat (FR)	1	1	1	1	1	1	1	1	1	1
Aquatic Invertebrate Habitat (INV)	1	2	1	2	2	1	2	2	1	2
Amphibian & Turtle Habitat (AM)	1	2	1	3	1	2	1	3	2	3
Waterbird Feeding Habitat (WBF)	2	2	2	3	1	1	2	3	2	3
Waterbird Nesting Habitat (WBN)	2	2	2	1	1	1	2	1	2	1
Songbird, Raptor, & Mammal Habitat (SBM)	2	2	2	3	2	3	2	3	3	3
Pollinator Habitat (POL)	3	1	3	1	2	1	3	3	3	1
Native Plant Habitat (PH)	2	1	2	1	1	1	1	3	1	1
Public Use & Recognition (PU)	N/A	2	N/A	2	N/A	2	N/A	2	N/A	2
Wetland Sensitivity (Sens)	N/A	2	N/A	2	N/A	3	N/A	3	N/A	2
Wetland Ecological Condition (EC)	N/A	3	N/A	3	N/A	2	N/A	1	N/A	1
Wetland Stressors (STR)	N/A	2	N/A	2	N/A	2	N/A	2	N/A	2





**Table 2: WESP Evaluation Results - Specific Wetland Functions**

Wetland	30		31		32		33		34		35	
	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating
<b>Individual Wetland Services</b>												
Water Storage & Delay (WS)	2	3	2	3	2	3	3	3	2	3	2	3
Stream Flow Support (SFS)	2	2	2	2	1	1	1	1	1	1	2	2
Water Cooling (WC)	1	1	1	1	3	1	1	1	3	1	1	1
Sediment Retention & Stabilisation (SR)	1	2	1	2	3	2	2	2	3	2	2	2
Phosphorus Retention (PR)	1	2	1	2	3	2	1	2	3	2	1	2
Nitrate Removal & Retention (NR)	2	2	2	2	3	2	3	2	3	2	2	2
Carbon Sequestration (CS)	2	N/A	2	N/A	1	N/A	3	N/A	1	N/A	2	N/A
Organic Nutrient Export (OE)	3	N/A	3	N/A	1	N/A	2	N/A	1	N/A	2	N/A
Anadromous Fish Habitat (FA)	1	1	1	1	1	1	1	1	1	1	1	1
Resident Fish Habitat (FR)	1	1	1	1	1	1	1	1	1	1	1	1
Aquatic Invertebrate Habitat (INV)	2	1	3	1	1	2	3	1	1	2	3	1
Amphibian & Turtle Habitat (AM)	1	2	1	2	2	3	1	2	2	3	1	2
Waterbird Feeding Habitat (WBF)	1	1	1	1	2	3	1	1	2	3	1	1
Waterbird Nesting Habitat (WBN)	1	1	1	1	2	1	1	1	2	1	1	1
Songbird, Raptor, & Mammal Habitat (SBM)	2	3	2	3	3	3	2	3	3	3	2	3
Pollinator Habitat (POL)	3	1	2	1	3	1	2	1	3	3	3	1
Native Plant Habitat (PH)	1	1	2	1	1	1	2	1	2	3	2	1
Public Use & Recognition (PU)	N/A	2	N/A	2	N/A	3	N/A	2	N/A	2	N/A	2
Wetland Sensitivity (Sens)	N/A	2	N/A	2	N/A	2	N/A	3	N/A	3	N/A	3
Wetland Ecological Condition (EC)	N/A	1	N/A	3	N/A	2	N/A	2	N/A	1	N/A	3
Wetland Stressors (STR)	N/A	2	N/A	2	N/A	2	N/A	2	N/A	3	N/A	3

**Table 2: WESP Evaluation Results - Specific Wetland Functions**

Wetland	36		37		38	
	Function Rating	Benefits Rating	Function Rating	Benefits Rating	Function Rating	Benefits Rating
<b>Individual Wetland Services</b>						
Water Storage & Delay (WS)	3	3	2	3	3	3
Stream Flow Support (SFS)	1	1	1	1	1	1
Water Cooling (WC)	1	1	1	1	1	1
Sediment Retention & Stabilisation (SR)	2	2	1	3	2	3
Phosphorus Retention (PR)	1	2	1	3	1	3
Nitrate Removal & Retention (NR)	3	2	3	2	3	2
Carbon Sequestration (CS)	3	N/A	2	N/A	3	N/A
Organic Nutrient Export (OE)	2	N/A	2	N/A	2	N/A
Anadromous Fish Habitat (FA)	1	1	1	1	1	1
Resident Fish Habitat (FR)	1	1	1	1	1	1
Aquatic Invertebrate Habitat (INV)	2	1	1	1	2	1
Amphibian & Turtle Habitat (AM)	1	1	1	1	1	1
Waterbird Feeding Habitat (WBF)	1	1	1	1	1	1
Waterbird Nesting Habitat (WBN)	1	1	1	1	1	1
Songbird, Raptor, & Mammal Habitat (SBM)	2	2	2	1	2	1
Pollinator Habitat (POL)	3	1	3	1	3	1
Native Plant Habitat (PH)	2	1	1	1	2	1
Public Use & Recognition (PU)	N/A	2	N/A	2	N/A	2
Wetland Sensitivity (Sens)	N/A	1	N/A	2	N/A	2
Wetland Ecological Condition (EC)	N/A	1	N/A	1	N/A	1
Wetland Stressors (STR)	N/A	2	N/A	2	N/A	2



## **Appendix D. PHOTO LOG**

**Photo Log – October 12<sup>th</sup>, 2018**  
**Wellington Road Wetland, Vascular Plant and Lichen Surveys**



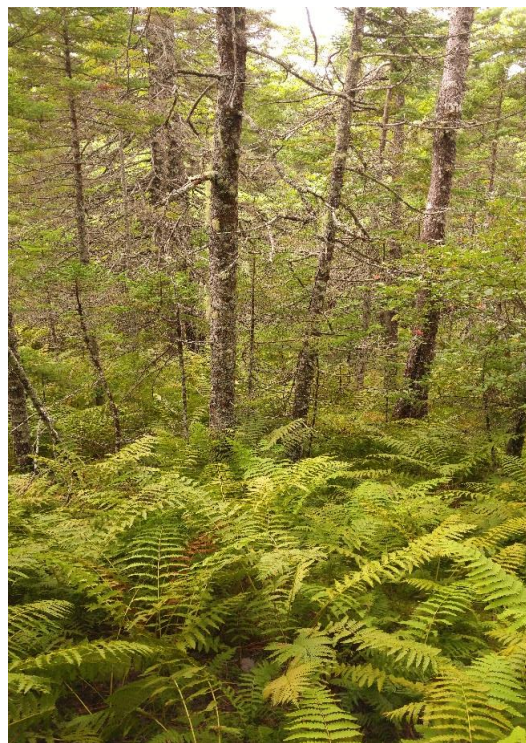
**Photo 1.** Treed Swamp portion of Wetland 5



**Photo 2.** Treed Bog Portion of Wetland 5



**Photo 3.** Bog Portion of Wetland 27



**Photo 4.** Swamp Portion of Wetland 27





**Photo 5.** Typical upland forested landscape within the Study Area



**Photo 6.** Typical upland forested landscape within the Study Area



**Photo 7.** *Agalinis neoscotica* on the edge of a dirt road



**Photo 8.** Zoomed in photo of the flower of *Agalinis neoscotica*





**Photo 9.** Typical *Agalinis neoscotica* habitat within the Study Area



**Photo 10.** *Degelia plumbea* on a mature Red Maple in Wetland 34



**Photo 11.** *Degelia plumbea* habitat in Wetland 34



**Photo 12.** *Degelia plumbea* growing on mature Red Maple in Wetland 16

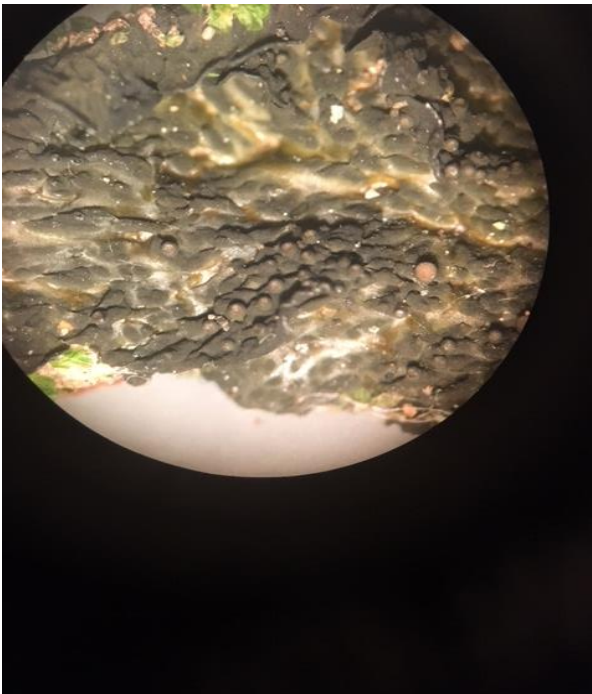




**Photo 13.** *Degelia plumbea* habitat in Wetland 16



**Photo 14.** *Collema nigrescens* (the black lichen) growing on a Red Maple in Wetland 27



**Photo 15.** *Collema nigrescens* at 20X on dissection microscope showing conspicuous ridges and pustules and apothecia



**Photo 16.** *Collema nigrescens* habitat in Wetland 27





**Photo 17.** *Coccocarpia palmicola* (within the red rectangle) an indicator of BFL habitat, found growing on a mature Red Maple in close proximity to wetland 3



**Photo 18.** Typical BFL habitat within and surrounding wetland 3 where *Coccocarpia palmicola* was found



**Photo 19.** *Heterodermia neglecta* found on a mature Red Maple in wetland 23

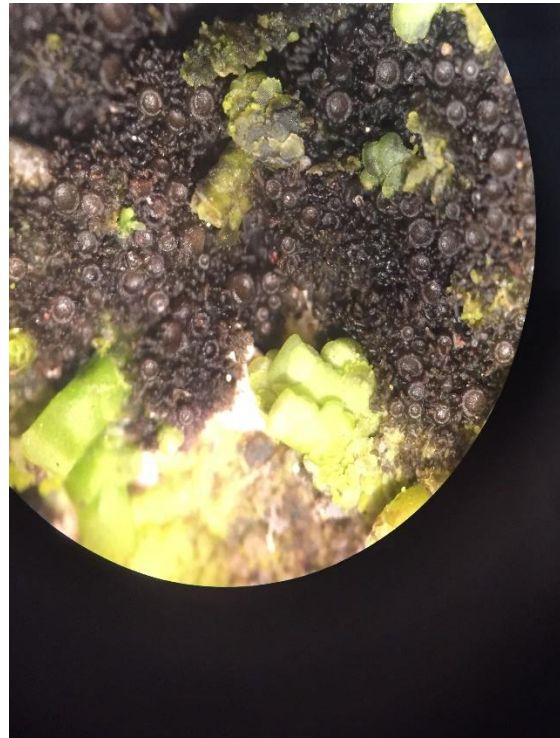


**Photo 20.** *Heterodermia neglecta* habitat within Wetland 23





**Photo 21.** *Leptogium subtile* (within the red rectangle) growing at the base of a Red Maple in Wetland 34



**Photo 22.** *Leptogium subtile* (wet thallus) at 20X on a dissecting microscope. Note the abundant apothecia and terete lobes which are diagnostic features for this species

## **Appendix E. VASCULAR PLANT LIST**



### VASCULAR PLANT LIST SEPTEMBER 2018

Scientific Name	Common Name	SRank
<i>Agalinis neoscotica</i>	Nova Scotia Agalinis	S3S4
<i>Abies balsamea</i>	Balsam Fir	S5
<i>Acer pensylvanicum</i>	Striped Maple	S5
<i>Acer saccharum</i>	Sugar Maple	S4S5
<i>Aegopodium podagraria</i>	Bishop's Goutweed	SNA
<i>Agrostis capillaris</i>	Colonial Bent Grass	SNA
<i>Agrostis scabra</i>	Rough Bent Grass	S5
<i>Agrostis stolonifera</i>	Creeping Bent Grass	S5
<i>Alnus incana</i>	Speckled Alder	S5
<i>Alnus viridis</i>	Green Alder	S5
<i>Amelanchier laevis</i>	Smooth Serviceberry	S5
<i>Anaphalis margaritacea</i>	Pearly Everlasting	S5
<i>Andromeda polifolia</i>	Bog Rosemary	S5
<i>Aralia nudicaulis</i>	Wild Sarsaparilla	S5
<i>Athyrium filix-femina</i>	Common Lady Fern	S5
<i>Bartonia paniculata</i>	Branched Bartonia	S4S5
<i>Betula alleghaniensis</i>	Yellow Birch	S5
<i>Betula papyrifera</i>	Paper Birch	S5
<i>Betula populifolia</i>	Gray Birch	S5
<i>Bidens frondosa</i>	Devil's Beggarticks	S5
<i>Brachyelytrum erectum</i>	Bearded Shorthusk	SNA
<i>Calamagrostis canadensis</i>	Bluejoint Reed Grass	S5
<i>Calamagrostis pickeringii</i>	Pickering's Reed Grass	S4S5
<i>Carex arctata</i>	Black Sedge	S5
<i>Carex atlantica</i>	Atlantic Sedge	S4
<i>Carex canescens</i>	Silvery Sedge	S5
<i>Carex communis</i>	Fibrous-Root Sedge	S5
<i>Carex debilis</i>	White-edged Sedge	S5
<i>Carex disperma</i>	Two-seeded Sedge	S5
<i>Carex echinata</i>	Star Sedge	S5
<i>Carex exilis</i>	Coastal Sedge	S4
<i>Carex flava</i>	Yellow Sedge	S5
<i>Carex folliculata</i>	Northern Long Sedge	S5
<i>Carex gynandra</i>	Nodding Sedge	S5
<i>Carex intumescens</i>	Bladder Sedge	S5
<i>Carex lacustris</i>	Lake Sedge	S4
<i>Carex lurida</i>	Sallow Sedge	S5
<i>Carex magellanica</i>	Boreal Bog Sedge	S5
<i>Carex pallescens</i>	Pale Sedge	S5
<i>Carex scoparia</i>	Broom Sedge	S5
<i>Carex stipata</i>	Awl-fruited Sedge	S5
<i>Carex stricta</i>	Tussock Sedge	S5
<i>Carex trisperma</i>	Three-seeded Sedge	S5
<i>Centaurea nigra</i>	Black Knapweed	SNA
<i>Chamaedaphne calyculata</i>	Leatherleaf	S5
<i>Cicuta maculata</i>	Spotted Water-Hemlock	S5

