McCallum Environmental Ltd.

September 4, 2015

Nova Scotia Environment
30 Damascus Road, Suite 115
Bedford, Nova Scotia
B4A 0C1

Attention: **Terry Randall, NSE Local Inspector**
Re: Wetland Alteration Application
Bedford Commons, PID 41376856 and 40832834
Bedford, Nova Scotia

McCallum Environmental Ltd. (MEL) was retained by Hamton Holdings Limited and Banc Developments Ltd. to prepare a wetland alteration application for a single wetland associated with PID 41376856 and a portion of PID 40832834 (right-of-way for Duke Street- owned by Halifax Regional Municipality (HRM)) (herein referred to as the Subject Property) in Bedford, Nova Scotia, which requires an area of infill in order to support commercial development. The proposed development involves infilling all of Wetland 1 within the subject property.

This report provides information necessary for a wetland alteration application. Current land use is undeveloped, and the Subject Property is deemed commercial taxable. Figure 1 attached in Appendix A provides the general location of the site. An application was submitted to NSE in January 2015 and reviewed by then inspector specialist Robert Cuthbert. A letter from NSE dated March 6, 2015 (File # 95100-30-092200 and Application # 2015-092200) was provided to the applicant contact and proponent outlining additional information that was required. The proponent commenced the process of completing necessary engineering studies to support the NSE request for additional information. During this time, NSE rejected our application (letter dated June 23, 2015). At this time, we are re-applying for this wetland alteration, and have provided all original information, plus additional information as requested in March 2015 in this documentation.

Proponent and Applicant Contact Information

The proponent contact information is summarized in the following table.

Table 1: Proponent Contact Information

Name of Proponent	Banc Developments Ltd
Mailing Address	30 Damascus Rd, Bedford, B4A 0C1
Civic Address	0 Damascus Rd., Lot 12A2-2, Bedford, NS.
Property Identification #	41376856, and 40832834 (HRM right-of-way Duke St)
Municipal Zoning	Commercial Taxable
Application Contact	Meghan Milloy, McCallum Environmental Ltd.
Phone Number	902-446-8252
Email Address	meghan@mccallumenvironmental.com
Mailing Address	Suite 135, 2 Bluewater Road, Bedford, NS, B4B 1G7

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 2. Curriculum Vitae for Meghan Milloy and Melanie MacDonald are provided in Appendix B.

Table 2: Project Team

Team Member	Role
Meghan Milloy, BSc. (Bio), MES	Project Manager and Wetland Delineator/Evaluator
Melanie MacDonald, BSc. (Bio & ISAR), MREM	Biologist, Wetland Delineator, and Species at Risk Evaluator, GIS watershed evaluation

Property and Wetland Information

MEL delineated the Subject Property in December 2014, with follow up evaluation completed in September 2015. A single wetland (Wetland 1) was identified on the Subject Property. Wetland 1 is located on the west side of Duke Street, between Mann St. and Damascus Rd. in Bedford, Nova Scotia. The wetland straddles two individual properties (PIDs 41376856 and 41395831) and the Duke Street right of way PID 40832834. The entire wetland is 9114 m^2 in size, and the proposed development involves infilling 5222 m^2 across PID 41376856 and 40832834). These PIDs are within the Halifax Regional Municipality (HRM), and are associated with an industrial/commercial area of Bedford called "Bedford Common".

Elevations in this area of the Bedford Common along Duke St. are generally flat, being located near the primary watershed divide between the Sackville River and Shubenacadie River watersheds. There is a gentle down-gradient draining to the north/northeast towards Rocky Lake. The site is situated near the southern boundary of the Powder Mill Lake tertiary watershed located within the Shubenacadie/Stewiacke primary watershed that drains into the Minas Basin.

Local groundwater flow is presumed to be in a north/north-easterly direction towards Rocky Lake. The current dominated land use in the local area is urban commercial, a mix of old and newly developed commercial areas, with parcels of undeveloped lands. The Nova Scotia Topographic Database has Wetland 1 defined as a "Lake". Based on the site visit performed by MEL, Wetland 1 is less than 2 metres in depth and significantly vegetated (greater than 50%) and therefore has been classified herein as a wetland. There are no mapped watercourses present inside the Subject Property flowing in or out of Wetland 1.

The Subject Property is located within the Eastern Ecoregion, which extends along the eastern shore from the Bedford Basin through Guysborough County, as described by Neily et al., (2003). This ecoregion is the eastern extension of the Appalachian peneplain which slopes towards the Atlantic Ocean. It is bordered to the south by the Atlantic Coastal Ecoregion (800) and to the north by the St. Mary's Fault. The highest points of elevation, 220 m above sea level,

are found in the Governor Lake Ecodistrict (450). The ecoregion is underlain by quartzite and slate of the Meguma Group, with granitic intrusives.

Within the Eastern Ecoregion, the Subject Property sits in the Eastern Interior ecodistrict (440). This is one of the largest ecodistricts in the province with 3,693 km^2 (or 58% of the ecodistrict) occupies an area from Pockwock Lake in the west to the Town of Guysborough in the east. The bedrock is highly visible in those areas where the glacial till is very thin, exposing the ridge topography. Where the till is thicker, the ridged topography is masked and thick softwood forests occur. The ecodistrict is heavily covered with freshwater lakes (27,312 hectares or 7.4%). The complexity of the ecodistrict is reflected in the abundance of ecosections due to the glacial history and movement of materials from northerly ecoregions

Within the site, bedrock is exposed at the surface or beneath shallow soils. It may contain minor fluvial, lacustrine and till deposits. The exposed surface is glacially scoured with ice movement features visible, such as striae. The bedrock is part of the Goldenville Formation, from the early-mid Cambrian period. It contains greywacke, meta-sandstone, slate, schist and migmatite. The surficial geology of the Subject Property is Anthropogenic surrounded by Till Veneer. Anthropogenic is artificial or geological material that has been disrupted and redistributed by human activity with highly variable texture. Note that many areas of residential communities and till veneer are mapped as the original material because of the sporadic and shallow nature of the modification.

Watershed Evaluation

The Subject Property lies with the Shubenacadie / Stewiacke primary watershed (1EJ) in Nova Scotia. The primary drains north into the Minus Basin in the Bay of Fundy. The proposed development area lies within the Powder Mill Lake tertiary watershed.

A watershed evaluation was completed to better understand the surface water systems across the property to support the detailed functions assessment process for each wetland proposed for alteration. Evaluation of the shore direct watershed basin allowed for identification of priority wetlands based on their size, type, function, system significance, and positioning inside the watershed. Watershed assessment also helped identify wetland types that were rare or significant and identified headwater wetlands and first/second order streams that generally play an important role in water storage, water quality and flood control inside a watershed.

Watershed Characteristics

Watershed conditions within and surrounding the subject property consist of a mix of old and newly developed commercial area. Within the tertiary watershed of Powder Mill Lake land use is dominated by natural forest areas and urban commercial development.

Section 1 of the NOVAWET 3.0 functions assessment has been completed below for the identified tertiary watershed basin for the subject property that will be affected by the proposed development. Watershed mapping is shown on Figure 2.

Powder Mill Lake Watershed Total Area: 2960 ha

The Powder Mill Lake Watershed is located within the Shunbenacadie / Stewiacke Primary Watershed, and land use cover within the Powder Mill Lake Watershed are described in the following table.

Table 3: Land Use Cover within the Powder Mill Lake Watershed

Landuse Type	Area (Hectares)	Percent of Watershed
Forested/natural	948.883	32.06%
Water/wetlands	684.434	23.12%
Urban commercial	1009.54	34.11%
Other development	148.407	5.01%
Roads	168.786	5.70%
Total	2960.051	100.00%

The Powder Mill Lake Watershed is 2960 km² in size. The predominant land use is split between forested/natural type representing 32.06% as well as urban and commercial development representing 34.11%. Water and wetlands account for the next highest usage of land at 23.13% of total area. Some lakes located within the Powder Mill Lake watershed include Rocky Lake, First Lake, Second Lake, Third Lake, Three Mile Lake, Perry Lake, Muddy Pond Powder, and Mill Lake.

The Powder Mill Lake Watershed has been evaluated to have 31.7% impervious surface (paved roads, plus two thirds of houses, buildings, and other urban infrastructure) and therefore, watershed conditions are considered highly altered (> 20%).

Wetland cover is estimated at 2.3% and therefore, wetlands contributes significantly to floodwater protection within the watershed basin. The wetlands have been classified at 43% bogs and 57% general unclassified wetlands. However, wetland cover is very likely underrepresented in the NSDNR Wetland Inventory used for the calculations, due to a lack of field verification.

Environmental Assessment Trigger

The Environmental Assessment Regulations (made under Section 49 of the Nova Scotia Environment Act) define a list of Class I undertakings which requires provincial environmental assessment (EA), including undertakings "that disrupt a total of 2 hectares or more of any wetland". The total impact area of the proposed development is 0.5222 hectares. As such, this proposed development does not trigger an Environmental Assessment.

Wetland Delineation

Initial wetland delineation and evaluation were completed by McCallum Environmental Ltd (MEL) in December 2014. This assessment included evaluation of the wetland habitat to

support wetland alteration permitting: a functions assessment (NovaWet version 3.0); and a desktop evaluation for species at risk. Field evaluations for species at risk was not completed due to time of year. Wetland data points were completed within identified wetland habitat as well in the surrounding upland habitat. One wetland data point and one upland data point were completed to support the wetland delineation process.

Follow up assessment for species at risk, and to update data sheets and the functional assessment was completed in September 2015.

Hydrophytic Vegetation Methodology

Hydrophytic vegetation is defined as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanent or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (Environmental Laboratory 1987). Hydrophytic vegetation should be the dominant plant type in wetland habitat (Environmental Laboratory 1987).

Dominant plant species observed at each data point location were classified according to their indicator status (probability of occurrence in wetlands), in accordance with the Nova Scotia Wetland Indicator Plant List (NSE 2011) as well as consultation with the U.S. Fish and Wildlife Service (USFWS) National List of Vascular Plant Species that Occur in Wetlands: NE Region (Region 1) (Reed 1988). Table 4 provides a description of each classification. Further relevant information was reviewed in Flora of Nova Scotia (A.E. Roland. 1998).

Table 4: Classification of Wetland-Associated Plant Species

Plant Species Classification	Abbreviation	Probability of Occurring in Wetland
Obligate	OBL	>99%
Facultative Wetland	FACW	66-99%
Facultative	FAC	33-66%
Facultative Upland	FACU	1-33%
Upland	UPL	<1%
No indicator status	NI	Insufficient information to determine status
Plants That Are Not Listed (assumed upland species)	NL	Does not occur in wetlands in any region.

[1] Definition Source: Reed 1988

If the majority (greater than 50%) of the dominant vegetation at a data point is classified as obligate (OBL), facultative wetland (FACW), or facultative (FAC), then the location of the data point is considered to be dominated by hydrophytic vegetation.

Hydric Soils Methodology

A hydric soil is defined as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA-NRCS 2003). Indicators that a hydric soil is present include soil colour (gleyed soils and

soils with bright mottles and/or low matrix chroma), aquic or pre-aquic moisture regime, reducing soil conditions, sulfidic material (odour), soils listed on the hydric soils list, iron and manganese concretions, organic soils (histosols), histic epipedon, high organic content in surface layer in sandy soils, and organic streaking in sandy soils.

Test pits were completed at each data point location within identified wetland habitat and upland habitat to identify hydric soils and upland soils.

Wetland Hydrology Methodology

Wetland habitat, by definition, either periodically or permanently, has a water table at, near, or above the land surface or that is saturated with water. To be classified as a wetland, a site should have at least one primary indicator or two secondary indicators of wetland hydrology Environmental Laboratory, 1987).

Table 5: Indicators of Wetland Hydrology

Examples of Primary Indicators	**Examples of Secondary Indicators**
Water marks	Oxidized Root Channels in the Upper 30 cm
Drift Lines	Local Soil Survey Data
Sediment Deposition	Dry season Water Table
Drainage Patterns	Stunted or Stressed Plants
Water-stained leaves	
Visual Observation of Saturated Soils	
Visual Observation of Inundation	

All identified wetland habitat was assessed for signs of hydrology through visual observations across the habitat.

Wetland Evaluation Results

As described, MEL completed a wetland delineation and evaluation of Wetland 1 on December 22nd, 2014 and a follow up assessment in September 2015. Wetland evaluation results are provided in the following section and delineation results and proposed alteration area are shown on Figure 3 attached in Appendix A.

Wetland 1

Wetland 1 is a terrene outflow fresh water marsh in a headwater position. It receives passive overland drainage from adjacent uplands all of which is stormwater. There is a drainage outlet that flows through a culvert at the northern edge of the wetland under Damascus Drive. Water drains north along Duke Street for 28 metres in a surface water channel then turns east and drains under Duke Street through a culvert. Water continues as Sucker Brook in an easterly direction through a tall shrub swamp and is prevented from entering Rocky Lake by an infilled laydown area for Strescon Limited. Historical imaging retrieved through Google Earth shows that the laydown yard was constructed in 2007. Water now filters through heavy vegetation along the northern edge of the infilled area for approximately 300, before entering an

established bog. The original outlet for Sucker Brook was observed from Rocky Lake by the Project Team. However upon upstream investigation it was determined that connectivity was no longer possible due to the construction of the laydown area. From Duke Street, Sucker Brook was evaluated to be potential fish habitat, however no fish passage is currently possible from Rocky Lake.

Photo 1: Wetland 1

Hydrological and Hydrogeological Character

Wetland 1 is a terrene outflow freshwater marsh in a headwater position. Passive drainage is collected by adjacent uplands predominantly influenced by stormwater runoff. A culvert is located at the most northern extent of the wetland (corner of Duke and Damascus). Overflow stormwater will backflow from the culvert at the northern end of the wetland and provide additional stormwater inflow into the wetland during severe storm events. Standing water is present across approximately 90% of the wetland, to a depth exceeding 100cm. Accurate depth measurements could not be obtained due to excessive water depth. Hydrologic condition is indicated by saturation of the soil at the surface (Indicator A3), the presence of the water table at surface (Indicator A2), surface water to a depth exceeding 100cm (Indicator A1), waster-stained leaves (Indicator B9) and inundation visible on aerial imagery (Indicator B7).

Dominant Vegetation within the Wetland

A rapid assessment for hydrophytic vegetation was completed in Wetland 1. The vegetation is dominated by Broadleaved cattail, Canada Rush and American White Water Lily. There was no tree cover observed although small amounts of Red Maple saplings were observed. Trace amounts of exotic Yellow Iris was identified and trace amounts of Purple Loosestrife was also observed. Neither was determined to be dominant within the data point location, or within the wetland as a whole. A list of species identified within Wetland 1 is present in Table 6.

Table 6: Wetland Vegetation found in Wetland 1

Latin Name	Common Name	Indicator Status	Srank
Abies balsamea	Balsam Fir	FAC	S5
Acer rubrum	Red Maple	FAC	S5
Alnus incana	Speckled Alder	FACW	S5
Aralia nudicaulis	Wild Sarsaparilla	FAC	S5
Betula papyrifera	Paper Birch	FACU	S5
Bidens frondosa	Devil's Beggarticks	FACW	S5
Calamagrostis canadensis	Bluejoint Reed Grass	FACW	S4S5
Carex brunnescens	Brownish Sedge	FAC	S5
Carex crinita	Fringed Sedge	OBL	S5
Carex folliculata	Northern Long Sedge	OBL	S5
Carex lurida	Sallow Sedge	OBL	S5
Carex scoparia	Broom Sedge	FAC	S5
Carex stipata	Awl-fruited Sedge	OBL	S5
Carex trisperma	Three-seeded Sedge	OBL	S4?
Chamaedaphne calyculata	Leatherleaf	OBL	S5
Cornus canadensis	Bunchberry	FAC	S5
Corylus cornuta	Beaked Hazel	FAC	S5
Danthonia spicata	Poverty Oat Grass	FACU	S5
Daucus carota	Queen Anne's Lace	FACU	SNA
Doellingeria umbellata	Hairy Flat-top White Aster	FAC	S5
Dulichium arundinaceum	Three-Way Sedge	OBL	S5
Eupatorium perfoliatum	Common Boneset	FACW	S5
Gaultheria hispidula	Creeping Snowberry	FAC	S5
Gaylussacia baccata	Black Huckleberry	FAC	S5
Glyceria canadensis	Canada Manna Grass	FACW	S5
Glyceria striata	Fowl Manna Grass	FACW	S5
Ilex verticillata	Common Winterberry	FACW+	S5
Iris pseudacorus	Yellow Iris	OBL	SNA - Exotic
Iris versicolor	Harlequin Blue Flag	FACW+	S5
Juncus canadensis	Canada Rush	OBL	S5
Juncus effusus	Soft Rush	FACW	S5
Kalmia angustifolia	Sheep Laurel	FAC	S5
Lythrym salicaria	Purple Loosestrife	FACW	SNA
Nymphaea odorata	Fragrant Water-lily	OBL	S5
Oclemena nemoralis	Bog Aster	OBL	S5
Onoclea sensibilis	Sensitive Fern	FACW	S5
Osmunda cinnamomea	Cinnamon Fern	FAC	S5
Osmunda regalis	Royal Fern	OBL	S5
Quercus rubra	Northern Red Oak	FACU	S5
Rhododendron canadense	Rhodora	FAC	S5
Rubus pubescens	Dwarf Red Raspberry	FAC	S5
Salix discolor	Pussy Willow	FAC	S5
Scirpus cyperinus	Common Woolly Bulrush	FACW	S5
Solidago canadensis	Canada Goldenrod	FAC	S5
Sparganium americanum	American Burreed	OBL	S5
Spiraea alba	White Meadowsweet	FAC	S5
Spiraea tomentosa	Steeplebush	FAC	S5
Triadenum virginicum	Virginia St John's-wort	OBL	S5
Typha latifolia	Broad-leaved Cat-tail	OBL	S5
Viburnum nudum	Northern Wild Raisin	FAC	S5

Soil Condition

A soil pit was completed within Wetland 1 to test for hydric soil conditions. Highly decomposed saturated organic soil is present to a depth of 15cm restricted by rock. Hydric soil is present as indicated by a histosol soil type (Indicator A1).

Wetland data sheets (wetland and upland) and the functional assessment summary have been provided in Appendix C.

Proposed Wetland Alteration

Hamton Holding Ltd. in conjunction with Banc Developments Ltd. is currently planning on a commercial development (gas station development) on PID 41376856 located on the corner of Duke Street and Damascus Road. This proposed development will involve alteration of Wetland 1 within the subject property, including the portion of Wetland 1 found on HRM Right-of-Way for Duke Street (portion of PID 40832834). This wetland alteration results in a total infill area of 5222 m^2 across both PIDs. This proposed area of alteration is shown in Figure 3, attached to this report in Appendix A. An email from the HRM right-of-way development engineer Evan Teasdale is attached to this application in Appendix F. Further to this email, a municipal permit to infill will be required from HRM once the wetland alteration application is approved. As a result, official municipal approval is required prior to commencement of alteration and will be granted post-provincial approval.

Wetland Functions Assessment Results

MEL completed an evaluation of Wetland 1 in support of this simplified wetland alteration application on December 22, 2014 and follow up evaluation in September 2015. The evaluation involved the following tasks:

1. Wetland Delineation (described in previous section);
2. Evaluation of Wetland Function (NovaWet Version 3.0); and,
3. Species at Risk Evaluation. The ACCDC data report and priority species list are provided in Appendix D.

Wetland 1 does not border a lake or pond. Urban commercial development is present within 60% of the Wetland 1 buffer (100 m). Roads are present within 20% and other development is present within 20%. Hydrologic condition is indicated by the presence of standing water to a depth of an estimated depth of 100+ cm across 90% of the wetland habitat. The water table is present at surface, and soil is saturated at surface, water-stained leaves were noted on site and inundation was visible on aerial imagery. Overall, Wetland 1 is likely most heavily influenced by the presence of Duke Street on the east side of the wetland and the contribution of two pipes along Duke St. While no direct storm water input was noted via pipes or culverts, overland drainage from Duke St and western commercial use drain into this wetland habitat, and storm water runoff provides input. Two small (approximately 4-6") drainage pipes were observed along the south western edge of Wetland 1, but no evidence of flow through those drainage pipes was observed.

Current Stormwater Design

Currently the Bedford Commons retail/office development has a piped storm drainage system that discharges to a control storm manhole at the intersection of Duke Street and Damascus Road. At this control manhole the flow is split with the 1 in 5 year predevelopment flow amount being directed towards the northwest along Duke Street to an 1800mmØ culvert crossing Duke Street, from this point the water flows in Sucker Brook to Rocky Lake.

The flow to the control manhole in excess of the 1 in 5 year predevelopment flow is directed towards the southeast in a pipe parallel to Duke Street where it discharges to Wetland 1. This wetland fills up during the peak of a rainstorm and drains back down through the control manhole once the storm has passed. The normal wetland water elevation is 40.0m and during the peak of a 1 in 5 year storm it would be as high as approx. 41.2m (Designpoint Engineering and Surveying Ltd, Appendix E attached report).

Standing water is present through the entire wetland. Emergent vegetation is present through approximately 90% of the wetland, and the degree of interspersion of this vegetation is moderate to high.

The vegetation community of Wetland 1 is dominated by Broadleaved cattail, Canada Rush and American White Water Lily. There was no tree cover observed although small amounts of Red Maple saplings were observed. Trace amounts of exotic Yellow Iris were identified and trace amounts of Purple Loosestrife was also observed.

Conditions and Integrity of Adjacent Land: 60% of the wetland and surrounding upland habitat is urban commercial development, roads are present within 20% of the 100m buffer around Wetland 1, as described earlier. Upland is steep bedrock outcrops and lacks significant mature tree cover, and Grey Birch and Red Maple are dominant sapling species. Large-toothed Aspen, Beaked Hazel, White Birch and Red Oak are also present at survey point locations. Table 6 in the previous section outlining wetland delineation efforts provides a list of vegetation identified with the wetland during the field surveys.

