Appendix H – Rare Plant, Wetland, and Watercourse Surveys

Biological Assessment for proposed Liverpool Wind Farm

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Introduction

East Coast Aquatics Inc. (ECA) was retained by Eon Wind Electric to conduct a biological assessment of the proposed Liverpool Wind Farm. The location for the proposed wind farm, consisting of two turbines, is approximately 5 km north of the community of Liverpool, Queens County. The project site is bounded on the south and east by Highway 103, to the west by Highway 8 and to the north by Herring Cove Lake (Figure 1).

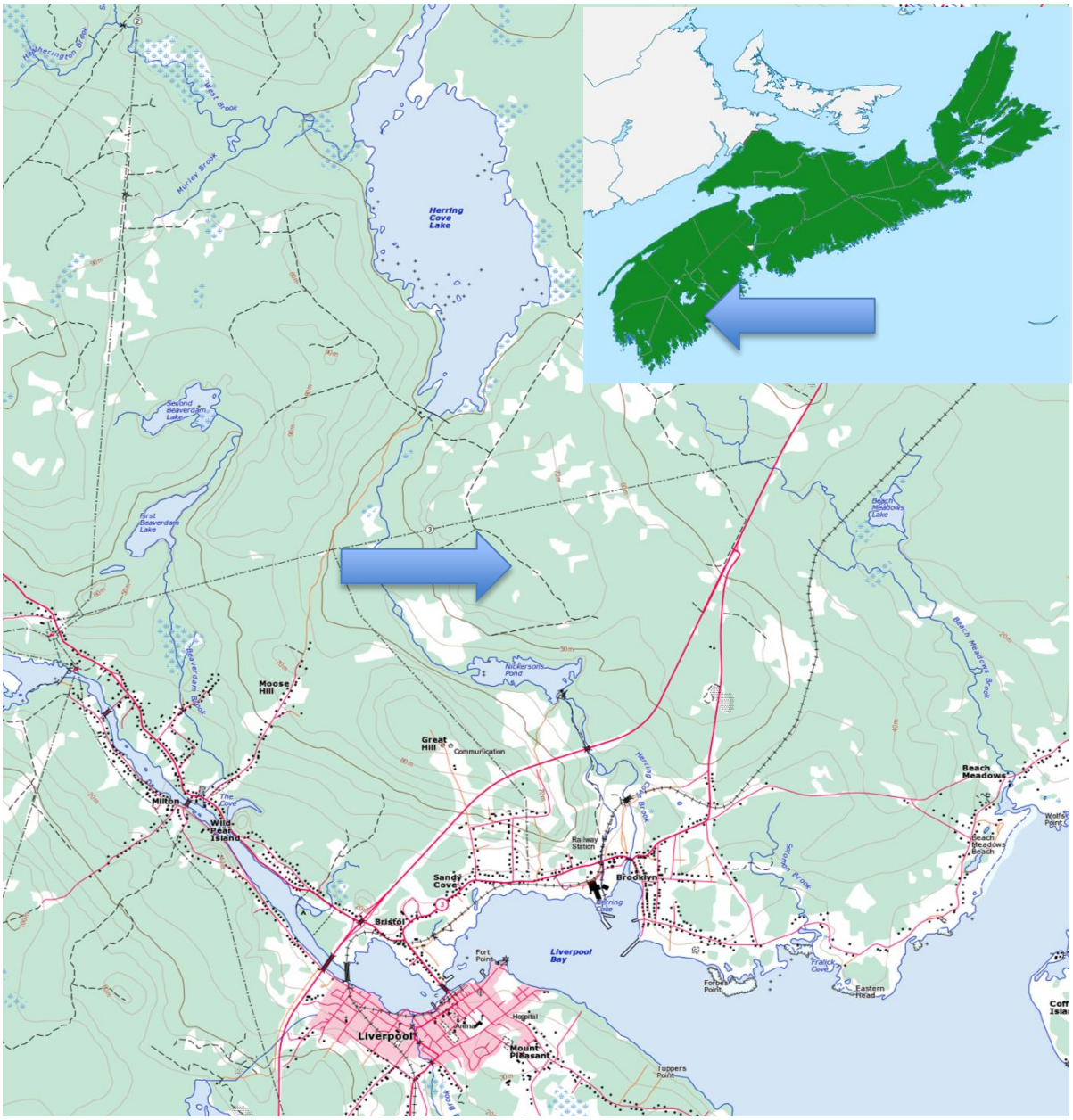

Figure 1: Locator map for Liverpool Wind Farm, situated approximately 5 km north of Liverpool, Queens County.

ECA's assessment of the site encompassed landscape features, forest ecotypes, wetlands, fisheries, water quality as well as floral species at risk and species of conservation concern. Field studies were conducted during the period of July to September 2014, over multiple site visits.

Project components will include access roads, two turbines and electric transmission lines. Centred on each turbine will be a 100 m x 100 m laydown area to provide for the assembly and erection of the turbines. An extensive network of gravel all-season roads currently exists at the site, providing historic access for commercial forestry operations. It is anticipated that gravel roads between Highway 103 and the turbine sites will be upgraded, where necessary, as part of the project implementation (Figure 2). The electric transmission will follow the alignment of existing gravel roads around the eastern end of Nickerson's Pond and south to the site of the former Bowater Mersey mill.

The study boundaries for the biological assessment included the existing gravel access roads from Highway 103 to the turbine sites, an area approximately 1 km x 1 km centred on the two turbines, and the alignment of the proposed utility line along existing gravel roads to the Innovacorp Demonstration site at the location of the former Bowater Mersey mill.

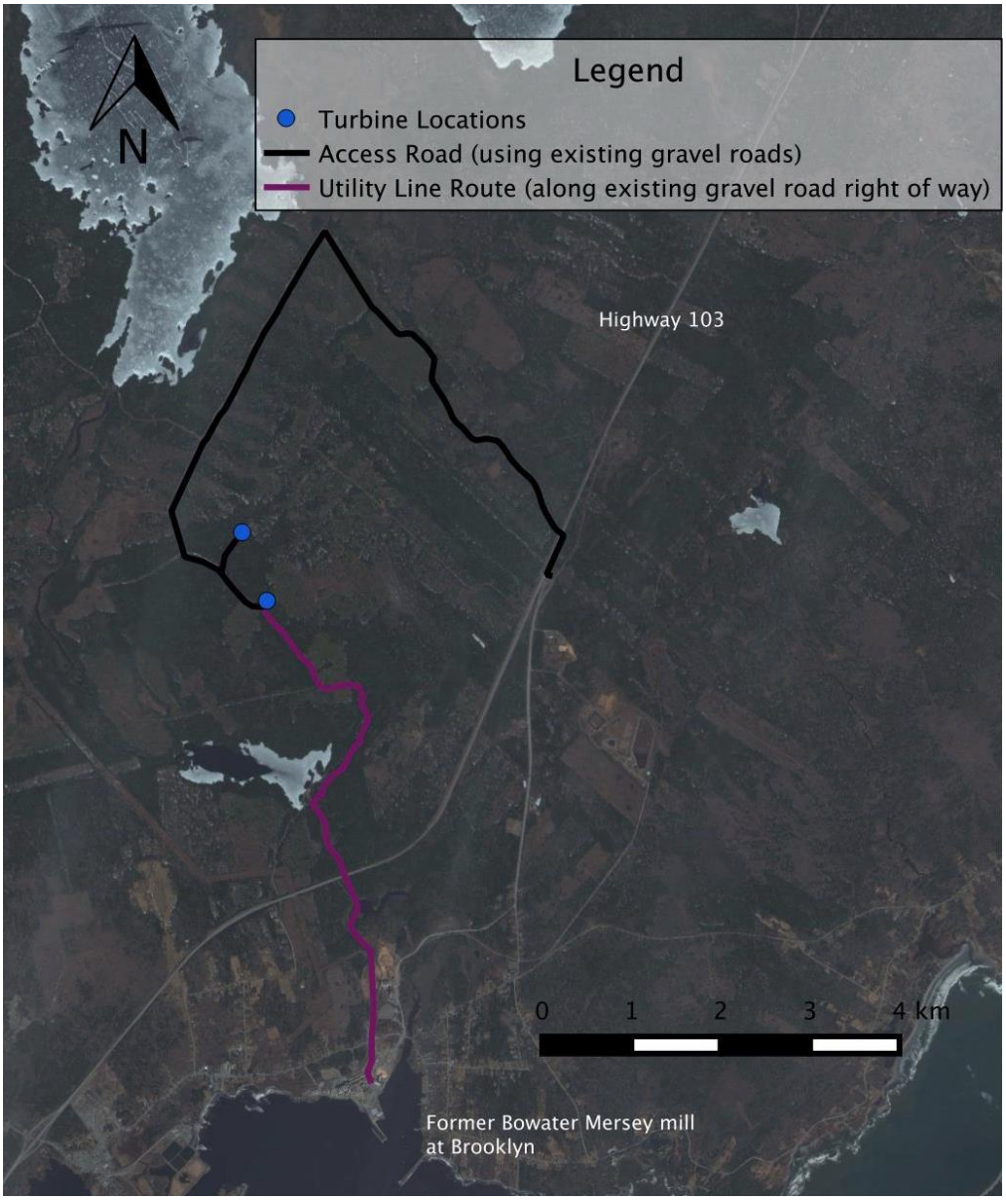

Figure 2: Liverpool Wind Farm site map.