Scientific Name	Common Name	SRank
<i>Cinna latifolia</i>	Drooping Wood Reed Grass	S5
<i>Cladium mariscoides</i>	Smooth Twigrush	S5
<i>Clintonia borealis</i>	Yellow Bluebead Lily	S5
<i>Comptonia peregrina</i>	Sweet-fern	S5
<i>Convallaria majalis</i>	European Lily-of-the-Valley	SNA
<i>Coptis trifolia</i>	Goldthread	S5
<i>Cornus canadensis</i>	Bunchberry	S5
<i>Corylus cornuta</i>	Beaked Hazel	S5
<i>Cypripedium acaule</i>	Pink Lady's-Slipper	S5
<i>Danthonia spicata</i>	Poverty Oat Grass	S5
<i>Dennstaedtia punctilobula</i>	Eastern Hay-Scented Fern	S5
<i>Deschampsia flexuosa</i>	Wavy Hair Grass	S5
<i>Dianthus armeria</i>	Deptford Pink	SNA
<i>Dichanthelium spretum</i>	Eaton's Witchgrass	S4
<i>Diervilla lonicera</i>	Northern Bush Honeysuckle	S5
<i>Digitaria sanguinalis</i>	Hairy Crab Grass	SNA
<i>Doellingeria umbellata</i>	Hairy Flat-top White Aster	S5
<i>Drosera rotundifolia</i>	Round-leaved Sundew	S5
<i>Dryopteris campyloptera</i>	Mountain Wood Fern	S5
<i>Dryopteris intermedia</i>	Evergreen Wood Fern	S5
<i>Dulichium arundinaceum</i>	Three-Way Sedge	S5
<i>Eleocharis tenuis</i>	Slender Spikerush	S5
<i>Epigaea repens</i>	Trailing Arbutus	S5
<i>Epilobium ciliatum</i>	Northern Willowherb	S5
<i>Epilobium leptophyllum</i>	Bog Willowherb	S5
<i>Equisetum arvense</i>	Field Horsetail	S5
<i>Eriocaulon aquaticum</i>	White Buttons	S5
<i>Eriophorum tenellum</i>	Rough Cottongrass	S4S5
<i>Eriophorum virginicum</i>	Tawny Cottongrass	S5
<i>Eupatorium perfoliatum</i>	Common Boneset	S5
<i>Euphrasia nemorosa</i>	Common Eyebright	S5
<i>Eurybia radula</i>	Low Rough Aster	S5
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	S5
<i>Festuca filiformis</i>	Hair Fescue	SNA
<i>Fragaria virginiana</i>	Wild Strawberry	S5
<i>Frangula alnus</i>	Glossy Buckthorn	SNA
<i>Fraxinus americana</i>	White Ash	S5
<i>Galeopsis tetrahit</i>	Common Hemp-nettle	SNA
<i>Galium tinctorium</i>	Dyer's Bedstraw	S5
<i>Gaultheria hispidula</i>	Creeping Snowberry	S5
<i>Gaultheria procumbens</i>	Eastern Teaberry	S5
<i>Gaylussacia baccata</i>	Black Huckleberry	S5
<i>Gaylussacia bigeloviana</i>	Dwarf Huckleberry	S5
<i>Glyceria canadensis</i>	Canada Manna Grass	S5
<i>Glyceria striata</i>	Fowl Manna Grass	S5
<i>Gnaphalium uliginosum</i>	Marsh Cudweed	SNA
<i>Gymnocarpium dryopteris</i>	Common Oak Fern	S5
<i>Hamamelis virginiana</i>	American Witch-Hazel	S5

Scientific Name	Common Name	SRank
<i>Hieracium lachenalii</i>	Common Hawkweed	SNA
<i>Hieracium piloselloides</i>	Tall Hawkweed	SNA
<i>Hypericum canadense</i>	Canada St John's-wort	S5
<i>Hypericum perforatum</i>	Common St. John's-wort	SNA
<i>Ilex verticillata</i>	Common Winterberry	S5
<i>Impatiens capensis</i>	Spotted Jewelweed	S5
<i>Iris versicolor</i>	Harlequin Blue Flag	S5
<i>Juncus brevicaudatus</i>	Narrow-Paniced Rush	S5
<i>Juncus canadensis</i>	Canada Rush	S5
<i>Juncus effusus</i>	Soft Rush	S5
<i>Juncus pelocarpus</i>	Brown-Fruited Rush	S5
<i>Juncus tenuis</i>	Slender Rush	S5
<i>Juniperus communis</i>	Common Juniper	S5
<i>Kalmia angustifolia</i>	Sheep Laurel	S5
<i>Kalmia polifolia</i>	Pale Bog Laurel	S5
<i>Larix laricina</i>	Tamarack	S5
<i>Ledum groenlandicum</i>	Common Labrador Tea	S5
<i>Leersia oryzoides</i>	Rice Cut Grass	S5
<i>Linnaea borealis</i>	Twinflower	S5
<i>Lonicera canadensis</i>	Canada Fly Honeysuckle	S5
<i>Lonicera villosa</i>	Mountain Fly Honeysuckle	S4S5
<i>Luzula multiflora</i>	Common Woodrush	S5
<i>Lycopodium annotinum</i>	Stiff Clubmoss	S5
<i>Lycopodium dendroideum</i>	Round-branched Tree-clubmoss	S5
<i>Lycopus uniflorus</i>	Northern Water Horehound	S5
<i>Lysimachia terrestris</i>	Swamp Yellow Loosestrife	S5
<i>Lythrum salicaria</i>	Purple Loosestrife	SNA
<i>Maianthemum canadense</i>	Wild Lily-of-The-Valley	S5
<i>Maianthemum trifolium</i>	Three-leaved False Solomon's Seal	S5
<i>Medeola virginiana</i>	Indian Cucumber Root	S5
<i>Medicago lupulina</i>	Black Medick	SNA
<i>Mitchella repens</i>	Partridgeberry	S5
<i>Monotropa uniflora</i>	Indian Pipe	S5
<i>Morella pensylvanica</i>	Northern Bayberry	S5
<i>Muhlenbergia uniflora</i>	Bog Muhly	S5
<i>Myrica gale</i>	Sweet Gale	S5
<i>Nemopanthus mucronatus</i>	Mountain Holly	S5
<i>Oclemena acuminata</i>	Whorled Wood Aster	S5
<i>Oclemena nemoralis</i>	Bog Aster	S5
<i>Onoclea sensibilis</i>	Sensitive Fern	S5
<i>Orthilia secunda</i>	One-sided Wintergreen	S5
<i>Osmunda cinnamomea</i>	Cinnamon Fern	S5
<i>Osmunda claytoniana</i>	Interrupted Fern	S5
<i>Osmunda regalis</i>	Royal Fern	S5
<i>Oxalis montana</i>	Common Wood Sorrel	S5
<i>Panicum capillare</i>	Common Witch Grass	SNA
<i>Panicum dichotomiflorum</i>	Fall Panic Grass	S5
<i>Phegopteris connectilis</i>	Northern Beech Fern	S5

Scientific Name	Common Name	SRank
<i>Photinia melanocarpa</i>	Black Chokeberry	S5
<i>Physocarpus opulifolius</i>	Eastern Ninebark	SNA
<i>Picea glauca</i>	White Spruce	S5
<i>Picea mariana</i>	Black Spruce	S5
<i>Picea rubens</i>	Red Spruce	S5
<i>Pinus strobus</i>	Eastern White Pine	S5
<i>Pinus sylvestris</i>	Scotch Pine	SNA
<i>Plantago major</i>	Common Plantain	SNA
<i>Platanthera clavellata</i>	Club Spur Orchid	S5
<i>Platanthera psycodes</i>	Small Purple Fringed Orchid	S4
<i>Poa pratensis</i>	Kentucky Blue Grass	S5
<i>Pogonia ophioglossoides</i>	Rose Pogonia	S4
<i>Polygonum sagittatum</i>	Arrow-leaved Smartweed	S5
<i>Polypodium virginianum</i>	Rock Polypody	S5
<i>Polystichum acrostichoides</i>	Christmas Fern	S5
<i>Populus grandidentata</i>	Large-toothed Aspen	S5
<i>Populus tremuloides</i>	Trembling Aspen	S5
<i>Potentilla simplex</i>	Old Field Cinquefoil	S5
<i>Prenanthes altissima</i>	Tall Rattlesnakeroot	S5
<i>Prunella vulgaris</i>	Common Self-heal	S5
<i>Prunus pensylvanica</i>	Pin Cherry	S5
<i>Prunus virginiana</i>	Chokecherry	S5
<i>Pteridium aquilinum</i>	Bracken Fern	S5
<i>Pyrola elliptica</i>	Shinleaf	S5
<i>Quercus rubra</i>	Northern Red Oak	S5
<i>Ranunculus acris</i>	Common Buttercup	SNA
<i>Ranunculus repens</i>	Creeping Buttercup	SNA
<i>Rhinanthus minor ssp. minor</i>	Little Yellow Rattle	S5
<i>Rhododendron canadense</i>	Rhodora	S5
<i>Rhynchospora alba</i>	White Beakrush	S5
<i>Rhynchospora capitellata</i>	Small-headed Beakrush	S4
<i>Rosa multiflora</i>	Multiflora Rose	SNA
<i>Rosa nitida</i>	Shining Rose	S4S5
<i>Rosa virginiana</i>	Virginia Rose	S5
<i>Rubus allegheniensis</i>	Alleghaney Blackberry	S5
<i>Rubus hispidus</i>	Bristly Dewberry	S5
<i>Rubus idaeus</i>	Red Raspberry	S5
<i>Rubus pubescens</i>	Dwarf Red Raspberry	S5
<i>Salix bebbiana</i>	Bebb's Willow	S5
<i>Sarracenia purpurea</i>	Northern Pitcher Plant	S5
<i>Scirpus cyperinus</i>	Common Woolly Bulrush	S5
<i>Scirpus hattorianus</i>	Mosquito Bulrush	S5
<i>Scirpus microcarpus</i>	Small-fruited Bulrush	S5
<i>Scutellaria galericulata</i>	Marsh Skullcap	S5
<i>Sisyrinchium angustifolium</i>	Narrow-leaved Blue-eyed-grass	S4
<i>Solidago puberula</i>	Downy Goldenrod	S5
<i>Solidago rugosa</i>	Rough-stemmed Goldenrod	S5
<i>Solidago uliginosa</i>	Northern Bog Goldenrod	S5

Scientific Name	Common Name	SRank
<i>Sorbus americana</i>	American Mountain Ash	S5
<i>Spiraea alba</i>	White Meadowsweet	S5
<i>Spiraea tomentosa</i>	Steeplebush	S5
<i>Spiranthes cernua</i>	Nodding Ladies'-Tresses	S5
<i>Symphyotrichum lateriflorum</i>	Calico Aster	S5
<i>Symphyotrichum novi-belgii</i>	New York Aster	S5
<i>Taxus canadensis</i>	Canada Yew	S4S5
<i>Thelypteris palustris</i>	Eastern Marsh Fern	S5
<i>Triadenum virginicum</i>	Virginia St John's-wort	S5
<i>Trientalis borealis</i>	Northern Starflower	S5
<i>Trillium undulatum</i>	Painted Trillium	S5
<i>Typha latifolia</i>	Broad-leaved Cattail	S5
<i>Utricularia cornuta</i>	Horned Bladderwort	S5
<i>Vaccinium angustifolium</i>	Late Lowbush Blueberry	S5
<i>Vaccinium macrocarpon</i>	Large Cranberry	S5
<i>Vaccinium myrtilloides</i>	Velvet-leaved Blueberry	S5
<i>Vaccinium oxycoccos</i>	Small Cranberry	S5
<i>Vaccinium vitis-idaea</i>	Mountain Cranberry	S5
<i>Veronica chamaedrys</i>	Germander Speedwell	SNA
<i>Veronica officinalis</i>	Common Speedwell	S5
<i>Viburnum nudum</i>	Northern Wild Raisin	S5
<i>Vicia cracca</i>	Tufted Vetch	SNA
<i>Viola cucullata</i>	Marsh Blue Violet	S5
<i>Viola macloskeyi</i>	Small White Violet	S5
<i>Woodwardia virginica</i>	Virginia Chain Fern	S4

Note: Scientific names used are in accordance to the latest ACCDC species list retrieved in March 2018. Scientific names may no longer be in use, however, for consistency in this report, species names in the ACCDC species list are used.

## **Appendix F. ACCDC REPORT**

# DATA REPORT 6066: Wellington, NS

Prepared 25 March 2018

by J. Churchill, Data Manager

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Map 1. A 100 km buffer around the study area

## 1.0 PREFACE

The Atlantic Canada Conservation Data Centre (ACCDC) 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 ACCDC 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 ACCDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees. URL: [www.ACCDC.com](http://www.ACCDC.com).

Upon request and for a fee, the ACCDC 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 ACCDC 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
WellingtonNS_6066ob.xls	All Rare and legally protected <i>Flora and Fauna</i> in your study area
WellingtonNS_6066ob100km.xls	A list of Rare and legally protected <i>Flora and Fauna</i> within 100 km of your study area
WellingtonNS_6066ma.xls	All <i>Managed Areas</i> in your study area
WellingtonNS_6066ff.xls	Rare and common <i>Freshwater Fish</i> in your study area (DFO database)



## 1.2 RESTRICTIONS

The ACCDC 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 ACCDC 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 ACCDC 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) ACCDC 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) ACCDC 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 ACCDC data response.

## 1.3 ADDITIONAL INFORMATION

The attached file DataDictionary 2.1.pdf provides metadata for the data provided.

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

### Plants, Lichens, Ranking Methods, All other Inquiries

Sean Blaney, Senior Scientist, Executive Director

Tel: (506) 364-2658

[sblaney@mta.ca](mailto:sblaney@mta.ca)

### Animals (Fauna)

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### Plant Communities

Sarah Robinson, Community Ecologist

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### Data Management, GIS

James Churchill, Data Manager

Tel: (902) 679-6146

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### Billing

Jean Breau

Tel: (506) 364-2657

[jrbreau@mta.ca](mailto:jrbreau@mta.ca)

Questions on the biology of Federal Species at Risk can be directed to ACCDC: (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 Stewart Lusk, Natural Resources: (506) 453-7110.

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 Sherman Boates, NSDNR: (902) 679-6146. To determine if location-sensitive species (section 4.3) occur near your study site please contact a NSDNR Regional Biologist:

**Western:** Duncan Bayne

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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

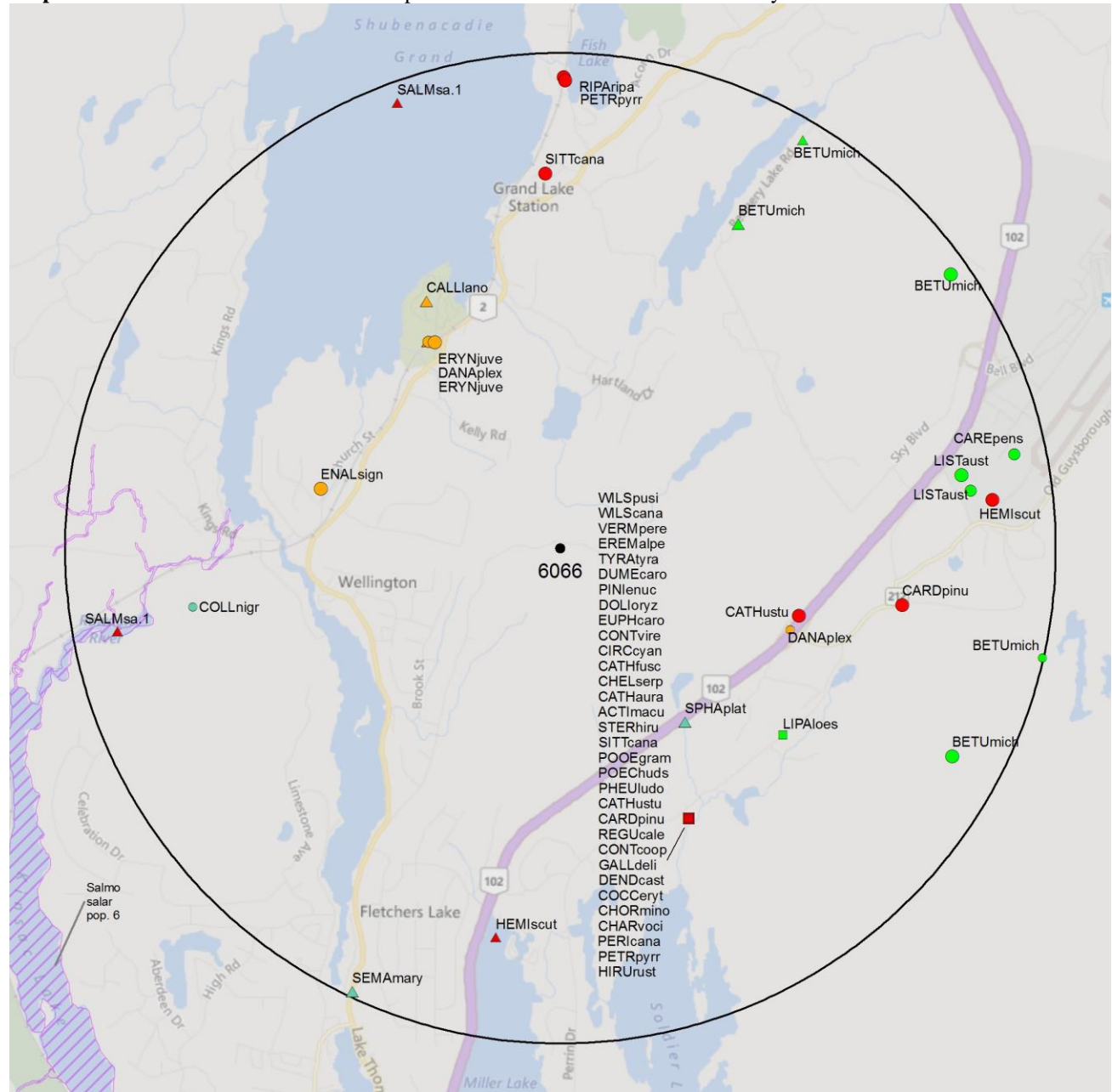
### 2.1 FLORA

The study area contains 9 records of 4 vascular, 4 records of 3 nonvascular flora (Map 2 and attached: \*ob.xls).