Wetland 1 is not classified as, or located within:

- A wetland of special significance
- A wetland that supports commercial/recreational fish/shellfish
- A wetland that has had conservation/compensation agreements/activity.
- A calcareous fen, cedar or black ash swamp
- A floodplain area that is upstream of, or within a populated area
- A federal/provincial/municipal area of interest (as per NOVAWET #SF12)

A search of the ACCDC database was completed to identify potential species at risk within close proximity of the subject property. The ACCDC report for the subject property is attached in Appendix D. The ACCDC identified two species at risk within a 5 km buffer of the property: Black Ash and Wood Turtle.

During MEL assessment of Wetland 1 in December 2014 and September 2015, the wetland habitat was thoroughly assessed for Black Ash. None was observed. No White Ash was observed either, which is known to co-exist with Black Ash in Nova Scotia. MEL also assessed Wetland 1 for the potential for Wood Turtle. Wood Turtle preferred nesting habitat consists of gravely river banks, and preferred hibernacula is located in moderately deep pools of water with a muddy bottom, Wetland 1 could potentially support Wood Turtle hibernacula. However, potential for Wood Turtle habitat is considered to be low due to limited access to Wetland 1 resulting from steep outcrops of rock on the banks and significant commercial development in all directions. Potential for other species at risk was determined to be low, and none were observed.

Wetland 1 has a highly modified hydrologic condition and integrity due to the surrounding development and alteration to the landscape. Water storage capacity is high given its basin formation and current volume of water and role in stormwater regulation. Its ability to detain surface water is moderate given the wetland type, landscape position, surrounding topography and depth of organic soil.

MEL has determined that this wetland is an isolated, fresh water marsh with a drainage outlet flowing through a culvert which drains north along Duke St. This drainage outlet also acts as an overflow inlet through the designed stormwater system during peak storm flows. Through the outlet culvert from Wetland 1, there is a direct connectivity with Sucker Brook (east of Duke St.). Sucker Brook has been infilled downstream and re-routed, limiting current connectivity with Rocky Lake. It is possible that resident fish (species unknown) are present within Wetland 1, but continued fish passage to Wetland 1 from downstream surface water systems has been compromised. Wetland 1 provides potential habitat for amphibians, reptiles, waterbirds, and waterfowl although it is located in a highly industrial and commercial area of Bedford. No species at risk were identified during site visit within its boundaries or within its associated upland buffers. The wetland type is common in Nova Scotia and the vegetation community is not unique or rare. An area of 5222 m^2 is required for infill to facilitate the construction along the portion of Wetland 1 present on the subject property.

Stormwater Management Plan

The Proponent, Banc Developments Ltd., retained Designpoint Engineering and Surveying Ltd. to design an on-site system for stormwater storage to replace the lost storage area offered by Wetland 1 within the boundaries of the subject property. The Designpoint letter is provided in Appendix E attached to this application.

The proposed plan involved the construction of an underground stormwater management system. Preliminary design has shown that this system can be constructed to manage all stormwater that is currently being held by the on-site portion of Wetland 1. Once Wetland 1 is infilled on the subject property, and the underground stormwater management system is constructed, the water level in the remaining wetland habitat on the southern adjacent property (PID 41395831) will remain generally the same.

Proposed Construction Methodology

Construction activities are proposed for late fall 2015 or spring 2016. To manage erosion and sedimentation control during construction and operation, erosion control systems will be developed by the Proponent. These systems will be in place to manage runoff from the construction area, especially into remaining adjacent wetland habitat on the southern adjacent property. The preferred approach is to focus on the prevention of erosion. This can be achieved by minimizing the time, slope and area of exposed soils. Details will be provided to the contractor relating to erosion fencing, the use of mulch and, if necessary, sedimentation control ponds and other control systems.

When infilling a portion of a wetland, there is potential of alteration of flow into, through, or out of wetland habitat. These flow interruptions might result in drier conditions or deeper/more prolonged inundation in remaining wetland habitat. In order to maintain a similar hydroperiod across the remaining wetland habitat and to minimize direct and indirect impacts from construction activities, some general guidelines are provided for the wetland that will be partially impacted, but preserved following project construction.

- The length of time during construction that the wetland topsoil is exposed will be minimized;
- Clean, pH neutral, coarse fill materials will be used within the wetland area;
- Any constructed drainage ditches will be graded such that they do not directly discharge into the wetland;
- The post-construction flow (in and out) from the wetland should be maintained at the same elevation as pre-construction flow (in and out);
- Machinery and personnel will be instructed not to enter the wetland outside of the road right-of-way;
- Vegetation control on road shoulders will be conducted, as necessary, by manual and mechanical clearing during operation; and,
- The slope between the edge of the asphalt or ditch and the wetlands will be re-vegetated to stabilize the slope and limit erosion and sedimentation into remaining wetland habitat.

Final construction methodology will be determined in conjuction with the contractor. Organic material present within proposed area of alteration of Wetland 1 will be removed as is required.

Proposed Monitoring of Remaining Wetland Habitat

The following outlines the scope for proposed monitoring based on expected requirements from Nova Scotia Environment (NSE) and our experience with other similar projects.

Pre-Construction (Spring 2015)
MEL recommends that the following steps be completed before work commences within Wetland 1:

- Water quality parameters should be collected (turbidity, dissolved oxygen (DO), pH and temperature);

- One shallow monitor well should be installed within remaining wetland habitat at the property line between the subject property and the southern adjacent property (PID 41395831) in order to establish baseline surface water levels; and,
- Visual assessment of vegetation and overall site condition should be recorded (assessment of hydrophytic vegetation, assessments for species at risk, and invasive species).

Construction

The contractor will be responsible for erosion and sediment control measures to ensure that the remaining undisturbed wetland habitat within Wetland 1 is not impacted by construction activities. General mitigation and erosion and sediment control practices that are outlined in this document must be adhered to, along with any requirements outlined in the pending wetland alteration approval.

We recommend that MEL complete a site visit prior to the commencement of construction activities to ensure that appropriate erosion and sediment control features are in place and the construction plan will not affect remaining wetland habitat. Monitoring should continue during construction activities as is needed to ensure remaining wetland habitat is maintained in its natural state.

Post-Construction Monitoring

Monitoring is proposed for Year 1 (Summer 2015) and Year 2 (Summer 2016). Annual reporting will be completed to NSE. After Year 2 of monitoring, if performance measures have been met, only visual evaluation of the wetland will be completed in Year 3 and 4. Monitoring will be completed in Year 5, with a final report submitted after Year 5 monitoring (Summer 2019). Should NSE determine that performance measures are not met after Year 2 monitoring, annual monitoring will continue through Year 5, or as required by the NSE wetland alteration approval.

The recommended scope of monitoring for Year 1 and 2 include:

- Hydrology (from shallow well and compared to baseline surface water level);
- Visual Assessment of Vegetation within remaining Wetland 1 (on adjacent southern property observed from the property line); and,
- Water Quality (turbidity, DO, pH and temperature).

Monitoring will continue in Year 3 and 4 only at the request of NSE. If detailed monitoring is not required in Years 3-4, a visual assessment will be completed during each of these monitoring events. Monitoring will be completed in Year 5, and then a final report will be issued in Year 5.

Proposed Compensation

Compensation for this lost wetland habitat (at a 2:1 ratio) will be provided through a McCallum Environmental Ltd. wetland restoration project. A Letter of Understanding (LOU) is attached to this report as Appendix G.

McCallum Environmental Ltd.

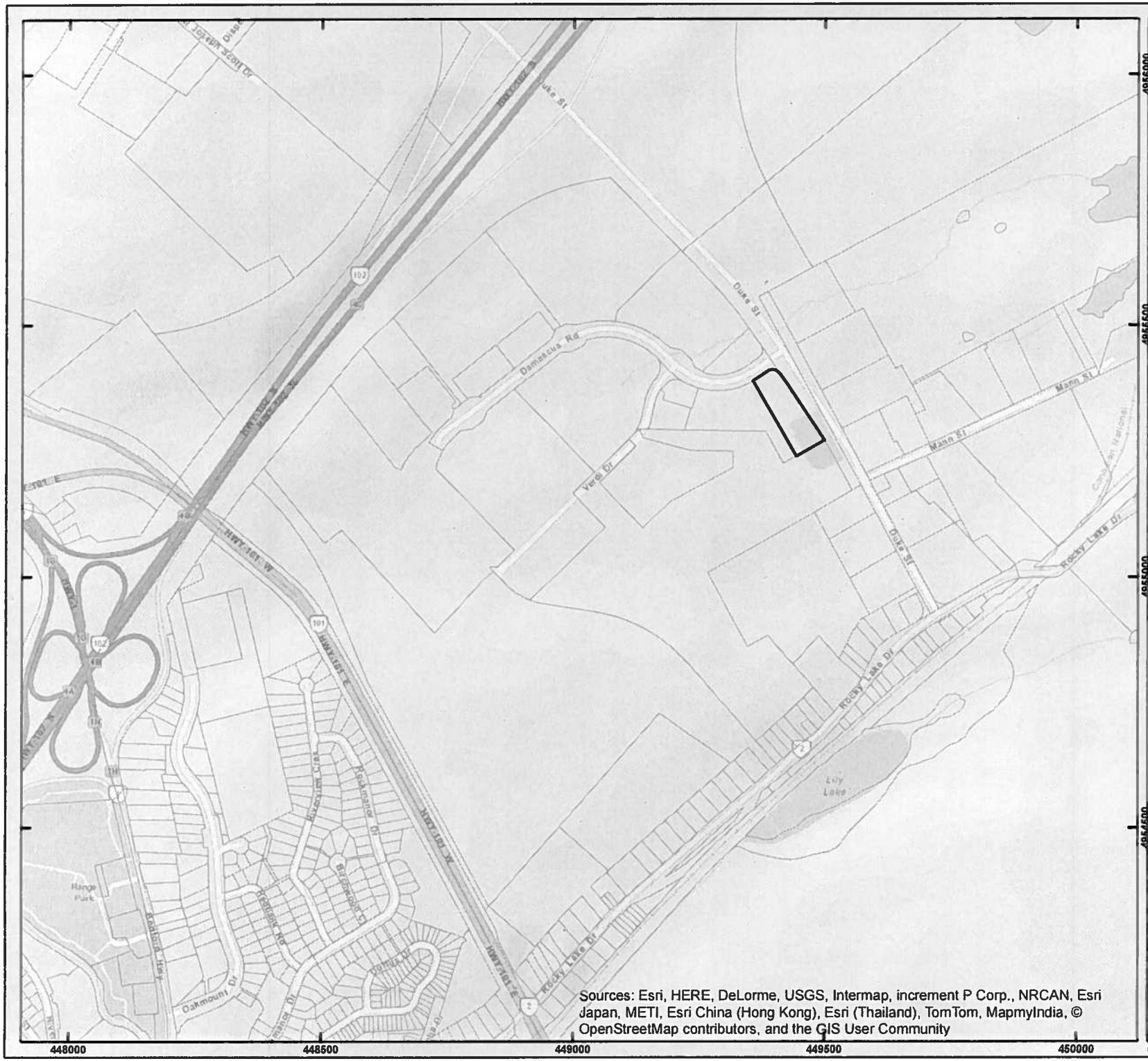
We look forward to your attention to this application. Please don't hesitate to contact the undersigned with any questions you might have.

Sincerely,

Original Signed

Meghan Milloy
Vice President
McCallum Environmental Ltd.

APPENDIX A: Figures



Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Prepared For:

Hamton Holdings Ltd.

Figure 1. Project Locator

Bedford Commons,
Damascus Drive,
Lot 12A2-2
Bedford, Nova Scotia

PID 41376856

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

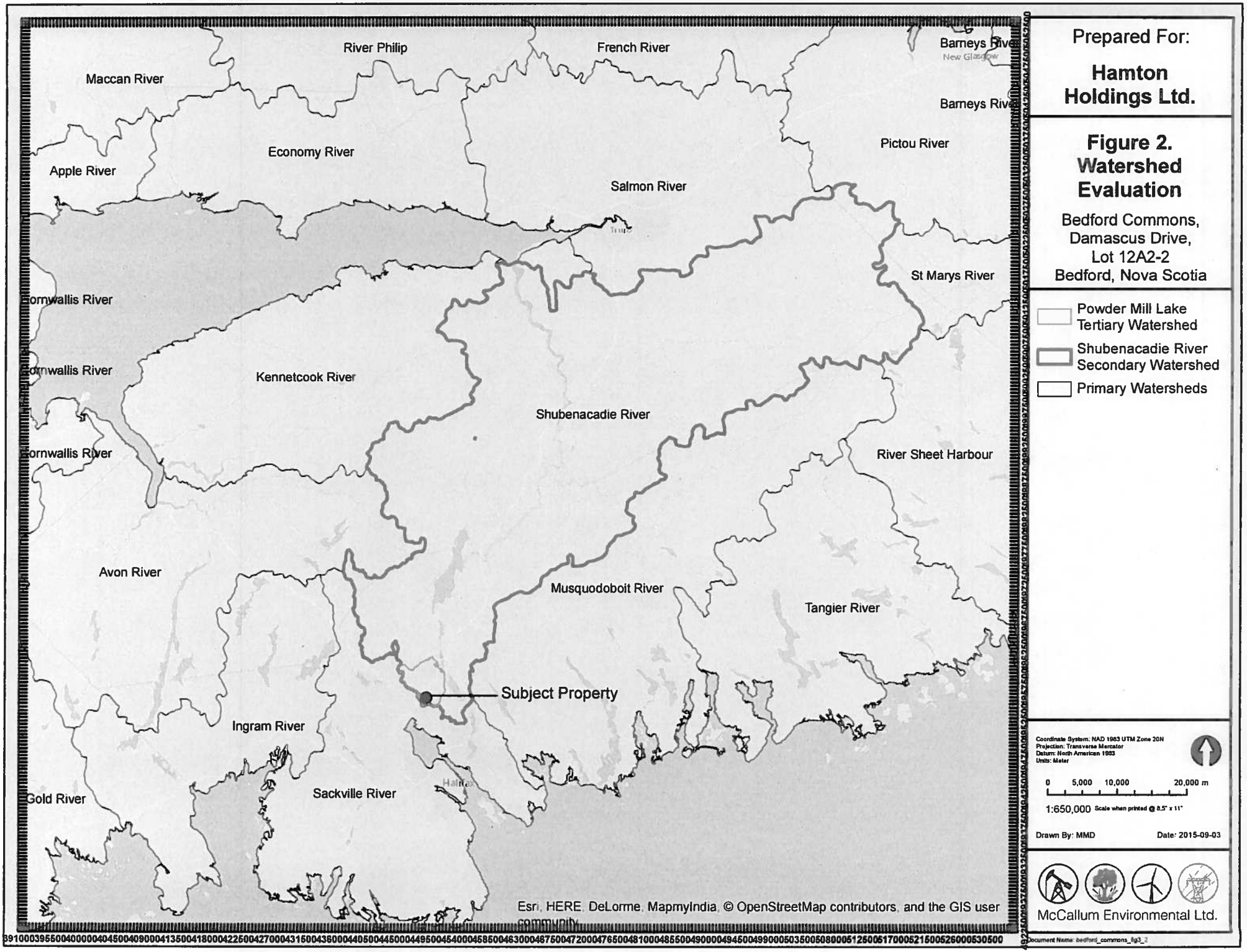
0 80 160 320 m

1:10,000 Scale when printed @ 8.5" x 11"

Drawn By: MMD Date: 2015-09-03

McCallum Environmental Ltd.

Document Name: bedford_commons_fig1



Prepared For:

Hamton Holdings Ltd.

Figure 2. Watershed Evaluation

Bedford Commons,
Damascus Drive,
Lot 12A2-2
Bedford, Nova Scotia

- Powder Mill Lake Tertiary Watershed
- Shubenacadie River Secondary Watershed
- Primary Watersheds

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

0 5,000 10,000 20,000 m

1:650,000 Scale when printed @ 8.5" x 11"

Drawn By: MMD

Date: 2015-09-03

McCallum Environmental Ltd.

Document Name: bedford_commons_fig3_2

Prepared For:

Hamton Holdings Ltd.

Figure 3. Wetland Delineation Results and Alteration Detail

Bedford Commons,
Damascus Drive,
Lot 12A2-2
Bedford, Nova Scotia

- Proposed Alteration Area
- Delineated Wetland
- PID 41376856

Wetland 1: 9114 m²

Proposed Alteration Area: 5222 m²

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

0 10 20 40 m

1:1,500 Scale when printed @ 8.5" x 11"

Drawn By: MMD Date: 2015-09-03

McCallum Environmental Ltd.

Document Name: bedford_commons_fig3

McCallum Environmental Ltd.

APPENDIX B: CV's

McCallum Environmental Ltd.

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

Years in Practice
14

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 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 environmental projects. She completes environmental baseline surveys for environmental assessment, wetland and watercourse delineations, characterizations and functional assessment, habitat surveys and bat hibernacula identification and associated surveys. Ms. Milloy also completes watershed evaluations, and guides clients through the environmental and permitting stages of development projects. Ms. Milloy guides clients through provincial and federal environmental assessment requirements and has completed several provincial environmental assessment registration documents in the past two years.

Ms. Milloy has submitted multiple applications for Transport Canada, under the Navigable Waters Protection Program, has submitted numerous Department of Fisheries and Oceans HADD applications (freshwater and marine) and has developed HADD compensation programs. Ms. Milloy regularly completes applications for wetland and watercourse alteration and development across Atlantic Canada, and has developed and implemented wetland compensation programs. Ms. Milloy is a trained wetland evaluator, biologist, and restoration professional.

Ms. Milloy is also involved with programs including the remediation of contaminated commercial and residential sites, and the execution of Phased Site Assessments in accordance with the Nova Scotia Management of Contaminated Sites Guidelines and CSA. Ms. Milloy is knowledgeable in risk assessment processes, and completes both qualitative and quantitative risk assessments for commercial and residential properties. Ms. Milloy has extensive experience working with the Atlantic Risk Based Corrective Action (RBCA) risk assessment process for hydrocarbon-impacted sites, and is proficient in plume characterization and exposure assessment.

Project Experience

- 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 environmental baseline surveys for a proposed gold mine expansion in eastern Nova Scotia.
- Completion of two provincial environmental assessments for community wind projects in Nova Scotia in 2013.
- 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, 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.
- Evaluation of the Sackville River Watershed for wetland restoration opportunities (GIS based and ecology/field based study).

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

- 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.
- Completion of wetland alteration permitting and associated compensation for 24 individual wetlands associated with road development in support of a planned residential development in Sackville Nova Scotia.
- Completed the Provincial Environmental Assessment for the 80 MW Glen Dhu South Wind Power Project, Nova Scotia, for Shear Wind Inc. The Project received Ministerial approval on March 16, 2012.
- Project Management of regulatory permitting and environmental assessments for a 50 MW Wind Power Project in Nova Scotia for Sprott Power Corp.
- Completion of wetland delineation and watercourse identification for three large scale developments (450 ha, 200 ha, 300 ha and 400 ha) from 2012 to 2014.
- Developed and implemented wetland restoration and creation projects as compensation for wetland losses for numerous development clients.
- Completion of more than 50 phased site assessment and remediation projects - Phase I, II, III and risk assessment for commercial property transfers.

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.

McCallum Environmental Ltd.

Melanie MacDonald, BSc. (Bio), MREM

Years in Practice
8

Education

Masters of Resource and Environmental Management 2009-2011, Dalhousie University

B.Sc. Advanced Major in Biology & Interdisciplinary Studies in Aquatic Resources 2001-2005, St. Francis Xavier University

Training

- Saint John Ambulance Standard First Aid, AED, CPR(C), 2013
- Health Safety and Environmental Leadership training and Advanced Safety Audit training, 2009
- Emergency Operations Centre crisis management training, 2006-2008
- Introduction to the Fisheries Act and Navigable Waters Protection Act course – ESAA
- Bear Awareness training and ATV training – Alberta Safety Council, 2006
- Site Supervisor Safety Training, Construction Safety Training System and W.H.M.I.S., 2005

Summary

Ms. MacDonald has worked in biology related environmental consulting since 2005. She has worked on both research related field assessments and project related field assessments in Nova Scotia, New Brunswick and Alberta.

Selected Project Experience

- Completion of environmental baseline surveys for the provincial environmental assessment process for Goldworx for a proposed re-development of a gold mine in eastern Nova Scotia.
- Completion of environmental baseline surveys for Quebec based company for a proposed gold mine expansion in eastern Nova Scotia.
- 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 development and associated wetland alteration permitting, compensation planning, wetland restoration activities, and enhancement of several wetlands to increase functionality.
- Completed watershed planning for the Sackville River Secondary watershed to evaluation wetland restoration potential and to aid in better land use planning, source water protection and management of water resources.
- Completion of 10-15 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.
- Completion of field work associated with a wetland alteration application and associated compensation for 24 individual wetlands associated with road development in support of a planned residential development in Sackville Nova Scotia.
- Completed field programs and reporting associated with the Provincial Environmental Assessment for the 80 MW Glen Dhu South Wind Power Project, Nova Scotia, for Shear Wind Inc. The Project received Ministerial approval on March 16, 2012.
- Completion of wetland delineation and watercourse identification for three large scale developments (2 - 200 ha and 400 ha) in 2012.

Environmental Work Experience

McCallum Environmental Ltd., Halifax, Nova Scotia

Field Biologist and Environmental Specialist:
May-Aug 2011, Jan 2012-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 and bat monitoring. Communicating field survey results and methodologies for Environmental Assessments and other Provincial regulatory applications.

Amec Colt, Shell/Albian Sands Expansion 1 - Fort McMurray, Alberta.
Environmental Specialist and Area Environmental Lead
July 2008 – October 2009.
Proactively monitored construction activities via inspections, audits and Environmental Work Permits & Protection Plans to ensure compliance with regulatory approvals, the projects' Environmental Control Plan, and best management practices. Investigated and reported incidents, and liaised between contractors and project owners. Implemented Environmental Awareness and communicated issues via weekly newsletters. Developed a greater business sense, working as an independent contractor to Amec Colt.

Canadian Natural Resources Ltd. - Fort McMurray, Alberta
Regulatory and Environmental Specialist
October 2005 – July 2008
Conducted extensive field work in various fish and wildlife programs. Communicated issues with government agencies, contractors and external stakeholders. Performed on-call duties, spill response, and non-compliance reporting and response. Expanded upon site wide procedures for protection of water, wildlife and waterbirds. Played a pivotal role in planning & completion of a fish salvage of 38 km of the Tar River, and in construction of a 77 hectare fish habitat compensation lake (Horizon Lake). Horizon Lake earned CAPP Steward of Excellence Award for Environmental Performance. Hired, trained, and supervised teams of up to four summer interns. Chaired the regional 'Oil Sands Bird and Wildlife Protection Committee.