Landscape Scale Characterization

Methodology

A desktop preliminary review of the project site and surrounding areas was undertaken in order to characterize key habitats, landscape-scale features and site-specific issues. Data sources for the desktop review included the Ecological Land Classification Map and Database of Nova Scotia (NSDNR, 2006) and associated report (NSDNR, 2003), Forest Cover Type Mapping (NSDNR, 2009), Soil Survey of Queens County (Cann and Hilchey, 1959) as well as other sources noted below.

Field surveys of the project site occurred on July 9, August 29, and September 16, 2014, with vegetation surveys untaken by an experienced botanist.

Findings

Landscape Scale Features

The project site occurs within Nova Scotia's Western Ecoregion (700), which covers most of southwest of the province, extending from Windsor to Yarmouth. The Ecoregion is generally characterized as a landform gently sloping to the southeast and the Atlantic Ocean. The Ecoregion has milder winters than the eastern portion of the province and warmer summers, with total annual precipitation in the range of 1300 to 1500 mm (NSDNR, 2003, 2006).

The project site is situated within Ecosections WMHO and IMHO of the Rossignol Ecodistrict. The Ecodistrict is characterized by low hills with elevations of 100 to 300 m above sea level and a climate of early springs, warms summers and mild winters. Bedrock under the Ecodistrict is principally Meguma quartzite and soils derived from glacial drift. Soils are generally shallow, stony and moderately course, making them unsuitable for agriculture. The majority of site infrastructure (access road, turbines and most of utility corridor) occurs in the WMHO Ecosection, described as well drained, medium textured soils on hummocky terrain. A short section of the utility corridor at the eastern end of Nickerson's Pond passes through the IMHO Ecosection, described as imperfectly drained, medium textured soils on hummocky terrain (NSDNR, 2003, 2006).

The generation of acidic run-off occurs when sulphide-bearing slates of the Halifax Formation are excavated and exposed to air. Based on geological mapping from the NSDNR Mineral Resource Land-Use Map (NSDNR, 2004a), a band of sulphide-bearing slates occurs on the northwest boundary of the project area, intersecting with the existing access road. More recent geological mapping (NSDNR, 2013) reports the entire project area to be in an area having a low potential to generate acid rock drainage. No field-based investigations of site geology were conducted by East Coast Aquatics.

Soils over much of the project area belong to the Danesville soil series, being dark, greyish brown sandy loam over dark yellowish brown sandy loam. The parent material for this series is olive green sandy loam till. These soils are recorded as having gently undulating to undulating topography and being imperfectly drained with moderately slow internal drainage. A portion of the existing gravel access road on the northwest edge of the project area has soils belonging to the Halifax soil series (Cann and Hilchey, 1959).

Forests

Forests within the Ecodistrict are vulnerable to fire and wind damage, with hurricanes causing considerable blowdown and fires common. Within well-drained upper slopes of the Rossignol Ecodistrict, hardwoods (Yellow birch and Sugar maple) form the climax forest. Hemlock, Red spruce and White pine occur widely on the lower slopes and on better drained sites. Black spruce is dominant on imperfectly drained sites (NSDNR, 2003).

Mapping of forest stands in the vicinity of the project site identified the dominant species to include Red spruce, Red maple and Eastern hemlock. Forest heights ranged from 12 to 20 m, with crown closures from 30 to 75% (NSDNR, 2009). The project site occurs on lands which were formerly part of the Bowater Mersey forestry operations. An extensive network of gravel roads are in place, with regular cut blocks and forest stands of varying age class.

The turbine pads will be situated in a block of coniferous and mixed woods. Mature Red spruce (*Picea rubens*) with scattered Eastern hemlock (*Tsuga Canadensis*), Balsam fir (*Abies balsamea*), Red maple (*Acer rubrum*) and Yellow birch (*Betula allegheniensis*) form a dense canopy that limits the ground plant species to ferns, tree seedlings, mosses and other species tolerant of low light levels (Figures 3 and 4). Fern species include Lady-Fern *(Athyrium filix-femina)*, Eastern hay-scented fern (*Dennstaedtia punctilobula*), Interrupted fern (*Osmunda claytoniana*) and Cinnamon fern (*O. cinnamomea*). Other plant species observed included Partridge-Berry (*Mitchella repens*), White wood-sorrel (*Oxalis montana*), Indian cucumber-root (*Medeola virginiana*) and Wild lily-of-the-valley (*Maianthemum canadense*). Very small and scattered wetlands formed by ground water were observed in the upland forest but did not provide additional species.

Logging roads and cleared property boundaries can be found around and in the upland forest (Figure 5). Increased light levels at these locations allow for a more diverse number of plant species including numerous graminoids. Sedge species observed include Hay sedge (*Carex argyrantha*), Fringed sedge (*Carex crinita*), Shallow sedge (*Carex lurida*) and Pointed broom sedge (*Carex scoparia*). A number of ruderal species can also be found along the logging roads such as Tiny all seed (*Radiola linoides*) and Pearly everlasting (*Anaphalis margaritacea*), both exotic species.

The transmission corridor will follow a series of connected logging roads south to the community of Brooklyn for a distance of approximately three kilometers. This route is generally over uplands through harvested woods and some standing coniferous woods on private land east of Nickersons Pond. South of Nickerson Pond the route follows the gravel road and water pipeline for the defunct Bowaters-Mersey Paper Mill. Road and ditch maintenance along these roads and wood harvesting limit the potential for species of interest in the five meters on either side of the road. Regenerating forest dominates the route and weedy and ruderal species line the ditches. Tree/shrub species include Gray birch (*Betula populifolia*), Red maple (*Acer rubrum*), Speckled alder (*Alnus incana*) and Wild raisin (*Viburnum nudum*). Weedy species such as Field sowthistle (*Sonchus arvensis*) and Low cudweed (*Gnaphalium uliginosum*) are frequent. Other exotic species include the common Pearly everlasting (*Anaphalis margaritacea*), St. John's-Wort (*Hypericum perforatum*) and Nipple-Seed plantain (*Plantago major*).

Figure 3: Clearing within mature upland coniferous forest. Photo taken July 7, 2014.

Figure 4: Mature upland deciduous forest. Photo taken August 29, 2014.

Figure 5: Existing gravel road used for commercial forestry operations, adjacent to proposed alignment of utility corridor.

Wetlands

Methodology

A preliminary desktop review of the project site and surrounding areas was undertaken to identify key wetland features, site topography and soils, and likely vegetation communities. Data sources for the desktop review included aerial photography (both current and historic), the Provincial Significant Species and Habitats database (NSDNR, 2004b), Wet Areas Mapping and Flow Accumulation Channels (NSDNR, 2013), Soil Survey of Queens County (Cann and Hilchey, 1959), the Nova Scotia database of Wetlands of Special Significance, as well as other sources noted below.

Field surveys of the project site occurred on July 9, August 29, and September 16, 2014, with vegetation surveys untaken by qualified wetland delineators. Field survey methods were based on U.S. Corps of Army Engineers (2009), Fern Hill Institute (2011) and Maritime College of Forest Technology (MCFT, 2008 and 2009). Assignment of vegetation indicator status was based on the Nova Scotia Wetland Indicator Plan List (Nova Scotia Environment, 2011).

The study boundaries for the biological assessment included the existing gravel access road from Highway 103, an area approximately 1 km x 1 km centred on the two turbines, and the alignment of the proposed utility line along existing gravel roads to the Innovacorp Demonstration site at the location of the former Bowater Mersey mill. The objectives of the field surveys were to (a) provide a general characterization of the vegetation communities within the wetlands and (b) identify and delineate wetlands which intersect with proposed project infrastructure.

Findings

Characterization of Wetlands

The Nova Scotia Department of Natural Resources Provincial Significant Species and Habitats database (NSDNR, 2004b) indicates a number of fresh water wetlands within 1 km of the project site (Figure 6). The access road to the turbine pads will pass within 1 km of several small, isolated treed swamps, as well as an 11 ha low shrub/graminoid marsh on the eastern shore of Herring Cover Lake. The access road and utility corridor will pass in the vicinity of several low shrub marshes. No wetlands are documented by the DNR Significant Species and Habitats database (2004b) in the vicinity of the two turbines and laydown pads.