### 2.2 FAUNA

The study area contains 80 records of 35 vertebrate, 7 records of 4 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

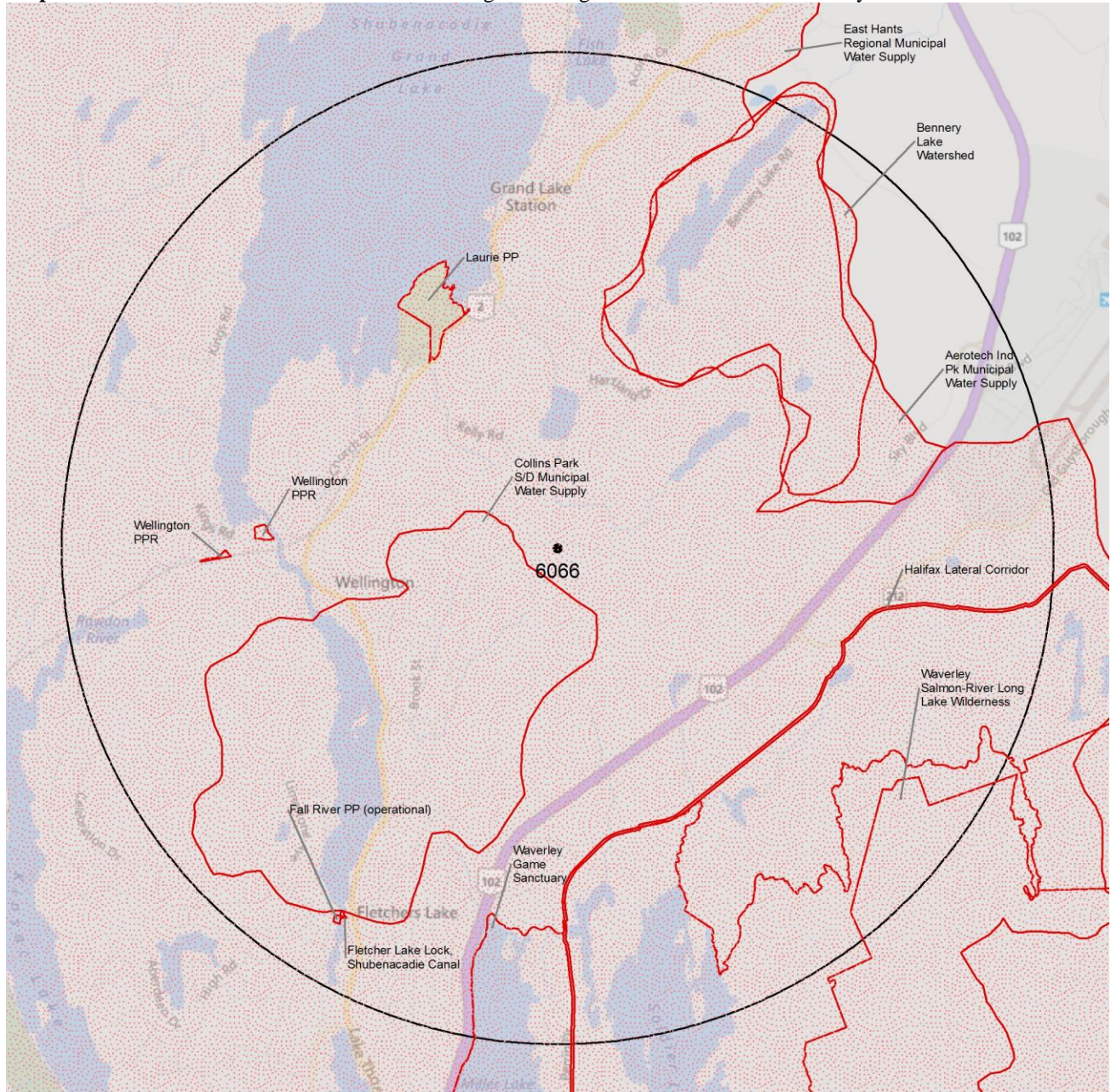
#### 3.1 MANAGED AREAS

The GIS scan identified 14 managed areas in the vicinity of the study area (Map 3 and attached file: \*ma\*.xls).

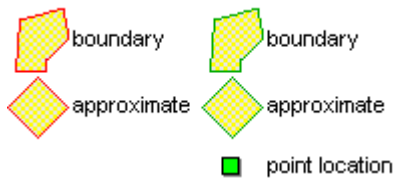
#### 3.2 SIGNIFICANT AREAS

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

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



**MANAGED AREAS    SIGNIFIANT AREAS**



## 4.0 RARE SPECIES LISTS

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

### 4.1 FLORA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
N	<i>Sphagnum platyphyllum</i>	Flat-leaved Peat Moss				S1S2		2	2.2 $\pm$ 3.0
N	<i>Sematophyllum marylandicum</i>	a Moss				S2?	3 Sensitive	1	4.9 $\pm$ 3.0
N	<i>Collema nigrescens</i>	Blistered Tarpaper Lichen				S3	3 Sensitive	1	3.8 $\pm$ 0.0
P	<i>Carex pennsylvanica</i>	Pennsylvania Sedge				S1?	2 May Be At Risk	1	4.7 $\pm$ 0.0
P	<i>Betula michauxii</i>	Michaux's Dwarf Birch				S2S3	3 Sensitive	5	3.7 $\pm$ 1.0
P	<i>Listera australis</i>	Southern Twayblade				S3	4 Secure	2	4.1 $\pm$ 0.0
P	<i>Liparis loeselii</i>	Loesel's Twayblade				S3S4	4 Secure	1	2.9 $\pm$ 5.0

### 4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Salmo salar pop. 1</i>	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered		S1	2 May Be At Risk	2	4.5 $\pm$ 0.0
A	<i>Chordeiles minor</i>	Common Nighthawk	Threatened	Threatened	Threatened	S2B	1 At Risk	1	3.0 $\pm$ 7.0
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S2B	1 At Risk	2	3.0 $\pm$ 7.0
A	<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened	Endangered	S2S3B	2 May Be At Risk	1	4.8 $\pm$ 0.0
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened	Endangered	S2S3B	1 At Risk	5	3.0 $\pm$ 7.0
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Endangered	S3B	1 At Risk	3	3.0 $\pm$ 7.0
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened	Threatened	Vulnerable	S3S4B	3 Sensitive	1	3.0 $\pm$ 7.0
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2B	2 May Be At Risk	2	3.0 $\pm$ 7.0
A	<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	3 Sensitive	3	3.0 $\pm$ 10.0
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern	Special Concern	Vulnerable	S3S4B	3 Sensitive	1	3.0 $\pm$ 7.0
A	<i>Hemidactylium scutatum</i>	Four-toed Salamander	Not At Risk			S3	4 Secure	2	4.0 $\pm$ 0.0
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk			S3B	3 Sensitive	2	3.0 $\pm$ 7.0
A	<i>Circus cyaneus</i>	Northern Harrier	Not At Risk			S3S4B	4 Secure	1	3.0 $\pm$ 7.0
A	<i>Pooecetes gramineus</i>	Vesper Sparrow				S2B	2 May Be At Risk	1	3.0 $\pm$ 7.0
A	<i>Carduelis pinus</i>	Pine Siskin				S2S3	3 Sensitive	3	3.0 $\pm$ 7.0
A	<i>Cathartes aura</i>	Turkey Vulture				S2S3B	3 Sensitive	1	3.0 $\pm$ 7.0
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B	2 May Be At Risk	5	3.0 $\pm$ 7.0
A	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak				S2S3B	3 Sensitive	2	3.0 $\pm$ 7.0
A	<i>Pinicola enucleator</i>	Pine Grosbeak				S2S3B,S5N	2 May Be At Risk	2	3.0 $\pm$ 7.0
A	<i>Perisoreus canadensis</i>	Gray Jay				S3	3 Sensitive	2	3.0 $\pm$ 7.0
A	<i>Poecile hudsonica</i>	Boreal Chickadee				S3	3 Sensitive	2	3.0 $\pm$ 7.0
A	<i>Sitta canadensis</i>	Red-breasted Nuthatch				S3	4 Secure	5	3.0 $\pm$ 7.0
A	<i>Charadrius vociferus</i>	Killdeer				S3B	3 Sensitive	2	3.0 $\pm$ 7.0
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3B	3 Sensitive	1	3.0 $\pm$ 7.0
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B	2 May Be At Risk	1	3.0 $\pm$ 7.0
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3B	3 Sensitive	1	3.0 $\pm$ 7.0
A	<i>Dumetella carolinensis</i>	Gray Catbird				S3B	2 May Be At Risk	1	3.0 $\pm$ 7.0
A	<i>Wilsonia pusilla</i>	Wilson's Warbler				S3B	3 Sensitive	1	3.0 $\pm$ 7.0
A	<i>Actitis macularia</i>	Spotted Sandpiper				S3S4B	3 Sensitive	4	3.0 $\pm$ 7.0
A	<i>Regulus calendula</i>	Ruby-crowned Kinglet				S3S4B	3 Sensitive	4	3.0 $\pm$ 7.0
A	<i>Catharus fuscescens</i>	Veery				S3S4B	4 Secure	2	3.0 $\pm$ 7.0
A	<i>Catharus ustulatus</i>	Swainson's Thrush				S3S4B	4 Secure	8	2.5 $\pm$ 0.0
A	<i>Vermivora peregrina</i>	Tennessee Warbler				S3S4B	3 Sensitive	3	3.0 $\pm$ 7.0
A	<i>Dendroica castanea</i>	Bay-breasted Warbler				S3S4B	3 Sensitive	2	3.0 $\pm$ 7.0

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Eremophila alpestris</i>	Horned Lark				SHB,S4S5N	4 Secure	1	3.0 ± 7.0
I	<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	Endangered	S2B	3 Sensitive	3	2.4 ± 0.0
I	<i>Enallagma signatum</i>	Orange Bluet				S2	2 May Be At Risk	1	2.5 ± 0.0
I	<i>Callophrys lanoraieensis</i>	Bog Elfin				S3	2 May Be At Risk	1	2.8 ± 1.0
I	<i>Erynnis juvenalis</i>	Juvenal's Duskywing				S3S4	4 Secure	2	2.5 ± 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?
<i>Fraxinus nigra</i>	Black Ash		Threatened	No
<i>Emydoidea blandingii</i>	Blanding's Turtle - Nova Scotia pop.	Endangered	Vulnerable	No
<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	No
<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Vulnerable	No
<i>Bat Hibernaculum</i>		[Endangered] <sup>1</sup>	[Endangered] <sup>1</sup>	No

<sup>1</sup> *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 ACCDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

# recs	CITATION
44	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
29	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 407,838 recs.
9	Staff, DNR 2007. Restricted & Limited Use Land Database (RLUL).
5	NSDNR website
4	Benjamin, L.K. (compiler). 2007. Significant Habitat & Species Database. Nova Scotia Dept Natural Resources, 8439 recs.
4	Klymko, J.J.D. 2014. Maritimes Butterfly Atlas, 2012 submissions. Atlantic Canada Conservation Data Centre, 8552 records.
4	Newell, R.E. 2000. E.C. Smith Herbarium Database. Acadia University, Wolfville NS, 7139 recs.
4	Scott, F.W. 2002. Nova Scotia Herpetofauna Atlas Database. Acadia University, Wolfville NS, 8856 recs.
3	Newell, R.E. 2005. E.C. Smith Digital Herbarium. E.C. Smith Herbarium, Irving Biodiversity Collection, Acadia University, Web site: <a href="http://luxor.acadiau.ca/library/Herbarium/project/">http://luxor.acadiau.ca/library/Herbarium/project/</a> . 582 recs.
2	Belland, R.J. Maritimes moss records from various herbarium databases. 2014.
1	Benjamin, L.K. (compiler). 2001. Significant Habitat & Species Database. Nova Scotia Dept of Natural Resources, 15 spp, 224 recs.
1	Brunelle, P.-M. (compiler). 2009. ADIP/MDDS Odonata Database: data to 2006 inclusive. Atlantic Dragonfly Inventory Program (ADIP), 24200 recs.
1	Cameron, R.P. 2011. Lichen observations, 2011. Nova Scotia Environment & Labour, 731 recs.
1	Cameron, R.P. 2012. Additional rare plant records, 2009. , 7 recs.
1	Klymko, J.J.D. 2012. Maritimes Butterfly Atlas, 2010 and 2011 records. Atlantic Canada Conservation Data Centre, 6318 recs.
1	LaPaix, R.W.; Crowell, M.J.; MacDonald, M. 2011. Stantec rare plant records, 2010-11. Stantec Consulting, 334 recs.
1	Layberry, R.A. & Hall, P.W., LaFontaine, J.D. 1998. The Butterflies of Canada. University of Toronto Press. 280 pp+plates.

## 5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 24705 records of 140 vertebrate and 874 records of 66 invertebrate fauna; 6084 records of 295 vascular, 1019 records of 105 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. All ranks correspond to the province in which the study site falls, even for out-of-province records. Taxa are listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation ( $\pm$  the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Coregonus huntsmani</i>	Atlantic Whitefish	Endangered	Endangered	Endangered	S1	7 Exotic	5	93.6 $\pm$ 1.0	NS
A	<i>Myotis lucifugus</i>	Little Brown Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	35	8.9 $\pm$ 0.0	NS
A	<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	5	19.0 $\pm$ 0.0	NS
A	<i>Perimyotis subflavus</i>	Eastern Pipistrelle	Endangered	Endangered	Endangered	S1	1 At Risk	7	19.0 $\pm$ 0.0	NS
A	<i>Salmo salar pop. 1</i>	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered		S1	2 May Be At Risk	32	4.5 $\pm$ 0.0	NS
A	<i>Charadrius melodus melodus</i>	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B	1 At Risk	463	25.4 $\pm$ 7.0	NS
A	<i>Sterna dougallii</i>	Roseate Tern	Endangered	Endangered	Endangered	S1B	1 At Risk	60	35.2 $\pm$ 0.0	NS
A	<i>Morone saxatilis pop. 2</i>	Striped Bass- Bay of Fundy pop.	Endangered			S1B	2 May Be At Risk	4	9.5 $\pm$ 0.0	NS
A	<i>Dermochelys coriacea (Atlantic pop.)</i>	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered		S1S2N		3	43.3 $\pm$ 5.0	NS
A	<i>Calidris canutus rufa</i>	Red Knot rufa ssp	Endangered		Endangered	S2M	1 At Risk	266	26.4 $\pm$ 0.0	NS
A	<i>Colinus virginianus</i>	Northern Bobwhite	Endangered	Endangered				6	27.7 $\pm$ 0.0	NS
A	<i>Caprimulgus vociferus</i>	Whip-Poor-Will	Threatened	Threatened	Threatened	S1?B	1 At Risk	14	7.3 $\pm$ 0.0	NS
A	<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	Threatened	S2	3 Sensitive	166	10.9 $\pm$ 0.0	NS
A	<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	Threatened			S2	2 May Be At Risk	5	19.7 $\pm$ 0.0	NS
A	<i>Anguilla rostrata</i>	American Eel	Threatened			S2	4 Secure	9	13.6 $\pm$ 0.0	NS
A	<i>Chordeiles minor</i>	Common Nighthawk	Threatened	Threatened	Threatened	S2B	1 At Risk	395	3.0 $\pm$ 7.0	NS
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S2B	1 At Risk	617	3.0 $\pm$ 7.0	NS
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Endangered	S2B,S1M	1 At Risk	250	7.4 $\pm$ 7.0	NS
A	<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened	Endangered	S2S3B	2 May Be At Risk	312	4.8 $\pm$ 0.0	NS
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened	Endangered	S2S3B	1 At Risk	794	3.0 $\pm$ 7.0	NS
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Endangered	S3B	1 At Risk	583	3.0 $\pm$ 7.0	NS
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened	Threatened	Vulnerable	S3S4B	3 Sensitive	413	3.0 $\pm$ 7.0	NS
A	<i>Sturnella magna</i>	Eastern Meadowlark	Threatened	Threatened	Threatened	SHB	3 Sensitive	2	55.8 $\pm$ 7.0	NS
A	<i>Hylocichla mustelina</i>	Wood Thrush	Threatened	Threatened		SUB	5 Undetermined	33	22.5 $\pm$ 7.0	NS
A	<i>Passerculus sandwichensis princeps</i>	Savannah Sparrow princeps ssp	Special Concern	Special Concern		S1B	3 Sensitive	2	29.1 $\pm$ 0.0	NS
A	<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius	Special Concern	Special Concern	Vulnerable	S1B,SNAM	3 Sensitive	86	45.6 $\pm$ 0.0	NS
A	<i>Asio flammeus</i>	Short-eared Owl	Special Concern	Special Concern		S1S2B	2 May Be At Risk	9	22.8 $\pm$ 7.0	NS
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2B	2 May Be At Risk	220	3.0 $\pm$ 7.0	NS
A	<i>Histrionicus histrionicus pop. 1</i>	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S2N	1 At Risk	17	44.9 $\pm$ 2.0	NS
A	<i>Phalaropus lobatus</i>	Red-necked Phalarope	Special Concern			S2S3M	3 Sensitive	5	26.4 $\pm$ 0.0	NS
A	<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	3 Sensitive	88	3.0 $\pm$ 10.0	NS
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern	Special Concern	Vulnerable	S3S4B	3 Sensitive	597	3.0 $\pm$ 7.0	NS
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	Special Concern		Vulnerable	S3S4B,S3N	4 Secure	367	6.8 $\pm$ 0.0	NS
A	<i>Phocoena phocoena (NW Atlantic pop.)</i>	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		4	58.2 $\pm$ 1.0	NS
A	<i>Podiceps auritus</i>	Horned Grebe	Special Concern			S4N	4 Secure	1	97.8 $\pm$ 10.0	NS
A	<i>Tryngites subruficollis</i>	Buff-breasted Sandpiper	Special Concern			SNA	8 Accidental	7	32.1 $\pm$ 0.0	NS
A	<i>Lynx canadensis</i>	Canadian Lynx	Not At Risk		Endangered	S1	1 At Risk	2	90.6 $\pm$ 1.0	NS



Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Accipiter cooperii</i>	Cooper's Hawk	Not At Risk			S1?B	5 Undetermined	4	13.3 ± 0.0	NS
A	<i>Fulica americana</i>	American Coot	Not At Risk			S1B	5 Undetermined	5	37.3 ± 7.0	NS
A	<i>Sorex dispar</i>	Long-tailed Shrew	Not At Risk	Special Concern		S2	3 Sensitive	3	69.3 ± 5.0	NS
A	<i>Aegolius funereus</i>	Boreal Owl	Not At Risk			S2?B	5 Undetermined	8	32.1 ± 7.0	NS
A	<i>Glaucomys volans</i>	Southern Flying Squirrel	Not At Risk	Special Concern		S2S3	3 Sensitive	6	64.3 ± 0.0	NS
A	<i>Globicephala melas</i>	Long-finned Pilot Whale	Not At Risk			S2S3		1	48.7 ± 100.0	NS
A	<i>Hemidactylium scutatum</i>	Four-toed Salamander	Not At Risk			S3	4 Secure	28	4.0 ± 0.0	NS
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk			S3B	3 Sensitive	205	3.0 ± 7.0	NS
A	<i>Sialia sialis</i>	Eastern Bluebird	Not At Risk			S3B	3 Sensitive	69	7.4 ± 7.0	NS
A	<i>Accipiter gentilis</i>	Northern Goshawk	Not At Risk			S3S4	4 Secure	117	7.4 ± 7.0	NS
A	<i>Lagenorhynchus acutus</i>	Atlantic White-sided Dolphin	Not At Risk			S3S4		1	49.5 ± 1.0	NS
A	<i>Circus cyaneus</i>	Northern Harrier	Not At Risk			S3S4B	4 Secure	257	3.0 ± 7.0	NS
A	<i>Ammodramus nelsoni</i>	Nelson's Sparrow	Not At Risk			S3S4B	4 Secure	91	7.4 ± 7.0	NS
A	<i>Alces americanus</i>	Moose			Endangered	S1	1 At Risk	14	33.2 ± 0.0	NS
A	<i>Salmo salar</i>	Atlantic Salmon				S1	2 May Be At Risk	46	14.6 ± 0.0	NS
A	<i>Passerina cyanea</i>	Indigo Bunting				S1?B	5 Undetermined	19	29.5 ± 7.0	NS
A	<i>Anas acuta</i>	Northern Pintail				S1B	2 May Be At Risk	18	19.2 ± 7.0	NS
A	<i>Gallinula chloropus</i>	Common Moorhen				S1B	5 Undetermined	6	42.4 ± 7.0	NS
A	<i>Myiarchus crinitus</i>	Great Crested Flycatcher				S1B	2 May Be At Risk	27	12.8 ± 7.0	NS
A	<i>Cistothorus palustris</i>	Marsh Wren				S1B	5 Undetermined	2	84.5 ± 0.0	NS
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S1B	4 Secure	40	15.4 ± 7.0	NS
A	<i>Toxostoma rufum</i>	Brown Thrasher				S1B	5 Undetermined	11	22.8 ± 7.0	NS
A	<i>Vireo gilvus</i>	Warbling Vireo				S1B	5 Undetermined	25	12.8 ± 7.0	NS
A	<i>Dendroica pinus</i>	Pine Warbler				S1B	5 Undetermined	17	22.8 ± 7.0	NS
A	<i>Calidris minutilla</i>	Least Sandpiper				S1B,S3M	4 Secure	503	26.4 ± 0.0	NS
A	<i>Charadrius semipalmatus</i>	Semipalmated Plover				S1B,S3S4M	4 Secure	821	26.4 ± 0.0	NS
A	<i>Lasiurus cinereus</i>	Hoary Bat				S1S2B, S1M	2 May Be At Risk	2	17.7 ± 0.0	NS
A	<i>Pluvialis dominica</i>	American Golden-Plover				S1S2M	3 Sensitive	99	26.4 ± 0.0	NS
A	<i>Limosa haemastica</i>	Hudsonian Godwit				S1S2M	3 Sensitive	57	26.4 ± 0.0	NS
A	<i>Vireo philadelphicus</i>	Philadelphia Vireo				S2?B	5 Undetermined	28	11.6 ± 7.0	NS
A	<i>Anas clypeata</i>	Northern Shoveler				S2B	2 May Be At Risk	8	22.5 ± 7.0	NS
A	<i>Anas strepera</i>	Gadwall				S2B	2 May Be At Risk	21	22.8 ± 7.0	NS
A	<i>Empidonax traillii</i>	Willow Flycatcher				S2B	3 Sensitive	28	17.0 ± 7.0	NS
A	<i>Dendroica tigrina</i>	Cape May Warbler				S2B	3 Sensitive	124	7.4 ± 7.0	NS
A	<i>Piranga olivacea</i>	Scarlet Tanager				S2B	5 Undetermined	32	12.8 ± 7.0	NS
A	<i>Poocetes gramineus</i>	Vesper Sparrow				S2B	2 May Be At Risk	46	3.0 ± 7.0	NS
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S2B	4 Secure	127	17.0 ± 7.0	NS
A	<i>Alca torda</i>	Razorbill				S2B,S4N	3 Sensitive	17	64.5 ± 0.0	NS
A	<i>Bucephala clangula</i>	Common Goldeneye				S2B,S5N	4 Secure	93	12.4 ± 0.0	NS
A	<i>Branta bernicla</i>	Brant				S2M	3 Sensitive	1	62.0 ± 0.0	NS
A	<i>Phalacrocorax carbo</i>	Great Cormorant				S2S3	3 Sensitive	46	30.7 ± 12.0	NS
A	<i>Asio otus</i>	Long-eared Owl				S2S3	2 May Be At Risk	25	17.4 ± 0.0	NS
A	<i>Carduelis pinus</i>	Pine Siskin				S2S3	3 Sensitive	347	3.0 ± 7.0	NS
A	<i>Cathartes aura</i>	Turkey Vulture				S2S3B	3 Sensitive	17	3.0 ± 7.0	NS
A	<i>Rallus limicola</i>	Virginia Rail				S2S3B	5 Undetermined	20	8.3 ± 0.0	NS
A	<i>Tringa semipalmata</i>	Willet				S2S3B	2 May Be At Risk	768	22.5 ± 7.0	NS
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B	2 May Be At Risk	228	3.0 ± 7.0	NS
A	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak				S2S3B	3 Sensitive	305	3.0 ± 7.0	NS
A	<i>Icterus galbula</i>	Baltimore Oriole				S2S3B	2 May Be At Risk	55	7.4 ± 7.0	NS
A	<i>Pinicola enucleator</i>	Pine Grosbeak				S2S3B,S5N	2 May Be At Risk	118	3.0 ± 7.0	NS
A	<i>Numenius phaeopus hudsonicus</i>	Hudsonian Whimbrel				S2S3M	3 Sensitive	48	26.4 ± 0.0	NS

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A	<i>Calidris melanotos</i>	Pectoral Sandpiper				S2S3M	4 Secure	86	26.4 ± 0.0	NS
A	<i>Phalaropus fulicarius</i>	Red Phalarope				S2S3M	3 Sensitive	2	32.1 ± 0.0	NS
A	<i>Perisoreus canadensis</i>	Gray Jay				S3	3 Sensitive	441	3.0 ± 7.0	NS
A	<i>Poecile hudsonica</i>	Boreal Chickadee				S3	3 Sensitive	480	3.0 ± 7.0	NS
A	<i>Sitta canadensis</i>	Red-breasted Nuthatch				S3	4 Secure	804	3.0 ± 7.0	NS
A	<i>Alosa pseudoharengus</i>	Alewife				S3	3 Sensitive	21	17.3 ± 0.0	NS
A	<i>Salvelinus fontinalis</i>	Brook Trout				S3	3 Sensitive	23	13.6 ± 0.0	NS
A	<i>Salvelinus namaycush</i>	Lake Trout				S3	3 Sensitive	2	21.7 ± 0.0	NS
A	<i>Synaptomys cooperi</i>	Southern Bog Lemming				S3	4 Secure	1	75.2 ± 0.0	NS
A	<i>Pekania pennanti</i>	Fisher				S3	3 Sensitive	2	73.0 ± 5.0	NS
A	<i>Calidris maritima</i>	Purple Sandpiper				S3?N	3 Sensitive	122	23.9 ± 0.0	NS
A	<i>Calcarius lapponicus</i>	Lapland Longspur				S3?N	4 Secure	1	85.4 ± 0.0	NS
A	<i>Falco sparverius</i>	American Kestrel				S3B	4 Secure	296	7.4 ± 7.0	NS
A	<i>Charadrius vociferus</i>	Killdeer				S3B	3 Sensitive	417	3.0 ± 7.0	NS
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3B	3 Sensitive	338	3.0 ± 7.0	NS
A	<i>Sterna paradisaea</i>	Arctic Tern				S3B	2 May Be At Risk	59	29.1 ± 0.0	NS
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B	2 May Be At Risk	56	3.0 ± 7.0	NS
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3B	3 Sensitive	201	3.0 ± 7.0	NS
A	<i>Dumetella carolinensis</i>	Gray Catbird				S3B	2 May Be At Risk	381	3.0 ± 7.0	NS
A	<i>Wilsonia pusilla</i>	Wilson's Warbler				S3B	3 Sensitive	69	3.0 ± 7.0	NS
A	<i>Tringa melanoleuca</i>	Greater Yellowlegs				S3B,S3S4M	3 Sensitive	875	21.5 ± 7.0	NS
A	<i>Oceanodroma leucorhoa</i>	Leach's Storm-Petrel				S3B,S5M	4 Secure	37	36.5 ± 0.0	NS
A	<i>Rissa tridactyla</i>	Black-legged Kittiwake				S3B,S5N	3 Sensitive	8	64.5 ± 0.0	NS
A	<i>Fratercula arctica</i>	Atlantic Puffin				S3B,S5N	3 Sensitive	18	63.9 ± 0.0	NS
A	<i>Pluvialis squatarola</i>	Black-bellied Plover				S3M	4 Secure	888	26.4 ± 0.0	NS
A	<i>Tringa flavipes</i>	Lesser Yellowlegs				S3M	4 Secure	405	26.4 ± 0.0	NS
A	<i>Arenaria interpres</i>	Ruddy Turnstone				S3M	4 Secure	352	26.4 ± 0.0	NS
A	<i>Calidris pusilla</i>	Semipalmated Sandpiper				S3M	3 Sensitive	726	26.4 ± 0.0	NS
A	<i>Calidris fuscicollis</i>	White-rumped Sandpiper				S3M	4 Secure	341	26.4 ± 0.0	NS
A	<i>Limnodromus griseus</i>	Short-billed Dowitcher				S3M	4 Secure	563	26.4 ± 0.0	NS
A	<i>Calidris alba</i>	Sanderling				S3M,S2N	4 Secure	541	26.4 ± 0.0	NS
A	<i>Chroicocephalus ridibundus</i>	Black-headed Gull				S3N	4 Secure	1	33.8 ± 7.0	NS
A	<i>Somateria mollissima</i>	Common Eider				S3S4	4 Secure	400	24.6 ± 5.0	NS
A	<i>Picoides arcticus</i>	Black-backed Woodpecker				S3S4	3 Sensitive	154	11.3 ± 7.0	NS
A	<i>Loxia curvirostra</i>	Red Crossbill				S3S4	4 Secure	185	11.3 ± 7.0	NS
A	<i>Botaurus lentiginosus</i>	American Bittern				S3S4B	3 Sensitive	143	7.4 ± 7.0	NS
A	<i>Anas discors</i>	Blue-winged Teal				S3S4B	2 May Be At Risk	64	12.8 ± 7.0	NS
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B	3 Sensitive	548	3.0 ± 7.0	NS
A	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher				S3S4B	3 Sensitive	456	9.1 ± 7.0	NS
A	<i>Regulus calendula</i>	Ruby-crowned Kinglet				S3S4B	3 Sensitive	1091	3.0 ± 7.0	NS
A	<i>Catharus fuscescens</i>	Veery				S3S4B	4 Secure	372	3.0 ± 7.0	NS
A	<i>Catharus ustulatus</i>	Swainson's Thrush				S3S4B	4 Secure	955	2.5 ± 0.0	NS
A	<i>Vermivora peregrina</i>	Tennessee Warbler				S3S4B	3 Sensitive	273	3.0 ± 7.0	NS
A	<i>Dendroica castanea</i>	Bay-breasted Warbler				S3S4B	3 Sensitive	357	3.0 ± 7.0	NS
A	<i>Dendroica striata</i>	Blackpoll Warbler				S3S4B	3 Sensitive	93	22.4 ± 0.0	NS
A	<i>Passerella iliaca</i>	Fox Sparrow				S3S4B	4 Secure	74	20.6 ± 7.0	NS
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3S4B,S5N	4 Secure	56	24.8 ± 7.0	NS
A	<i>Bucephala albeola</i>	Bufflehead				S3S4N	4 Secure	25	30.7 ± 12.0	NS
A	<i>Leucophaeus atricilla</i>	Laughing Gull				SHB	4 Secure	1	57.6 ± 0.0	NS
A	<i>Progne subis</i>	Purple Martin				SHB	2 May Be At Risk	4	82.4 ± 7.0	NS
A	<i>Eremophila alpestris</i>	Horned Lark				SHB,S4S5N	4 Secure	7	3.0 ± 7.0	NS
A	<i>Morus bassanus</i>	Northern Gannet				SHB,S5M	4 Secure	2	46.9 ± 12.0	NS
I	<i>Gomphus ventricosus</i>	Skillet Clubtail	Endangered			S1	2 May Be At Risk	2	8.8 ± 0.0	NS
I	<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	Endangered	S2B	3 Sensitive	73	2.4 ± 0.0	NS