McCallum Environmental Ltd.

APPENDIX C: Wetland Determination Forms and Functional Assessment Worksheet

WETLAND DETERMINATION DATA FORM – NOVA SCOTIA

Sept 5, 2015

Project/Site: Bedford Commons. Municipality/County: Halifax Sampling Date: ~~2014~~ 2015

Applicant/Owner: Hamton Holdings Ltd. Sampling Point: Wet 2

Investigator(s): M. MacDonald Affiliation: McCallum Environmental Ltd.

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 4494456mE Long: 4955338m N Datum: UTM NAD83

Soil Map Unit Name/Type: Wetland Type: Freshwater Marsh.

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation X, Soil X, or Hydrology X naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	If yes, optional Wetland Site ID: Wetland 2
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10m)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 5m)			
1. Acer rubrum	5	✓	fac.
2.			
3.			
4.			
5.			
	5 = Total Cover		

Herb Stratum (Plot size: 1m)			
1. Drellingeria umbellata	5		fac
2. Clemmina nemoralis	5		obl
3. Scirpus cyperinus	25	✗	facw
4. Juncus canadensis	30	✗	obl
5. Carex folliculata	5		obl
6. Orchis sensibilis	3		facw
7. Iris pseudacorus	5		obl
8. Glyceria striata	10		facw
9. Typha Latifolia	40	✓	OBL
10. Nymphaea Odorata	30	✗	OBL
	158 = Total Cover		

Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	38	x 2 =	76
FAC species	10	x 3 =	30
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	98 (A)		156 (B)

Prevalence Index = B/A = 1.59

Hydrophytic Vegetation Indicators:

- ✓ Rapid Test for Hydrophytic Vegetation
- ✓ Dominance Test is >50%
- ✓ Prevalence Index is ≤3.0[1]
- ____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (Include photo numbers here or on a separate sheet.)

Sampling Point: WET +

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
15-0							Mear	organic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ✓ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Depleted Dark Surface (F7)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Polyvalue Below Surface (S8)
- ___ Thin Dark Surface (S9)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Redox Depressions (F8)
- ___ Red Parent Material (TF2)

Indicators for Problematic Hydric Soils[3]:

- ___ Sandy Gleyed Matrix (S4)
- ___ Coast Prairie Redox (A16)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Iron-Manganese Masses (F12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock

Depth (inches): 15cm

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 15cm

Water Table Present? Yes ✓ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – NOVA SCOTIA

Sept 5/15

Project/Site: Bedford Commons Municipality/County: Halifax Sampling Date: 22 Dec 2014

Applicant/Owner: Hanton Holdings LTD. Sampling Point: WP2

Investigator(s): M. MacDonald Affiliation: McCallum Environmental Ltd.

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex

Slope (%): ~5 Lat: 449437mE Long: 4955327mN Datum: UTM NAD83

Soil Map Unit Name/Type: Wetland Type:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation X, Soil X, or Hydrology X naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No ✓	Is the Sampled Area within a Wetland? Yes ___ No ✓
Hydric Soil Present?	Yes ___	No ✓	
Wetland Hydrology Present?	Yes ___	No ✓	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10m)	Absolute % Cover	Dominant Species?	Indicator Status
1. Betula papyrifera	5	✓	FACU
2.			
3.			
4.			
5.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5m)			
1. Betula populifolia	25	✓	FAC
2. Corylus cornuta	8		FAC.
3. Betula papyrifera	5		FACU
4. Quercus rubra	5		FACU
5. Populus grandidentata	8		FACU
Acer rubrum.	10	~~= Total Cover~~	FAC
	61		
Herb Stratum (Plot size: 1m)			
1. Pteridium aquilinum	12.		FACU
2. Kalmia angustifolium	10		FAC
3. Gaylussacia baccata	35	✓	FACU
4. Gaultheria procumbens	5		FAC.
5.			
6.			
7.			
8.			
9.			
10.			
	62 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	93	x 3 =	279.
FACU species	35	x 4 =	140
UPL species		x 5 =	
Column Totals:	128 (A)		419 (B)

Prevalence Index = B/A = 3.27

Hydrophytic Vegetation Indicators:

___ Rapid Test for Hydrophytic Vegetation

✓ Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

Vegetation not hydrophytic based on prevalence index

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches) cm	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
3-0							fibric	Organic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Depleted Dark Surface (F7)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Polyvalue Below Surface (S8)
- ___ Thin Dark Surface (S9)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Redox Depressions (F8)
- ___ Red Parent Material (TF2)

Indicators for Problematic Hydric Soils[3]:

- ___ Sandy Gleyed Matrix (S4)
- ___ Coast Prairie Redox (A16)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Iron-Manganese Masses (F12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock

Depth (inches): 3cm

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX C:	Nova Scotia Wetland Evaluation Technique Field Data Sheet (September 2011)									
Wetland Number:	1									
Project Name: Bedford Commons		Evaluator:	M. MacDonald	GPS Coordinates: 449456 mE, 4955338 mN						
PID: 41376856	Site Address: 0 Damascus Road, Bedford, LOT 12A2-2									
Sources and Dates of Mapping/Images:										
Evaluation Date:	04-Sep-15	Site Visit Date:	04-Sep-15							
Weather Conditions (past 48 hours): Sunny warm										
Seasonal Weather Conditions: warm and dry										
SECTION ONE: WATERSHED CHARACTERISTICS										
1	Watershed Name (tertiary): Powder Mill Lake Tertiary	Size: 2960 km^2								
2	% Watershed Land Cover	For/Nat: 32	Urb/Com: 34		Water/Wetlands: 23		Road: 6	Other Dev: 5		
3	% Watershed WL Cover and by Class	Total: 2.3 %	General: 57%		Bog: 43%					
SF1	***Watershed condition***		***M***	***L***	***Impervious surface: 31.7% (2/3 of urban/commercial dev + roads)***					
SF2	***Proportion of WL area in watershed & opportunity for floodwater detention***		***M***	***L***	***Wetland cover likely underestimated, based on desktop analyses only***					
SECTION TWO: WETLAND CHARACTERISTICS										
Wetland Type: Freshwater marsh		WL size: 0.9114 hectares			Landform: Basin			Landscape Position: Terrene outflow		
Water flow path: Outflow		Wetland Origin: Natural								
1	Water Regime	PF X	SF	TF	SS	PS	RfT	IfT	AF	
2	# WL's within 30m project area	Total# 0	SM:	BO:	FE:	FM:	FS:	SS:	CP:	VP:
3	Is WL part of complex	Yes	No X							
4	% each wetland type in complex	SM:	BO:	FE:	FM:	FS:	SS:	CP:	VP:	
5	Is WL bordering or associated with a lake or pond?	bordering		within 100m		N/A X		specify		
6	Standing water?	Yes X	Avg Dep: 100cm+		% Inundated: 90%		No			
7	Inlet or Outlet (circle all that apply)?	Inlet	Outlet X							
8	Adjacent Upland Land Use within 100m (%)	For:	Nat:	PasHay:	Crop:	UrbCm:60	Road:20	Other Dev: 20		
9	Are there stressors in WL or WL buffer area? Circle primary stressor(s).	DD__, CW__, WcS__, O/C__,EB__,DP_X_,F_X_,M__, ES__,NE__,DwP_X_,								
		M__,GC__,ATV__,DG_X_,EA__, R__,Rr_X_,U/CD_X_,F__,FA__, other (specify):								
10	Hydrology Altered (circle all that apply)?	Ditching	Dams	Tiles	Culvert X	Well	Diversion	Other Specify:		
SF3	***Rate the general wetland condition/integrity***	H	M X	L						
SECTION THREE: ADJACENT LAND CONDITION AND INTEGRITY										
1	Average width of adjacent naturalized buffer	__5__meters								
2	Widths for water quality	H >15	M 8-15	L <8 X						
3	Widths for wildlife habitat	H >100	M 15-100	L <15 X						
4	Adjacent area vegetation condition (list % in each category)	H	M	L 100%						
5	Adjacent area diversity and structure (list % in each category)	H	M	L 100%						
6	Adjacent Upland Slope (list % in each category)	Steep 90	Mod10	Gentle						
7	Adjacent land supports water quality	*Yes*	*No x*	Specify:						
8	Adjacent land supports wildlife habitat	*Yes*	*No x*	Specify:						
SF4	***Rate the overall condition and integrity land adjacent to wetland***	***H***	***M***	***L x***	**is buffer required to maintain red flag functions of wetland? If yes if no**					
SECTION FOUR: DOCUMENTED IMPORTANT FEATURES										
SF5	***Is the WL a WSS?***		***No x***							
SF6	***Does the WL support commercial/recreational fish/shellfish?***		***No***	Potential for a resident fish population						
SF7	***Species of concern (Fed/Prov)? Specify.***					***Yellow***		***S2***	***S3***	***N/A X****
SF8	***Wetland has conservation/compensation agreements/activity?***		***No X***	specify:						
SF9	***Wetland is calcerous fen, black ash or cedar swamp?***		***No X***							
SF10	***Within Drinking Water Protected Area (designated watershed/wellfield)***		***No X***	specify:						
SF11	***WL within a floodplain and upstream of or within of a populated area?***		***NoX***	specify:						
SF12	***Fed/Prov/Municipal area of interest?***		***No X***	specify:						
	*Field assessment completed outside of growing season. Follow up SAR assessment reccommended during growing season.									
SECTION FIVE: HYDROLOGIC CONDITION AND INTEGRITY										
1	Is WL source of stream or headwater(wc order 1 or 2)		No x	Specify:						
2	Is WL geographically isolated?	Yes	No X	Specify: *Drainage outlet flows through culvert under Damascus Dr. towards*						
3	WL ability to maintain characteristic hydrologic regime	High		Med X	Low	*Sucker Brook (Rocky Lake)*				
4	Water Storage Depth (list % in each class)	>30cm 90%	15-30cm	up to 15cm	No ponding					
5	Signs of surface water retention observed?	SW_100+_cm, WSL_X_, WCD__, WM_X_cm, SM__cm, SD__, AD__, ID__, PMT__, AI__, BT__, AR__, Other:								
6	Describe observable/historical anthropogenic sediment delivery	Low		Med X	High					
7	Disturbance of WL soils	Low		Med X	High					

8	Predominant soils adjacent to WL	Sand		Silt/loam		Clay/bedrock X			
9	Capacity of WL to alter/retard flows	High		Med		Low X			
10	Roughness coefficient for surface water flow path	High		Med		Low X			
11	Strormwater/Wastewater/Agricultural runoff detention			Med X		Low			
12	Water Source	Natural		Mostly natural		Partly altered X		Controlled	
13	Hydrology of tidal wetlands	Unrestricted		Reduced		Restricted		*N/A X*	
14	Coastal storm surge		No X						
SF13	*WL hydrologic condition*	*Natural*	*Modified X*		*Significantly Modified*				
SF14	*WL important for maintaining stream flow?*		*No*						
SF15	*WL ability to detain surface water*	*High*	*Med X*	Low					
SECTION SIX: WATER QUALITY									
1	Strormwater/Wastewater/Agricultural runoff as water source?	High		Med X		Low			
2	Nutrients/sediments from surrounding land	High		Med X		Low			
3	Significant flood/stormwater attenuation		*No X*						
4	Vegetation capacity to settle suspended sediments	High		Med X		Low			
5	WL type /landscape position holds/filters runoff?	*Yes X*	*No*	Wetland holds runoff, does not provide significant filtering functions					
SF16	*Wetland improves water quality?*	*Yes X*	*No*	Moderate amount					
SF17	*Evidence of excess nutrient loading/contamination?*	*Low*	*Med X*	*High*	Cat-tails				
SF18	*WL contributes to water quality in downstream resources*	*High X*	*Med*	*Low*					
SECTION SEVEN: GROUNDWATER INTERACTIONS									
1	Describe soils in wetland	Recharge		Discharge X					
2	Land use / run off in subwatershed upstream	Recharge X		Discharge					
3	Conditions of upland soils within 200m of wetland	Recharge X		Discharge					
4	Hydroperiod of wetland	Recharge		Discharge X					
5	Describe inlet/outlet configuration	Recharge		Discharge X					
6	Characterize topographic relief surrounding wetland	Recharge		Discharge X					
SF19	*WL serves as a recharge site*		*No X*						
SF20	*WL serves as a discharge site*	*Yes X*	*No*						
SECTION EIGHT: SHORELINE STABILIZATION AND INTEGRITY									
1	Wetland fringing ocean/estuary/lake/pond/river/stream?		No X	streamwidth >4m		streamwidth<4m		WB Exposed	WB Sheltered
2	% cover of rooted vegetation in shallow water zone	H >50%	M 10-50	L <10%					
3	Avg veg WL width b/w shoreline/streambank & 2 m depth contour	H >10m	M 3-10	L <3m					
4	Prevalence of strong-stemmed emerg. veg (shoreline marshes and fens only)	High	Med	Low					
5	Describe shoreline erosion potential	High	Med	Low					
6	Shoreline/streambank veg condition upslope of water level	Low	Med	High	Artificial				
SF21	*WL ability to stabilize shoreline*		*M*	*L*	N/A				
SECTION NINE: PLANT COMMUNITY									
1	Vegetation diversity	High	Med X	Low					
1b	Dominant plant species and % cover in the WL	list:Typha latifolia 40%, Juncus canadensis 30%, Nymphaea odorata 30%							
3	Dominant Non-native or Invasive species and % cover	Yes X	No	specify: %	traces amounts of purple loosestrife				
4	Vegetation Disturbance	H	M X	L	specify type(s) below				
5	Disturbance Types	H___,ATV___,G___,M___,In X__, D/D___, Im__X_, OAH___, Ii___, Sd___,E___,other___,							
7	Vegetative Integrity of plant community	E	H X	M	L	Trace amounts of exotic Yellow Iris are present. Not dominant.			
SF22	*Is the plant community unique or rare regionally or provincially?*		*no X*	*specify:*					
SF23	*Does the WL contain a diversity of plant communities*	*H*	*M*	*L X*					
SF24	*Rate the overall integrity/quality of plant community?*	*H*	*M X*	*L*					
SF25	*Are there any observed rare or endangered plant species? Specify.*	Bird	Tur	SpC	Red	*Yellow*		*S2*	*S3*	*N/A X*
SECTION TEN: FISH AND WILDLIFE HABITAT AND INTEGRITY									
1	Interspersion of open water and vegetation (open water types only)	H	M X	L					
1b	% cover in vegetation verus open water	___90__%							
2	Interspersion that best fits entire wetland	H	M	L	N/A X				
3	Wetland condition related to detritus	H	M	L X	N/A				
4	Interspersion of other wetlands in vicinity	H	M	L X					
6	Barriers/restriction between wetland and other habitat	L	M	H X					
7	Noteworthy wildlife or evidence (birds, mammals, amphibians,etc)	Yes X	No	list: Pair of Mallards					
8	Connected to permanent water (accessible to fish)?	Exceptional	High	Med X	Low	N/A *Potential for resident fish population based on historical*			
9	Fish species observed or evidence seen (list)	Yes	No X	list:		*connection to Rocky Lake*			

10	Wetland part of contiguous upland or wetland:	>50ha	25-50ha	10-25ha	<10ha X						
11	WL provides habitat for:	**Amphibians**	**Reptiles**	**Waterfowl**	**Waterbirds**	Mammals	Fish	R/E species			
SF26	***Does wetland support fish/fish habitat?***	***Yes X***	***No***	Potential resident fish							
SF27	***Rare or endangered fish/wildlife species found in the wetland?***					***Yellow***		***S2***	***S3***	***N/A X***	
SF28	***Overall fish and wildlife habitat quality***		***M X***	L							
SECTION ELEVEN: COMMUNITY USE/VALUE											
1	Describe community use	VV_X_,CP__,CO__,PO__,PA__,AV__,GB__,E__,HI__, WV__, BO__,HU__, PG__, BP__,F__, E__, R__, Other:									
SF29	***Rate the wetland's community use/value***		***M X***	L							

SF ratings highlighted in red indicate critical wetland functions or watershed conditions that are highly degraded. Whenever a wetland is found to have red-highlighted **SFs** the proponent is encouraged to contact NSE for advice about the approval because NSE is unlikely to approve alterations to wetlands that would affect these red-rated functions.

McCallum Environmental Ltd.

APPENDIX D: ACCDC Data Report and Priority Species List

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

DATA REPORT 5318: Bedford Commons, NS

Prepared 2 January 2015
by J. Churchill, Data Manager

CONTENTS OF REPORT

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- 5.1 Source Bibliography

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.

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
BedfordCommoNS_5318ob.xls	All Rare and legally protected *Flora and Fauna* within 5 km of your study area
BedfordCommoNS_5318ob100km.xls	A list of Rare and legally protected *Flora and Fauna* within 100 km of your study area
BedfordCommoNS_5318ma.xls	All *Managed Areas* in your study area
BedfordCommoNS_5318ff.xls	Rare and common *Freshwater Fish* 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

Animals (Fauna)
John Klymko, Zoologist
Tel: (506) 364-2660
jklymko@mta.ca

Plant Communities
Sarah Robinson , Community Ecologist
Tel: (506) 364-2664
srobinson@mta.ca

Data Management, GIS
James Churchill, Data Manager
Tel: (902) 679-6146
jlchurchill@mta.ca

Billing
Jean Breau
Tel: (506) 364-2659
jrbreau@mta.ca

Questions on the biology of Federal Species at Risk can be directed to ACCDC: (506) 364-2657, 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
(902) 648-3536
baynedz@gov.ns.ca

Western: Donald Sam
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Central: Shavonne Meyer
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Central: Kimberly George
(902) 893-5630
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Eastern: Mark Pulsifer
(902) 863-7523
pulsifmd@gov.ns.ca

Eastern: Donald Anderson
(902) 295-3949
andersdg@gov.ns.ca

Eastern: Terry Power
(902) 563-3370
powertd@gov.ns.ca

For provincial information about rare taxa and protected areas, or information about game animals, fish habitat etc., in Prince Edward Island, please contact Rosemary Curley, PEI Dept. of Agriculture and Forestry: (902) 368-4807.

2.0 RARE AND ENDANGERED SPECIES

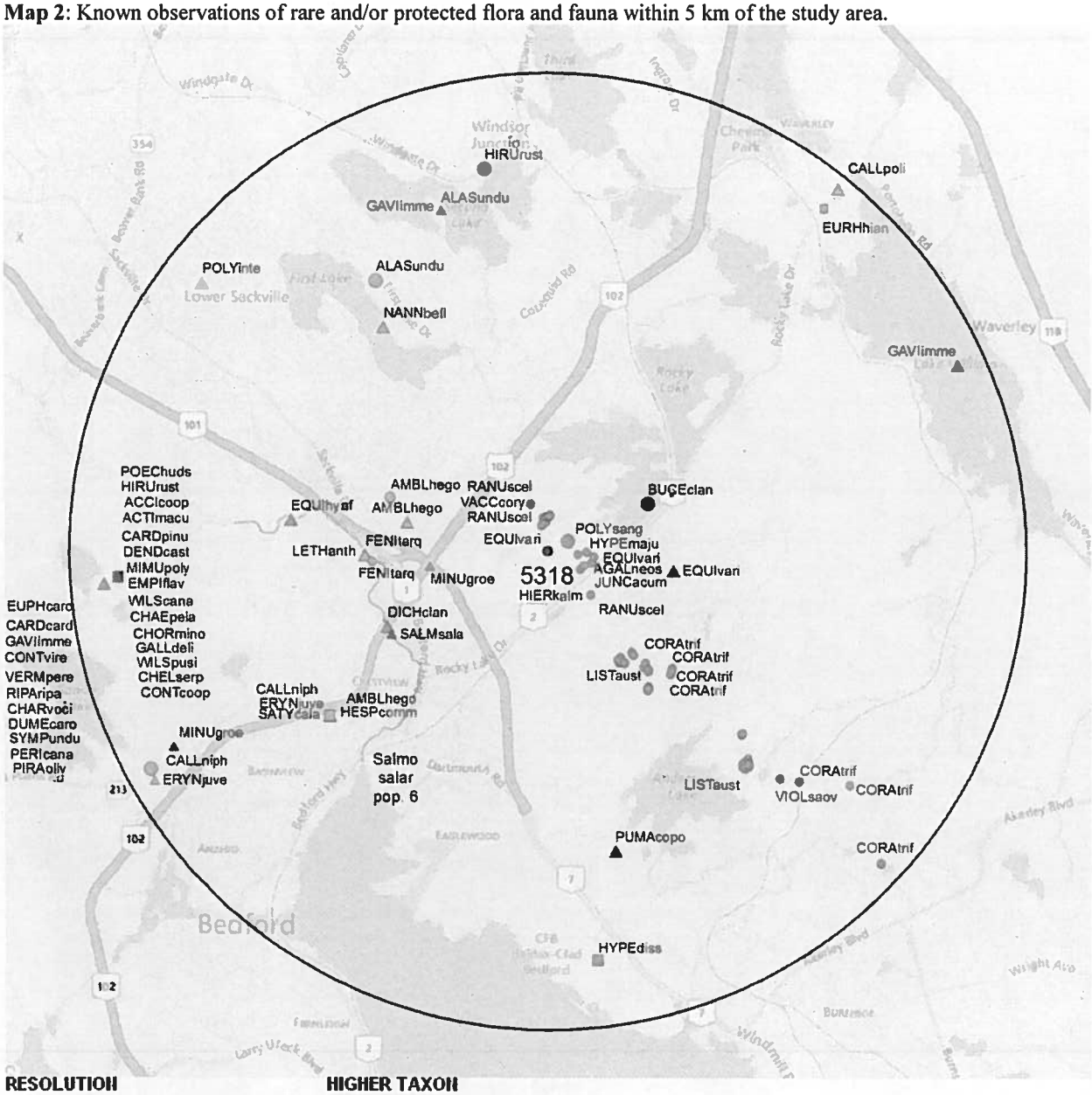
2.1 FLORA

A 5 km buffer around the study area contains 90 records of 16 vascular, 1 record of 1 nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

A 5 km buffer around the study area contains 58 records of 28 vertebrate, 26 records of 11 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 5 km of the study area.