There are no provincial Wetlands of Special Significance in the vicinity of the project site. The closest Wetlands of Special Significance occur in separate and distinct catchments approximately 4.8 km to the southeast (Mersey River estuary), approximately 7.1 km to the northeast (Medway River estuary) and approximately 8.5 km to the northwest of the site.

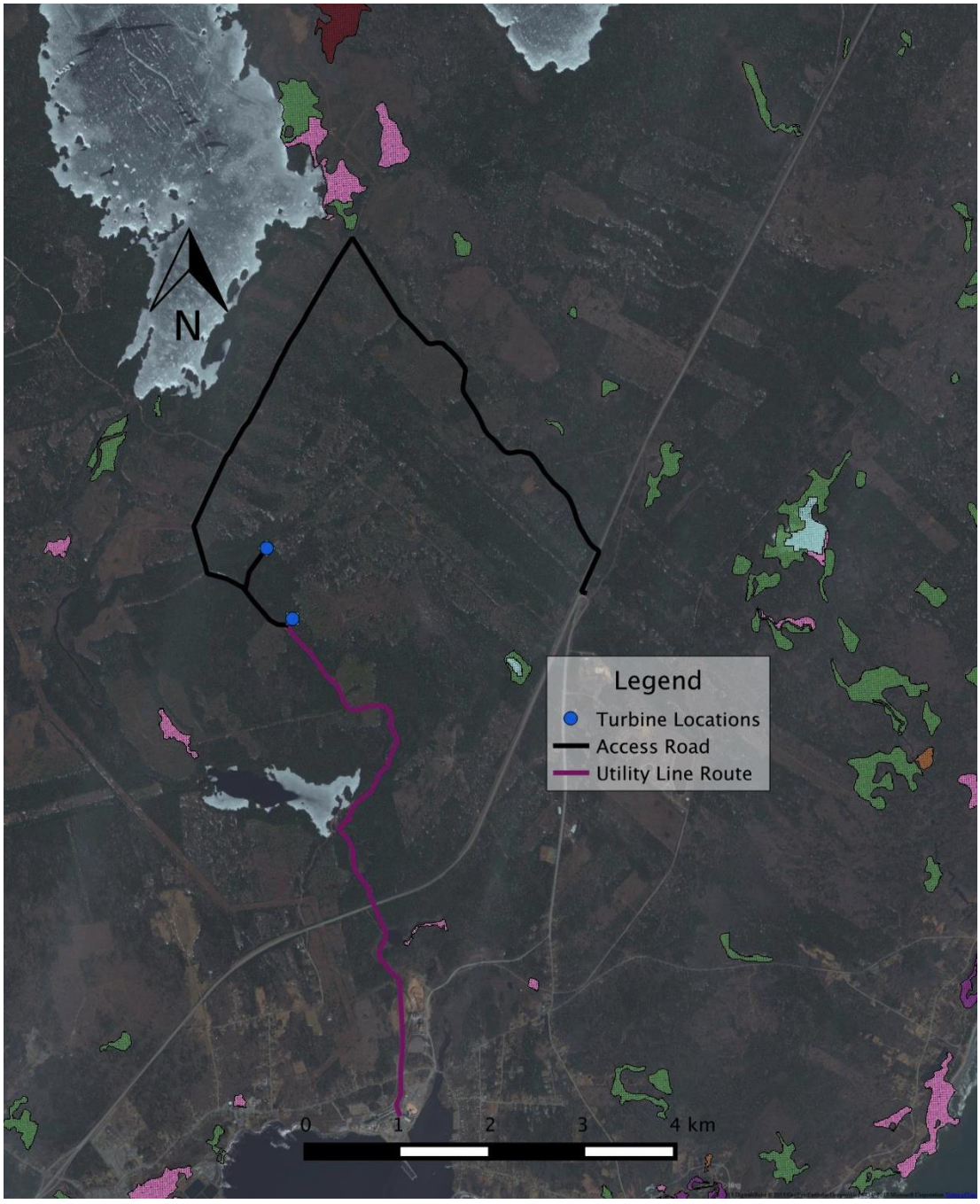

Figure 6: Nova Scotia Department of Natural Resource wetlands database mapping, indicating wetlands adjacent to the project site.

Field surveys of the project site in July 2014 identified several small isolated additional wetlands in the vicinity of the turbine pads, which were not recorded in the Provincial Significant Species and Habitats database. This result is not unusual, as it is generally recognized that the provincial wetlands mapping database is limited in its identification of physically small wetlands as well as shrub and treed wetlands.

Using the Canadian Wetland Classification System (Warner and Rubec, 1997), the majority of wetlands at the project site were described as shrub and treed swamps. The wetlands

consisted of both small, isolated seeps within mature forest stands, as well as linear drainage features arising near the height of land. Several linear wetland features were encountered through the field surveys, having widths in the range of 3 to 6 m (Figure 7). These features occasionally broadened into small definable wetlands having surface areas in the range of 0.1 to 0.2 ha before narrowing again (Figure 8).

Figure 7: Linear treed swamp wetland draining to the northwest, having a typical width of 3 to 6 m.

Figure 8: Shrub/treed swamp wetland occurring as part of a linear drainage feature.

Wetland tree species encountered include Red maple (*Acer rubrum*) and Balsam fir (*Abies balsamea*) (Table 1). Shrubs observed consisted of Speckled alder *(Alnus incana),* Gray birch (*Betula populifolia*) and Bebb's willow (*Salix bebbiana*). Herbaceous species included Cinnamon fern *(Osmunda cinnamomea),* Wild lily-of-the-valley *(Maianthemum canadense)*, Swamp loosestrife *(Lysimachia terrestris)* and Shallow sedge *(Carex lurida).* Peat mosses *(Sphagnum spp)* were found throughout the wetlands. No floral species at risk or species of conservation concern were observed at the project site. No alien invasive species were observed within the delineated wetlands.

Table 1: Common vegetation species within the herbaceous, shrub, sapling and tree strata of mapped wetlands at the Liverpool project site.

Herbaceous Species	Shrub / Sampling Species	Tree Species
Cinnamon fern *(Osmunda cinnamomea)* Devil's beggar-tick (Bidens frondosa) Eastern hay-scented fern (*Dennstaedtia punctilobula*) Fringed sedge (*Carex crinita*) Hay sedge (*Carex argyrantha*), Interrupted fern (*Osmunda claytoniana*) Lady-Fern *(Athyrium filix-femina)* Pointed broom sedge (*Carex scoparia*) Roundleaf sundew (*Drosera rotundifolia*) Shallow sedge (*Carex lurida*) Swamp Loosestrife *(Lysimachia terrestris)* Wild lily-of-the-valley (*Maianthemum canadense*)	Gray birch (*Betula populifolia*) Speckled alder (*Alnus incana*) Striped maple (*Acer pensylanicum*) Bebb's willow (*Salix bebbiana*)	Red maple (*Acer rubrum*) Balsam fir (*Abies balsamea*)

Wetland delineations were carried out by experienced wetland delineators. Delineations focused on wetlands occurring within the footprint of the project infrastructure or where alternative routing of access roads may be required. In a number of cases, wetlands extending beyond the project footprint were not completely delineated (Figure 9).