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	<i>Barnea truncata</i>	Atlantic Mud-piddock	Threatened			S1	1 At Risk	1	61.8 ± 1.0	NS
	<i>Alasmidonta varicosa</i>	Brook Floater	Special Concern		Threatened	S1S2	3 Sensitive	11	24.5 ± 0.0	NS
	<i>Bombus terricola</i>	Yellow-banded Bumblebee	Special Concern		Vulnerable	S3	3 Sensitive	3	36.9 ± 0.0	NS
	<i>Cicindela formosa</i>	Big Sand Tiger Beetle				S1	2 May Be At Risk	1	73.8 ± 1.0	NS
	<i>Satyrium acadica</i>	Acadian Hairstreak				S1	5 Undetermined	1	64.8 ± 0.0	NS
	<i>Neurocordulia michaeli</i>	Broadtailed Shadowdragon				S1		4	91.9 ± 0.0	NS
	<i>Somatochlora brevicincta</i>	Quebec Emerald				S1	2 May Be At Risk	1	26.2 ± 0.0	NS
	<i>Leptodea ochracea</i>	Tidewater Mucket				S1	3 Sensitive	9	93.7 ± 1.0	NS
	<i>Strophitus undulatus</i>	Creepier				S1	2 May Be At Risk	6	98.0 ± 0.0	NS
	<i>Polygonia comma</i>	Eastern Comma				S1?	1 At Risk	10	23.5 ± 1.0	NS
	<i>Polygonia satyrus</i>	Satyr Comma				S1?	3 Sensitive	2	25.6 ± 1.0	NS
	<i>Strymon melinus</i>	Grey Hairstreak				S1S2	4 Secure	6	55.7 ± 1.0	NS
	<i>Nymphalis l-album</i>	Compton Tortoiseshell				S1S2	4 Secure	10	5.5 ± 1.0	NS
	<i>Somatochlora kennedyi</i>	Kennedy's Emerald				S1S2	2 May Be At Risk	3	22.6 ± 1.0	NS
	<i>Coenagrion resolutum</i>	Taiga Bluet				S1S2	2 May Be At Risk	2	6.7 ± 1.0	NS
	<i>Stylurus scudderii</i>	Zebra Clubtail				S1S2	2 May Be At Risk	6	8.8 ± 0.0	NS
	<i>Lycaena hyllus</i>	Bronze Copper				S2	4 Secure	4	6.3 ± 1.0	NS
	<i>Lycaena dospassosi</i>	Salt Marsh Copper				S2	1 At Risk	4	99.4 ± 0.0	NS
	<i>Satyrium calanus</i>	Banded Hairstreak				S2	5 Undetermined	10	15.6 ± 10.0	NS
	<i>Satyrium calanus falacer</i>	Banded Hairstreak				S2	1 At Risk	2	26.2 ± 0.0	NS
	<i>Boloria chariclea</i>	Arctic Fritillary				S2	3 Sensitive	4	82.6 ± 1.0	NS
	<i>Aglais milberti</i>	Milbert's Tortoiseshell				S2	4 Secure	9	20.1 ± 1.0	NS
	<i>Epithea princeps</i>	Prince Baskettail				S2	3 Sensitive	21	5.5 ± 0.0	NS
	<i>Williamsonia fletcheri</i>	Ebony Boghaunter				S2	2 May Be At Risk	4	97.0 ± 0.0	NS
	<i>Enallagma signatum</i>	Orange Bluet				S2	2 May Be At Risk	3	2.5 ± 0.0	NS
	<i>Margaritifera margaritifera</i>	Eastern Pearlshell				S2	3 Sensitive	116	14.1 ± 1.0	NS
	<i>Pantala hymenaea</i>	Spot-Winged Glider				S2?B	3 Sensitive	6	26.6 ± 1.0	NS
	<i>Thorybes pylades</i>	Northern Cloudywing				S2S3	3 Sensitive	1	61.7 ± 1.0	NS
	<i>Amblyscirtes hegon</i>	Pepper and Salt Skipper				S2S3	4 Secure	21	5.5 ± 1.0	NS
	<i>Satyrium liparops</i>	Striped Hairstreak				S2S3	5 Undetermined	8	6.9 ± 1.0	NS
	<i>Satyrium liparops strigosum</i>	Striped Hairstreak				S2S3	3 Sensitive	2	26.2 ± 0.0	NS
	<i>Euphydryas phaeton</i>	Baltimore Checkerspot				S2S3	4 Secure	15	5.5 ± 1.0	NS
	<i>Gomphus descriptus</i>	Harpoon Clubtail				S2S3	3 Sensitive	2	91.4 ± 1.0	NS
	<i>Ophiogomphus aspersus</i>	Brook Snaketail				S2S3	2 May Be At Risk	6	35.5 ± 0.0	NS
	<i>Ophiogomphus mainensis</i>	Maine Snaketail				S2S3	2 May Be At Risk	16	88.5 ± 0.0	NS
	<i>Ophiogomphus rupinsulensis</i>	Rusty Snaketail				S2S3	2 May Be At Risk	19	8.8 ± 0.0	NS
	<i>Somatochlora forcipata</i>	Forcipate Emerald				S2S3	2 May Be At Risk	4	23.5 ± 1.0	NS
	<i>Somatochlora franklini</i>	Delicate Emerald				S2S3	3 Sensitive	2	22.6 ± 1.0	NS
	<i>Erythrodiplax berenice</i>	Seaside Dragonlet				S2S3	3 Sensitive	1	73.5 ± 0.0	NS
	<i>Enallagma vesperum</i>	Vesper Bluet				S2S3	3 Sensitive	2	83.3 ± 1.0	NS
	<i>Alasmidonta undulata</i>	Triangle Floater				S2S3	4 Secure	31	10.4 ± 0.0	NS
	<i>Hippodamia parenthesis</i>	Parenthesis Lady Beetle				S3	5 Undetermined	1	91.6 ± 0.0	NS
	<i>Naemia seriata</i>	a Ladybird beetle				S3	3 Sensitive	1	59.4 ± 1.0	NS
	<i>Chilocorus stigma</i>	Twice-stabbed Lady Beetle				S3	4 Secure	1	67.8 ± 0.0	NS
	<i>Callophrys henrici</i>	Henry's Elfin				S3	4 Secure	23	5.5 ± 1.0	NS
	<i>Callophrys lanoraieensis</i>	Bog Elfin				S3	2 May Be At Risk	15	2.8 ± 1.0	NS
	<i>Speyeria aphrodite</i>	Aphrodite Fritillary				S3	4 Secure	19	5.1 ± 1.0	NS



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I	<i>Polygonia faunus</i>	Green Comma				S3	4 Secure	13	5.5 ± 1.0	NS
I	<i>Megisto cymela</i>	Little Wood-satyr				S3	4 Secure	2	79.1 ± 0.0	NS
I	<i>Oeneis jutta</i>	Jutta Arctic				S3	2 May Be At Risk	4	22.6 ± 1.0	NS
I	<i>Aeshna clepsydra</i>	Mottled Darner				S3	4 Secure	11	6.9 ± 1.0	NS
I	<i>Aeshna constricta</i>	Lance-Tipped Darner				S3	4 Secure	18	22.3 ± 1.0	NS
I	<i>Boyeria grafiana</i>	Ocellated Darner				S3	3 Sensitive	6	33.8 ± 1.0	NS
I	<i>Gomphaeschna furcillata</i>	Harlequin Darner				S3	3 Sensitive	6	19.5 ± 1.0	NS
I	<i>Somatochlora tenebrosa</i>	Clamp-Tipped Emerald				S3	4 Secure	13	22.6 ± 1.0	NS
I	<i>Nannothemis bella</i>	Elfin Skimmer				S3	4 Secure	17	11.7 ± 1.0	NS
I	<i>Enallagma vernale</i>	Vernal Bluet				S3	5 Undetermined	6	22.6 ± 1.0	NS
I	<i>Amphiagrion saucium</i>	Eastern Red Damsel				S3	4 Secure	2	60.8 ± 1.0	NS
I	<i>Polygonia interrogationis</i>	Question Mark				S3B	4 Secure	115	11.9 ± 0.0	NS
I	<i>Erynnis juvenalis</i>	Juvenal's Duskywing				S3S4	4 Secure	53	2.5 ± 0.0	NS
I	<i>Amblyscirtes vialis</i>	Common Roadside-Skipper				S3S4	4 Secure	11	5.5 ± 1.0	NS
I	<i>Polygonia progne</i>	Grey Comma				S3S4	4 Secure	24	8.9 ± 0.0	NS
I	<i>Lanthus parvulus</i>	Northern Pygmy Clubtail				S3S4	4 Secure	4	62.3 ± 5.0	NS
I	<i>Lampsilis radiata</i>	Eastern Lampmussel				S3S4	3 Sensitive	45	24.5 ± 0.0	NS
N	<i>Erioderma pedicellatum</i> (Atlantic pop.)	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	S1	1 At Risk	373	27.5 ± 0.0	NS
N	<i>Erioderma mollissimum</i>	Graceful Felt Lichen	Endangered		Endangered	S1S2	2 May Be At Risk	11	36.1 ± 0.0	NS
N	<i>Peltigera hydrothyria</i>	Eastern Waterfan	Threatened		Threatened	S1	2 May Be At Risk	2	70.9 ± 3.0	NS
N	<i>Anzia colpodes</i>	Black-foam Lichen	Threatened		Threatened	S3	3 Sensitive	2	47.6 ± 0.0	NS
N	<i>Sclerophora peronella</i> (Nova Scotia pop.)	Frosted Glass-whiskers Lichen - Nova Scotia pop.	Special Concern	Special Concern		S1?		12	18.3 ± 0.0	NS
N	<i>Degelia plumbea</i>	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S3	4 Secure	48	24.9 ± 0.0	NS
N	<i>Fissidens exilis</i>	Pygmy Pocket Moss	Not At Risk			S1S2	1 At Risk	3	34.9 ± 1.0	NS
N	<i>Pseudevernia cladonia</i>	Ghost Antler Lichen	Not At Risk			S2S3	3 Sensitive	12	29.8 ± 0.0	NS
N	<i>Aloina brevirostris</i>	Short-Beaked Rigid Screw Moss				S1		1	37.1 ± 2.0	NS
N	<i>Collema cristatum</i>	Fingered Tarpaper Lichen				S1	5 Undetermined	3	43.2 ± 0.0	NS
N	<i>Peltigera lepidophora</i>	Scaly Pelt Lichen				S1	2 May Be At Risk	1	44.5 ± 0.0	NS
N	<i>Aloina rigida</i>	Aloe-Like Rigid Screw Moss				S1?	2 May Be At Risk	3	37.1 ± 2.0	NS
N	<i>Conardia compacta</i>	Coast Creeping Moss				S1?	3 Sensitive	1	48.1 ± 2.0	NS
N	<i>Tortula obtusifolia</i>	a Moss				S1?	5 Undetermined	2	61.3 ± 1.0	NS
N	<i>Paludella squarrosa</i>	Tufted Fen Moss				S1?	3 Sensitive	2	34.5 ± 0.0	NS
N	<i>Trichodon cylindricus</i>	Cylindric Hairy-teeth Moss				S1?		1	98.8 ± 3.0	NS
N	<i>Lichina confinis</i>	Marine Seaweed Lichen				S1?	6 Not Assessed	2	43.5 ± 0.0	NS
N	<i>Parmeliella parvula</i>	Poor-man's Shingles Lichen				S1?	2 May Be At Risk	1	58.5 ± 0.0	NS
N	<i>Aulacomnium heterostichum</i>	One-sided Groove Moss				S1S2	3 Sensitive	2	37.1 ± 2.0	NS
N	<i>Brachythecium turgidum</i>	Thick Ragged Moss				S1S2	3 Sensitive	2	98.8 ± 3.0	NS
N	<i>Ctenidium molluscum</i>	Mollusc Ctenidium moss				S1S2		1	97.7 ± 2.0	NS
N	<i>Hypnum pratense</i>	Meadow Plait Moss				S1S2	3 Sensitive	1	85.7 ± 3.0	NS
N	<i>Mnium thomsonii</i>	Thomson's Leafy Moss				S1S2	3 Sensitive	1	42.7 ± 2.0	NS
N	<i>Plagiothecium latebricola</i>	Alder Silk Moss				S1S2	3 Sensitive	2	60.2 ± 5.0	NS
N	<i>Sematophyllum demissum</i>	a Moss				S1S2	3 Sensitive	2	5.1 ± 2.0	NS
N	<i>Sphagnum platyphyllum</i>	Flat-leaved Peat Moss				S1S2		2	2.2 ± 3.0	NS
N	<i>Timmia megapolitana</i>	Metropolitan Timmia Moss				S1S2	3 Sensitive	3	68.3 ± 1.0	NS
N	<i>Tortula mucronifolia</i>	Mucronate Screw Moss				S1S2	3 Sensitive	1	74.5 ± 3.0	NS
N	<i>Cyrto-hypnum</i>	Tiny Cedar Moss				S1S2	3 Sensitive	1	83.4 ± 0.0	NS

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N	<i>minutulum</i> <i>Bryohaplocladium</i>	Tiny-leaved Haplocladium Moss				S1S2		1	51.2 ± 5.0	NS
N	<i>microphyllum</i> <i>Sticta limbata</i>	Powdered Moon Lichen				S1S2	2 May Be At Risk	3	53.1 ± 0.0	NS
N	<i>Anacamptodon</i> <i>splachnoides</i>	a Moss				S2?	3 Sensitive	2	23.1 ± 30.0	NS
N	<i>Anomodon viticulosus</i>	a Moss				S2?	3 Sensitive	1	89.6 ± 5.0	NS
N	<i>Weissia</i> <i>muhlenbergiana</i>	a Moss				S2?	3 Sensitive	5	42.7 ± 1.0	NS
N	<i>Atrichum angustatum</i>	Lesser Smoothcap Moss				S2?	3 Sensitive	2	67.4 ± 5.0	NS
N	<i>Bryum algovicum</i>	a Moss				S2?	3 Sensitive	1	37.1 ± 2.0	NS
N	<i>Campylium polygamum</i>	a Moss				S2?	5 Undetermined	2	5.1 ± 2.0	NS
N	<i>Campylium radicale</i>	Long-stalked Fine Wet Moss				S2?	5 Undetermined	1	85.7 ± 3.0	NS
N	<i>Dicranum</i> <i>condensatum</i>	Condensed Broom Moss				S2?	5 Undetermined	2	75.6 ± 0.0	NS
N	<i>Ditrichum</i> <i>rhynchostegium</i>	a Moss				S2?	3 Sensitive	1	20.4 ± 1.0	NS
N	<i>Fissidens taxifolius</i>	Yew-leaved Pocket Moss				S2?	3 Sensitive	2	37.1 ± 2.0	NS
N	<i>Grimmia anomala</i>	Mountain Forest Grimmia				S2?	3 Sensitive	1	69.1 ± 1.0	NS
N	<i>Kiaeria starkei</i>	Starke's Fork Moss				S2?	3 Sensitive	1	41.8 ± 10.0	NS
N	<i>Orthotrichum</i> <i>anomalum</i>	Anomalous Bristle Moss				S2?	3 Sensitive	1	46.3 ± 2.0	NS
N	<i>Philonotis marchica</i>	a Moss				S2?	5 Undetermined	2	68.2 ± 0.0	NS
N	<i>Physcomitrium</i> <i>collenchymatum</i>	a Moss				S2?	3 Sensitive	1	98.8 ± 0.0	NS
N	<i>Racomitrium affine</i>	a Moss				S2?	5 Undetermined	1	19.5 ± 2.0	NS
N	<i>Saelania glaucescens</i>	Blue Dew Moss				S2?	3 Sensitive	1	90.0 ± 0.0	NS
N	<i>Sematophyllum</i> <i>marylandicum</i>	a Moss				S2?	3 Sensitive	2	4.9 ± 3.0	NS
N	<i>Sphagnum subnitens</i>	Lustrous Peat Moss				S2?	3 Sensitive	1	55.7 ± 2.0	NS
N	<i>Tetraplodon</i> <i>angustatus</i>	Toothed-leaved Nitrogen Moss				S2?	3 Sensitive	1	55.7 ± 2.0	NS
N	<i>Plagiomnium rostratum</i>	Long-beaked Leafy Moss				S2?	5 Undetermined	1	97.7 ± 2.0	NS
N	<i>Cyrtomnium</i> <i>hymenophylloides</i>	Short-pointed Lantern Moss				S2?	3 Sensitive	2	21.1 ± 5.0	NS
N	<i>Platylomella lescurii</i>	a Moss				S2?	3 Sensitive	4	46.0 ± 0.0	NS
N	<i>Phyllicum</i> <i>demangeonii</i>	Black Rock-wafer Lichen				S2?	5 Undetermined	1	91.5 ± 2.0	NS
N	<i>Leptogium</i> <i>teretiusculum</i>	Beaded Jellyskin Lichen				S2?	3 Sensitive	3	9.6 ± 0.0	NS
N	<i>Peltigera collina</i>	Tree Pelt Lichen				S2?	3 Sensitive	3	37.4 ± 2.0	NS
N	<i>Ephemerum serratum</i>	a Moss				S2S3	3 Sensitive	4	45.1 ± 5.0	NS
N	<i>Eurhynchium hians</i>	Light Beaked Moss				S2S3	3 Sensitive	3	9.0 ± 5.0	NS
N	<i>Platydictya subtilis</i>	Bark Willow Moss				S2S3	3 Sensitive	1	77.9 ± 3.0	NS
N	<i>Tortula truncata</i>	a Moss				S2S3	3 Sensitive	3	45.0 ± 300.0	NS
N	<i>Limprichtia revolvens</i>	a Moss				S2S3	3 Sensitive	2	34.5 ± 0.0	NS
N	<i>Solorina saccata</i>	Woodland Owl Lichen				S2S3	2 May Be At Risk	4	43.1 ± 0.0	NS
N	<i>Everniastrum</i> <i>catawbiense</i>	Powder-tipped Antler Lichen				S2S3	2 May Be At Risk	1	54.0 ± 0.0	NS
N	<i>Fuscopannaria</i> <i>leucosticta</i>	Rimmed Shingles Lichen				S2S3	2 May Be At Risk	10	48.6 ± 0.0	NS
N	<i>Parmeliopsis ambigua</i>	Green Starburst Lichen				S2S3	3 Sensitive	1	68.6 ± 2.0	NS
N	<i>Racodium rupestre</i>	Rockhair Lichen				S2S3	5 Undetermined	1	58.5 ± 0.0	NS
N	<i>Umbilicaria polyphylla</i>	Petalled Rocktripe Lichen				S2S3	3 Sensitive	1	68.6 ± 2.0	NS
N	<i>Usnea flammaea</i>	Coastal Bushy Beard Lichen				S2S3	3 Sensitive	1	43.4 ± 1.0	NS
N	<i>Collema nigrescens</i>	Blistered Tarpaper Lichen				S3	3 Sensitive	10	3.8 ± 0.0	NS
N	<i>Sticta fuliginosa</i>	Peppered Moon Lichen				S3	3 Sensitive	20	14.6 ± 0.0	NS