3.0 SPECIAL AREAS

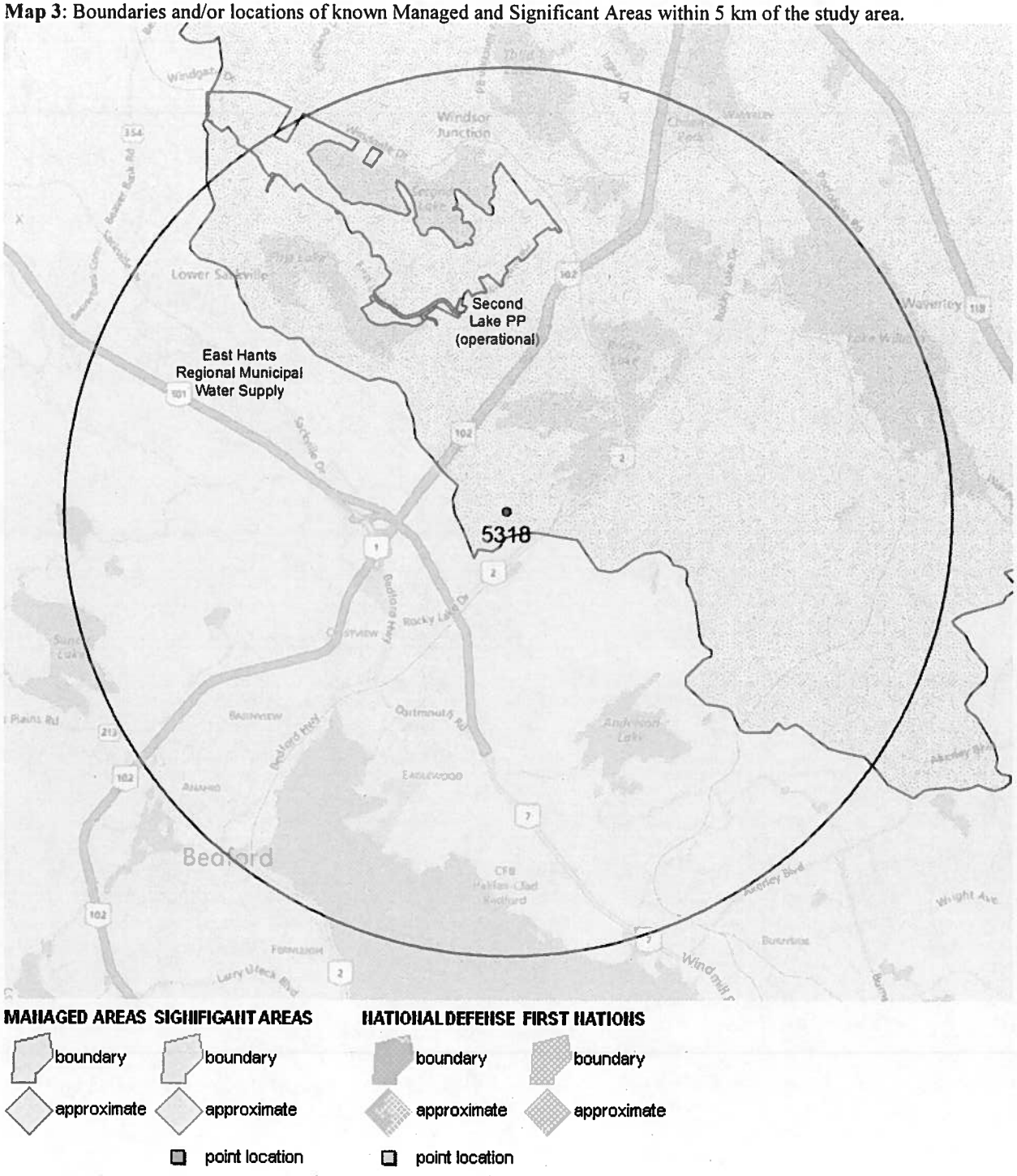
3.1 MANAGED AREAS

The GIS scan identified 2 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 5 km of the study area.



4.0 RARE SPECIES LISTS

Rare and/or endangered taxa within the 5 km-buffered area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record). [P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community.

4.1 FLORA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
N	*Eurhynchium hians*	Light Beaked Moss				S2?	3 Sensitive	1	4.6 ± 5.0
P	*Hypericum majus*	Large St John's-wort				S1	2 May Be At Risk	1	0.4 ± 0.01
P	*Ranunculus sceleratus*	Cursed Buttercup				S1S2	2 May Be At Risk	16	0.3 ± 0.01
P	*Symphyotrichum undulatum*	Wavy-leaved Aster				S2	3 Sensitive	2	4.5 ± 7.07
P	*Minuartia groenlandica*	Greenland Stitchwort				S2	3 Sensitive	2	1.2 ± 0.5
P	*Listera australis*	Southern Twayblade				S2	2 May Be At Risk	48	1.3 ± 0.01
P	*Hieracium kalmii*	Kalm's Hawkweed				S2?	5 Undetermined	1	0.4 ± 0.01
P	*Hypericum dissimulatum*	Disguised St John's-wort				S2S3	3 Sensitive	1	4.3 ± 10.0
P	*Polygala sanguinea*	Blood Milkwort				S2S3	3 Sensitive	1	0.3 ± 0.01
P	*Vaccinium corymbosum*	Highbush Blueberry				S3	4 Secure	1	0.5 ± 0.01
P	*Agalinis neoscotica*	Nova Scotia Agalinis				S3	4 Secure	1	0.5 ± 0.01
P	*Corallorhiza trifida*	Early Coralroot				S3	4 Secure	9	1.8 ± 0.01
P	*Dichanthelium clandestinum*	Deer-tongue Panic Grass				S3	4 Secure	1	1.8 ± 1.5
P	*Equisetum variegatum*	Variegated Horsetail				S3	4 Secure	3	0.2 ± 0.1
P	*Viola sagittata var. ovata*	Arrow-Leaved Violet				S3S4	4 Secure	1	3.4 ± 0.01
P	*Juncus acuminatus*	Sharp-Fruit Rush				S3S4	3 Sensitive	1	0.4 ± 0.01
P	*Equisetum hyemale var. affine*	Common Scouring-rush				S3S4	4 Secure	1	2.7 ± 2.0

4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Salmo salar pop. 6*	Altantic Salmon - Nova Scotia Southern Upland pop.	Endangered			S2		1	1.7 ± 0
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Endangered	S2S3B	1 At Risk	2	4.5 ± 7.07
A	*Hirundo rustica*	Barn Swallow	Threatened		Endangered	S3B	1 At Risk	5	4.1 ± 0.15
A	*Wilsonia canadensis*	Canada Warbler	Threatened	Threatened	Endangered	S3B	1 At Risk	1	4.5 ± 7.07
A	*Chordeiles minor*	Common Nighthawk	Threatened	Threatened	Threatened	S3B	1 At Risk	2	4.5 ± 7.07
A	*Contopus cooperi*	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3B	1 At Risk	1	4.5 ± 7.07
A	*Riparia riparia*	Bank Swallow	Threatened			S3B	2 May Be At Risk	2	4.5 ± 7.07
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2S3B	2 May Be At Risk	2	4.5 ± 7.07
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	3 Sensitive	2	4.5 ± 10.0
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern		Vulnerable	S3S4B	3 Sensitive	5	4.5 ± 7.07
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1?B,SNAN	5 Undetermined	1	4.5 ± 7.07
A	*Gavia immer*	Common Loon	Not At Risk			S3B,S4N	2 May Be At Risk	5	3.7 ± 0.55
A	*Puma concolor pop. 1*	Cougar - Eastern pop.	Data Deficient			SH	5 Undetermined	1	3.2 ± 1.0
A	*Salmo salar*	Atlantic Salmon				S2	2 May Be At Risk	1	1.8 ± 0.5
A	*Piranga olivacea*	Scarlet Tanager				S2B	5 Undetermined	1	4.5 ± 7.07
A	*Bucephala clangula*	Common Goldeneye				S2B,S5N	4 Secure	1	1.2 ± 0.15
A	*Poecile hudsonica*	Boreal Chickadee				S3	3 Sensitive	3	4.5 ± 7.07
A	*Dumetella carolinensis*	Gray Catbird				S3B	2 May Be At Risk	3	4.5 ± 7.07
A	*Mimus polyglottos*	Northern Mockingbird				S3B	4 Secure	1	4.5 ± 7.07
A	*Perisoreus canadensis*	Gray Jay				S3S4	3 Sensitive	3	4.5 ± 7.07
A	*Cardinalis cardinalis*	Northern Cardinal				S3S4	4 Secure	2	4.5 ± 7.07
A	*Charadrius vociferus*	Killdeer				S3S4B	3 Sensitive	2	4.5 ± 7.07
A	*Actitis macularius*	Spotted Sandpiper				S3S4B	3 Sensitive	2	4.5 ± 7.07
A	*Gallinago delicata*	Wilson's Snipe				S3S4B	3 Sensitive	2	4.5 ± 7.07

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Empidonax flaviventris*	Yellow-bellied Flycatcher				S3S4B	3 Sensitive	2	4.5 ± 7.07
A	*Vermivora peregrina*	Tennessee Warbler				S3S4B	3 Sensitive	1	4.5 ± 7.07
A	*Dendroica castanea*	Bay-breasted Warbler				S3S4B	3 Sensitive	2	4.5 ± 7.07
A	*Wilsonia pusilla*	Wilson's Warbler				S3S4B	3 Sensitive	1	4.5 ± 7.07
A	*Carduelis pinus*	Pine Siskin				S3S4B,S5N	3 Sensitive	2	4.5 ± 7.07
I	*Amblyscirtes hegon*	Pepper and Salt Skipper				S2	4 Secure	4	1.5 ± 1.0
I	*Satyrium calanus*	Banded Hairstreak				S2	5 Undetermined	2	2.9 ± 10.0
I	*Callophrys niphon*	Eastern Pine Elfin				S2	4 Secure	2	2.9 ± 1.0
I	*Erynnis juvenalis*	Juvenal's Duskywing				S2S3	4 Secure	7	2.9 ± 10.0
I	*Alasmidonta undulata*	Triangle Floater				S2S3	4 Secure	4	3.4 ± 0.1
I	*Hesperia comma*	Common Branded Skipper				S3	4 Secure	1	2.9 ± 1.0
I	*Lethe anthedon*	Northern Pearly-Eye				S3	4 Secure	1	1.9 ± 1.0
I	*Nannothemis bella*	Elfin Skimmer				S3	4 Secure	1	2.9 ± 1.0
I	*Polygonia interrogationis*	Question Mark				S3B	4 Secure	1	4.6 ± 2.0
I	*Feniseca tarquinius*	Harvester				S3S4	4 Secure	2	1.8 ± 0.01
I	*Callophrys polios*	Hoary Elfin				S3S4	4 Secure	1	4.9 ± 1.0

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 a 5 km buffer of your study area are indicated below with "YES".

Nova Scotia

Scientific *Name*	Common Name	SARA	Prov Legal Prot	Known within 5 km of Study Site?
Fraxinus nigra	**Black Ash**		**Threatened**	**YES**
Glyptemys insculpta	**Wood Turtle**	**Threatened**	**Threatened**	**YES**
Emydoidea blandingii	*Blanding's Turtle - Nova Scotia pop.*	Endangered	Vulnerable	No
Falco peregrinus pop. 1	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Vulnerable	No
Bat Hibernaculum			**[Endangered][1]**	**YES**

1 *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all Endangered under the 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
81	LaPaix, R.W.; Crowell, M.J.; MacDonald, M. 2011. Stantec rare plant records, 2010-11. Stantec Consulting, 334 recs.
29	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
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5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 20798 records of 123 vertebrate and 936 records of 65 invertebrate fauna; 5323 records of 288 vascular, 398 records of 54 nonvascular flora (attached: *ob100km.xls).

Rare and/or endangered taxa within the 100 km-buffered area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Coregonus huntsmani*	Atlantic Whitefish	Endangered	Endangered	Endangered	S1	7 Exotic	9	84.9 ± 1.0
A	*Myotis lucifugus*	Little Brown Myotis	Endangered		Endangered	S1	1 At Risk	33	4.3 ± 0.5
A	*Myotis septentrionalis*	Northern Long-eared Myotis	Endangered		Endangered	S1	1 At Risk	5	31.7 ± 0.2
A	*Perimyotis subflavus*	Eastern Pipistrelle	Endangered		Endangered	S1	1 At Risk	7	31.7 ± 0.2
A	*Emydoidea blandingii*	Blanding's Turtle - Nova Scotia pop.	Endangered	Endangered	Endangered	S1	1 At Risk	470	94.0 ± 0.01
A	*Morone saxatilis pop. 2*	Striped Bass- Bay of Fundy pop.	Endangered			S1	2 May Be At Risk	4	22.4 ± 0.5
A	*Charadrius melodus melodus*	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B	1 At Risk	862	18.3 ± 0.2
A	*Sterna dougallii*	Roseate Tern	Endangered	Endangered	Endangered	S1B	1 At Risk	62	27.9 ± 0.1
A	*Dermochelys coriacea (Atlantic pop.)*	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered		S1S2N		3	33.7 ± 5.0
A	*Salmo salar pop. 1*	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered		S2	2 May Be At Risk	31	11.6 ± 0.5
A	*Calidris canutus rufa*	Red Knot rufa ssp	Endangered		Endangered	S2S3M	1 At Risk	583	20.1 ± 0.5
A	*Colinus virginianus*	Northern Bobwhite	Endangered	Endangered				6	39.6 ± 0.15
A	*Acipenser oxyrinchus*	Atlantic Sturgeon	Threatened			S1?	2 May Be At Risk	5	32.4 ± 0.5
A	*Caprimulgus vociferus*	Whip-Poor-Will	Threatened	Threatened	Threatened	S1?B	1 At Risk	13	5.5 ± 7.07
A	*Hylocichla mustelina*	Wood Thrush	Threatened			S1B	5 Undetermined	30	32.3 ± 7.07
A	*Sturnella magna*	Eastern Meadowlark	Threatened			S1B	3 Sensitive	2	45.9 ± 7.07
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2	3 Sensitive	140	3.0 ± 1.0
A	*Thamnophis sauritus pop. 3*	Eastern Ribbonsnake - Atlantic pop.	Threatened	Threatened	Threatened	S2S3	1 At Risk	62	90.2 ± 0.1
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Endangered	S2S3B	1 At Risk	150	4.5 ± 7.07
A	*Hirundo rustica*	Barn Swallow	Threatened		Endangered	S3B	1 At Risk	721	4.1 ± 0.15
A	*Wilsonia canadensis*	Canada Warbler	Threatened	Threatened	Endangered	S3B	1 At Risk	551	4.5 ± 7.07
A	*Chordeiles minor*	Common Nighthawk	Threatened	Threatened	Threatened	S3B	1 At Risk	363	4.5 ± 7.07
A	*Contopus cooperi*	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3B	1 At Risk	557	4.5 ± 7.07
A	*Riparia riparia*	Bank Swallow	Threatened			S3B	2 May Be At Risk	275	4.5 ± 7.07
A	*Dolichonyx oryzivorus*	Bobolink	Threatened		Vulnerable	S3S4B	3 Sensitive	357	11.2 ± 7.07
A	*Anguilla rostrata*	American Eel	Threatened			S5	4 Secure	9	26.6 ± 0.5
A	*Falco peregrinus pop. 1*	Peregrine Falcon - anatum/tundrius	Special Concern	Special Concern	Vulnerable	S1B	3 Sensitive	84	33.7 ± 0.5
A	*Passerculus sandwichensis princeps*	Savannah Sparrow princeps ssp	Special Concern	Special Concern		S1B	3 Sensitive	2	23.6 ± 0.05
A	*Asio flammeus*	Short-eared Owl	Special Concern	Special Concern		S1S2	2 May Be At Risk	9	11.7 ± 7.07
A	*Histrionicus histrionicus pop. 1*	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S2N	1 At Risk	18	31.7 ± 2.15
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2S3B	2 May Be At Risk	201	4.5 ± 7.07
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	3 Sensitive	95	4.5 ± 10.0

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern		Vulnerable	S3S4B	3 Sensitive	519	4.5 ± 7.07
A	*Phocoena phocoena (NW Atlantic pop.)*	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		4	50.8 ± 1.0
A	*Tryngites subruficollis*	Buff-breasted Sandpiper	Special Concern			SNA	8 Accidental	40	23.2 ± 0.5
A	*Lynx canadensis*	Canadian Lynx	Not At Risk		Endangered	S1	1 At Risk	2	78.8 ± 1.0
A	*Sorex dispar*	Long-tailed Shrew	Not At Risk	Special Concern		S1	3 Sensitive	2	81.3 ± 5.0
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1?B,SNAN	5 Undetermined	2	4.5 ± 7.07
A	*Fulica americana*	American Coot	Not At Risk			S1B	5 Undetermined	5	50.0 ± 7.07
A	*Aegolius funereus*	Boreal Owl	Not At Risk			S1B	5 Undetermined	4	40.6 ± 7.07
A	*Glaucomys volans*	Southern Flying Squirrel	Not At Risk	Special Concern		S2S3	3 Sensitive	6	63.9 ± 0.2
A	*Globicephala melas*	Long-finned Pilot Whale	Not At Risk			S2S3		1	57.6 ± 100.0
A	*Hemidactylium scutatum*	Four-toed Salamander	Not At Risk			S3	4 Secure	26	5.4 ± 0.5
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B	3 Sensitive	194	5.8 ± 0.15
A	*Sialia sialis*	Eastern Bluebird	Not At Risk			S3B	3 Sensitive	62	16.1 ± 0.15
A	*Gavia immer*	Common Loon	Not At Risk			S3B,S4N	2 May Be At Risk	668	3.7 ± 0.55
A	*Accipiter gentilis*	Northern Goshawk	Not At Risk			S3S4	4 Secure	111	5.5 ± 7.07
A	*Lagenorhynchus acutus*	Atlantic White-sided Dolphin	Not At Risk			S3S4		1	36.9 ± 1.0
A	*Puma concolor pop. 1*	Cougar - Eastern pop.	Data Deficient			SH	5 Undetermined	70	3.2 ± 1.0
A	*Alces americanus*	Moose			Endangered	S1	1 At Risk	8	20.1 ± 0.1
A	*Lasiurus cinereus*	Hoary Bat				S1	2 May Be At Risk	2	21.9 ± 0.5
A	*Toxostoma rufum*	Brown Thrasher				S1?B	5 Undetermined	11	11.7 ± 7.07
A	*Vireo gilvus*	Warbling Vireo				S1?B	5 Undetermined	18	5.5 ± 7.07
A	*Tringa solitaria*	Solitary Sandpiper				S1?B,S4S5M	4 Secure	28	26.1 ± 0.5
A	*Larus delawarensis*	Ring-billed Gull				S1?B,S5N	4 Secure	10	27.5 ± 7.07
A	*Gallinula chloropus*	Common Moorhen				S1B	5 Undetermined	2	45.5 ± 7.07
A	*Progne subis*	Purple Martin				S1B	2 May Be At Risk	2	93.0 ± 7.07
A	*Cistothorus palustris*	Marsh Wren				S1B	5 Undetermined	2	72.4 ± 0.15
A	*Alca torda*	Razorbill				S1B,S4N	3 Sensitive	17	52.1 ± 0.5
A	*Fratercula arctica*	Atlantic Puffin				S1B,S4S5N	3 Sensitive	18	52.1 ± 0.5
A	*Calidris minutilla*	Least Sandpiper				S1B,S5M	4 Secure	1012	18.0 ± 0.15
A	*Passerina cyanea*	Indigo Bunting				S1S2B	5 Undetermined	19	42.7 ± 7.07
A	*Eremophila alpestris*	Horned Lark				S1S2B,S4N	4 Secure	8	11.2 ± 7.07
A	*Charadrius semipalmatus*	Semipalmated Plover				S1S2B,S5M	4 Secure	1383	15.3 ± 0.5
A	*Asio otus*	Long-eared Owl				S2	2 May Be At Risk	21	11.2 ± 7.07
A	*Salmo salar*	Atlantic Salmon				S2	2 May Be At Risk	31	1.8 ± 0.5
A	*Pekania pennanti*	Fisher				S2	3 Sensitive	2	66.1 ± 5.0
A	*Vireo philadelphicus*	Philadelphia Vireo				S2?B	5 Undetermined	26	17.3 ± 0.15
A	*Anas acuta*	Northern Pintail				S2B	2 May Be At Risk	16	6.3 ± 7.2
A	*Anas clypeata*	Northern Shoveler				S2B	2 May Be At Risk	7	27.5 ± 7.07
A	*Anas strepera*	Gadwall				S2B	2 May Be At Risk	19	11.7 ± 7.07
A	*Rallus limicola*	Virginia Rail				S2B	5 Undetermined	17	18.3 ± 7.07
A	*Empidonax traillii*	Willow Flycatcher				S2B	3 Sensitive	28	7.0 ± 0.15
A	*Myiarchus crinitus*	Great Crested Flycatcher				S2B	2 May Be At Risk	22	5.5 ± 7.07
A	*Piranga olivacea*	Scarlet Tanager				S2B	5 Undetermined	34	4.5 ± 7.07
A	*Rissa tridactyla*	Black-legged Kittiwake				S2B,S4S5N	3 Sensitive	8	52.1 ± 0.5
A	*Bucephala clangula*	Common Goldeneye				S2B,S5N	4 Secure	97	1.2 ± 0.15
A	*Cathartes aura*	Turkey Vulture				S2S3B	3 Sensitive	16	5.5 ± 7.07
A	*Tringa semipalmata*	Willet				S2S3B	2 May Be At Risk	1221	18.6 ± 7.07
A	*Pooecetes gramineus*	Vesper Sparrow				S2S3B	2 May Be At Risk	32	11.2 ± 7.07
A	*Molothrus ater*	Brown-headed Cowbird				S2S3B	4 Secure	124	11.7 ± 7.07
A	*Icterus galbula*	Baltimore Oriole				S2S3B	2 May Be At Risk	54	11.2 ± 7.07
A	*Phalaropus lobatus*	Red-necked Phalarope				S2S3M	3 Sensitive	6	20.1 ± 0.5
A	*Phalaropus fulicarius*	Red Phalarope				S2S3M	3 Sensitive	2	23.2 ± 0.5
A	*Phalacrocorax carbo*	Great Cormorant				S3	3 Sensitive	41	19.9 ± 12.5
A	*Poecile hudsonica*	Boreal Chickadee				S3	3 Sensitive	422	4.5 ± 7.07
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3?B	2 May Be At Risk	40	11.2 ± 7.07
A	*Dendroica tigrina*	Cape May Warbler				S3?B	3 Sensitive	101	6.2 ± 0.15