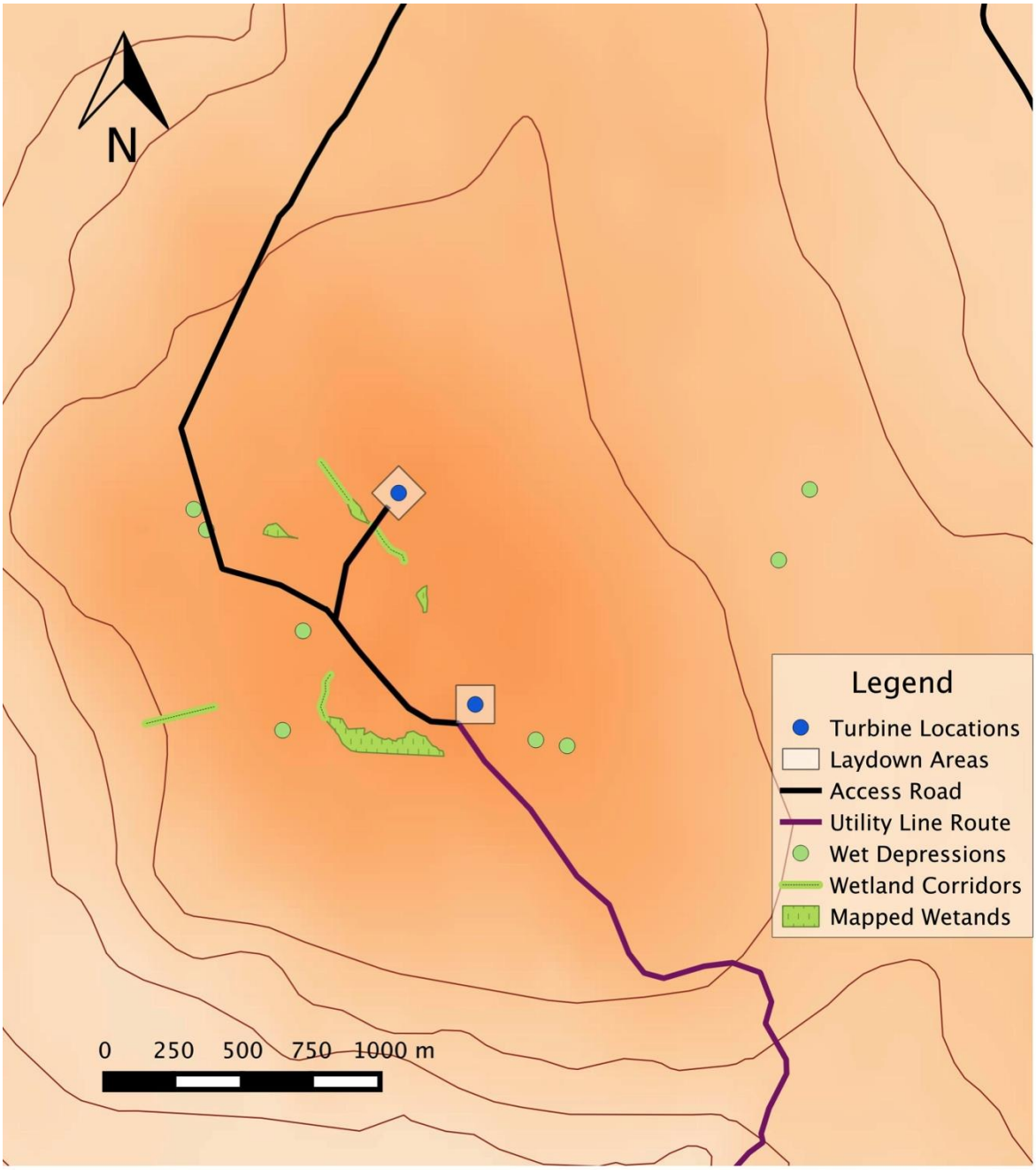

Figure 9: Wetlands documented through field surveys of the project site, conducted during July 2014 by East Coast Aquatics.

Predicted Impacts to Wetlands

The field surveys conducted in 2014 followed an iterative process, with the field surveys providing input to the layout and positioning of project infrastructure. Based on the July 2014 field identification of several small wetlands, the location of the turbines was revised to avoid the laydown areas intersecting the wetlands. This process is ongoing to further refine the locations of project infrastructure and the construction process to minimize impacts on environmental features.

It is anticipated that the access road to one turbine will need to cross a linear wetland feature at one location (Table 2). The access roads will have a total width of 10 m,

consisting of a 6 m wide road surface, with 2 m wide ditches on either side. Field surveys determined the wetland corridor as having a width of 3 to 6 m. For this estimate, a width of 6 m was used, providing a conservative prediction of the impact to wetlands. Based on preliminary estimates, it is anticipated that an unavoidable 0.006 ha of wetland will be impacted through the construction of access roads and the turbine laydown pads.

Table 2: Predicted Impacts to wetlands from the construction of site infrastructure.

Project Component	Predicted Footprint of Impact to Wetlands (m^2)	Notes
Access road	60	6 m road surface, with 2 m ditches on either side, for total width of 10 m
Total Wetland Impact	**60**	

The unavoidable impacts to wetlands arising from the implementation of the project will be mitigated in a number of ways. Appropriately sized culverts will be used where access roads cross wetlands to ensure impacts to local wetland hydrology is minimized. Industry-standard erosion and sedimentation control measures will be implemented to avoid impacts to adjacent wetlands.

Fish and Aquatic Habitats

Methodology

A preliminary desktop review of the project site and surrounding areas was undertaken to identify site topography and key watercourse features. Data sources for the desktop review included aerial photography (both current and historic), the Provincial Groundwater Maps and Databases (NSDNR, 2009), the Nova Scotia Watershed Atlas (Sterling, 2014), as well as other sources noted below.

Field surveys of aquatic habitats at the project site occurred on September 16, 2014, with the surveys undertaken by experienced biologists. Electrofishing was conducted using a Smith-Root Model 12POW, with settings adjusted to optimize catch efficiency (PDC, 500 V, 60 to 70 Hz, 2 ms), under the terms of Fisheries and Oceans Canada Science License #328116. Water quality observations were recorded using a YSI ProPlus Quattro multi-probe water quality meter.

Findings

The project site occurs within the Herring Cove / Medway Primary watershed. The turbine pads will be located at the height of land between the Herring Cove Brook (1EE-3) and Beach Meadows Brook secondary watersheds (NSDNR, 2009), both of which discharge to the Atlantic Ocean near Brooklyn. The area of the Herring Cove Brook catchment is 57.5 km^2, with the Beach Meadows Brook catchment being 24.8 km^2.

The Nova Scotia Watershed Atlas (Sterling, 2014) identified the total threat to the Herring Cove Brook watershed as being high, with hydrologic change, water quality, instream habitat, acid rock drainage and portion of the stream behind dams being the greatest contributing stressors.

The Herring Cove Brook catchment has had significant anthropogenic alteration with the construction of dams at the outlet of Nickerson's Pond and Herring Cove Lake, as part of the water supply for the Bowater Mersey pulp and paper mill at Brooklyn. Water abstraction for the mill occured at the Nickerson's Pond dam. Both dams represent a complete barrier to upstream fish passage (Figure 10).

Alexander, Kerekes and Sabean (1986) have reported on the survey of water quality and fish populations in 781 Nova Scotia lakes, carried out between 1964 and 1981. These surveys were completed as a partnership between Fisheries and Oceans Canada, the Canadian Wildlife Service and the Wildlife Division of Nova Scotia Department of Natural Resources. The study encompassed several lakes within the Herring Cove Brook catchment (Table 3). Water quality measurements were recorded onsite with handheld water quality instruments. Fish samples were collected through a variety of methods, including gill netting, trap netting, beach seining, minnow trapping and angling.