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N	<i>Leptogium subtile</i>	Appressed Jellyskin Lichen				S3	3 Sensitive	7	51.3 ± 0.0	NS
N	<i>Fuscopannaria ahlneri</i>	Corrugated Shingles Lichen				S3	4 Secure	32	35.8 ± 0.0	NS
N	<i>Heterodermia speciosa</i>	Powdered Fringe Lichen				S3	4 Secure	1	83.3 ± 0.0	NS
N	<i>Leptogium corticola</i>	Blistered Jellyskin Lichen				S3	3 Sensitive	18	28.1 ± 0.0	NS
N	<i>Leptogium lichenoides</i>	Tattered Jellyskin Lichen				S3	2 May Be At Risk	5	43.1 ± 0.0	NS
N	<i>Nephroma bellum</i>	Naked Kidney Lichen				S3	3 Sensitive	1	74.6 ± 0.0	NS
N	<i>Punctelia appalachensis</i>	Appalachian Speckleback Lichen				S3	3 Sensitive	2	75.6 ± 0.0	NS
N	<i>Moelleropsis nebulosa</i>	Blue-gray Moss Shingle Lichen				S3	4 Secure	31	35.4 ± 0.0	NS
N	<i>Usnea macaronesica</i>	Beard Lichen				S3	5 Undetermined	2	53.3 ± 1.0	NS
N	<i>Calliergon giganteum</i>	Giant Spear Moss				S3?	3 Sensitive	2	33.0 ± 3.0	NS
N	<i>Drummondia prorepens</i>	a Moss				S3?	3 Sensitive	1	46.5 ± 5.0	NS
N	<i>Anomodon tristis</i>	a Moss				S3?	3 Sensitive	8	51.2 ± 15.0	NS
N	<i>Helodium blandowii</i>	Wetland-plume Moss				S3?	4 Secure	5	23.9 ± 7.0	NS
N	<i>Mnium stellare</i>	Star Leafy Moss				S3?	5 Undetermined	2	40.1 ± 1.0	NS
N	<i>Cladina stygia</i>	Black-footed Reindeer Lichen				S3?	3 Sensitive	3	30.8 ± 0.0	NS
N	<i>Anomodon rugelii</i>	Rugel's Anomodon Moss				S3S4	3 Sensitive	2	74.9 ± 0.0	NS
N	<i>Dichelyma capillaceum</i>	Hairlike Dichelyma Moss				S3S4	4 Secure	3	9.2 ± 3.0	NS
N	<i>Dicranella varia</i>	a Moss				S3S4	5 Undetermined	1	98.8 ± 3.0	NS
N	<i>Myurella julacea</i>	Small Mouse-tail Moss				S3S4	3 Sensitive	1	90.0 ± 0.0	NS
N	<i>Thamnobryum alleghaniense</i>	a Moss				S3S4	3 Sensitive	3	71.4 ± 4.0	NS
N	<i>Schistidium agassizii</i>	Elf Bloom Moss				S3S4	4 Secure	2	69.1 ± 1.0	NS
N	<i>Hylocomiastrum pyrenaicum</i>	a Feather Moss				S3S4	3 Sensitive	1	25.7 ± 0.0	NS
N	<i>Arctoparmelia incurva</i>	Finger Ring Lichen				S3S4	4 Secure	1	43.4 ± 1.0	NS
N	<i>Hypogymnia vittata</i>	Slender Monk's Hood Lichen				S3S4	4 Secure	1	35.9 ± 0.0	NS
N	<i>Leptogium acadense</i>	Acadian Jellyskin Lichen				S3S4		4	52.8 ± 0.0	NS
N	<i>Parmeliopsis hyperopta</i>	Gray Starburst Lichen				S3S4	5 Undetermined	1	98.4 ± 1.0	NS
N	<i>Physconia detorsa</i>	Bottlebrush Frost Lichen				S3S4	3 Sensitive	1	56.3 ± 0.0	NS
N	<i>Sphaerophorus fragilis</i>	Fragile Coral Lichen				S3S4	4 Secure	1	43.4 ± 1.0	NS
N	<i>Coccocarpia palmicola</i>	Salted Shell Lichen				S3S4	4 Secure	248	35.4 ± 0.0	NS
N	<i>Physcia caesia</i>	Blue-gray Rosette Lichen				S3S4	5 Undetermined	1	43.4 ± 1.0	NS
N	<i>Physcia tenella</i>	Fringed Rosette Lichen				S3S4	6 Not Assessed	1	43.4 ± 1.0	NS
N	<i>Anaptychia palmulata</i>	Shaggy Fringed Lichen				S3S4	4 Secure	7	46.3 ± 0.0	NS
N	<i>Evermia prunastri</i>	Valley Oakmoss Lichen				S3S4	3 Sensitive	1	40.9 ± 2.0	NS
N	<i>Heterodermia neglecta</i>	Fringe Lichen				S3S4	4 Secure	10	37.7 ± 0.0	NS
P	<i>Juglans cinerea</i>	Butternut	Endangered	Endangered		SNA	7 Exotic	1	31.6 ± 0.0	NS
P	<i>Liatris spicata</i>	Dense Blazing Star	Threatened	Threatened		SNA		1	25.2 ± 0.0	NS
P	<i>Bartonia paniculata</i>	Branched Bartonia	Threatened	Threatened		SNA		1	71.7 ± 10.0	NS
P	<i>Clethra alnifolia</i>	Coast Pepper-Bush			Vulnerable	S1	1 At Risk	2	27.9 ± 0.0	NS
P	<i>Lilaeopsis chinensis</i>	Eastern Lilaeopsis	Special Concern	Special Concern	Vulnerable	S2	3 Sensitive	136	87.6 ± 1.0	NS
P	<i>Lophiola aurea</i>	Goldencrest	Special Concern	Threatened	Vulnerable	S2	1 At Risk	19	96.3 ± 1.0	NS
P	<i>Isoetes prototypus</i>	Prototype Quillwort	Special Concern	Special Concern	Vulnerable	S2	3 Sensitive	13	71.5 ± 0.0	NS
P	<i>Floerkea proserpinacoides</i>	False Mermaidweed	Not At Risk			S2	3 Sensitive	24	65.3 ± 7.0	NS
P	<i>Helianthemum canadense</i>	Long-branched Frostweed			Endangered	S1	1 At Risk	2	27.9 ± 1.0	NS
P	<i>Cypripedium arietinum</i>	Ram's-Head Lady's-Slipper			Endangered	S1	1 At Risk	159	34.4 ± 2.0	NS
P	<i>Thuja occidentalis</i>	Eastern White Cedar			Vulnerable	S1	1 At Risk	36	8.8 ± 1.0	NS
P	<i>Acer saccharinum</i>	Silver Maple				S1	5 Undetermined	12	63.8 ± 2.0	NS
P	<i>Osmorhiza depauperata</i>	Blunt Sweet Cicely				S1	2 May Be At Risk	1	66.5 ± 5.0	NS
P	<i>Sanicula odorata</i>	Clustered Sanicle				S1	2 May Be At Risk	13	33.5 ± 7.0	NS

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P	<i>Zizia aurea</i>	Golden Alexanders				S1	2 May Be At Risk	35	58.8 ± 1.0	NS
P	<i>Antennaria parlinii</i>	a Pussytoes				S1	2 May Be At Risk	16	28.6 ± 7.0	NS
P	<i>Cynoglossum virginianum</i> var. <i>boreale</i>	Wild Comfrey				S1	2 May Be At Risk	5	39.3 ± 1.0	NS
P	<i>Arabis glabra</i>	Tower Mustard				S1	5 Undetermined	1	81.4 ± 0.0	NS
P	<i>Draba glabella</i>	Rock Whitlow-Grass				S1	2 May Be At Risk	2	75.2 ± 0.0	NS
P	<i>Lobelia spicata</i>	Pale-Spiked Lobelia				S1	2 May Be At Risk	8	57.3 ± 7.0	NS
P	<i>Desmodium canadense</i>	Canada Tick-trefoil				S1	2 May Be At Risk	12	61.0 ± 5.0	NS
P	<i>Desmodium glutinosum</i>	Large Tick-Trefoil				S1	2 May Be At Risk	17	34.9 ± 0.0	NS
P	<i>Ribes americanum</i>	Wild Black Currant				S1	5 Undetermined	4	37.2 ± 3.0	NS
P	<i>Fraxinus americana</i>	White Ash				S1	2 May Be At Risk	2	92.9 ± 0.0	NS
P	<i>Fraxinus pennsylvanica</i>	Red Ash				S1	2 May Be At Risk	8	19.7 ± 5.0	NS
P	<i>Polygala polygama</i>	Racemed Milkwort				S1	5 Undetermined	1	23.7 ± 1.0	NS
P	<i>Polygonum careyi</i>	Carey's Smartweed				S1	5 Undetermined	1	45.4 ± 3.0	NS
P	<i>Podostemum ceratophyllum</i>	Horn-leaved Riverweed				S1	2 May Be At Risk	1	94.5 ± 0.0	NS
P	<i>Montia fontana</i>	Water Blinks				S1	2 May Be At Risk	1	25.8 ± 1.0	NS
P	<i>Lysimachia quadrifolia</i>	Whorled Yellow Loosestrife				S1	5 Undetermined	1	30.3 ± 0.0	NS
P	<i>Ranunculus pensylvanicus</i>	Pennsylvania Buttercup				S1	2 May Be At Risk	23	88.9 ± 0.0	NS
P	<i>Amelanchier nantucketensis</i>	Nantucket Serviceberry				S1	2 May Be At Risk	1	84.6 ± 1.0	NS
P	<i>Salix myrtilifolia</i>	Blueberry Willow				S1	2 May Be At Risk	1	35.5 ± 0.0	NS
P	<i>Salix serissima</i>	Autumn Willow				S1	2 May Be At Risk	2	35.5 ± 0.0	NS
P	<i>Dirca palustris</i>	Eastern Leatherwood				S1	2 May Be At Risk	49	17.9 ± 1.0	NS
P	<i>Boehmeria cylindrica</i>	Small-spike False-nettle				S1	2 May Be At Risk	47	18.5 ± 0.0	NS
P	<i>Pilea pumila</i>	Dwarf Clearweed				S1	2 May Be At Risk	3	34.4 ± 0.0	NS
P	<i>Carex garberi</i>	Garber's Sedge				S1	2 May Be At Risk	4	69.5 ± 0.0	NS
P	<i>Carex gynocrates</i>	Northern Bog Sedge				S1	2 May Be At Risk	2	35.6 ± 0.0	NS
P	<i>Carex haydenii</i>	Hayden's Sedge				S1	2 May Be At Risk	2	62.0 ± 1.0	NS
P	<i>Carex pellita</i>	Woolly Sedge				S1	2 May Be At Risk	2	58.1 ± 10.0	NS
P	<i>Carex laxiflora</i>	Loose-Flowered Sedge				S1	2 May Be At Risk	2	75.0 ± 1.0	NS
P	<i>Carex ormostachya</i>	Necklace Spike Sedge				S1	2 May Be At Risk	1	89.7 ± 5.0	NS
P	<i>Carex plantaginea</i>	Plantain-Leaved Sedge				S1	2 May Be At Risk	3	64.5 ± 0.0	NS
P	<i>Carex prairea</i>	Prairie Sedge				S1	2 May Be At Risk	2	80.5 ± 1.0	NS
P	<i>Carex viridula</i> var. <i>saxillitoralis</i>	Greenish Sedge				S1	2 May Be At Risk	4	69.2 ± 2.0	NS
P	<i>Iris prismatica</i>	Slender Blue Flag				S1	2 May Be At Risk	1	81.3 ± 100.0	NS
P	<i>Sisyrinchium fuscatum</i>	Coastal Plain Blue-eyed-grass				S1	2 May Be At Risk	1	92.8 ± 0.0	NS
P	<i>Juncus secundus</i>	Secund Rush				S1	2 May Be At Risk	1	85.0 ± 0.0	NS
P	<i>Juncus vaseyi</i>	Vasey Rush				S1	2 May Be At Risk	2	70.2 ± 0.0	NS
P	<i>Allium tricoccum</i>	Wild Leek				S1	2 May Be At Risk	22	73.7 ± 5.0	NS
P	<i>Trillium grandiflorum</i>	White Trillium				S1	5 Undetermined	3	80.5 ± 1.0	NS
P	<i>Malaxis brachypoda</i>	White Adder's-Mouth				S1	2 May Be At Risk	4	69.1 ± 10.0	NS
P	<i>Spiranthes casei</i> var. <i>casei</i>	Case's Ladies'-Tresses				S1	2 May Be At Risk	1	66.0 ± 0.0	NS
P	<i>Bromus latiglumis</i>	Broad-Glumed Brome				S1	2 May Be At Risk	30	54.0 ± 0.0	NS
P	<i>Dichanthelium xanthophysum</i>	Slender Panic Grass				S1	2 May Be At Risk	9	91.5 ± 1.0	NS
P	<i>Elymus wiegandii</i>	Wiegand's Wild Rye				S1	2 May Be At Risk	13	22.8 ± 7.0	NS
P	<i>Elymus hystrix</i> var. <i>bigeloviana</i>	Spreading Wild Rye				S1	2 May Be At Risk	11	34.3 ± 1.0	NS
P	<i>Puccinellia fasciculata</i>	Saltmarsh Alkali Grass				S1	5 Undetermined	2	64.6 ± 1.0	NS