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Pinicola enucleator*	Pine Grosbeak				S3?B,S5N	2 May Be At Risk	116	5.5 ± 7.07
A	*Podilymbus podiceps*	Pied-billed Grebe				S3B	3 Sensitive	56	5.5 ± 7.07
A	*Anas discors*	Blue-winged Teal				S3B	2 May Be At Risk	46	5.5 ± 7.07
A	*Sterna paradisaea*	Arctic Tern				S3B	2 May Be At Risk	59	22.7 ± 7.07
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S3B	2 May Be At Risk	194	10.7 ± 7.07
A	*Dumetella carolinensis*	Gray Catbird				S3B	2 May Be At Risk	333	4.5 ± 7.07
A	*Mimus polyglottos*	Northern Mockingbird				S3B	4 Secure	40	4.5 ± 7.07
A	*Tringa melanoleuca*	Greater Yellowlegs				S3B,S5M	3 Sensitive	1380	12.5 ± 7.07
A	*Mergus serrator*	Red-breasted Merganser				S3B,S5N	4 Secure	56	18.6 ± 7.07
A	*Branta bernicla*	Brant				S3M	3 Sensitive	1	66.1 ± 0.5
A	*Pluvialis dominica*	American Golden-Plover				S3M	3 Sensitive	218	20.1 ± 0.5
A	*Numenius phaeopus hudsonicus*	Hudsonian Whimbrel				S3M	3 Sensitive	211	20.1 ± 0.5
A	*Limosa haemastica*	Hudsonian Godwit				S3M	3 Sensitive	86	20.1 ± 0.5
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	3 Sensitive	1254	15.3 ± 0.5
A	*Calidris maritima*	Purple Sandpiper				S3N	3 Sensitive	162	19.9 ± 12.5
A	*Cepphus grylle*	Black Guillemot				S3S4	4 Secure	68	19.9 ± 12.5
A	*Picoides arcticus*	Black-backed Woodpecker				S3S4	3 Sensitive	141	11.2 ± 7.07
A	*Perisoreus canadensis*	Gray Jay				S3S4	3 Sensitive	405	4.5 ± 7.07
A	*Cardinalis cardinalis*	Northern Cardinal				S3S4	4 Secure	68	4.5 ± 7.07
A	*Botaurus lentiginosus*	American Bittern				S3S4B	3 Sensitive	119	10.7 ± 7.07
A	*Charadrius vociferus*	Killdeer				S3S4B	3 Sensitive	448	4.5 ± 7.07
A	*Actitis macularius*	Spotted Sandpiper				S3S4B	3 Sensitive	605	4.5 ± 7.07
A	*Gallinago delicata*	Wilson's Snipe				S3S4B	3 Sensitive	300	4.5 ± 7.07
A	*Empidonax flaviventris*	Yellow-bellied Flycatcher				S3S4B	3 Sensitive	407	4.5 ± 7.07
A	*Sayornis phoebe*	Eastern Phoebe				S3S4B	3 Sensitive	125	11.7 ± 7.07
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	3 Sensitive	177	11.2 ± 7.07
A	*Vermivora peregrina*	Tennessee Warbler				S3S4B	3 Sensitive	244	4.5 ± 7.07
A	*Dendroica castanea*	Bay-breasted Warbler				S3S4B	3 Sensitive	317	4.5 ± 7.07
A	*Dendroica striata*	Blackpoll Warbler				S3S4B	3 Sensitive	89	11.7 ± 7.07
A	*Wilsonia pusilla*	Wilson's Warbler				S3S4B	3 Sensitive	65	4.5 ± 7.07
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3S4B	3 Sensitive	247	5.5 ± 7.07
A	*Passerella iliaca*	Fox Sparrow				S3S4B	4 Secure	66	11.2 ± 7.07
A	*Carduelis pinus*	Pine Siskin				S3S4B,S5N	3 Sensitive	329	4.5 ± 7.07
A	*Leucophaeus atricilla*	Laughing Gull				SHB	4 Secure	2	59.7 ± 0.01
A	*Morus bassanus*	Northern Gannet				SHB,S5M	4 Secure	1	35.0 ± 12.1
I	*Gomphus ventricosus*	Skillet Clubtail	Endangered	Endangered		S1	2 May Be At Risk	2	21.9 ± 0.5
I	*Barnea truncata*	Atlantic Mud-piddock	Threatened					1	73.2 ± 1.0
I	*Alasmidonta varicosa*	Brook Floater	Special Concern		Threatened	S1S2	3 Sensitive	6	37.1 ± 0.1
I	*Danaus plexippus*	Monarch	Special Concern	Special Concern		S2B	3 Sensitive	76	5.2 ± 0.03
I	*Lycaena hyllus*	Bronze Copper				S1	4 Secure	2	19.2 ± 1.0
I	*Plebejus saepiolus*	Greenish Blue				S1	1 At Risk	1	11.0 ± 1.0
I	*Polygonia satyrus*	Satyr Comma				S1	3 Sensitive	2	12.9 ± 1.0
I	*Polygonia gracilis*	Hoary Comma				S1	3 Sensitive	1	74.6 ± 1.0
I	*Oeneis jutta*	Jutta Arctic				S1	2 May Be At Risk	4	24.7 ± 1.0
I	*Ophiogomphus aspersus*	Brook Snaketail				S1	2 May Be At Risk	2	26.7 ± 0.1
I	*Ophiogomphus mainensis*	Maine Snaketail				S1	2 May Be At Risk	7	84.8 ± 0.05
I	*Somatochlora brevicincta*	Quebec Emerald				S1	2 May Be At Risk	1	25.8 ± 0.1
I	*Somatochlora franklini*	Delicate Emerald				S1	3 Sensitive	1	24.7 ± 1.0
I	*Coenagrion resolutum*	Taiga Bluet				S1	2 May Be At Risk	2	6.6 ± 1.0
I	*Enallagma signatum*	Orange Bluet				S1	2 May Be At Risk	3	13.2 ± 0.1
I	*Cicindela formosa*	Big Sand Tiger Beetle				S1S2	2 May Be At Risk	1	74.9 ± 1.0
I	*Cicindela marginata*	Margined Tiger Beetle				S1S2	2 May Be At Risk	1	77.1 ± 1.0
I	*Callophrys lanoraieensis*	Bog Elfin				S1S2	2 May Be At Risk	15	6.4 ± 1.0
I	*Nymphalis l-album*	Compton Tortoiseshell				S1S2	4 Secure	10	7.7 ± 1.0
I	*Ophiogomphus rupinsulensis*	Rusty Snaketail				S1S2	2 May Be At Risk	19	21.9 ± 0.5
I	*Somatochlora kennedyi*	Kennedy's Emerald				S1S2	2 May Be At Risk	3	17.2 ± 1.0
I	*Stylurus scudderi*	Zebra Clubtail				S1S2	2 May Be At Risk	6	21.9 ± 0.5

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
I	*Thorybes pylades*	Northern Cloudywing				S2	3 Sensitive	1	74.2 ± 1.0
I	*Amblyscirtes hegon*	Pepper and Salt Skipper				S2	4 Secure	21	1.5 ± 1.0
I	*Amblyscirtes vialis*	Common Roadside-Skipper				S2	4 Secure	10	7.7 ± 1.0
I	*Pieris oleracea*	Mustard White				S2	3 Sensitive	82	7.7 ± 1.0
I	*Satyrium calanus*	Banded Hairstreak				S2	5 Undetermined	10	2.9 ± 10.0
I	*Satyrium calanus falacer*	Banded Hairstreak				S2	1 At Risk	2	13.7 ± 0.5
I	*Callophrys henrici*	Henry's Elfin				S2	4 Secure	23	7.7 ± 1.0
I	*Callophrys niphon*	Eastern Pine Elfin				S2	4 Secure	26	2.9 ± 1.0
I	*Strymon melinus*	Grey Hairstreak				S2	4 Secure	5	58.9 ± 1.0
I	*Boloria chariclea*	Arctic Fritillary				S2	3 Sensitive	5	77.2 ± 1.0
I	*Polygonia comma*	Eastern Comma				S2	1 At Risk	9	11.4 ± 1.0
I	*Aglais milberti*	Milbert's Tortoiseshell				S2	4 Secure	9	12.9 ± 1.0
I	*Epitheca princeps*	Prince Baskettail				S2	3 Sensitive	12	6.6 ± 1.0
I	*Somatochlora forcipata*	Forcipate Emerald				S2	2 May Be At Risk	4	11.4 ± 1.0
I	*Lampsilis radiata*	Eastern Lampmussel				S2	3 Sensitive	11	35.3 ± 0.1
I	*Pantala hymenaea*	Spot-Winged Glider				S2B	3 Sensitive	6	15.0 ± 1.0
I	*Naemia seriata*	a Ladybird beetle				S2S3	3 Sensitive	1	62.7 ± 1.0
I	*Erynnis juvenalis*	Juvenal's Duskywing				S2S3	4 Secure	53	2.9 ± 10.0
I	*Enallagma vesperum*	Vesper Bluet				S2S3	3 Sensitive	2	74.6 ± 1.0
I	*Alasmidonta undulata*	Triangle Floater				S2S3	4 Secure	24	3.4 ± 0.1
I	*Hesperia comma*	Common Branded Skipper				S3	4 Secure	29	2.9 ± 1.0
I	*Satyrium liparops*	Striped Hairstreak				S3	5 Undetermined	8	6.4 ± 1.0
I	*Satyrium liparops strigosum*	Striped Hairstreak				S3	3 Sensitive	2	13.7 ± 0.5
I	*Euphydryas phaeton*	Baltimore Checkerspot				S3	4 Secure	13	7.7 ± 1.0
I	*Polygonia faunus*	Green Comma				S3	4 Secure	10	7.7 ± 1.0
I	*Lethe anthedon*	Northern Pearly-Eye				S3	4 Secure	47	1.9 ± 1.0
I	*Lanthus parvulus*	Northern Pygmy Clubtail				S3	4 Secure	3	75.4 ± 5.0
I	*Ophiogomphus carolus*	Riffle Snaketail				S3	4 Secure	29	13.2 ± 0.1
I	*Aeshna clepsydra*	Mottled Darner				S3	4 Secure	11	6.4 ± 1.0
I	*Aeshna constricta*	Lance-Tipped Darner				S3	4 Secure	16	16.7 ± 1.0
I	*Boyeria grafiana*	Ocellated Darner				S3	3 Sensitive	4	38.1 ± 1.0
I	*Gomphaeschna furcillata*	Harlequin Darner				S3	3 Sensitive	6	8.9 ± 1.0
I	*Somatochlora tenebrosa*	Clamp-Tipped Emerald				S3	4 Secure	13	16.1 ± 0.5
I	*Erythrodiplax berenice*	Seaside Dragonlet				S3	3 Sensitive	2	63.1 ± 0.1
I	*Nannothemis bella*	Elfin Skimmer				S3	4 Secure	17	2.9 ± 1.0
I	*Amphiagrion saucium*	Eastern Red Damsel				S3	4 Secure	2	73.9 ± 1.0
I	*Polygonia interrogationis*	Question Mark				S3B	4 Secure	115	4.6 ± 2.0
I	*Feniseca tarquinius*	Harvester				S3S4	4 Secure	50	1.8 ± 0.01
I	*Callophrys polios*	Hoary Elfin				S3S4	4 Secure	36	4.9 ± 1.0
I	*Speyeria cybele*	Great Spangled Fritillary				S3S4	4 Secure	2	30.2 ± 5.0
I	*Speyeria aphrodite*	Aphrodite Fritillary				S3S4	4 Secure	19	8.1 ± 1.0
I	*Polygonia progne*	Grey Comma				S3S4	4 Secure	19	8.9 ± 0.5
I	*Megisto cymela*	Little Wood-satyr				S3S4	4 Secure	1	80.6 ± 0.01
N	*Erioderma mollissimum*	Graceful Felt Lichen	Endangered		Endangered	S1S2	2 May Be At Risk	7	43.0 ± 0.01
N	*Erioderma pedicellatum (Atlantic pop.)*	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	S1S2	1 At Risk	230	14.4 ± 0.5
N	*Fissidens exilis*	Pygmy Pocket Moss	Special Concern			S1?	1 At Risk	3	40.3 ± 1.5
N	*Sclerophora peronella (Nova Scotia pop.)*	Frosted Glass-whiskers Lichen - Nova Scotia pop.	Special Concern	Special Concern		S1?		1	60.1 ± 0.01
N	*Degelia plumbea*	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S2	4 Secure	36	20.4 ± 0.01
N	*Pseudevernia cladonia*	Ghost Antler Lichen	Not At Risk			S2S3	3 Sensitive	13	17.1 ± 0.1
N	*Aloina rigida*	Aloe-Like Rigid Screw Moss				S1	2 May Be At Risk	2	40.7 ± 0.1
N	*Bryohaplocladium microphyllum*	Tiny-leaved Haplocladium Moss				S1		1	64.2 ± 5.0
N	*Solorina saccata*	Woodland Owl Lichen				S1	2 May Be At Risk	4	46.6 ± 0.05
N	*Pannaria lurida*	Veined Shingle Lichen				S1?	2 May Be At Risk	1	98.1 ± 0.1
N	*Parmeliella parvula*	Poor-man's Shingles Lichen				S1?	2 May Be At Risk	1	46.8 ± 0.1

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
N	*Everniastrum catawbiense*	Powder-tipped Antler Lichen				S1S2	2 May Be At Risk	2	43.4 ± 0.01
N	*Fuscopannaria leucosticta*	Rimmed Shingles Lichen				S1S2	2 May Be At Risk	3	56.9 ± 0.1
N	*Leptogium lichenoides*	Tattered Jellyskin Lichen				S1S2	2 May Be At Risk	5	46.4 ± 0.05
N	*Sticta limbata*	Powdered Moon Lichen				S1S2	2 May Be At Risk	3	42.7 ± 0.1
N	*Peltigera lepidophora*	Scaly Pelt Lichen				S1S2	2 May Be At Risk	1	48.3 ± 0.05
N	*Leptogium subtile*	Appressed Jellyskin Lichen				S1S3	3 Sensitive	2	41.5 ± 0.1
N	*Weissia muhlenbergiana*	a Moss				S2?	3 Sensitive	1	47.0 ± 5.0
N	*Aulacomnium heterostichum*	One-sided Groove Moss				S2?	3 Sensitive	1	93.1 ± 5.0
N	*Conardia compacta*	Coast Creeping Moss				S2?	3 Sensitive	1	35.5 ± 2.0
N	*Drummondia prorepens*	a Moss				S2?	3 Sensitive	1	45.9 ± 5.0
N	*Eurhynchium hians*	Light Beaked Moss				S2?	3 Sensitive	3	4.6 ± 5.0
N	*Fissidens taxifolius*	Yew-leaved Pocket Moss				S2?	3 Sensitive	1	47.0 ± 5.0
N	*Paludella squarrosa*	Tufted Fen Moss				S2?	3 Sensitive	1	39.2 ± 0.1
N	*Plagiothecium latebricola*	Alder Silk Moss				S2?	3 Sensitive	1	50.6 ± 5.0
N	*Sematophyllum marylandicum*	a Moss				S2?	3 Sensitive	1	8.3 ± 3.0
N	*Sphagnum subnitens*	Lustrous Peat Moss				S2?	3 Sensitive	1	58.5 ± 2.0
N	*Thamnobryum alleghaniense*	a Moss				S2?	3 Sensitive	1	93.8 ± 1.0
N	*Thelia hirtella*	a Moss				S2?	3 Sensitive	2	31.1 ± 12.0
N	*Timmia megapolitana*	Metropolitan Timmia Moss				S2?	3 Sensitive	2	79.9 ± 1.0
N	*Zygodon conoideus*	a Moss				S2?	3 Sensitive	1	89.2 ± 5.0
N	*Cyrtomnium hymenophylloides*	Short-pointed Lantern Moss				S2?	3 Sensitive	1	9.8 ± 5.0
N	*Platylomella lescurii*	a Moss				S2?	3 Sensitive	3	37.0 ± 0.7
N	*Ephemerum serratum*	a Moss				S2S3	3 Sensitive	2	47.0 ± 5.0
N	*Hygrohypnum luridum*	Drab Brook Moss				S2S3	3 Sensitive	2	37.0 ± 1.0
N	*Orthotrichum anomalum*	Anomalous Bristle Moss				S2S3	3 Sensitive	1	47.0 ± 2.0
N	*Sphagnum wulfianum*	Wulf's Peat Moss				S2S3	3 Sensitive	4	37.8 ± 0.01
N	*Tetraplodon angustatus*	Toothed-leaved Nitrogen Moss				S2S3	3 Sensitive	1	58.5 ± 2.0
N	*Hylocomiastrum pyrenaicum*	a Feather Moss				S2S3	3 Sensitive	1	13.6 ± 0.5
N	*Collema nigrescens*	Blistered Tarpaper Lichen				S2S3	3 Sensitive	5	11.9 ± 0.01
N	*Leptogium teretiusculum*	Beaded Jellyskin Lichen				S2S3	3 Sensitive	2	16.5 ± 0.01
N	*Heterodermia squamulosa*	Scaly Fringe Lichen				S2S3	3 Sensitive	1	98.1 ± 0.1
N	*Leptogium corticola*	Blistered Jellyskin Lichen				S2S3	3 Sensitive	11	41.6 ± 0.1
N	*Leptogium milligranum*	Stretched Jellyskin Lichen				S2S3	3 Sensitive	2	98.0 ± 0.1
N	*Parmeliopsis ambigua*	Green Starburst Lichen				S2S3	3 Sensitive	1	69.9 ± 2.0
N	*Physconia detersa*	Bottlebrush Frost Lichen				S2S3	3 Sensitive	1	63.7 ± 0.01
N	*Umbilicaria polyphylla*	Petalled Rocktripe Lichen				S2S3	3 Sensitive	1	69.9 ± 2.0
N	*Peltigera collina*	Tree Pelt Lichen				S2S3	3 Sensitive	2	40.4 ± 2.0
N	*Evernia prunastri*	Valley Oakmoss Lichen				S2S3	3 Sensitive	1	42.6 ± 2.0
N	*Usnea flammea*	Coastal Bushy Beard Lichen				S2S3	3 Sensitive	1	31.5 ± 1.0
N	*Anzia colpodes*	Black-foam Lichen				S3?	3 Sensitive	2	55.7 ± 0.1
N	*Sticta fuliginosa*	Peppered Moon Lichen				S3?	3 Sensitive	17	14.5 ± 0.01
N	*Nephroma bellum*	Naked Kidney Lichen				S3?	3 Sensitive	1	86.4 ± 0.01
N	*Collema furfuraceum*	Blistered Tarpaper Lichen				S3?	3 Sensitive	2	51.0 ± 0.1
P	*Juglans cinerea*	Butternut	Endangered	Endangered		SNA	7 Exotic	1	36.7 ± 0.01
P	*Bartonia paniculata ssp. paniculata*	Branched Bartonia	Threatened	Threatened		SNA		1	82.3 ± 10.0
P	*Liatris spicata*	Dense Blazing Star	Threatened	Threatened				1	13.8 ± 0.03
P	*Clethra alnifolia*	Coast Pepper-Bush	Special Concern	Special Concern	Vulnerable	S1	3 Sensitive	2	17.3 ± 0.1
P	*Lilaeopsis chinensis*	Eastern Lilaeopsis	Special Concern	Special Concern	Vulnerable	S2	3 Sensitive	136	76.9 ± 1.0
P	*Lophiola aurea*	Goldencrest	Special Concern	Threatened	Vulnerable	S2	1 At Risk	298	85.7 ± 1.0
P	*Isoetes prototypus*	Prototype Quillwort	Special Concern	Special Concern	Vulnerable	S2	3 Sensitive	13	82.6 ± 0.5
P	*Scirpus longii*	Long's Bulrush	Special Concern	Special Concern	Vulnerable	S3	Sensitive	7	97.9 ± 0.01
P	*Floerkea proserpinacoides*	False Mermaidweed	Not At Risk			S2	3 Sensitive	11	78.3 ± 7.07
P	*Helianthemum canadense*	Long-branched Frostweed			Endangered	S1	At Risk	2	16.3 ± 1.6
P	*Cypripedium arietinum*	Ram's-Head Lady's-Slipper			Endangered	S1	1 At Risk	145	37.0 ± 2.0
P	*Thuja occidentalis*	Eastern White Cedar			Vulnerable	S1	At Risk	15	5.1 ± 1.0
P	*Acer saccharinum*	Silver Maple				S1	Undetermined	12	67.0 ± 2.5
P	*Osmorhiza depauperata*	Blunt Sweet Cicely				S1	2 May Be At Risk	1	68.8 ± 5.0