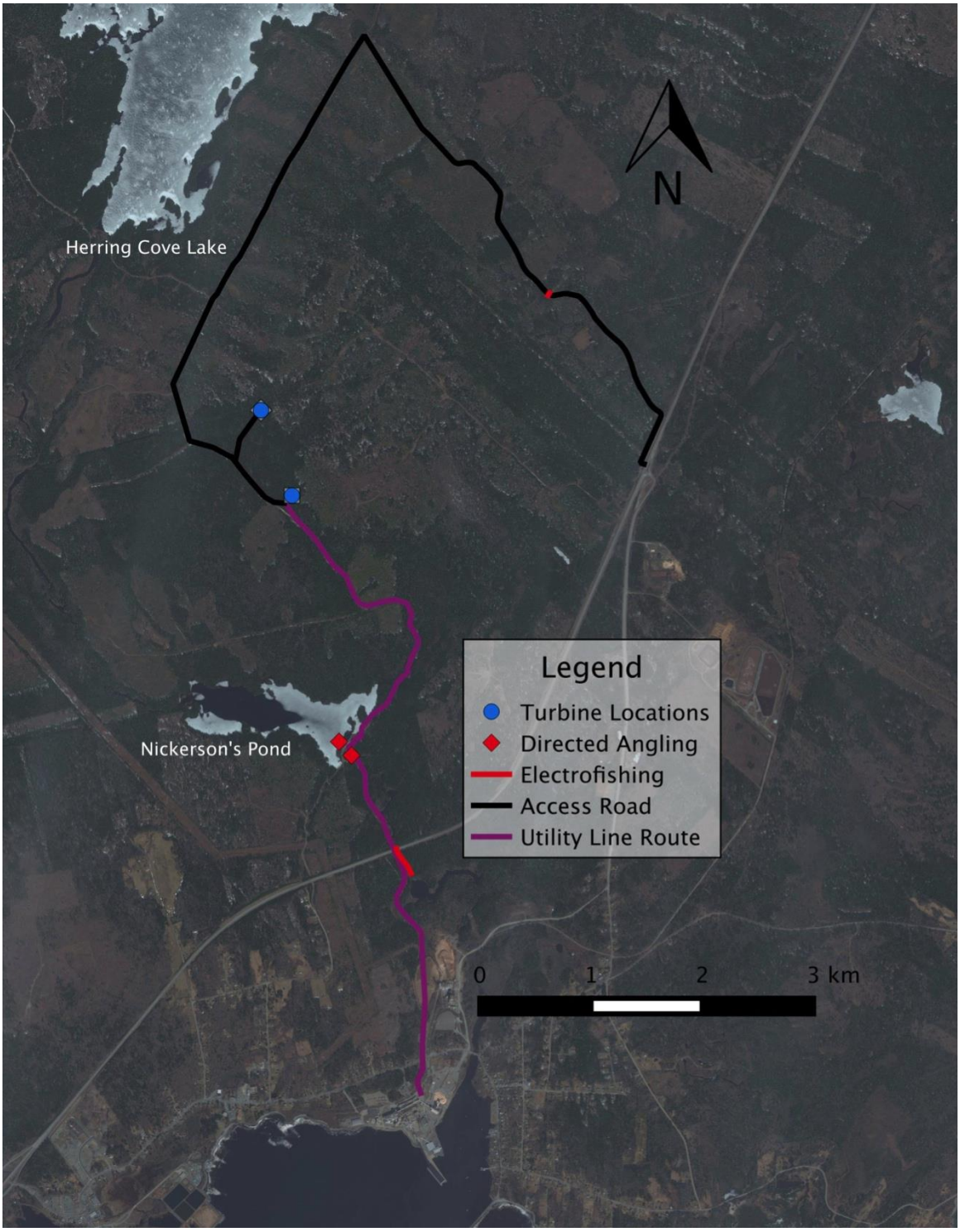

Figure 10: Fish surveys locations at Liverpool Wind Farm

Surveys of Herring Cove Lake in July 1972 documented the presence of White sucker (*Catostomus commersoni*), Yellow perch (*Perca flavescens*) and American eel (*Anquilla rostrata*). The water quality measurements indicate the lakes within the catchment to be of moderate pH and low conductivity.

Table 3: Selected Lake Characteristics and Occurrence of Fish Species for several lakes within the Herring Cove Brook catchment. Data based on Alexander *et al* (1986).

Waterbody	Conductivity (umhos/cm)	pH	Surface Area (ha)	Depth	
				Max. (m)	Mean (m)
Herring Cove Lake	22.6	6.40	547.1	8	3.4
Nickerson's Pond	n/a	6.00	33.6	6	1.8

Smallmouth bass (*Micropterus dolomieu*) are known to occur within at least 188 lakes and rivers in Nova Scotia, resulting from deliberate introductions as well as accidental and illegal transfers (LeBlanc, 2010). Within the province, the species exhibits a preference for lacustrine over riverine systems, in particular lake habitats where water depths are less than 6 m. There is an indication that Smallmouth bass may have low tolerance for acidic water, although the actual pH threshold value and widespread applicability of these criteria remains unclear. LeBlanc (2010) reports the presence of Smallmouth bass was first documented at Herring Cove Lake in 1999.

Surface water quality was recorded at three locations within the project site (Table 4) on September 16, 2014, with the observations recorded in conjunction with the electrofishing and directed angling surveys. Weather conditions on September 16 were overcast with light winds and an air temperature of 18 C. Herring Cove Brook, both above and below the Nickerson's Pond dam, was found to be relatively warm, well oxygenated, with low conductivity and pH. The unnamed tributary to Halfway Brook, where it crosses the access road to the turbine site, was found to be cooler, suggested a groundwater source. This tributary had low dissolved oxygen levels, likely due to the watercourse's low flow and gradient. The watercourse was found to have low pH and conductivity/total dissolved solids.

Table 4: Water quality observations, September 16, 2014.

Location	Water Temp.	Dissolved Oxygen	Dissolved Oxygen	Conductivity (Ambient)	Total Dissolved Solids	pH
Units	(°C)	(%)	(mg/L)	(µS/cm)	(mg/L)	
Herring Cove Brook, downstream of Nickerson's Pond dam	17.3	94	9.0	29.7	22.75	4.45
Herring Cove Brook, upstream of Nickerson's Pond dam, 0.5m depth	18.2	90	8.3	19.7	14.95	5.26
Unnamed tributary to Halfway Brook	12.6	46	4.9	39.5	33.8	4.53
CCME Guidelines for Protection of Aquatic Life	Not applicable	Not applicable	5.5 to 9.5	Not applicable	Not applicable	6.5 to 9.0

The pH values at all water quality locations were outside the recommended range for the protection of freshwater aquatic life (CCME, 2007). Low pH and conductivity values are frequently encountered across many areas of the southern Nova Scotia Uplands as a result of thin soils, limited buffering capacity within catchments and decades of acidic precipitation.

Field surveys were conducted on September 16, 2014 to ascertain the potential for fish habitat using electrofishing and directed angling. Electroseining was conducted on Herring Cove Brook, from a small pond upstream to the Highway 103 overpass, covering a linear distance of approximately 200 m (Figure 11). Riparian habitat consisted of mature Hemlock and Red maple forest on both banks, with 70 to 90% coverage. The surveyed reached consisted of a series of chutes, rapids and runs over stable boulder and cobble substrate. Bedrock was present as ledge at the chutes. Herring Cove Brook at this location had a wetted width of 7.0 m and a bankfull width of 10 to 12 m. Typical depths within the watercourse ranged from 0.25 to 0.4 m.

Directed angling was conducted on Herring Cove Brook both above and below the Nickerson's Pond dam (Figure 12).

The gravel access road between Highway 103 and the turbine site (approximate distance 6.3 km) was examined for watercourse crossings. One location was found to provide fish habitat. This location, where an unnamed tributary to Halfway Brook intersects with the access road via a 900 mm plastic culvert, was surveyed by electroseining (Figure 13).

A total of two species were documented through the electroseining and directed angling within the Liverpool wind farm site (Table 5) (Appendix 1). A total of five American eels were caught and released, within an additional 22 observed, for a total of 27 (Figure 14). A single large Smallmouth bass was caught and landed, with an additional two hooked but not landed (Figure 15). Given typical Smallmouth bass growth rates in Nova Scotia (Halfyard, 2008) this represents a 10 to 11 year old fish. This would suggest the successful spawning of Smallmouth bass within the catchment.

Table 5: Summary of Electrofishing and Directed Angling Surveys

Species	Name	Total Length (cm)				Total Number Caught
		Median	Mean	Min	Max	
American eel	*Anguilla rostrata*	25.0	24.0	17.0	30.0	5*
Small mouth bass	*Micropterus dolomieu*	n/a	n/a	n/a	39.0	1**

* An additional 22 American eels were observed through the course of the electrofishing but not recovered.
** An additional 2 Smallmouth bass hooked but not landed.

Evidence of recent recreational angling activity (trampling of grass) was observed on Herring Cove Brook at the start of the electrofishing reach, where the brook discharges into small pond. Abundant evidence of recreational angling and camping (fire pit, garbage, fishing line, boat access, footpaths to shoreline) was also observed at the Nickerson's Pond dam. Department of Natural Resources staff reported that a seasonal run (spring only) of sea-run Brook trout occurs in Herring Cove Brook as far as the small pond downstream of

the Highway 103 crossing, with angling for Smallmouth bass occurring at both Nickerson's Pond and Herring Cove Lake (Lowe, 2014).

Figure 11: Portion of Herring Cove Brook electroseined, downstream of Nickerson's Pond, with abundant course woody debris. View to the North (upstream). Photo taken September 16, 2014.

Figure 12: Directed angling of Herring Cove Brook immediately downstream of Nickerson's Pond dam. Photo taken September 16, 2014.

Figure 13: Small, unnamed tributary to Halfway Brook, at crossing of gravel access road, which was sampled by electroseining. Photo taken September 16, 2014.

Figure 14: American eel (Anguilla rostrata) caught via electroseining Herring Cove Brook. Photo taken September 16, 2014.

Figure 15: Large Smallmouth bass (Micropterus dolomieu) caught via directed angling at Nickerson's Pond from dam. Photo taken September 16, 2014.

Salmonids, in particular Atlantic salmon (*Salmo salar*) are know to be sensitive to acidification of watersheds due to acid rain, with the populations in many rivers within Nova Scotia's Southern Uplands being extirpated (DFO, 2000). Salmon production is considered unstable with only remnant populations persisting when mean annual pH falls below 5.1. While limited in scope, the single set of pH observations for Herring Cove Brook ranged from 4.45 to 5.26, suggesting limited opportunities for recruitment of Atlantic salmon. A search of the North Atlantic Salmon Conservation Organization (NASCO) Atlantic Salmon Rivers Database indicates the status of the Herring Cove Brook population as "Lost", with "Pollution" provided as a comment (NASCO, 2015). The presence of two non-passable barriers, in the form of dams at Nickerson's Pond and Herring Cove Lake, further limit opportunities for Atlantic salmon utilization of Herring Cove Brook.