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P	<i>Adiantum pedatum</i>	Northern Maidenhair Fern				S1	2 May Be At Risk	11	33.0 ± 0.0	NS
P	<i>Equisetum palustre</i>	Marsh Horsetail				S1	2 May Be At Risk	1	76.0 ± 5.0	NS
P	<i>Botrychium lunaria</i>	Common Moonwort				S1	2 May Be At Risk	3	30.6 ± 2.0	NS
P	<i>Selaginella rupestris</i>	Rock Spikemoss				S1	2 May Be At Risk	1	38.4 ± 0.0	NS
P	<i>Solidago hispida</i>	Hairy Goldenrod				S1?	2 May Be At Risk	2	22.8 ± 7.0	NS
P	<i>Suaeda rolandii</i>	Roland's Sea-Blite				S1?	2 May Be At Risk	3	39.6 ± 2.0	NS
P	<i>Proserpinaca palustris</i> <i>var. palustris</i>	Marsh Mermaidweed				S1?	2 May Be At Risk	2	88.1 ± 1.0	NS
P	<i>Crataegus robinsonii</i>	Robinson's Hawthorn				S1?	5 Undetermined	1	61.3 ± 5.0	NS
P	<i>Carex pensylvanica</i>	Pennsylvania Sedge				S1?	2 May Be At Risk	2	4.7 ± 0.0	NS
P	<i>Dichanthelium acuminatum</i> <i>var. lindheimeri</i>	Woolly Panic Grass				S1?	5 Undetermined	3	90.8 ± 1.0	NS
P	<i>Fraxinus nigra</i>	Black Ash			Threatened	S1S2	1 At Risk	230	10.8 ± 0.0	NS
P	<i>Rudbeckia laciniata</i>	Cut-Leaved Coneflower				S1S2	2 May Be At Risk	17	28.8 ± 7.0	NS
P	<i>Rudbeckia laciniata</i> <i>var. gaspereauiensis</i>	Cut-Leaved Coneflower				S1S2	2 May Be At Risk	9	64.7 ± 0.0	NS
P	<i>Arabis hirsuta</i> <i>var. pycnocarpa</i>	Western Hairy Rockcress				S1S2	2 May Be At Risk	1	70.1 ± 0.0	NS
P	<i>Cardamine maxima</i>	Large Toothwort				S1S2	2 May Be At Risk	1	85.3 ± 0.0	NS
P	<i>Proserpinaca intermedia</i>	Intermediate Mermaidweed				S1S2	2 May Be At Risk	2	27.3 ± 0.0	NS
P	<i>Conopholis americana</i>	American Cancer-root				S1S2	2 May Be At Risk	14	73.9 ± 1.0	NS
P	<i>Anemone virginiana</i> <i>var. alba</i>	Virginia Anemone				S1S2	3 Sensitive	5	61.1 ± 7.0	NS
P	<i>Hepatica nobilis</i> <i>var. obtusa</i>	Round-lobed Hepatica				S1S2	2 May Be At Risk	48	25.2 ± 0.0	NS
P	<i>Ranunculus sceleratus</i>	Cursed Buttercup				S1S2	2 May Be At Risk	20	12.8 ± 0.0	NS
P	<i>Gratiola neglecta</i>	Clammy Hedge-Hyssop				S1S2	3 Sensitive	5	49.8 ± 2.0	NS
P	<i>Carex livida</i> <i>var. radicaulis</i>	Livid Sedge				S1S2	2 May Be At Risk	12	45.7 ± 10.0	NS
P	<i>Juncus greenei</i>	Greene's Rush				S1S2	2 May Be At Risk	5	23.7 ± 10.0	NS
P	<i>Platanthera huronensis</i>	Fragrant Green Orchid				S1S2	5 Undetermined	1	33.5 ± 10.0	NS
P	<i>Calamagrostis stricta</i> <i>ssp. stricta</i>	Slim-stemmed Reed Grass				S1S2	3 Sensitive	1	91.3 ± 7.0	NS
P	<i>Cinna arundinacea</i>	Sweet Wood Reed Grass				S1S2	2 May Be At Risk	54	54.2 ± 0.0	NS
P	<i>Festuca subverticillata</i>	Nodding Fescue				S1S2	2 May Be At Risk	12	40.2 ± 5.0	NS
P	<i>Cryptogramma stelleri</i>	Steller's Rockbrake				S1S2	2 May Be At Risk	3	45.7 ± 0.0	NS
P	<i>Carex vacillans</i>	Estuarine Sedge				S1S3	5 Undetermined	1	62.3 ± 0.0	NS
P	<i>Conioselinum chinense</i>	Chinese Hemlock-parsley				S2	3 Sensitive	2	35.7 ± 0.0	NS
P	<i>Osmorhiza longistylis</i>	Smooth Sweet Cicely				S2	2 May Be At Risk	23	37.5 ± 0.0	NS
P	<i>Erigeron philadelphicus</i>	Philadelphia Fleabane				S2	3 Sensitive	2	58.6 ± 1.0	NS
P	<i>Lactuca hirsuta</i> <i>var. sanguinea</i>	Hairy Lettuce				S2	3 Sensitive	4	24.8 ± 7.0	NS
P	<i>Symphotrichum undulatum</i>	Wavy-leaved Aster				S2	3 Sensitive	108	15.4 ± 7.0	NS
P	<i>Symphotrichum ciliolatum</i>	Fringed Blue Aster				S2	3 Sensitive	16	35.3 ± 0.0	NS
P	<i>Impatiens pallida</i>	Pale Jewelweed				S2	3 Sensitive	2	75.0 ± 1.0	NS
P	<i>Caulophyllum thalictroides</i>	Blue Cohosh				S2	2 May Be At Risk	56	21.7 ± 0.0	NS
P	<i>Arabis drummondii</i>	Drummond's Rockcress				S2	3 Sensitive	10	67.5 ± 0.0	NS
P	<i>Cardamine parviflora</i> <i>var. arenicola</i>	Small-flowered Bittercress				S2	3 Sensitive	14	43.6 ± 50.0	NS
P	<i>Draba arabisans</i>	Rock Whitlow-Grass				S2	3 Sensitive	13	75.0 ± 1.0	NS
P	<i>Stellaria humifusa</i>	Saltmarsh Starwort				S2	3 Sensitive	5	55.6 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Stellaria longifolia</i>	Long-leaved Starwort				S2	3 Sensitive	12	32.3 ± 5.0	NS
P	<i>Chenopodium rubrum</i>	Red Pigweed				S2	2 May Be At Risk	2	69.2 ± 2.0	NS
P	<i>Hudsonia ericoides</i>	Pinebarren Golden Heather				S2	3 Sensitive	29	22.8 ± 7.0	NS
P	<i>Hypericum majus</i>	Large St John's-wort				S2	3 Sensitive	6	13.0 ± 0.0	NS
P	<i>Crassula aquatica</i>	Water Pygmyweed				S2	3 Sensitive	1	48.7 ± 0.0	NS
P	<i>Myriophyllum farwellii</i>	Farwell's Water Milfoil				S2	3 Sensitive	9	21.3 ± 1.0	NS
P	<i>Myriophyllum verticillatum</i>	Whorled Water Milfoil				S2	3 Sensitive	3	33.1 ± 7.0	NS
P	<i>Oenothera fruticosa</i> <i>ssp. glauca</i>	Narrow-leaved Evening Primrose				S2	5 Undetermined	8	33.9 ± 7.0	NS
P	<i>Polygonum arifolium</i>	Halberd-leaved Tearthumb				S2	3 Sensitive	12	32.9 ± 0.0	NS
P	<i>Rumex salicifolius</i> var. <i>mexicanus</i>	Triangular-valve Dock				S2	3 Sensitive	11	32.8 ± 0.0	NS
P	<i>Primula mistassinica</i>	Mistassini Primrose				S2	3 Sensitive	16	61.1 ± 7.0	NS
P	<i>Anemone canadensis</i>	Canada Anemone				S2	2 May Be At Risk	3	29.6 ± 7.0	NS
P	<i>Anemone quinquefolia</i>	Wood Anemone				S2	3 Sensitive	14	34.1 ± 0.0	NS
P	<i>Anemone virginiana</i>	Virginia Anemone				S2	3 Sensitive	16	33.1 ± 5.0	NS
P	<i>Anemone virginiana</i> var. <i>virginiana</i>	Virginia Anemone				S2	3 Sensitive	2	33.5 ± 7.0	NS
P	<i>Caltha palustris</i>	Yellow Marsh Marigold				S2	3 Sensitive	1	66.5 ± 5.0	NS
P	<i>Galium boreale</i>	Northern Bedstraw				S2	2 May Be At Risk	7	63.5 ± 1.0	NS
P	<i>Galium labradoricum</i>	Labrador Bedstraw				S2	3 Sensitive	79	32.9 ± 0.0	NS
P	<i>Salix pedicellaris</i>	Bog Willow				S2	3 Sensitive	56	30.6 ± 0.0	NS
P	<i>Salix sericea</i>	Silky Willow				S2	2 May Be At Risk	119	7.4 ± 1.0	NS
P	<i>Saxifraga paniculata</i> <i>ssp. neogaea</i>	White Mountain Saxifrage				S2	3 Sensitive	4	69.5 ± 7.0	NS
P	<i>Tiarella cordifolia</i>	Heart-leaved Foamflower				S2	3 Sensitive	222	29.3 ± 0.0	NS
P	<i>Agalinis maritima</i>	Saltmarsh Agalinis				S2	3 Sensitive	1	26.2 ± 0.0	NS
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S2	3 Sensitive	7	36.7 ± 1.0	NS
P	<i>Carex atratiformis</i>	Scabrous Black Sedge				S2	3 Sensitive	3	82.3 ± 0.0	NS
P	<i>Carex bebbii</i>	Bebb's Sedge				S2	3 Sensitive	15	36.2 ± 0.0	NS
P	<i>Carex castanea</i>	Chestnut Sedge				S2	2 May Be At Risk	23	32.9 ± 0.0	NS
P	<i>Carex comosa</i>	Bearded Sedge				S2	3 Sensitive	7	42.4 ± 7.0	NS
P	<i>Carex hystericina</i>	Porcupine Sedge				S2	2 May Be At Risk	7	68.6 ± 1.0	NS
P	<i>Carex tenera</i>	Tender Sedge				S2	3 Sensitive	8	34.2 ± 0.0	NS
P	<i>Carex tuckermanii</i>	Tuckerman's Sedge				S2	3 Sensitive	24	33.9 ± 0.0	NS
P	<i>Vallisneria americana</i>	Wild Celery				S2	2 May Be At Risk	11	26.1 ± 1.0	NS
P	<i>Allium schoenoprasum</i> var. <i>sibiricum</i>	Wild Chives				S2	2 May Be At Risk	1	61.1 ± 7.0	NS
P	<i>Lilium canadense</i>	Canada Lily				S2	2 May Be At Risk	70	15.0 ± 0.0	NS
P	<i>Najas gracillima</i>	Thread-Like Naiad				S2	3 Sensitive	2	27.9 ± 0.0	NS
P	<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Yellow Lady's-slipper				S2	3 Sensitive	9	9.1 ± 7.0	NS
P	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Small Yellow Lady's-Slipper				S2	3 Sensitive	13	36.2 ± 0.0	NS
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S2	2 May Be At Risk	30	29.9 ± 0.0	NS
P	<i>Goodyera pubescens</i>	Downy Rattlesnake-Plantain				S2	3 Sensitive	10	23.6 ± 1.0	NS
P	<i>Platanthera flava</i>	Southern Rein-Orchid				S2	3 Sensitive	31	90.7 ± 0.0	NS
P	<i>Platanthera flava</i> var. <i>flava</i>	Southern Rein Orchid				S2	3 Sensitive	2	64.7 ± 7.0	NS
P	<i>Platanthera flava</i> var. <i>herbiola</i>	Pale Green Orchid				S2	5 Undetermined	7	64.6 ± 1.0	NS
P	<i>Platanthera macrophylla</i>	Large Round-Leaved Orchid				S2	3 Sensitive	12	50.6 ± 1.0	NS
P	<i>Spiranthes lucida</i>	Shining Ladies'-Tresses				S2	2 May Be At Risk	13	23.7 ± 1.0	NS

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P	<i>Dichanthelium linearifolium</i>	Narrow-leaved Panic Grass				S2	3 Sensitive	7	42.4 ± 7.0	NS
P	<i>Piptatherum canadense</i>	Canada Rice Grass				S2	3 Sensitive	8	11.7 ± 1.0	NS
P	<i>Piptatherum pungens</i>	Slender Rice Grass				S2	3 Sensitive	2	81.2 ± 10.0	NS
P	<i>Potamogeton friesii</i>	Fries' Pondweed				S2	2 May Be At Risk	10	62.7 ± 5.0	NS
P	<i>Potamogeton richardsonii</i>	Richardson's Pondweed				S2	2 May Be At Risk	8	35.6 ± 0.0	NS
P	<i>Dryopteris fragrans</i> var. <i>remotiuscula</i>	Fragrant Wood Fern				S2	3 Sensitive	11	70.8 ± 1.0	NS
P	<i>Woodsia glabella</i>	Smooth Cliff Fern				S2	3 Sensitive	2	70.3 ± 1.0	NS
P	<i>Symphytotrichum boreale</i>	Boreal Aster				S2?	3 Sensitive	7	5.5 ± 5.0	NS
P	<i>Cuscuta cephalanthi</i>	Buttonbush Dodder				S2?	5 Undetermined	1	43.2 ± 0.0	NS
P	<i>Epilobium coloratum</i>	Purple-veined Willowherb				S2?	3 Sensitive	5	26.2 ± 0.0	NS
P	<i>Crataegus submollis</i>	Quebec Hawthorn				S2?	5 Undetermined	6	17.3 ± 7.0	NS
P	<i>Carex peckii</i>	White-Tinged Sedge				S2?	2 May Be At Risk	4	26.3 ± 0.0	NS
P	<i>Eleocharis ovata</i>	Ovate Spikerush				S2?	3 Sensitive	8	36.2 ± 0.0	NS
P	<i>Scirpus pedicellatus</i>	Stalked Bulrush				S2?	3 Sensitive	7	19.5 ± 0.0	NS
P	<i>Potamogeton pulcher</i>	Spotted Pondweed			Vulnerable	S2S3	3 Sensitive	8	57.7 ± 2.0	NS
P	<i>Hieracium robinsonii</i>	Robinson's Hawkweed				S2S3	3 Sensitive	3	60.0 ± 1.0	NS
P	<i>Iva frutescens</i> ssp. <i>oraria</i>	Big-leaved Marsh-elder				S2S3	3 Sensitive	17	46.4 ± 1.0	NS
P	<i>Senecio pseudoarnica</i>	Seabeach Ragwort				S2S3	3 Sensitive	19	30.1 ± 1.0	NS
P	<i>Betula michauxii</i>	Michaux's Dwarf Birch				S2S3	3 Sensitive	16	3.7 ± 1.0	NS
P	<i>Sagina nodosa</i>	Knotted Pearlwort				S2S3	4 Secure	38	28.4 ± 5.0	NS
P	<i>Sagina nodosa</i> ssp. <i>borealis</i>	Knotted Pearlwort				S2S3	4 Secure	7	61.7 ± 0.0	NS
P	<i>Ceratophyllum echinatum</i>	Prickly Hornwort				S2S3	3 Sensitive	6	58.0 ± 0.0	NS
P	<i>Hypericum dissimulatum</i>	Disguised St John's-wort				S2S3	3 Sensitive	5	8.5 ± 0.0	NS
P	<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed				S2S3	3 Sensitive	27	34.2 ± 2.0	NS
P	<i>Shepherdia canadensis</i>	Soapberry				S2S3	3 Sensitive	73	29.6 ± 7.0	NS
P	<i>Empetrum eamesii</i> ssp. <i>atropurpureum</i>	Pink Crowberry				S2S3	3 Sensitive	5	22.6 ± 7.0	NS
P	<i>Empetrum eamesii</i> ssp. <i>eamesii</i>	Pink Crowberry				S2S3	3 Sensitive	5	22.6 ± 7.0	NS
P	<i>Chamaesyce polygonifolia</i>	Seaside Spurge				S2S3	3 Sensitive	3	73.0 ± 3.0	NS
P	<i>Halenia deflexa</i>	Spurred Gentian				S2S3	3 Sensitive	3	45.8 ± 0.0	NS
P	<i>Hedeoma pulegioides</i>	American False Pennyroyal				S2S3	3 Sensitive	17	39.9 ± 5.0	NS
P	<i>Polygonum buxiforme</i>	Small's Knotweed				S2S3	5 Undetermined	7	45.4 ± 0.0	NS
P	<i>Polygonum raii</i>	Sharp-fruited Knotweed				S2S3	5 Undetermined	3	56.1 ± 1.0	NS
P	<i>Amelanchier fernaldii</i>	Fernald's Serviceberry				S2S3	5 Undetermined	1	89.6 ± 7.0	NS
P	<i>Potentilla canadensis</i>	Canada Cinquefoil				S2S3	3 Sensitive	1	44.2 ± 5.0	NS
P	<i>Galium aparine</i>	Common Bedstraw				S2S3	3 Sensitive	23	25.4 ± 0.0	NS
P	<i>Salix pellita</i>	Satiny Willow				S2S3	3 Sensitive	8	39.7 ± 4.0	NS
P	<i>Carex adusta</i>	Lesser Brown Sedge				S2S3	3 Sensitive	7	25.2 ± 5.0	NS
P	<i>Carex hirtifolia</i>	Pubescent Sedge				S2S3	3 Sensitive	38	28.4 ± 7.0	NS
P	<i>Carex houghtoniana</i>	Houghton's Sedge				S2S3	3 Sensitive	4	42.8 ± 1.0	NS
P	<i>Eleocharis olivacea</i>	Yellow Spikerush				S2S3	3 Sensitive	6	13.5 ± 0.0	NS
P	<i>Eriophorum gracile</i>	Slender Cottongrass				S2S3	3 Sensitive	7	31.1 ± 7.0	NS
P	<i>Coeloglossum viride</i> var. <i>virescens</i>	Long-bracted Frog Orchid				S2S3	2 May Be At Risk	2	64.3 ± 1.0	NS
P	<i>Cypripedium</i>	Yellow Lady's-slipper				S2S3	3 Sensitive	513	33.0 ± 1.0	NS