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P	*Sanicula odorata*	Clustered Sanicle				S1	2 May Be At Risk	8	38.5 ± 7.07
P	*Zizia aurea*	Golden Alexanders				S1	2 May Be At Risk	35	69.4 ± 1.0
P	*Antennaria parlinii*	a Pussytoes				S1	2 May Be At Risk	16	39.2 ± 0.1
P	*Cynoglossum virginianum var. boreale*	Wild Comfrey				S1	2 May Be At Risk	5	42.2 ± 1.6
P	*Arabis glabra*	Tower Mustard				S1	5 Undetermined	1	76.1 ± 0.5
P	*Cardamine maxima*	Large Toothwort				S1	2 May Be At Risk	2	76.1 ± 0.01
P	*Draba glabella*	Rock Whitlow-Grass				S1	2 May Be At Risk	2	80.8 ± 0.05
P	*Lobelia spicata*	Pale-Spiked Lobelia				S1	2 May Be At Risk	5	70.0 ± 7.07
P	*Desmodium canadense*	Canada Tick-trefoil				S1	2 May Be At Risk	12	70.3 ± 1.5
P	*Desmodium glutinosum*	Large Tick-Trefoil				S1	2 May Be At Risk	17	40.7 ± 0.01
P	*Ribes americanum*	Wild Black Currant				S1	5 Undetermined	4	41.0 ± 3.0
P	*Proserpinaca intermedia*	Intermediate Mermaidweed				S1	2 May Be At Risk	2	38.5 ± 0.9
P	*Trichostema dichotomum*	Forked Bluecurls				S1	2 May Be At Risk	3	99.9 ± 0.01
P	*Fraxinus pennsylvanica*	Red Ash				S1	2 May Be At Risk	8	22.3 ± 5.0
P	*Polygala polygama*	Racemed Milkwort				S1	5 Undetermined	1	11.8 ± 1.0
P	*Polygonum careyi*	Carey's Smartweed				S1	5 Undetermined	1	57.9 ± 3.0
P	*Podostemum ceratophyllum*	Horn-leaved Riverweed				S1	2 May Be At Risk	4	86.2 ± 0.1
P	*Montia fontana*	Water Blinks				S1	2 May Be At Risk	1	13.6 ± 1.0
P	*Lysimachia quadrifolia*	Whorled Yellow Loosestrife				S1	5 Undetermined	1	21.6 ± 0.01
P	*Amelanchier nantucketensis*	Nantucket Serviceberry				S1	2 May Be At Risk	1	91.9 ± 1.0
P	*Dirca palustris*	Eastern Leatherwood				S1	2 May Be At Risk	47	30.8 ± 1.0
P	*Boehmeria cylindrica*	Small-spike False-nettle				S1	2 May Be At Risk	45	81.3 ± 0.01
P	*Pilea pumila*	Dwarf Clearweed				S1	2 May Be At Risk	3	40.2 ± 0.01
P	*Carex garberi*	Garber's Sedge				S1	2 May Be At Risk	4	82.4 ± 0.01
P	*Carex haydenii*	Hayden's Sedge				S1	2 May Be At Risk	4	75.1 ± 1.0
P	*Carex pellita*	Woolly Sedge				S1	2 May Be At Risk	2	68.3 ± 10.0
P	*Carex laxiflora*	Loose-Flowered Sedge				S1	2 May Be At Risk	2	79.5 ± 1.0
P	*Carex livida var. radicaulis*	Livid Sedge				S1	2 May Be At Risk	1	47.4 ± 10.0
P	*Carex ormostachya*	Necklace Spike Sedge				S1	2 May Be At Risk	1	88.9 ± 5.0
P	*Carex plantaginea*	Plantain-Leaved Sedge				S1	2 May Be At Risk	3	77.6 ± 0.1
P	*Carex prairea*	Prairie Sedge				S1	2 May Be At Risk	2	82.5 ± 1.0
P	*Carex viridula ssp. brachyrrhyncha*	Greenish Sedge				S1	2 May Be At Risk	3	72.5 ± 2.0
P	*Schoenoplectus torreyi*	Torrey's Bulrush				S1	2 May Be At Risk	1	98.7 ± 0.01
P	*Iris prismatica*	Slender Blue Flag				S1	2 May Be At Risk	1	80.8 ± 100.0
P	*Sisyrinchium fuscatum*	Coastal Plain Blue-eyed-grass				S1	2 May Be At Risk	1	84.1 ± 0.1
P	*Juncus secundus*	Secund Rush				S1	2 May Be At Risk	1	85.4 ± 0.1
P	*Juncus vaseyi*	Vasey Rush				S1	2 May Be At Risk	1	83.0 ± 0.02
P	*Allium tricoccum*	Wild Leek				S1	2 May Be At Risk	17	78.1 ± 5.0
P	*Trillium grandiflorum*	White Trillium				S1	5 Undetermined	3	82.5 ± 1.0
P	*Malaxis brachypoda*	White Adder's-Mouth				S1	2 May Be At Risk	4	73.8 ± 10.0
P	*Spiranthes casei var. casei*	Case's Ladies'-Tresses				S1	2 May Be At Risk	1	64.0 ± 0.1
P	*Bromus latiglumis*	Broad-Glumed Brome				S1	2 May Be At Risk	28	66.2 ± 0.01
P	*Cinna arundinacea*	Sweet Wood Reed Grass				S1	2 May Be At Risk	54	66.4 ± 0.01
P	*Dichanthelium xanthophysum*	Slender Panic Grass				S1	2 May Be At Risk	9	81.5 ± 1.6
P	*Elymus wiegandii*	Wiegand's Wild Rye				S1	2 May Be At Risk	6	11.7 ± 7.07
P	*Elymus hystrix var. bigeloviana*	Spreading Wild Rye				S1	2 May Be At Risk	9	38.7 ± 0.5
P	*Festuca subverticillata*	Nodding Fescue				S1	2 May Be At Risk	12	52.6 ± 7.07
P	*Puccinellia fasciculata*	Saltmarsh Alkali Grass				S1	5 Undetermined	2	68.1 ± 1.0
P	*Adiantum pedatum*	Northern Maidenhair Fern				S1	2 May Be At Risk	11	36.1 ± 0.1
P	*Equisetum palustre*	Marsh Horsetail				S1	2 May Be At Risk	1	77.2 ± 5.0
P	*Botrychium lunaria*	Common Moonwort				S1	2 May Be At Risk	3	25.6 ± 2.0
P	*Selaginella rupestris*	Rock Spikemoss				S1	2 May Be At Risk	1	41.3 ± 0.01
P	*Solidago hispida*	Hairy Goldenrod				S1?	2 May Be At Risk	2	11.7 ± 7.07
P	*Suaeda rolandii*	Roland's Sea-Blite				S1?	2 May Be At Risk	3	42.5 ± 2.0
P	*Proserpinaca palustris var. palustris*	Marsh Mermaidweed				S1?	2 May Be At Risk	2	77.8 ± 1.5
P	*Crataegus robinsonii*	Robinson's Hawthorn				S1?	5 Undetermined	1	74.4 ± 5.0
P	*Crataegus submollis*	Quebec Hawthorn				S1?	5 Undetermined	5	30.2 ± 7.07

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P	*Rubus flagellaris*	Northern Dewberry				S1?	5 Undetermined	1	75.2 ± 1.0
P	*Carex pensylvanica*	Pennsylvania Sedge				S1?	May Be At Risk	2	16.0 ± 0.05
P	*Dichanthelium acuminatum var. lindheimeri*	Woolly Panic Grass				S1?	5 Undetermined	3	81.2 ± 5.0
P	*Huperzia selago*	Northern Firmoss				S1?	May Be At Risk	8	60.0 ± 7.07
P	*Fraxinus nigra*	Black Ash			Threatened	S1S2	At Risk	118	0.5 ± 0.01
P	*Rudbeckia laciniata*	Cut-Leaved Coneflower				S1S2	May Be At Risk	14	26.4 ± 7.07
P	*Rudbeckia laciniata var. gaspereauensis*	Cut-Leaved Coneflower				S1S2	May Be At Risk	9	66.6 ± 0.5
P	*Arabis hirsuta var. pycnocarpa*	Western Hairy Rockcress				S1S2	2 May Be At Risk	1	78.9 ± 0.1
P	*Chenopodium rubrum*	Red Pigweed				S1S2	May Be At Risk	2	72.5 ± 2.0
P	*Conopholis americana*	American Cancer-root				S1S2	2 May Be At Risk	14	75.4 ± 1.0
P	*Anemone virginiana var. alba*	Virginia Anemone				S1S2	3 Sensitive	5	74.3 ± 7.07
P	*Hepatica nobilis var. obtusa*	Round-lobed Hepatica				S1S2	May Be At Risk	44	33.9 ± 0.01
P	*Ranunculus sceleratus*	Cursed Buttercup				S1S2	2 May Be At Risk	20	0.3 ± 0.01
P	*Gratiola neglecta*	Clammy Hedge-Hyssop				S1S2	3 Sensitive	3	65.0 ± 7.07
P	*Juncus greenei*	Greene's Rush				S1S2	2 May Be At Risk	5	11.8 ± 10.0
P	*Cryptogramma stelleri*	Steller's Rockbrake				S1S2	May Be At Risk	3	47.5 ± 0.25
P	*Conioselinum chinense*	Chinese Hemlock-parsley				S2	3 Sensitive	1	46.8 ± 0.05
P	*Osmorhiza longistylis*	Smooth Sweet Cicely				S2	May Be At Risk	18	41.7 ± 0.01
P	*Erigeron philadelphicus*	Philadelphia Fleabane				S2	3 Sensitive	2	69.1 ± 1.0
P	*Hieracium robinsonii*	Robinson's Hawkweed				S2	3 Sensitive	2	73.1 ± 1.0
P	*Iva frutescens ssp. oraria*	Big-leaved Marsh-elder				S2	Sensitive	17	48.4 ± 1.0
P	*Lactuca hirsuta var. sanguinea*	Hairy Lettuce				S2	3 Sensitive	4	25.5 ± 7.07
P	*Senecio pseudoarnica*	Seabeach Ragwort				S2	3 Sensitive	11	21.9 ± 1.5
P	*Symphyotrichum undulatum*	Wavy-leaved Aster				S2	3 Sensitive	108	4.5 ± 7.07
P	*Symphyotrichum ciliolatum*	Fringed Blue Aster				S2	Sensitive	8	40.7 ± 0.01
P	*Impatiens pallida*	Pale Jewelweed				S2	3 Sensitive	2	80.6 ± 1.0
P	*Caulophyllum thalictroides*	Blue Cohosh				S2	2 May Be At Risk	47	34.8 ± 0.01
P	*Betula michauxii*	Michaux's Dwarf Birch				S2	3 Sensitive	13	13.2 ± 0.1
P	*Arabis drummondii*	Drummond's Rockcress				S2	3 Sensitive	9	78.0 ± 0.01
P	*Cardamine parviflora var. arenicola*	Small-flowered Bittercress				S2	3 Sensitive	7	33.2 ± 50.0
P	*Draba arabisans*	Rock Whitlow-Grass				S2	3 Sensitive	7	79.5 ± 1.0
P	*Stellaria humifusa*	Saltmarsh Starwort				S2	3 Sensitive	4	60.0 ± 0.1
P	*Stellaria longifolia*	Long-leaved Starwort				S2	Sensitive	11	37.2 ± 5.0
P	*Hudsonia ericoides*	Pinebarren Golden Heather				S2	3 Sensitive	28	11.7 ± 7.07
P	*Hypericum majus*	Large St John's-wort				S2	Sensitive	3	0.4 ± 0.01
P	*Crassula aquatica*	Water Pygmyweed				S2	3 Sensitive	1	36.1 ± 0.1
P	*Myriophyllum farwellii*	Farwell's Water Milfoil				S2	3 Sensitive	9	23.5 ± 1.5
P	*Myriophyllum verticillatum*	Whorled Water Milfoil				S2	3 Sensitive	3	42.3 ± 7.07
P	*Utricularia resupinata*	Inverted Bladderwort				S2	Sensitive	2	72.2 ± 0.2
P	*Oenothera fruticosa ssp. glauca*	Narrow-leaved Evening Primrose				S2	5 Undetermined	8	20.8 ± 7.07
P	*Polygonum arifolium*	Halberd-leaved Tearthumb				S2	3 Sensitive	4	78.7 ± 1.5
P	*Rumex salicifolius var. mexicanus*	Triangular-valve Dock				S2	3 Sensitive	9	41.6 ± 1.0
P	*Primula mistassinica*	Mistassini Primrose				S2	3 Sensitive	16	73.0 ± 1.0
P	*Anemone canadensis*	Canada Anemone				S2	2 May Be At Risk	3	31.4 ± 7.07
P	*Anemone quinquefolia*	Wood Anemone				S2	3 Sensitive	13	46.9 ± 0.01
P	*Anemone virginiana*	Virginia Anemone				S2	3 Sensitive	16	38.2 ± 5.0
P	*Anemone virginiana var. virginiana*	Virginia Anemone				S2	3 Sensitive	2	38.5 ± 7.07
P	*Caltha palustris*	Yellow Marsh Marigold				S2	3 Sensitive	1	68.6 ± 5.0
P	*Galium boreale*	Northern Bedstraw				S2	2 May Be At Risk	7	73.8 ± 7.07
P	*Galium labradoricum*	Labrador Bedstraw				S2	3 Sensitive	10	68.3 ± 0.01
P	*Salix pedicellaris*	Bog Willow				S2	3 Sensitive	77	67.1 ± 0.1
P	*Salix sericea*	Silky Willow				S2	2 May Be At Risk	119	20.5 ± 1.0
P	*Saxifraga paniculata ssp. neogaea*	White Mountain Saxifrage				S2	3 Sensitive	4	73.8 ± 7.07
P	*Tiarella cordifolia*	Heart-leaved Foamflower				S2	3 Sensitive	16	40.0 ± 0.01
P	*Viola nephrophylla*	Northern Bog Violet				S2	3 Sensitive	6	49.5 ± 1.5

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Carex atratiformis*	Scabrous Black Sedge				S2	3 Sensitive	3	90.0 ± 0.1
P	*Carex bebbii*	Bebb's Sedge				S2	Sensitive	11	42.8 ± 0.7
P	*Carex castanea*	Chestnut Sedge				S2	2 May Be At Risk	1	50.6 ± 0.01
P	*Carex comosa*	Bearded Sedge				S2	3 Sensitive	7	45.5 ± 7.07
P	*Carex hystericina*	Porcupine Sedge				S2	2 May Be At Risk	7	76.6 ± 0.1
P	*Carex tenera*	Tender Sedge				S2	Sensitive	5	40.0 ± 0.1
P	*Carex tuckermanii*	Tuckerman's Sedge				S2	Sensitive	13	39.1 ± 2.5
P	*Eriophorum gracile*	Slender Cottongrass				S2	3 Sensitive	6	27.5 ± 7.07
P	*Vallisneria americana*	Wild Celery				S2	2 May Be At Risk	11	32.8 ± 1.2
P	*Allium schoenoprasum var. sibiricum*	Wild Chives				S2	2 May Be At Risk	1	74.3 ± 7.07
P	*Lilium canadense*	Canada Lily				S2	May Be At Risk	56	28.1 ± 0.1
P	*Najas gracillima*	Thread-Like Naiad				S2	Sensitive	2	30.7 ± 0.45
P	*Cypripedium parviflorum var. pubescens*	Yellow Lady's-slipper				S2	3 Sensitive	9	10.7 ± 7.07
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	3 Sensitive	8	42.9 ± 0.1
P	*Cypripedium reginae*	Showy Lady's-Slipper				S2	2 May Be At Risk	13	37.3 ± 0.5
P	*Goodyera pubescens*	Downy Rattlesnake-Plantain				S2	Sensitive	10	35.8 ± 1.0
P	*Platanthera flava*	Southern Rein-Orchid				S2	3 Sensitive	31	81.1 ± 0.01
P	*Platanthera flava var. flava*	Southern Rein Orchid				S2	3 Sensitive	4	67.4 ± 7.07
P	*Platanthera flava var. herbiola*	Pale Green Orchid				S2	Undetermined	6	66.6 ± 1.0
P	*Platanthera macrophylla*	Large Round-Leaved Orchid				S2	3 Sensitive	5	50.4 ± 1.0
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S2	May Be At Risk	13	36.6 ± 1.3
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S2	Sensitive	7	45.5 ± 7.07
P	*Piptatherum canadense*	Canada Rice Grass				S2	3 Sensitive	15	18.2 ± 1.0
P	*Piptatherum pungens*	Slender Rice Grass				S2	3 Sensitive	4	69.9 ± 10.0
P	*Potamogeton friesii*	Fries' Pondweed				S2	2 May Be At Risk	10	75.6 ± 1.0
P	*Potamogeton richardsonii*	Richardson's Pondweed				S2	May Be At Risk	7	46.7 ± 0.01
P	*Asplenium trichomanes-ramosum*	Green Spleenwort				S2	3 Sensitive	8	77.8 ± 7.07
P	*Dryopteris fragrans var. remotiuscula*	Fragrant Wood Fern				S2	3 Sensitive	11	83.4 ± 1.0
P	*Woodsia glabella*	Smooth Cliff Fern				S2	3 Sensitive	2	82.8 ± 1.0
P	*Symphyotrichum boreale*	Boreal Aster				S2?	3 Sensitive	6	18.1 ± 5.5
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S2?	Undetermined	1	33.5 ± 0.25
P	*Epilobium coloratum*	Purple-veined Willowherb				S2?	3 Sensitive	5	34.9 ± 0.1
P	*Amelanchier fernaldii*	Fernald's Serviceberry				S2?	5 Undetermined	1	80.4 ± 7.07
P	*Carex peckii*	White-Tinged Sedge				S2?	2 May Be At Risk	4	38.8 ± 0.01
P	*Eleocharis ovata*	Ovate Spikerush				S2?	3 Sensitive	6	29.1 ± 5.0
P	*Scirpus pedicellatus*	Stalked Bulrush				S2?	Sensitive	4	37.4 ± 1.0
P	*Sagina nodosa*	Knotted Pearlwort				S2S3	4 Secure	36	23.0 ± 0.5
P	*Ceratophyllum echinatum*	Prickly Hornwort				S2S3	Sensitive	6	69.8 ± 0.01
P	*Hypericum dissimulatum*	Disguised St John's-wort				S2S3	3 Sensitive	5	4.3 ± 10.0
P	*Triosteum aurantiacum*	Orange-fruited Tinker's Weed				S2S3	Sensitive	17	38.4 ± 2.0
P	*Shepherdia canadensis*	Soapberry				S2S3	Sensitive	71	31.4 ± 7.07
P	*Empetrum eamesii ssp. atropurpureum*	Pink Crowberry				S2S3	3 Sensitive	5	11.5 ± 7.07
P	*Empetrum eamesii ssp. eamesii*	Pink Crowberry				S2S3	3 Sensitive	5	11.5 ± 7.07
P	*Chamaesyce polygonifolia*	Seaside Spurge				S2S3	Sensitive	3	62.6 ± 3.0
P	*Halenia deflexa*	Spurred Gentian				S2S3	3 Sensitive	3	32.7 ± 0.01
P	*Hedeoma pulegioides*	American False Pennyroyal				S2S3	3 Sensitive	17	33.3 ± 5.0
P	*Polygala sanguinea*	Blood Milkwort				S2S3	3 Sensitive	13	0.3 ± 0.01
P	*Polygonum buxiforme*	Small's Knotweed				S2S3	5 Undetermined	7	47.6 ± 0.5
P	*Polygonum raii*	Sharp-fruited Knotweed				S2S3	5 Undetermined	3	46.2 ± 1.0
P	*Plantago rugelii*	Rugel's Plantain				S2S3	Secure	7	12.2 ± 0.1
P	*Potentilla canadensis*	Canada Cinquefoil				S2S3	Sensitive	1	57.3 ± 5.0
P	*Galium aparine*	Common Bedstraw				S2S3	Sensitive	8	13.9 ± 0.08
P	*Galium obtusum*	Blunt-leaved Bedstraw				S2S3	Sensitive	1	97.8 ± 0.01
P	*Salix pellita*	Satiny Willow				S2S3	Sensitive	3	52.4 ± 4.0
P	*Carex adusta*	Lesser Brown Sedge				S2S3	3 Sensitive	5	12.5 ± 5.0
P	*Carex hirtifolia*	Pubescent Sedge				S2S3	Sensitive	23	38.6 ± 0.01
P	*Carex houghtoniana*	Houghton's Sedge				S2S3	Sensitive	1	55.7 ± 1.2