At the time of the September 16, 2014 field surveys, it was observed that bridge abutments had recently been constructed on Herring Cove Brook immediately below the Nickerson's Pond dam (Figure 16). Discussions later on the same day with DNR Conservation and Enforcement staff indicated that the works were in conjunction with a planned all-terrain vehicle (ATV) bridge over Herring Cove Brook (Lowe, 2014). The Queens County ATV Association has been active during 2014 establishing a multi-use trail through the former Bowater Mersey lands on former logging roads (NovaNewsNow.Com, 2014) (Queens County Advance, 2014). A portion of this trail network will pass through the study site for the Liverpool wind farm.

Figure 16: Recently constructed bridge abutment on Herring Cove Brook, immediately downstream of Nickerson's Pond dam. Photo taken September 16, 2014

Floral Species at Risk and Species of Conservation Concern

Methodology

A preliminary desktop review of the project site and surrounding areas was undertaken to identify priority species and habitats. Data sources for the desktop review included aerial photography (both current and historic), conservation records for the site (ACCDC, 2013), as well as other sources noted below. Conservation records for the site were examined at two spatial scales (100 km and 5 km buffers) in order to better examine possible interactions with project components. The hierarchy of protection levels described in the NSE Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSE, 2009) was used to guide this process. Specifically, ACCDC data was sorted to include species at risk (COSEWIC, SARA or NSESA listed) and species of conservation concern (S1 to S3).

Botanical field surveys of the project site occurred on July 9 and August 29, 2014, with the surveys being undertaken an experienced botanist. These dates were selected to maximize opportunities to identify botanical species and in accordance with the NSE Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSE, 2009). The meandering route surveyed by the botanist encompassed all project components (access roads, turbine pads and utility line corridor) as well the wider footprint of the project site. The botanical surveys covered in total a linear distance of 12.6 km over the two survey days.

Findings

Examination of the ACCDC data (2013) for the site using a 100 km buffer identified a total of 217 unique floral species comprising 4312 observations. Of these, 14 floral species are considered to be species at risk (Table 6). This included 12 protected vascular species: Coast Pepper-Bush (*Clethra alnifolia*) (Special Concern/Vulnerable), Rose coreopsis (*Coreopsis rosea*) (Endangered), Thread-Leaf sundew (*Drosera filiformis*) (Endangered), Long-Tubercled Spike-Rush (*Eleocharis tuberculosa*) (Threatended), Many-Flowered pennywort (*Hydrocotyle umbellate*) (Threatened/Endangered), Prototype quillwort (*Isoetes prototypus*) (Vulnerable/Special Concern), Carolina redroot (*Lachnanthes caroliana*) (Threatened), Eastern lilaeopsis (*Lilaeopsis chinensis*) (Special Concern/Vulnerable), Golden crest (*Lophiola aurea*) (Threatened), Plymouth gentian (*Sabatia kennedyana*) (Threatened/Endangered), Long's bulrush (*Scirpus longii*) (Special Concern/Vulnerable) and Northern white cedar (*Thuja occidentalis*) (Vulnerable).

The 100 km buffer for this ACCDC search encompassed much of southwestern Nova Scotia, an area with numerous floral species at risk, including the Atlantic Coastal Plain Flora group. Of the 14 floral species at risk found within 100 km of the project site, nine belong to the Atlantic Coastal Plain Flora group.

Two non-vascular protected species were also reported within 100 km of the project site: Boreal felt lichen (Atlantic population) (*Erioderma pedicellatum* (Atlantic pop.*))* (Endangered) and Ghost antler lichen (*Pseudevernia cladonia*) (Special Concern).

The ACCDC database had no records for rare or endangered flora as occurring within 5 km of the project site. Examination of the ACCDC data (2013) for the site using a 5 km buffer

identified a total of ten floral species considered as species of conservation concern (Table 7).

Five of the vascular plant species reported in Table 7 (Southern bog clubmoss (*Lycopodiella appressa),* Round-Leaved greenbrier *(Smilax rotundifolia* (Atlantic pop.*)),* Eaton's witchgrass *(Dichanthelium spretum),* Virginia meadow beauty *(Rhexia virginica)* and Little floating bladderwort *(Utricularia radiata))* were identified during a 2009 botanical survey of the area. These five species were found in shallow water and shoreline habitats of Crane Lake, located approximately 6.2 km northeast of the turbine locations. Development of the Liverpool Wind Farm will occur along existing gravel roads and in forested upland habitats. There is therefore a low to moderate likelihood of these five species being impacted by the project.

Based on the ACCDC report, two observations of Silky willow (Salix sericea) were recorded in 1957 along the Mersey River, with the species found in wet thickets, stream edges and river margins. Given the project description, there is a low to moderate likelihood of this species occurring in the project area.

The ACCDC report documented Case's ladies' treeses (*Spiranthes casei var. casei*) and Yellow ladies's tressess (*Spiranthes ochroleuca*) as being identified in 1975 along Highway 103 to the east of the project site. The species are reported to occur in exposed gravel barrens and road edges. There is a moderate likelihood of these species occurring in the project area.

A single record of Narrow-leaved Blue-eyed-grass (*Sisyrinchium angustifolium*) from 1954 exists for the Brooklyn area, with the specimen occurring on a roadside. The species occurs in meadows, low woods and shorelines. There is a low to moderate likelihood of this species occurring in the project area.

A single record of the moss (*Drummondia prorepens*) from 1929 exists for the Milton area, with the specimen occurring on white ash and willow. The 2014 field surveys did not document the presence of White Ash, although Bebb's Willow was recorded as occurring adjacent to gravel roads in the project area. There is a moderate likelihood of this species occurring in the project area.

The 2014 field surveys conducted by ECA documented a total of 90 species across the site (Table 8), occurring in three habitats. No rare, endangered or species of conservation concern were identified. All species encountered either had a General Status Ranking of **4 – Secure / Not At Risk** (85 taxa) or **Exotic** (5 taxa).

Table 6: Floral species at risk or of conservation concern, reported within 100 km of the project site

Scientific Name	Common Name	COSEWIC	SARA	NSESA	NS Rarity
Adiantum pedatum	Northern Maidenhair-Fern				S1
Agalinis maritima	Salt-Marsh False-Foxglove				S1
Agrimonia gryposepala	Tall Hairy Groovebur				S3?
Allium tricoccum	Small White Leek				S1
Alnus serrulata	Brook-Side Alder				S2
Amelanchier fernaldii	Fernald Serviceberry				S2?
Amelanchier nantucketensis	Nantucket Shadbush				S1
Anemone canadensis	Canada Anemone				S2
Anemone quinquefolia	Wood Anemone				S2
Antennaria parlinii	a Pussytoes				S1
Arabis glabra	Tower-Mustard				S1SE
Asclepias incarnata	Swamp Milkweed				S3
Asclepias incarnata ssp. pulchra	Swamp Milkweed				S2S3
Asplenium trichomanes	Maidenhair Spleenwort				S2
Baccharis halimifolia	Groundseltree				S1
Bartonia virginica	Yellow Screwstem				S3
Betula michauxii	Michaux's Dwarf Birch				S2
Bidens connata	Purple-Stem Swamp Beggar-Ticks				S3?
Bidens discoidea	Swamp Beggar-Ticks				SH
Botrychium dissectum	Cutleaf Grape-Fern				S3
Botrychium simplex	Least Grape-Fern				S2S3
Cardamine parviflora var. arenicola	Small-Flower Bitter-Cress				S2
Carex adusta	Crowded Sedge				S2S3
Carex albicans var. emmonsii	Emmons Sedge				S3S4
Carex argyrantha	Hay Sedge				S3S4
Carex atlantica ssp. capillacea	Howe Sedge				S2
Carex cryptolepis	Northeastern Sedge				S3?
Carex digitalis	Slender Wood Sedge				S1
Carex foenea	Dry-Spike Sedge				S3?
Carex granularis	Meadow Sedge				S1
Carex houghtoniana	A Sedge				S2?
Carex hystericina	Porcupine Sedge				S1S2
Carex laxiflora	Loose-Flowered Sedge				S1
Carex longii	Greenish-White Sedge				S1?
Carex lupulina	Hop Sedge				S3
Carex ormostachya	Necklace Spike Sedge				S1
Carex pensylvanica	Pennsylvania Sedge				S1S2
Carex rosea	Rosy Sedge				S3
Carex swanii	Swan Sedge				S2?