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P	<i>parviflorum</i>									
P	<i>Poa glauca</i>	Glaucous Blue Grass				S2S3	3 Sensitive	5	34.9 ± 1.0	NS
P	<i>Botrychium lanceolatum</i> var. <i>angustisegmentum</i>	Lance-Leaf Grape-Fern				S2S3	3 Sensitive	7	41.8 ± 5.0	NS
P	<i>Botrychium simplex</i>	Least Moonwort				S2S3	3 Sensitive	4	41.0 ± 0.0	NS
P	<i>Ophioglossum pusillum</i>	Northern Adder's-tongue				S2S3	3 Sensitive	6	9.1 ± 7.0	NS
P	<i>Angelica atropurpurea</i>	Purple-stemmed Angelica				S3	4 Secure	1	56.8 ± 0.0	NS
P	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane				S3	3 Sensitive	16	39.4 ± 7.0	NS
P	<i>Hieracium paniculatum</i>	Panicled Hawkweed				S3	4 Secure	25	40.4 ± 11.0	NS
P	<i>Megalodonta beckii</i>	Water Beggarticks				S3	4 Secure	12	26.2 ± 0.0	NS
P	<i>Packera paupercula</i>	Balsam Groundsel				S3	4 Secure	39	31.1 ± 0.0	NS
P	<i>Alnus serrulata</i>	Smooth Alder				S3	3 Sensitive	5	93.4 ± 0.0	NS
P	<i>Betula pumila</i>	Bog Birch				S3	3 Sensitive	3	33.2 ± 0.0	NS
P	<i>Campanula aparinoides</i>	Marsh Bellflower				S3	3 Sensitive	28	37.6 ± 1.0	NS
P	<i>Minuartia groenlandica</i>	Greenland Stitchwort				S3	3 Sensitive	35	13.7 ± 0.0	NS
P	<i>Viburnum edule</i>	Squashberry				S3	3 Sensitive	2	92.7 ± 0.0	NS
P	<i>Empetrum eamesii</i>	Pink Crowberry				S3	3 Sensitive	83	22.8 ± 7.0	NS
P	<i>Vaccinium boreale</i>	Northern Blueberry				S3	3 Sensitive	3	47.4 ± 0.0	NS
P	<i>Vaccinium caespitosum</i>	Dwarf Bilberry				S3	4 Secure	76	28.2 ± 0.0	NS
P	<i>Vaccinium uliginosum</i>	Alpine Bilberry				S3	3 Sensitive	3	38.6 ± 1.0	NS
P	<i>Bartonia virginica</i>	Yellow Bartonia				S3	4 Secure	26	7.4 ± 7.0	NS
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	4 Secure	14	45.4 ± 3.0	NS
P	<i>Proserpinaca palustris</i>	Marsh Mermaidweed				S3	4 Secure	21	29.0 ± 0.0	NS
P	<i>Proserpinaca palustris</i> var. <i>crebra</i>	Marsh Mermaidweed				S3	4 Secure	28	16.4 ± 0.0	NS
P	<i>Proserpinaca pectinata</i>	Comb-leaved Mermaidweed				S3	4 Secure	12	20.5 ± 1.0	NS
P	<i>Teucrium canadense</i>	Canada Germander				S3	3 Sensitive	44	25.5 ± 5.0	NS
P	<i>Epilobium strictum</i>	Downy Willowherb				S3	3 Sensitive	6	40.2 ± 0.0	NS
P	<i>Polygala sanguinea</i>	Blood Milkwort				S3	3 Sensitive	18	13.1 ± 0.0	NS
P	<i>Polygonum pennsylvanicum</i>	Pennsylvania Smartweed				S3	4 Secure	25	17.3 ± 7.0	NS
P	<i>Polygonum scandens</i>	Climbing False Buckwheat				S3	3 Sensitive	20	29.3 ± 2.0	NS
P	<i>Plantago rugelii</i>	Rugel's Plantain				S3	4 Secure	8	23.5 ± 0.0	NS
P	<i>Primula laurentiana</i>	Laurentian Primrose				S3	4 Secure	12	73.9 ± 7.0	NS
P	<i>Samolus valerandi</i> ssp. <i>parviflorus</i>	Seaside Brookweed				S3	3 Sensitive	40	21.6 ± 1.0	NS
P	<i>Pyrola asarifolia</i>	Pink Pyrola				S3	4 Secure	10	30.0 ± 1.0	NS
P	<i>Pyrola minor</i>	Lesser Pyrola				S3	3 Sensitive	2	83.3 ± 7.0	NS
P	<i>Ranunculus gmelinii</i>	Gmelin's Water Buttercup				S3	4 Secure	41	17.3 ± 0.0	NS
P	<i>Rhamnus alnifolia</i>	Alder-leaved Buckthorn				S3	4 Secure	108	16.6 ± 0.0	NS
P	<i>Agrimonia gryposepala</i>	Hooked Agrimony				S3	4 Secure	107	28.8 ± 0.0	NS
P	<i>Amelanchier stolonifera</i>	Running Serviceberry				S3	4 Secure	43	34.7 ± 3.0	NS
P	<i>Geocaldon lividum</i>	Northern Comandra				S3	4 Secure	5	83.3 ± 5.0	NS
P	<i>Limosella australis</i>	Southern Mudwort				S3	4 Secure	9	28.0 ± 3.0	NS
P	<i>Lindernia dubia</i>	Yellow-seeded False Pimperel				S3	4 Secure	21	34.2 ± 0.0	NS
P	<i>Laportea canadensis</i>	Canada Wood Nettle				S3	3 Sensitive	48	17.9 ± 0.0	NS
P	<i>Verbena hastata</i>	Blue Vervain				S3	4 Secure	133	17.9 ± 0.0	NS
P	<i>Carex cryptolepis</i>	Hidden-scaled Sedge				S3	4 Secure	11	6.3 ± 6.0	NS
P	<i>Carex eburnea</i>	Bristle-leaved Sedge				S3	3 Sensitive	5	42.6 ± 1.0	NS
P	<i>Carex lupulina</i>	Hop Sedge				S3	4 Secure	44	6.3 ± 6.0	NS
P	<i>Carex rosea</i>	Rosy Sedge				S3	4 Secure	30	33.4 ± 1.0	NS
P	<i>Carex swanii</i>	Swan's Sedge				S3	3 Sensitive	2	21.2 ± 0.0	NS
P	<i>Carex tribuloides</i>	Blunt Broom Sedge				S3	4 Secure	14	25.9 ± 0.0	NS



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P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	3 Sensitive	3	39.1 ± 0.0	NS
P	<i>Carex foenea</i>	Fernald's Hay Sedge				S3	4 Secure	12	15.5 ± 0.0	NS
P	<i>Eleocharis nitida</i>	Quill Spikerush				S3	4 Secure	11	27.4 ± 5.0	NS
P	<i>Elodea canadensis</i>	Canada Waterweed				S3	4 Secure	8	17.7 ± 0.0	NS
P	<i>Juncus subcaudatus</i> <i>var. planisepalus</i>	Woods-Rush				S3	3 Sensitive	14	20.7 ± 1.0	NS
P	<i>Juncus dudleyi</i>	Dudley's Rush				S3	4 Secure	14	34.8 ± 0.0	NS
P	<i>Goodyera repens</i>	Lesser Rattlesnake-plantain				S3	3 Sensitive	6	44.8 ± 0.0	NS
P	<i>Listera australis</i>	Southern Twayblade				S3	4 Secure	105	4.1 ± 0.0	NS
P	<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid				S3	4 Secure	96	34.7 ± 0.0	NS
P	<i>Platanthera hookeri</i>	Hooker's Orchid				S3	4 Secure	17	34.9 ± 0.0	NS
P	<i>Platanthera orbiculata</i>	Small Round-leaved Orchid				S3	4 Secure	21	29.5 ± 4.0	NS
P	<i>Spiranthes ochroleuca</i>	Yellow Ladies'-tresses				S3	4 Secure	14	27.4 ± 4.0	NS
P	<i>Alopecurus aequalis</i>	Short-awned Foxtail				S3	4 Secure	18	39.5 ± 0.0	NS
P	<i>Dichanthelium clandestinum</i>	Deer-tongue Panic Grass				S3	4 Secure	264	15.7 ± 0.0	NS
P	<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed				S3	4 Secure	1	96.7 ± 0.0	NS
P	<i>Potamogeton praelongus</i>	White-stemmed Pondweed				S3	3 Sensitive	5	48.2 ± 5.0	NS
P	<i>Potamogeton zosteriformis</i>	Flat-stemmed Pondweed				S3	3 Sensitive	15	26.2 ± 0.0	NS
P	<i>Sparganium natans</i>	Small Burreed				S3	4 Secure	11	35.3 ± 0.0	NS
P	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort				S3	4 Secure	14	61.6 ± 0.0	NS
P	<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort				S3	3 Sensitive	8	69.1 ± 7.0	NS
P	<i>Equisetum pratense</i>	Meadow Horsetail				S3	3 Sensitive	14	35.1 ± 0.0	NS
P	<i>Equisetum variegatum</i>	Variegated Horsetail				S3	4 Secure	21	8.6 ± 5.0	NS
P	<i>Isoetes acadensis</i>	Acadian Quillwort				S3	3 Sensitive	7	7.0 ± 0.0	NS
P	<i>Lycopodium sitchense</i>	Sitka Clubmoss				S3	4 Secure	2	66.4 ± 1.0	NS
P	<i>Huperzia appalachiana</i>	Appalachian Fir-Clubmoss				S3	3 Sensitive	16	47.3 ± 7.0	NS
P	<i>Botrychium dissectum</i>	Cut-leaved Moonwort				S3	4 Secure	8	69.8 ± 0.0	NS
P	<i>Polypodium appalachianum</i>	Appalachian Polypody				S3	5 Undetermined	14	30.2 ± 0.0	NS
P	<i>Asclepias incarnata</i> <i>ssp. pulchra</i>	Swamp Milkweed				S3?	5 Undetermined	53	5.5 ± 5.0	NS
P	<i>Polygonum amphibium</i> <i>var. emersum</i>	Water Smartweed				S3?	5 Undetermined	18	19.6 ± 0.0	NS
P	<i>Lycopodium sabinifolium</i>	Ground-Fir				S3?	4 Secure	3	60.8 ± 0.0	NS
P	<i>Suaeda calceoliformis</i>	Horned Sea-blite				S3S4	4 Secure	10	22.8 ± 7.0	NS
P	<i>Vaccinium corymbosum</i>	Highbush Blueberry				S3S4	4 Secure	2	12.8 ± 0.0	NS
P	<i>Myriophyllum sibiricum</i>	Siberian Water Milfoil				S3S4	4 Secure	5	59.5 ± 0.0	NS
P	<i>Rhexia virginica</i>	Virginia Meadow Beauty				S3S4	4 Secure	71	82.7 ± 5.0	NS
P	<i>Nuphar lutea</i> <i>ssp. pumila</i>	Small Yellow Pond-lily				S3S4	4 Secure	2	90.0 ± 1.0	NS
P	<i>Sanguinaria canadensis</i>	Bloodroot				S3S4	4 Secure	79	13.9 ± 0.0	NS
P	<i>Polygonum fowleri</i>	Fowler's Knotweed				S3S4	4 Secure	3	60.5 ± 1.0	NS
P	<i>Rumex maritimus</i>	Sea-Side Dock				S3S4		5	67.0 ± 0.0	NS
P	<i>Rumex maritimus</i> <i>var. fueginus</i>	Tierra del Fuego Dock				S3S4	4 Secure	12	58.6 ± 0.0	NS
P	<i>Crataegus succulenta</i>	Fleshy Hawthorn				S3S4	5 Undetermined	1	13.5 ± 0.0	NS
P	<i>Fragaria vesca</i> <i>ssp. americana</i>	Woodland Strawberry				S3S4	4 Secure	65	17.2 ± 0.0	NS
P	<i>Salix petiolaris</i>	Meadow Willow				S3S4	4 Secure	23	32.0 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Agalinis neoscotica</i>	Nova Scotia Agalinis				S3S4	4 Secure	14	13.1 ± 0.0	NS
P	<i>Viola sagittata</i> var. <i>ovata</i>	Arrow-Leaved Violet				S3S4	4 Secure	18	15.0 ± 0.0	NS
P	<i>Carex argyrantha</i>	Silvery-flowered Sedge				S3S4	4 Secure	9	49.5 ± 1.0	NS
P	<i>Eriophorum russeolum</i>	Russet Cottongrass				S3S4	4 Secure	9	42.3 ± 3.0	NS
P	<i>Sisyrinchium atlanticum</i>	Eastern Blue-Eyed-Grass				S3S4	4 Secure	4	75.9 ± 0.0	NS
P	<i>Triglochin gaspensis</i>	Gasp Arrowgrass				S3S4	5 Undetermined	27	45.8 ± 0.0	NS
P	<i>Juncus acuminatus</i>	Sharp-Fruit Rush				S3S4	4 Secure	5	13.2 ± 0.0	NS
P	<i>Luzula parviflora</i>	Small-flowered Woodrush				S3S4	4 Secure	2	64.9 ± 0.0	NS
P	<i>Liparis loeselii</i>	Loesel's Twayblade				S3S4	4 Secure	4	2.9 ± 5.0	NS
P	<i>Panicum tuckermanii</i>	Tuckerman's Panic Grass				S3S4	4 Secure	12	34.2 ± 0.0	NS
P	<i>Trisetum spicatum</i>	Narrow False Oats				S3S4	4 Secure	13	34.9 ± 1.0	NS
P	<i>Cystopteris bulbifera</i>	Bulblet Bladder Fern				S3S4	4 Secure	74	19.0 ± 0.0	NS
P	<i>Equisetum hyemale</i>	Common Scouring-rush				S3S4	4 Secure	4	33.6 ± 0.0	NS
P	<i>Equisetum hyemale</i> var. <i>affine</i>	Common Scouring-rush				S3S4	4 Secure	55	14.0 ± 2.0	NS
P	<i>Equisetum scirpoides</i>	Dwarf Scouring-Rush				S3S4	4 Secure	59	22.6 ± 4.0	NS
P	<i>Lycopodium complanatum</i>	Northern Clubmoss				S3S4	4 Secure	13	21.8 ± 1.0	NS
P	<i>Schizaea pusilla</i>	Little Curlygrass Fern				S3S4	4 Secure	5	25.6 ± 1.0	NS
P	<i>Viola canadensis</i>	Canada Violet				SH	0.1 Extirpated	2	42.0 ± 0.0	NS

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The recipient of these data shall acknowledge the ACCDC 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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