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Carex swanii*	Swan's Sedge				S2S3	3 Sensitive	3	8.1 ± 0.5
P	*Eleocharis olivacea*	Yellow Spikerush				S2S3	3 Sensitive	6	6.3 ± 0.25
P	*Elodea canadensis*	Canada Waterweed				S2S3	Secure	4	40.2 ± 0.01
P	*Coeloglossum viride var. virescens*	Long-bracted Frog Orchid				S2S3	2 May Be At Risk	2	64.5 ± 1.0
P	*Cypripedium parviflorum*	Yellow Lady's-slipper				S2S3	3 Sensitive	502	36.1 ± 1.0
P	*Poa glauca*	Glaucous Blue Grass				S2S3	3 Sensitive	5	40.7 ± 1.0
P	*Potamogeton pulcher*	Spotted Pondweed				S2S3	Sensitive	10	68.2 ± 2.5
P	*Potamogeton zosteriformis*	Flat-stemmed Pondweed				S2S3	Sensitive	15	37.3 ± 5.0
P	*Botrychium lanceolatum var. angustisegmentum*	Lance-Leaf Grape-Fern				S2S3	3 Sensitive	4	54.0 ± 5.0
P	*Botrychium simplex*	Least Moonwort				S2S3	3 Sensitive	4	41.1 ± 0.1
P	*Ophioglossum pusillum*	Northern Adder's-tongue				S2S3	3 Sensitive	5	10.7 ± 7.07
P	*Angelica atropurpurea*	Purple-stemmed Angelica				S3	Secure	1	68.8 ± 0.01
P	*Erigeron hyssopifolius*	Hyssop-leaved Fleabane				S3	3 Sensitive	13	39.7 ± 7.07
P	*Hieracium paniculatum*	Panicled Hawkweed				S3	4 Secure	20	38.6 ± 11.0
P	*Megalodonta beckii*	Water Beggarticks				S3	Secure	7	37.3 ± 5.0
P	*Packera paupercula*	Balsam Groundsel				S3	4 Secure	19	37.0 ± 0.01
P	*Alnus serrulata*	Smooth Alder				S3	Sensitive	23	84.4 ± 0.01
P	*Campanula aparinoides*	Marsh Bellflower				S3	3 Sensitive	17	44.0 ± 1.0
P	*Minuartia groenlandica*	Greenland Stitchwort				S3	Sensitive	43	1.2 ± 0.5
P	*Empetrum eamesii*	Pink Crowberry				S3	3 Sensitive	83	11.7 ± 7.07
P	*Vaccinium boreale*	Northern Blueberry				S3	Sensitive	2	50.8 ± 0.01
P	*Vaccinium caespitosum*	Dwarf Bilberry				S3	Secure	54	31.1 ± 0.01
P	*Vaccinium uliginosum*	Alpine Bilberry				S3	Sensitive	3	27.2 ± 1.0
P	*Bartonia virginica*	Yellow Bartonia				S3	4 Secure	26	20.5 ± 7.07
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	4 Secure	14	47.3 ± 3.0
P	*Proserpinaca palustris*	Marsh Mermaidweed				S3	4 Secure	17	45.2 ± 1.0
P	*Proserpinaca palustris var. crebra*	Marsh Mermaidweed				S3	4 Secure	20	29.1 ± 0.01
P	*Proserpinaca pectinata*	Comb-leaved Mermaidweed				S3	Secure	20	7.5 ± 1.5
P	*Teucrium canadense*	Canada Germander				S3	3 Sensitive	45	25.7 ± 5.0
P	*Rhexia virginica*	Virginia Meadow Beauty				S3	Secure	205	76.4 ± 5.0
P	*Epilobium strictum*	Downy Willowherb				S3	3 Sensitive	6	53.3 ± 0.01
P	*Polygonum pensylvanicum*	Pennsylvania Smartweed				S3	4 Secure	22	30.2 ± 7.07
P	*Polygonum scandens*	Climbing False Buckwheat				S3	3 Sensitive	15	30.8 ± 2.0
P	*Primula laurentiana*	Laurentian Primrose				S3	4 Secure	11	75.7 ± 7.07
P	*Samolus valerandi ssp. parviflorus*	Seaside Brookweed				S3	Sensitive	40	8.6 ± 1.0
P	*Pyrola asarifolia*	Pink Pyrola				S3	4 Secure	8	36.6 ± 50.0
P	*Pyrola minor*	Lesser Pyrola				S3	Sensitive	1	84.4 ± 7.07
P	*Ranunculus gmelinii*	Gmelin's Water Buttercup				S3	4 Secure	24	30.1 ± 0.01
P	*Rhamnus alnifolia*	Alder-leaved Buckthorn				S3	Secure	18	29.3 ± 0.01
P	*Agrimonia gryposepala*	Hooked Agrimony				S3	4 Secure	87	25.7 ± 5.0
P	*Cephalanthus occidentalis*	Common Buttonbush				S3	Sensitive	18	94.7 ± 0.01
P	*Salix petiolaris*	Meadow Willow				S3	4 Secure	19	41.2 ± 0.01
P	*Geocaulon lividum*	Northern Comandra				S3	Secure	2	89.3 ± 5.0
P	*Agalinis neoscotica*	Nova Scotia Agalinis				S3	4 Secure	13	0.5 ± 0.01
P	*Limosella australis*	Southern Mudwort				S3	Secure	5	20.6 ± 1.0
P	*Lindernia dubia*	Yellow-seeded False Pimperel				S3	Secure	7	40.0 ± 0.01
P	*Laportea canadensis*	Canada Wood Nettle				S3	3 Sensitive	24	39.5 ± 0.01
P	*Verbena hastata*	Blue Vervain				S3	Secure	91	18.6 ± 7.07
P	*Carex eburnea*	Bristle-leaved Sedge				S3	3 Sensitive	3	55.5 ± 1.0
P	*Carex lupulina*	Hop Sedge				S3	4 Secure	27	16.6 ± 1.2
P	*Carex rosea*	Rosy Sedge				S3	4 Secure	26	38.4 ± 1.0
P	*Carex wiegandii*	Wiegand's Sedge				S3	Sensitive	2	52.0 ± 0.01
P	*Eleocharis nitida*	Quill Spikerush				S3	4 Secure	11	36.4 ± 5.0
P	*Juncus marginatus*	Grassleaf Rush				S3	3 Sensitive	1	99.8 ± 0.01
P	*Juncus subcaudatus var. planisepalus*	Woods-Rush				S3	3 Sensitive	14	23.1 ± 0.01
P	*Juncus dudleyi*	Dudley's Rush				S3	Secure	12	40.7 ± 0.01

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Goodyera repens*	Lesser Rattlesnake-plantain				S3	3 Sensitive	3	70.7 ± 1.0
P	*Listera australis*	Southern Twayblade				S3	Secure	104	1.3 ± 0.01
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	4 Secure	56	40.7 ± 1.8
P	*Platanthera hookeri*	Hooker's Orchid				S3	4 Secure	12	41.6 ± 1.0
P	*Platanthera orbiculata*	Small Round-leaved Orchid				S3	4 Secure	10	35.0 ± 4.8
P	*Spiranthes ochroleuca*	Yellow Ladies'-tresses				S3	Secure	14	17.8 ± 7.07
P	*Alopecurus aequalis*	Short-awned Foxtail				S3	Secure	8	52.7 ± 0.5
P	*Dichanthelium clandestinum*	Deer-tongue Panic Grass				S3	4 Secure	264	1.8 ± 1.5
P	*Panicum rigidulum var. pubescens*	Redtop Panic Grass				S3	Secure	124	94.5 ± 0.01
P	*Sparganium natans*	Small Burreed				S3	4 Secure	9	41.1 ± 0.01
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S3	Secure	11	63.8 ± 0.85
P	*Equisetum pratense*	Meadow Horsetail				S3	Sensitive	14	38.9 ± 0.01
P	*Equisetum variegatum*	Variegated Horsetail				S3	4 Secure	17	0.2 ± 0.1
P	*Isoetes acadiensis*	Acadian Quillwort				S3	3 Sensitive	7	20.0 ± 0.5
P	*Huperzia appalachiana*	Appalachian Fir-Clubmoss				S3	Sensitive	9	83.4 ± 1.0
P	*Botrychium dissectum*	Cut-leaved Moonwort				S3	4 Secure	4	76.7 ± 0.5
P	*Schizaea pusilla*	Little Curlygrass Fern				S3	4 Secure	5	18.8 ± 1.0
P	*Asclepias incarnata ssp. pulchra*	Swamp Milkweed				S3?	Undetermined	15	18.2 ± 5.5
P	*Polygonum amphibium var. emersum*	Water Smartweed				S3?	Undetermined	17	81.4 ± 0.01
P	*Amelanchier stolonifera*	Running Serviceberry				S3?	4 Secure	37	36.6 ± 3.0
P	*Carex cryptolepis*	Hidden-scaled Sedge				S3?	4 Secure	7	19.1 ± 6.5
P	*Carex tribuloides*	Blunt Broom Sedge				S3?	4 Secure	8	53.2 ± 0.01
P	*Carex foenea*	Fernald's Hay Sedge				S3?	4 Secure	13	5.4 ± 0.01
P	*Triglochin gaspensis*	Gaspé Arrowgrass				S3?	Undetermined	9	32.7 ± 0.01
P	*Potamogeton praelongus*	White-stemmed Pondweed				S3?	3 Sensitive	3	61.2 ± 5.0
P	*Lycopodium sabinifolium*	Ground-Fir				S3?	4 Secure	1	73.9 ± 0.1
P	*Lycopodium sitchense*	Sitka Clubmoss				S3?	4 Secure	2	68.8 ± 1.0
P	*Polypodium appalachianum*	Appalachian Polypody				S3?	5 Undetermined	13	40.0 ± 0.01
P	*Suaeda calceoliformis*	Horned Sea-blite				S3S4	Secure	7	11.7 ± 7.07
P	*Vaccinium corymbosum*	Highbush Blueberry				S3S4	Secure	2	0.5 ± 0.01
P	*Myriophyllum sibiricum*	Siberian Water Milfoil				S3S4	4 Secure	5	71.4 ± 0.01
P	*Sanguinaria canadensis*	Bloodroot				S3S4	4 Secure	47	27.0 ± 0.01
P	*Polygonum fowleri*	Fowler's Knotweed				S3S4	Secure	1	72.5 ± 1.0
P	*Rumex fueginus*	Tierra del Fuego Dock				S3S4	4 Secure	5	60.9 ± 0.1
P	*Fragaria vesca ssp. americana*	Woodland Strawberry				S3S4	Secure	36	30.0 ± 0.01
P	*Viola sagittata var. ovata*	Arrow-Leaved Violet				S3S4	4 Secure	18	3.4 ± 0.01
P	*Carex argyrantha*	Silvery-flowered Sedge				S3S4	4 Secure	9	49.5 ± 1.5
P	*Eriophorum chamissonis*	Russet Cotton-Grass				S3S4	4 Secure	7	30.4 ± 3.0
P	*Sisyrinchium atlanticum*	Eastern Blue-Eyed-Grass				S3S4	4 Secure	6	65.7 ± 0.8
P	*Juncus acuminatus*	Sharp-Fruit Rush				S3S4	Secure	3	0.4 ± 0.01
P	*Luzula parviflora*	Small-flowered Woodrush				S3S4	4 Secure	2	75.4 ± 0.01
P	*Liparis loeselii*	Loesel's Twayblade				S3S4	4 Secure	5	12.4 ± 5.0
P	*Panicum tuckermanii*	Tuckerman's Panic Grass				S3S4	Secure	6	40.0 ± 0.01
P	*Trisetum spicatum*	Narrow False Oats				S3S4	4 Secure	12	38.7 ± 1.5
P	*Cystopteris bulbifera*	Bulblet Bladder Fern				S3S4	4 Secure	52	35.3 ± 0.01
P	*Equisetum hyemale var. affine*	Common Scouring-rush				S3S4	4 Secure	35	2.7 ± 2.0
P	*Equisetum scirpoides*	Dwarf Scouring-Rush				S3S4	4 Secure	54	35.6 ± 4.0
P	*Lycopodium complanatum*	Northern Clubmoss				S3S4	4 Secure	11	8.8 ± 1.0
P	*Viola canadensis*	Canada Violet				SH	Extirpated	2	45.6 ± 0.75

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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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NAME	Common Name	COSEWIC/SARA	NSESA Provincial	DNR General Ranking	Habitat Requirements
Charadrius vociferus	Killdeer			YELLOW	Preferred habitat includes open areas such as plowed fields, golf courses, and short-grass prairies
Contopus cooperi	Olive-sided Flycatcher	T	Threatened	RED	Breeds throughout the maritime provinces. Is most associated with openings or edges in coniferous forest containing tall trees or snags for perching. Bog margins, river valleys, beaver ponds and meadows, slow moving streams with broad floodplains and cut over areas with some standing trees are frequently used habitats.
Contopus virens	Eastern Wood-Pewee		Vulnerable	YELLOW	Breeds from eastern Great Plains to the Atlantic ocean, ranging from southern Canada to northern Florida, the gulf coast and central Texas. Winters in the tropics. Preferred habitats include northern hardwood, pine-oak, oak-hickory, bottomland hardwood, southern pine savannah, and Midwestern forests; also found in orchards, parks, roadsides and suburban areas.
Dendroica castanea	Bay-breasted Warbler			YELLOW	Breeds from northeastern B.C. east to Maritime provinces and south to the northern Great Lakes region and northern New England. Spends winters in the tropics. Preferred habitats include open spruce forests and deciduous woodlands.
Dendroica striata	Blackpoll Warbler			YELLOW	Breeds from Alaska and northern Canada to southern Canada and northern New England. Spends winters in the tropics. Preferred breeding habitat is coniferous forests; during migration found chiefly in tall trees.
Dendroica tigrina	Cape May Warbler			YELLOW	Breeds from southern Mackenzie, Manitoba, Ontario and Quebec south to North Dakota, Michigan, northern New York, Maine and Nova Scotia. Spends winters in southern Florida and the West Indies. Preferred habitats, but during migration also found in evergreen or deciduous woodlands, and often parks or suburban yards.

NAME	Common Name	COSEWIC/SARA	NSESA Provincial	DNR General Ranking	Habitat Requirements
Dumetella carolinensis	Gray Catbird			RED	Breeds from southern Canada to central New Mexico, the Gulf states and Bermuda. Winters in the southeastern U.S., Panama, and the West Indie. Prefers low, dense vegetation or vine tangles at the edges of forests, marshes and streams; does not occur in forest interiors. Suburban landscapes often contain good habitat for this species.
Empidonax flaviventris	Yellow-bellied Flycatcher			YELLOW	Breeds from central Canada and Newfoundland south to Great Lakes region, northern New York, northern New England, and maritime provinces. Spends winters from Mexico to Panama.
Hirundo rustica	Barn Swallow	COSEWIC T	Endangered	YELLOW	Breeds from Alaska east across Canada to Newfoundland and south throughout most of the U.S.; spends winters in the tropics and Eurasia. Preferred habitats include agricultural lands, suburban areas, marshes and lakeshores.
Molothrus ater	Brown-headed Cowbird			RED	Breeding habitat includes woodland, forest (primarily deciduous), forest edge, city parks, suburban gardens, farms, and ranches. Cowbirds often are associated with forest-field edge habitat and clearings in forests. Feedlots, pastures, and fields with livestock also attract cowbirds, especially in predominately forested areas. Permanent resident in NS
Myiarchus crinitus	Great Crested Flycatcher			RED	Uncommon with few confirmed breeding records broadly scattered over central and southern Nova Scotia. Breeding: deciduous (mainly), mixed, or pine woodland or somewhat open forest, parks, orchards, wooded residential areas, areas of scattered trees in cultivated regions, clearings and edges of wooded areas, and swamps. Nests in natural cavity or old woodpecker hole in live or dead tree, average of 3-6 m above ground; also in bird box, pipe or similar cavity
Perisoreus canadensis	Gray Jay			YELLOW	Resident form Alaska east to Labrador and south across the northern U.S. Most commonly found in coniferous forests.

NAME	Common Name	COSEWIC/SARA	NSESA Provincial	DNR General Ranking	Habitat Requirements
Pheucticus ludovicianus	Rose-breasted Grosbeak			YELLOW	Breeds from northeastern B.C. Manitoba, and Nova Scotia to southern Alberta, North Dakota, Oklahoma, and New Jersey, and as far south as Georgia; regular visitor on the west coast and winters from central into northern South America. Preferred habitats include moist woodlands, open fields and old, overgrown orchards.
Picoides arcticus	Black-backed Woodpecker			YELLOW	Resident in Alaska, Canada, and northern U.S. Preferred habitat includes coniferous forests in the boreal zone, especially where burned, logged, or swampy.
Pinicola enucleator	Pine Grosbeak			RED	Open coniferous (less commonly mixed coniferous-deciduous) forest and forest edge; in migration and winter also in deciduous forest, woodland, second growth and shrubbery. Nests in trees or shrubs in coniferous woods, 2-9 m above ground. Non breeding resident in NS
Poecile hudsonica	Boreal Chickadee			YELLOW	Boreal coniferous and mixed forests, muskeg bogs, vicinity of white cedar and hemlock swamps, birches and streamside willows. Nests in natural cavities or abandoned woodpecker holes, or in cavity dug by pair in rotten tree stub, usually within 1 m of ground. Permanent resident. Breeds from northern Alaska east to Labrador and Newfoundland, south to northern edge of U.S. Occasionally wanders southward during winter. Usually found in coniferous forests.
Regulus calendula	Ruby-crowned Kinglet			YELLOW	Breeds from Alaska east across Canada to Newfoundland, south California and New Mexico, and to the Great Lakes region and southern New England in the east. Spends winters south from southern B.C. and California across the southern tier of the states to southern New England. Preferred habitats include coniferous and deciduous forests.

NAME	Common Name	COSEWIC/SARA	NSESA Provincial	DNR General Ranking	Habitat Requirements
Regulus satrapa	Golden-crowned Kinglet			YELLOW	Common from southern Alaska to central Canada and southeast to the Carolinas; spends winters south to Florida and the Gulf Coast. Preferred habitats include dense conifer forests; also found in deciduous and mixed forests.
Sayornis phoebe	Eastern Phoebe			YELLOW	Breeds north of Mason-Dixon lines in North America; spends winters as far north as the Ohio River.
Sialia sialis	Eastern Bluebird	NAR		YELLOW	Habitat includes forest edge, open woodland, and partly open situations with scattered trees, from coniferous or deciduous forest to riparian woodland, also pine woodland or savannah in the tropics. Nests are in natural cavities, old woodpecker holes, bird boxes, or similar sites, mostly 3-20 feet (1-6 meters) above ground. Breeding Bird- NS- northern portions only - towards Amherst and Pictou/Antigonish counties. Breeds east of the Rockies from southeast Canada to the Gulf of Mexico; winters in southern portion of breeding range. Inhabits open woodlands, clearings, farmlands, parks, orchards, gardens, fields, often seen along roadsides on utility wires and fences.
Spinus pinus	Pine Siskin			YELLOW	Breeds from southern Alaska, Mackenzie, Quebec, and Newfoundland south to California, Arizona, New Mexico, Texas, Great Lakes region, and northern New England; wanders southward throughout the U.S. during winter. Preferred habitats include coniferous and deciduous forests, woodlands, parks, alder thickets, and brushy pastures.
Tyrannus tyrannus	Eastern Kingbird			YELLOW	Breeds from British Columbia across interior Canada to Maritime Provinces and south to Northern California, central Texas, the Gulf coast, and Florida. Spends winters in the tropics. Inhabits open woodlands, clearings, rural roadsides, farms, orchards, edges of fields, streams, and suburbs.

NAME	Common Name	COSEWIC/SARA	NSESA Provincial	DNR General Ranking	Habitat Requirements
Wilsonia canadensis	Canada Warbler	T	Endangered	RED	Found throughout the maritime, breeds in a variety of forest types- always in areas with a well-developed shrub layer and frequently in moist to wet sites. Forested swamps with some combination of white cedar, black spruce, red maple, and tamarack and dense mixed forests on steep river valley slopes are favoured habitat.
Wilsonia pusilla	Wilson's Warbler			YELLOW	Breeds from Alaska eastward to Newfoundland and south to southern California, New Mexico, central Ontario, and Nova Scotia. Spends winters in the tropics. Preferred habitats include moist thickets in woodlands and along streams as well as alder, willow thickets, and bogs.
Alces alces americana	Moose (Nova Scotia Mainland population)		Endangered	Red	In Nova Scotia moose use mixed wood forests with lakes and streams for summer aquatic feeding habitat high quality winter browse, mature forest shelter areas that allow access to food; isolated sites for calving; and young forest stands with deciduous shrubs are essential components of moose habitat. In winter, food close to shelter in a mature conifer forest is especially important because in deep snow moose may expend more energy than they gain if they have to work too hard to find food.
Chelydra serpentina	Snapping Turtle	SC	Vulnerable	Red	Inhabits southern New Brunswick and parts of mainland Nova Scotia in ponds, lakes, slow-moving streams and sometimes in brackish water if these water bodies have soft mud bottoms and abundant aquatic vegetation
Plants					
Betula michauxii	Newfoundland Dwarf Birch			YELLOW	Sphagnum bogs, around pools, and wet peaty meadows
Betula pumila	Bog Birch			YELLOW	bog
Calamagrostis stricta	Slim-stemmed Reed Grass			YELLOW	bog, cliff or talus slope, lakeshore wetland

NAME	Common Name	COSEWIC/SARA	NSESA Provincial	DNR General Ranking	Habitat Requirements
Callitriche hermaphroditica	Northern Water-starwort			RED	ponds
Carex chordorrhiza	Creeping Sedge			RED	bog
Carex livida	Livid Sedge			RED	bog or field meadow
Carex rariflora	Loose-flowered Alpine Sedge			RED	beach or coastal shore, bog
Coeloglossum viride	Long-bracted Frog Orchid			RED	Alluvial floodplain, bog, coastal island, mixed and softwood forests
Empetrum eamesii	Pink Crowberry			YELLOW	barrens, beach or coastal shore, bog, exposed rock or sand, headland
Galium labradoricum	Labrador Bedstraw			YELLOW	Bogs, mossy thickets, woods. [Conifer forest (forest, upland)]
Hypericum dissimulatum	Disguised St John's-wort			YELLOW	pond and lake shore
Juncus stygius	Moor Rush			YELLOW	bog
Listera australis	Southern Twayblade			RED	Bog, mixed wood forest
Lobelia kalmii	Brook Lobelia			RED	bog, cliff or talus slope, field meadow
Rhamnus alnifolia	Alder-leaved Buckthorn			YELLOW	bog, field meadow, swamp
Salix candida	Sage Willow			RED	bog
Salix pedicellaris	Bog Willow			YELLOW	bog, lake or pond shore, lakeshore wetland, marsh
Sparganium hyperboreum	Northern Burreed			YELLOW	bog, coastal island
Toxicodendron vernix	Poison Sumac			RED	lake or pond shore
Vaccinium uliginosum	Alpine Bilberry			YELLOW	barrens, beach or coastal shore, bog, exposed rock or sand, headlands, field meadow
Vallisneria americana	Wild Celery			RED	Ponds, lakes, and quiet streams at depths of 1 to 4 m

NAME	Common Name	COSEWIC/SARA	NSESA Provincial	DNR General Ranking	Habitat Requirements
Symphyotrichum boreale	Boreal Aster			YELLOW	bogs, fens
Botrychium lanceolatum	Triangle Moonwort			YELLOW	field meadow, hardwood forest, swamp
Carex gynocrates	Northern Bog Sedge			RED	bog, coastal island, swamp
Eleocharis fallax	Creeping Spikerush			RED	marsh, lakeshore wetlands
Eleocharis flavescens	Yellow Spikerush			YELLOW	lakeshore wetland, swamp
Fraxinus nigra	Black Ash			YELLOW	swamp
Galium obtusum	Blunt-leaved Bedstraw			RED	swamps, swampy grounds, wet areas of prairies, wet woods and thickets, roadside ditches.
Adiantum pedatum	Northern Maidenhair Fern			RED	hardwood forest, intervale
Allium tricoccum	Wild Leek			RED	hardwood forest, intervale
Boehmeria cylindrica	Small-spike False-nettle			RED	Moist and shady ground, in deciduous woods, swamps, bogs, marshes, wet meadows and ditches
Botrychium simplex	Least Moonwort			YELLOW	beach or coastal shore, field meadow, lake or pond shore, river or stream, swamp
Caltha palustris	Yellow Marsh Marigold			YELLOW	field meadow, river or stream, swamp
Carex capillaris	Hairlike Sedge			YELLOW	calcium-rich, wet habitats, including ledges, talus slopes, ditches, cedar swamps, and bogs
Carex castanea	Chestnut Sedge			RED	cliff or talus slope, field meadow, swamp
Carex haydenii	Hayden's Sedge			RED	open habitats of bogs/poor fens, moist meadows, and seasonally wet soils
Carex hystericina	Porcupine Sedge			RED	wet prairies, swamps, grassy fens, sedge meadows, calcareous seeps, edges of marshes (sandy & non-sandy), and ditches
Carex pellita	Woolly Sedge			RED	moist to wet prairies and dolomite prairies, prairie swales, sedge meadows, seeps and calcareous seeps, swamps and