Carex tribuloides	Blunt Broom Sedge				S3S4
Carex wiegandii	Wiegand's Sedge				S1
Caulophyllum thalictroides	Blue Cohosh				S2
Cephalanthus occidentalis	Common Buttonbush				S2S3
Chenopodium rubrum	Coast-Blite Goosefoot				S1?
Clethra alnifolia	Coast Pepper-Bush	SC		V	S1S2
Conioselinum chinense	Hemlock Parsley				S2S3
Conopholis americana	Squaw-Root				S1S2
Corallorhiza trifida	Early Coralroot				S3
Coreopsis rosea	Rose Coreopsis	E		E	S1
Cornus suecica	Swedish Dwarf Dogwood				S1S2
Crassula aquatica	Water Pigmy-Weed				S2
Crataegus submollis	A Hawthorn				S1?
Cuscuta cephalanthi	Button-Bush Dodder				S1
Cyperus dentatus	Toothed Sedge				S3
Cyperus diandrus	Umbrella Flatsedge				S1SE
Cystopteris bulbifera	Bulblet Fern				S3S4
Decodon verticillatus	Hairy Swamp Loosestrife				S2S3
Desmodium canadense	Showy Tick-Trefoil				S1
Desmodium glutinosum	Large Tick-Trefoil				S2
Dichanthelium acuminatum var. lindheimeri	Panic Grass				S1?
Dichanthelium clandestinum	Deer-Tongue Witchgrass				S3
Dichanthelium linearifolium	Slim-Leaf Witchgrass				S2?
Dichanthelium meridionale	Matting Witchgrass				SH
Dichanthelium spretum	Eaton's Witchgrass				S3S4
Dichanthelium xanthophysum	Slender Dichanthelium				S1
Drosera filiformis	Thread-Leaf Sundew	E		E	S1
Eleocharis nitida	Slender Spike-Rush				S3
Eleocharis olivacea	Capitate Spikerush				S2
Eleocharis ovata	Ovate Spikerush				S2?
Eleocharis rostellata	Beaked Spikerush				S2
Eleocharis tuberculosa	Long-Tubercled Spike-Rush	T		T	S1
Empetrum eamesii	Rock Crowberry				S2S3
Epilobium coloratum	Purple-Leaf Willow-Herb				S2?
Epilobium strictum	Downy Willow-Herb				S3
Erioderma pedicellatum (Atlantic pop.)	Boreal Felt Lichen	E		E	S1S2
Eriophorum gracile	Slender Cotton-Grass				S2
Eupatorium dubium	Joe-Pye Thoroughwort				S2
Euthamia caroliniana	Grass-Leaved Goldenrod				S3
Euthamia galetorum	Narrow-Leaf Fragrant Golden-Rod				S3S4
Fraxinus nigra	Black Ash				S3

Fraxinus pennsylvanica	Green Ash				S1
Galium boreale	Northern Bedstraw				S2
Galium obtusum	Blunt-Leaf Bedstraw				S1
Geranium bicknellii	Bicknell Northern Crane's-Bill				S3
Goodyera pubescens	Downy Rattlesnake-Plantain				S1
Goodyera repens	Dwarf Rattlesnake-Plantain				S2S3
Goodyera tesselata	Checkered Rattlesnake-Plantain				S3
Hedeoma pulegioides	American Pennyroyal				S2S3
Helianthemum canadense	Canada Frostweed				S1
Hepatica nobilis var. obtusa	Round-Leaved Liverleaf				S1
Hieracium kalmii	Kalm's Hawkweed				S2?
Hieracium kalmii var. kalmii	Kalm's Hawkweed				S2?
Hieracium paniculatum	Panicled Hawkweed				S3
Hudsonia ericoides	Golden-Heather				S2
Hydrocotyle umbellata	Many-Flowered Pennywort	T		E	S1
Hypericum dissimulatum	Disguised St. John's-Wort				S2S3
Hypericum majus	Larger Canadian St. John's Wort				S1
Iris prismatica	Slender Blue Flag				S1
Isoetes acadiensis	Acadian Quillwort				S3
Isoetes lacustris	Lake Quillwort				S3?
Isoetes prototypus	Prototype Quillwort	SC		V	S2
Iva frutescens ssp. oraria	Marsh Elder				S2SE
Juncus dudleyi	Dudley's Rush				S2?
Juncus greenei	Greene's Rush				S1S2
Juncus marginatus	Grassleaf Rush				S2S3
Juncus nodosus	Knotted Rush				S3S4
Juncus secundus	Secund Rush				S1
Juncus subcaudatus	Woods-Rush				S3
Lachnanthes caroliana	Carolina Redroot	T		T	S1
Lactuca hirsuta var. sanguinea	Hairy Wild Lettuce				S2
Lilaeopsis chinensis	Eastern Lilaeopsis	SC		V	S1
Limosella australis	Mudwort				S2S3
Lindernia dubia	Yellow-Seed False-Pimpernel				S3S4
Liparis loeselii	Loesel's Twayblade				S3S4
Listera australis	Southern Twayblade				S1
Lobelia spicata	Pale-Spiked Lobelia				S1S2SE
Lophiola aurea	Golden Crest	T		T	S2
Lycopodiella appressa	Southern Bog Clubmoss				S3
Lycopodium complanatum	Trailing Clubmoss				S3?
Megalodonta beckii	Beck Water-Marigold				S3

Minuartia groenlandica	Mountain Sandwort				S2
Myriophyllum farwellii	Farwell's Water-Milfoil				S2
Myriophyllum humile	Low Water-Milfoil				S3?
Najas gracillima	Thread-Like Naiad				S1S2
Oenothera fruticosa ssp. glauca	Shrubby Sundrops				S2SE
Ophioglossum pusillum	Adder's Tongue				S2S3
Panicum dichotomiflorum var. puritanorum	Spreading Panic-Grass				S1?
Panicum philadelphicum	Philadelphia Panic Grass				S2S3SE
Panicum rigidulum var. pubescens	Redtop Panic Grass				S2
Piptatherum canadense	Canada Mountain-Ricegrass				S2
Piptatherum pungens	Slender Mountain-Ricegrass				S2
Plantago rugelii	Black-Seed Plantain				S1SE
Platanthera flava	Southern Rein-Orchid				S2
Platanthera flava var. flava	Southern Rein Orchid				S2
Platanthera flava var. herbiola	Pale Green Orchid				S1S2
Platanthera grandiflora	Large Purple-Fringe Orchis				S3
Platanthera hookeri	Hooker Orchis				S3
Platanthera orbiculata	Large Roundleaf Orchid				S3
Podostemum ceratophyllum	Threadfoot				S1
Polygala polygama	Racemed Milkwort				S1SE
Polygala sanguinea	Field Milkwort				S2S3
Polygonum achoreum	Leathery Knotweed				S1?SE
Polygonum buxiforme	Small's Knotweed				S2S3SE
Polygonum pensylvanicum	Pennsylvania Smartweed				S3
Polygonum raii	Pondshore Knotweed				S2S3SE
Polygonum robustius	Stout Smartweed				S3S4
Polygonum scandens	Climbing False-Buckwheat				S2
Polypodium appalachianum	Appalachian Polypody				S3?
Potamogeton confervoides	Algae-Like Pondweed				S3S4
Potamogeton pulcher	Spotted Pondweed				S1
Prenanthes nana	Dwarf Rattlesnakeroot				S2?
Proserpinaca intermedia	Intermediate Mermaid-Weed				S1S2
Proserpinaca palustris var. crebra	Marsh Mermaid-Weed				S3S4
Proserpinaca palustris var. palustris	Marsh Mermaid-Weed				S1?
Proserpinaca pectinata	Comb-Leaved Mermaid-Weed				S3
Pseudevernia cladonia	Ghost Antler Lichen	SC			S2
Pseudognaphalium obtusifolium	Fragrant Cudweed				S3S4
Pyrola asarifolia	Pink Wintergreen				S3
Ranunculus flammula var. flammula	Greater Creeping Spearwort				S2