NAME	Common Name	COSEWIC/SARA	NSESA Provincial	DNR General Ranking	Habitat Requirements
					openings in floodplain woodlands, poorly drained fields, and roadside ditches
Carex prairea	Prairie Sedge			RED	disturbed sites, swamps
Carex rostrata	Narrow-leaved Beaked Sedge			RED	wet meadows, marshes, edges of lakes, ponds, and streams, and other riparian areas
Carex swanii	Swan's Sedge			YELLOW	Boggy pastures, dry peaty barrens, forests, clearings and the edges of woods.
Carex tenera	Tender Sedge			YELLOW	wet prairies, swamps, and floodplain woods
Carex tenuiflora	Sparse-flowered Sedge			RED	fen and mixed wood forest
Carex tincta	Tinged Sedge			RED	disturbed sites, hardwood forests
Carex tuckermanii	Tuckerman's Sedge			RED	field meadow, marsh, river or stream
Carex wiegandii	Wiegand's Sedge			RED	bogs and poor fens, disturbed sites, swamps
Cypripedium reginae	Showy Lady's-slipper			RED	bog, swamp
Decodon verticillatus	Swamp Loosestrife			YELLOW	lakeshore wetland, river or stream
Eleocharis quinqueflora	Few-flowered Spikerush			RED	sparsely vegetated wet habitats found in graminoid fens, shorelines of ponds and small lakes, and occasionally in wet prairie openings
Equisetum palustre	Marsh Horsetail			RED	cold streams, ponds, and lakeshores; in fens and marshes; wooded swamps. Not often actually growing in water.
Erigeron hyssopifolius	Hyssop-leaved Fleabane			YELLOW	cliff or talus slope, river or stream
Festuca subverticillata	Nodding Fescue			RED	alluvial floodplain, hardwood forest
Isoetes acadiensis	Acadian Quillwort			YELLOW	aquatic, lake or pond shore, rivers and stream
Juncus subcaudatus	Woodland Rush			YELLOW	Marshes, edges of streams, and peaty acidic and basic wetlands including fens

NAME	Common Name	COSEWIC/SARA	NSESA Provincial	DNR General Ranking	Habitat Requirements
Najas gracillima	Thread-like Naiad			RED	riparian, swamp, marsh, lakeshore wetlands
Platanthera flava	Tubercled Orchid			YELLOW	bog, field meadow, lake or pond shore, lakeshore wetland, river or stream, swamp
Proserpinaca intermedia	Intermediate Mermaidweed			RED	sandy bogs and savannas, and especially along the periphery of sandy, acid ponds, lakes, streams, ditches, and also in wet pine savannas and flatwoods, cypress-black gum ponds, swamps, and damp clearings
Proserpinaca pectinata	Comb-leaved Mermaidweed			YELLOW	shallow waters of bogs, marshes, swamps, and along the muddy shores and banks of ponds and streams
Rudbeckia laciniata	Cut-leaved Coneflower			YELLOW	intervale, lake or pond shore
Salix sericea	Silky Willow			RED	lake or pond shore, river or stream
Saxifraga cernua	Nodding Saxifrage			RED	seepage areas, moist crevices, and along streambanks,creeks and lakeshores, on moist ledges and in exposed dry sites
Selaginella selaginoides	Low Spikemoss			RED	bog, river or stream
Utricularia resupinata	Inverted Bladderwort			RED	lake or pond shore, river or stream
Viola nephrophylla	Northern Bog Violet			YELLOW	barrens, bog, river or stream
Woodwardia areolata	Netted Chain Fern			YELLOW	bog, river or stream, swamp

APPENDIX E: Designpoint Engineering and Surveying Ltd. Stormwater Report

DESIGN POINT
ENGINEERING & SURVEYING

June 11, 2015

Job# 15-036

Hamton Holdings Ltd.
[redacted]
Bedford, Nova Scotia
[redacted]
Attention: Ralph Hamilton
Via email: hamtonholdings@eastlink.ca

RE: Duke Street Property

At the request of Hamton Holdings we have reviewed the Hydrology and Hydraulics of the wetland and storm drainage system in the area of Duke Street and Damascus Road intersection in Bedford Nova Scotia. Our review included the existing wetland and the piped storm drainage system from Bedford Commons to the outlet along Duke Street.

Existing Configuration

Currently the Bedford Commons retail/office development has a piped storm drainage system that discharges to a control storm manhole at the intersection of Duke Street and Damascus Road. At this control manhole the flow is split with the 1 in 5 year predevelopment flow amount being directed towards the northwest along Duke Street to an 1800mmØ culvert crossing Duke Street, from this point the water flows in a drainage course to Rocky Lake.

The flow to the control manhole in excess of the 1 in 5 year predevelopment flow is directed towards the southeast in a pipe parallel to Duke Street where it discharges to a large wetland/pond created when Duke Street was constructed. This pond would fill up during the peak of a rainstorm and drain back down through the control manhole once the storm has passed. The normal pond water elevation is 40.0m and during the peak of a 1 in 5 year storm it would be as high as approx. 41.2m.

The piped drainage system (the minor drainage system) was designed for the 1 in 5 year storm event, the road system (the major drainage system) was designed to handle the 1 in 100 year flow. Generally the 1 in 5 year flow will be drained into the storm sewer system through the street and lot catchbasins, and the 1 in 100 year flow would drain on the surface of the lot areas and streets to the low point on Damascus Drive at the intersection of Duke Street and then flow over the curb in a northwest direction to the 1800mmØ culvert under Duke Street (see attached sketch of drainage patterns). The 1800mmØ culvert was designed for the major storm event (1 in 100 year).

DESIGN POINT
ENGINEERING & SURVEYING

Proposed Development

We understand that a service station is proposed in the area adjacent to the existing pond and part of the proposal is to have a portion of the pond filled in (approximately 56%) and compensate for the lost storage using underground storage chambers as shown in the attached sketch.

We have been asked to review the effects of infilling the pond on the existing storm drainage works. In particular we have been asked to answer the following questions:

1. How much underground storage do we need to compensate for filling in 56% of the pond?
2. If the pond is partially filled in (56%), what is the peak flow out of the pond to the watercourse on the other side of Duke Street compared to what it is without filling the pond in?
3. Can the peak 1 in 5 year flood levels in the 56% filled in pond match existing conditions?
4. Can the existing storm drainage system including the downstream receiving system handle the storm drainage if the pond is partially filled in?

To analyze the system, we have prepared a storm drainage computer model in HydroCAD which uses the SCS TR-55 method for runoff. This is the same model that was used for the original design of the storm drainage system in the area. The model was prepared to include the pipe system to the pond, the control manhole, the pond, the underground storage chambers, and the pipe from control manhole, and the culvert under Duke Street.

We ran the model for two separate scenarios:

- Using a 1 in 5 year storm, 112mm in 24 hours without the pond filled in (existing conditions).
- Using a 1 in 5 year storm, 112mm in 24 hours and 56% of the pond filled in with underground chambers providing additional storage (proposed development).

See detailed print out of model results attached to this letter report.

Based on the above described modeling the answer to the questions asked of us are as follows:

1. We need 978m^3 of underground storage – 28 rows of 25 chambers (see attached sketch)
2. The estimated peak 1 in 5 year flow to the watercourse on the northeast side of Duke Street is:
    a) Pond not partially filled in (current condition) 1.6m^3/s
    b) Pond partially filled in (proposed condition) 1.6m^3/s
3. The estimated peak 1 in 5 year flood levels in the pond are as follows:
    a) Pond not partially filled in (current condition) - peak water level = 41.2m ±

b) Pond partially filled in (proposed condition) - peak water level = 41.2m ±

4. If the pond is partially filled in with the addition of underground storage, the existing storm drainage system can adequately handle the storm drainage for up to a 1 in 100 year storm with no adverse effects on the downstream system, similar to the current situation.

Summary

From a storm drainage engineering perspective there is no reason why this pond could not be 56% filled in with underground storage being provided. We can confirm that the storm drainage system will continue to function in accordance with the original design intent and there would be no adverse downstream effects. Additionally, the water level in the pond will remain generally the same during a 1 in 5 year storm event.

Our analysis has not considered any environmental aspects of the filling in of the wetland/pond, as we understand this will be done by McCallum Environmental.

If you have any questions please feel free to contact us by e-mail or phone.

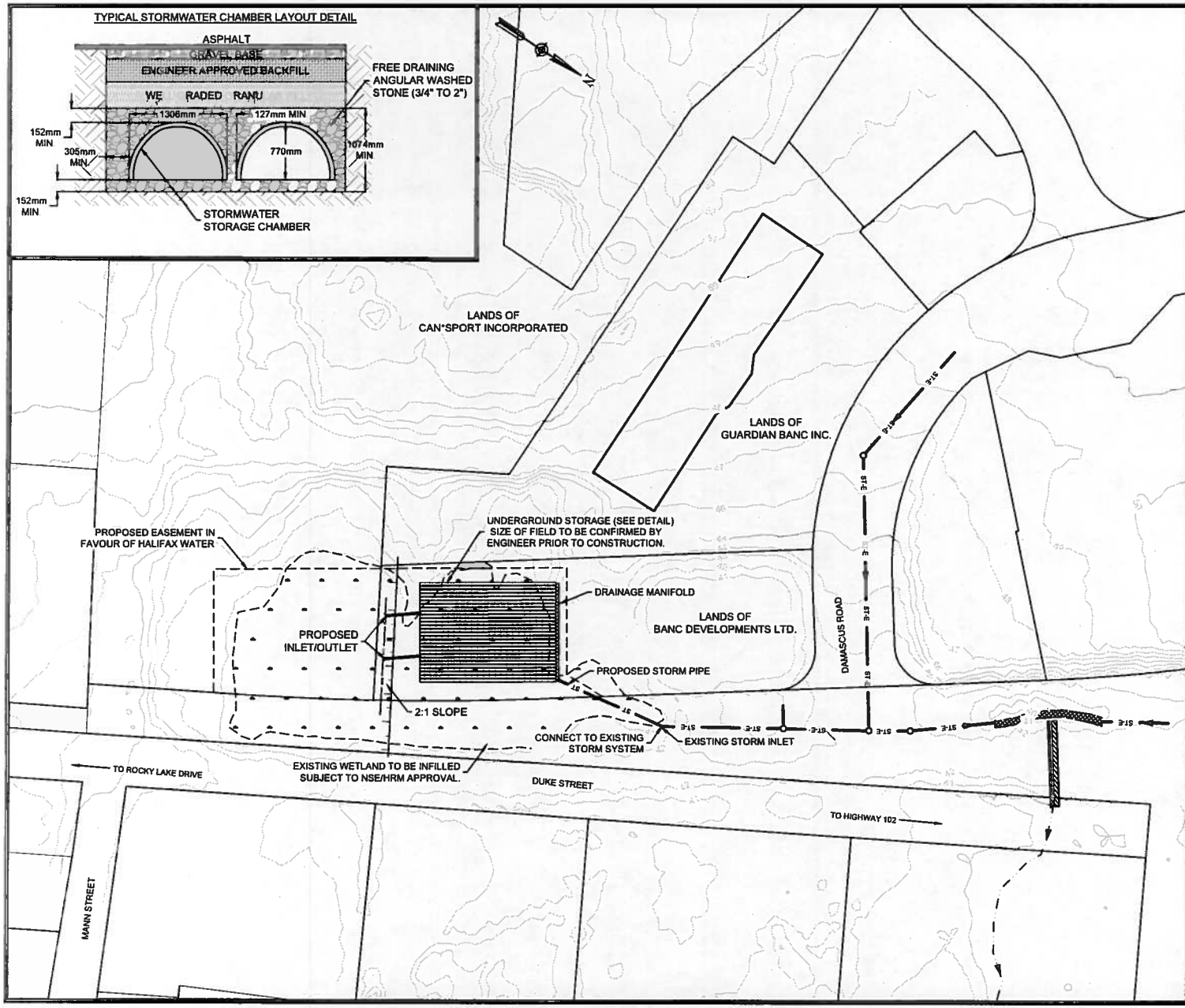
Thank you,

DesignPoint Engineering & Surveying Ltd.

Original Signed

Glenn Woodford P.Eng.
Senior Engineer & Principal

Attachments



NOTES

1. APPROXIMATE STORAGE FIELD SIZE = 25 CHAMBERS X 28 ROWS.
2. STORAGE CHAMBERS TO BE CHAMBERMAXX OR APPROVED EQUIVALENT.
3. CONTOURS BASED ON LIDAR.
4. PROPERTY LINES BASED ON PROPERTY MAPPING AND ARE APPROXIMATE AND SUBJECT TO SURVEY.
5. PROPOSED STORMWATER STORAGE SUBJECT TO APPROVAL BY HRM AND HALIFAX WATER.
6. WETLAND DELINEATION BY McCALLUM ENVIRONMENTAL. WETLAND ALTERATION SUBJECT TO NSE AND HRM APPROVAL.

Metres
30 0 30 60
1:1500

CONSULTANT

DESIGN POINT
ENGINEERING & SURVEYING

CLIENT

HAMTON HOLDINGS

PROJECT DESCRIPTION

DUKE STREET PROPERTY

BEDFORD, NOVA SCOTIA

SHEET DESCRIPTION

PRELIMINARY LAYOUT OF UNDERGROUND STORMWATER MANAGEMENT SYSTEM

Drawn	Engineer	Project No.	Drawing No.
A. SKETCHLEY	G. WOODFORD	15-036	1 of 1
Date of 1st Issue	Scale	Filename	
MAY 25, 2015	1:1500	15-018ST.dwg	

APPENDIX F: HRM Correspondence

Subject: Duke Street, Bedford HRM Right of Way
Date: Wednesday, July 1, 2015 at 8:25:03 PM Atlantic Daylight Time
From: Hamton Holdings Ltd.
To: Meghan Milloy

FYI

From: Andrew Forsythe
Sent: Tuesday, June 30, 2015 4:51 PM
To: Ralph Hamilton
Cc: Glenn Woodford
Subject: Fwd: Duke Street, Bedford

Hi Ralph,

See response from HRM below.

Let us know if you require anything further.

Have a great Canada Day.

Thanks,
Andrew

Sent from my iPhone

Begin forwarded message:

> **From:** "Teasdale, Evan" <teasdae@halifax.ca>
> **Date:** June 30, 2015 at 4:35:52 PM ADT
> **To:** Andrew Forsythe <Andrew.Forsythe@designpoint.ca>, "Davis, Christopher" <davisc@halifax.ca>
> **Cc:** Glenn Woodford <Glenn.Woodford@designpoint.ca>
> **Subject: RE: Duke Street, Bedford**
>
> Hi Andrew,
>
> In general, in terms of the street right of way, I don't see any issue. As long as grading is completed in accordance with rural road cross sections in the HRM design specs; the gravel shoulder should have to be graded at 4% slope away from the road, and any drop behind the shoulder would have to be no steeper than 2:1. This work could happen with a temporary work within the ROW permit (SANS permit).
>
> In addition, Duke street is subject to the Bedford Grade Alteration By-Law so any property grading (outside the ROW) would require a Grade Alteration Permit. It is not uncommon to issue this permit in conjunction with a SANS permit if the work is being conducted at the same time.
>
> I hope this helps to clarify the requirements.
> If you have any questions or concerns, or if you need any further info, just let me know.
>
> Thanks,
> Evan
>
> **EVAN TEASDALE, P.ENG.**
> DEVELOPMENT ENGINEER

DEVELOPMENT APPROVALS
PLANNING AND DEVELOPMENT

HALIFAX
40 ALDERNEY DRIVE
DARTMOUTH NS B2Y 2N5
T. 902.490.1206
C. 902.817.4836
F. 902.490.4661
halifax.ca

From: Andrew Forsythe [mailto:Andrew.Forsythe@designpoint.ca]
Sent: June-26-15 11:15 AM
To: Davis, Christopher
Cc: Glenn Woodford
Subject: Re: Duke Street, Bedford

Hi Chris,

Just following up on this. Are you able to provide something on this?

Thanks,
Andrew

Sent from my iPhone

On Jun 19, 2015, at 10:18 AM, Andrew Forsythe <Andrew.Forsythe@designpoint.ca> wrote:

> Hi Chris,
>
> I am following up on the discussion that you had with Glenn Woodford regarding the low wet area adjacent to Duke Street in Bedford (close to Mann Street) – outlined in blue on the attached sketch.
>
> As discussed with Glenn, a client of ours is considering infilling the wet area adjacent to Duke Street. As you can see from the sketch, there are 3 landowners that are impacted by the wet area and as part of the approval process with NSE, we would like to provide confirmation that the area within the HRM right of way can be infilled.
>
> As you know, infilling will require the appropriate approvals from the province and the municipality. We wanted to confirm that HRM didn't have any objections to infilling this area as long as the appropriate approvals were

obtained (i.e. NSE approval) and that the stormwater was managed such that there was no negative impact on Duke Street.

Would you be able to provide this confirmation? If you have any questions, please feel free to contact us.

Thanks,
Andrew

Andrew S. Forsythe, P.Eng.
Senior Engineer & Principal

DesignPoint Engineering & Surveying Ltd.
200 Waterfront Drive, Suite 100
Bedford, Nova Scotia, B4A 4J4
902.832.5597 office
[redacted]
Email: andrew.forsythe@designpoint.ca
www.designpoint.ca

DesignPointLogosmall

<duke street.jpg>

APPENDIX G: Letter of Understanding, Ducks Unlimited Canada

McCallum Environmental Ltd.

Letter of Understanding for Wetland Restoration to Meet Compensation Requirements

This is a *letter of understanding* ("LOU") made as of September 4, 2015 between:

Hamton Holdings Ltd. ("the Proponent")

-AND-

McCallum Environmental Ltd. Bedford NS ("McCallum")

WHEREAS in compliance with the *Nova Scotia Wetland Conservation Policy,* the Proponent is required by Nova Scotia Environment ("NSE") to compensate for wetland loss at the proposed property located at 0 Damascus Road (PID 41376856) in Bedford, Nova Scotia;

AND WHEREAS McCallum provides services to clients who need to restore, protect or create wetlands as a result of an approved wetland alteration;

AND WHEREAS McCallum will perform certain work and provide certain services to restore 10,444 m^2 of wetland habitat before the end of 2017 ("the Project");

AND WHEREAS the Proponent has accepted this proposal and wishes McCallum to perform the work and provide the services referred to therein;

NOW THEREFORE this LOU witnesses that in consideration of a sum to be paid to McCallum by the Proponent in accordance with the terms and conditions of this LOU, the parties agree as follows:

i. SCOPE OF WORK AND SERVICES

McCallum shall:

1. Identify a site suitable as a wetland compensation project;
2. Obtain approval for the aforementioned project (#1) from NSE;
3. Design the Project, and provide plans to NSE for review and comment;
4. Obtain all necessary provincial and federal regulatory approvals prior to work commencing;
5. Provide construction supervision for the delivery of the Project;
6. Complete the restoration of approximately 10,444 m^2 of wetland creation before the end of 2017;
7. In consultation with NSE, complete monitoring events as required and provide reporting to NSE; and
8. Notify NSE upon Project completion.

ii. TERMS OF PAYMENT

McCallum will provide the necessary equipment, engineering, design and staff to restore 10,444 m^2 of wetland habitat. The Proponent will provide McCallum with the funds necessary to cover the associated costs, totalling $31,332 plus HST.

iii. COMPLIANCE WITH LAWS

McCallum, in the performance of the services, shall observe and abide by all applicable laws, rules and regulations of the federal, provincial and municipal bodies having jurisdiction in the location where the services are performed.

iv. ASSIGNMENT

This LOU shall not be assigned by either party hereto without the prior written approval of the other, except that McCallum may utilize in the performance of this LOU, without the prior approval of the Proponent, personnel or services or related and affiliated companies and groups as if they were an integral part of McCallum.

v. TERMINATION

The Proponent shall have the right at any time to terminate, with or without cause, the services of McCallum and to cancel this LOU by giving McCallum fourteen days prior written notice to that effect. The parties may, however, mutually agree to waive the fourteen day notice period.

In the event of termination the Proponent shall reimburse McCallum for all costs incurred by McCallum in relation to the scope of work for this LOU up to and including the fourteen day notice period.

vi. INDEPENDENT CONTRACTOR

It is understood and agreed by and between the parties hereto that the relationship between the Proponent and McCallum existing and to exist from and after the execution of this LOU, and at all times during the term of same, is that of an independent contractor.

vii. EXECUTION AND COUNTERPART

This LOU may be executed in one or more counterparts, each of which when so executed and all of which together shall constitute the same LOU.

viii. NOTICES

All notices and reports provided for in this LOU shall be in writing and delivered to the parties by email or mail delivery at the following addressed unless the parties agree otherwise.

To: McCallum Environmental Ltd.
208 Kingswood Drive
Hammonds Plains, NS
B4B 1L2
meghan@mccallumenvironmental.com

And To: Hamton Holdings Ltd.
[redacted]
Bedford, Nova Scotia
[redacted]
Ralph Hamilton ([redacted]) hamtonholdings@eastlink.ca

ix. INCORPORATION

The preamble hereto is incorporated into and forms part of this LOU.

THIS LOU and everything contained herein shall be binding upon and inure to the benefit of the parties hereto and their respective executors, administrators, successors and assigns.

IN WITNESS WHEREOF both the Proponent and McCallum have executed and delivered this LOU.

SIGNED AND DELIVERED

Original Signed

Witness

Sept 21 /15.

Date

Witness

Ralph Hamilton
Hamton Holdings Ltd.

Original Signed

Meghan Milloy
Vice President
McCallum Environmental Ltd.

APPENDIX H: Bibliography

Bibliography

1. Nova Scotia Environment under Section 105 of the Environment Act
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2. Nova Scotia Wetland Conservation Policy (September 2011) -
https://www.novascotia.ca/nse/wetland/docs/Nova.Scotia.Wetland.Conservation.Policy.pdf

3. Nova Scotia Wetland Indicator Plant List (NSE 2011)
http://www.novascotia.ca/nse/wetland/indicator.plant.list.asp

4. Reed, Jr., Porter B. 1988. National List of Plant Species That Occur in Wetlands: National Summary. U.S. Fish & Wildlife Service. Biol. Rep. 88 (24). 244 pp.

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