Ranunculus sceleratus	Cursed Crowfoot				S1S2
Rhexia virginica	Virginia Meadow-Beauty				S3
Rosa palustris	Swamp Rose				S3
Rubus pensilvanicus	Pennsylvania Blackberry				S3?
Rumex maritimus	Sea-Side Dock				S3
Rumex salicifolius var. mexicanus	Willow Dock				S2
Sabatia kennedyana	Plymouth Gentian	T		E	S1
Sagina nodosa	Knotted Pearlwort				S2S3
Sagina nodosa ssp. borealis	Knotted Pearlwort				S2S3
Salix candida	Hoary Willow				S1
Salix pedicellaris	Bog Willow				S2
Salix petiolaris	Meadow Willow				S3
Salix sericea	Silky Willow				S2
Samolus valerandi ssp. parviflorus	Water Pimpernel				S2
Schizaea pusilla	Curly-Grass Fern				S3
Schoenoplectus americanus	Three-Square Bulrush				S2
Schoenoplectus robustus	Saltmarsh Bulrush				S1?
Scirpus longii	Long's Bulrush	SC		V	S2
Scrophularia lanceolata	Hare Figwort				S1
Senecio pseudoarnica	Seabeach Groundsel				S2
Sisyrinchium angustifolium	Pointed Blue-Eyed-Grass				S3S4
Sisyrinchium atlanticum	Eastern Blue-Eyed-Grass				S3
Sisyrinchium fuscatum	Coastal-Plain Blue-Eyed-Grass				S1
Solidago latissimifolia	Elliott Goldenrod				S3
Sparganium fluctuans	Floating Bur-Reed				S3?
Sphagnum torreyanum	a Peatmoss				S2
Spiranthes casei	Case's Ladies'-Tresses				S2
Spiranthes casei var. casei	Case's Ladies'-Tresses				S1
Spiranthes casei var. novaescotiae	Case's Ladies'-Tresses				S2
Spiranthes lucida	Shining Ladies'-Tresses				S2
Spiranthes ochroleuca	Yellow Nodding Ladies'-Tresses				S2
Spiranthes romanzoffiana	Hooded Ladies'-Tresses				S3S4
Stellaria crassifolia	Fleshy Stitchwort				S1
Stuckenia filiformis ssp. alpina	Northern Slender Pondweed				S2S3
Suaeda calceoliformis	American Sea-Blite				S2S3
Suaeda maritima ssp. richii	Rich's Sea-blite				S1
Symphyotrichum boreale	Boreal American-Aster				S2?
Symphyotrichum tradescantii	Tradescant Aster				S3
Symphyotrichum undulatum	Wavy-leaf American-Aster				S2
Symplocarpus foetidus	Skunk Cabbage				S3
Teucrium canadense	American Germander				S2S3

Thuja occidentalis	Northern White Cedar			V	S1S2
Torreyochloa pallida var. pallida	Pale Manna Grass				S1
Toxicodendron vernix	Poison Sumac				S1
Triglochin gaspensis	Gaspe Peninsula Arrow-Grass				S1?
Trillium erectum	Ill-Scent Trillium				S3
Utricularia gibba	Humped Bladderwort				S2
Utricularia radiata	Small Swollen Bladderwort				S3
Utricularia resupinata	Northeastern Bladderwort				S1
Utricularia subulata	Zigzag Bladderwort				S3
Vaccinium boreale	Northern Blueberry				S2
Vaccinium corymbosum	Highbush Blueberry				S3
Verbena hastata	Blue Vervain				S3
Viola nephrophylla	Northern Bog Violet				S2
Viola sagittata var. ovata	Arrow-Leaved Violet				S3S4
Woodwardia areolata	Netted Chainfern				S2

Notes: SC=Special Concern; T=Threatened; V=Vulnerable; E=Endangered

Table 7: Floral species at risk or of conservation concern, reported within 5 km of the project site

Scientific Name	Common Name	COSEWIC	SARA	NSESA	NS Rarity	NS General Status Rank	Number of Records; Distance (km)	Typical Species Habitat	Likelihood of Occurrence at or near Project Site
Salix sericea	Silky Willow				S2	2 May Be At Risk	2; 4.7+/-3.0	Low thickets, stream banks, fens and swamps	Low to Moderate
Spiranthes casei var. casei	Case's Ladies'-Tresses				S1	2 May Be At Risk	1; 4.7+/-0.5	Acid, sandy soils, roadsides, and open barrens	Moderate
Spiranthes ochroleuca	Yellow Ladies'-tresses				S2S3	3 Sensitive	1; 4.7+/-0.5	Characteristic of the driest barrens in south western counties. Also near rivers and in dry habitats such as roadsides and fields.	Moderate
Lycopodiella appressa	Southern Bog Clubmoss				S3S4	4 Secure	1; 4.8+/-0.01	Beaches, boggy savannas and wet depressions	Low to Moderate
Smilax rotundifolia (Atlantic pop.)	Round-leaved Greenbrier				S3	4 Secure	1; 5.0+/-0.01	Thickets and borders of lakes and rivers. Often growing in dense tangles over other shrubs.	Low to Moderate
Dichanthelium spretum	Eaton's Witchgrass				S3S4	4 Secure	9; 4.6+/-0.01	Sandy, mucky shores, especially during low water years, sandy wet meadows and swales.	Low to Moderate
Rhexia virginica	Virginia Meadow Beauty				S3	4 Secure	11; 4.6+/-0.01	Peaty lake margins and swales or wet thickets	Low to Moderate
Utricularia radiata	Little Floating Bladderwort				S3	4 Secure	1; 5.0+/-0.01	Ponds and sluggish waters	Low to Moderate
Sisyrinchium angustifolium	Narrow-leaved Blue-eyed-grass				S3S4	4 Secure	1; 3.7+/-2.5	Moist meadows and open woodlands, shorelines	Low to moderate
Drummondia prorepens	a Moss				S2?	3 Sensitive	1; 4.3+/-5.0	Trunks and branches of deciduous trees, dry upland forests, conifers and logs at low to moderate elevations.	Moderate

Table 8: Floral species documented through the Summer 2014 field surveys, which occurred on July 9 and August 29.

Species	Common Name	General Status Rank	Upland Forest	Logging Road/Property Edges	Roadside Transmission Corridor
Abies balsamea	Balsam Fir	4 secure	x		
Acer pensylvanicum	Striped Maple	4 secure	x		
Acer rubrum	Red Maple	4 secure	x		x
Agalinis neoscotica	Nova Scotia False-Foxglove	4 secure		x	
Alnus incana	Speckled Alder	4 secure			x
Anaphalis margaritacea	Pearly Everlasting	exotic		x	x
Athyrium filix-femina	Lady-Fern	4 secure			x
Betula alleghaniensis	Yellow Birch	4 secure	x		
Betula alleghaniensis	Yellow Birch	4 secure			x
Betula populifolia	Gray Birch	4 secure			x
Bidens frondosa	Devil's Beggar-Ticks	4 secure			x
Carex arctata	Black Sedge	4 secure		x	
Carex argyrantha	Hay Sedge	4 secure		x	
Carex canescens	Hoary Sedge	4 secure		x	
Carex crawfordii	Crawford Sedge	4 secure			x
Carex crinita	Fringed Sedge	4 secure			x
Carex echinata	Little Prickly Sedge	4 secure		x	x
Carex gynandra	A Sedge	4 secure		x	
Carex leptonervia	Finely-Nerved Sedge	4 secure		x	
Carex lurida	Shallow Sedge	4 secure		x	
Carex scoparia	Pointed Broom Sedge	4 secure		x	x
Clintonia borealis	Clinton Lily	4 secure	x		
Comptonia peregrina	Sweet Fern	4 secure			x
Coptis trifolia	Goldthread	4 secure	x		
Cornus canadensis	Dwarf Dogwood	4 secure			x
Cypripedium acaule	Pink Lady's-Slipper	4 secure	x		
Dennstaedtia punctilobula	Eastern Hay-Scented Fern	4 secure	x	x	x

Drosera intermedia	Spoon-Leaved Sundew	4 secure			x
Drosera rotundifolia	Roundleaf Sundew	4 secure			x
Dryopteris intermedia	Evergreen Woodfern	4 secure	x		
Eleocharis acicularis	Least Spike-Rush	4 secure			x
Eleocharis obtusa	Blunt Spike-Rush	4 secure		x	x
Epigaea repens	Trailing Arbutus	4 secure			x
Epilobium angustifolium	Fireweed	4 secure	x	x	
Eupatorium perfoliatum	Common Boneset	4 secure		x	
Gaultheria hispidula	Creeping Snowberry	4 secure	x		x
Gaultheria procumbens	Teaberry	4 secure			x
Gnaphalium uliginosum	Low Cudweed	exotic			x
Hamamelis virginiana	American Witch-Hazel	4 secure	x		
Hypericum boreale	Northern St. John's-Wort	4 secure			x
Hypericum perforatum	A St. John's-Wort	4 secure			x
Juncus bufonius	Toad Rush	4 secure		x	
Juncus effusus	Soft Rush	4 secure		x	x
Kalmia angustifolia	Sheep-Laurel	4 secure		x	x
Kalmia polifolia	Pale Laurel	4 secure			x
Lechea intermedia	Narrowleaf Pinweed	4 secure			x
Lycopodium obscurum	Tree Clubmoss	4 secure	x		
Lysimachia terrestris	Swamp Loosestrife	4 secure		x	
Maianthemum canadense	Wild Lily-of-The-Valley	4 secure	x		
Medeola virginiana	Indian Cucumber-Root	4 secure	x		
Mitchella repens	Partridge-Berry	4 secure	x		
Myrica pensylvanica	Northern Bayberry	4 secure			x
Oclemena acuminata	Whorled Aster	4 secure			x
Osmunda cinnamomea	Cinnamon Fern	4 secure			x
Osmunda claytoniana	Interrupted Fern	4 secure		x	
Osmunda regalis	Royal Fern	4 secure			x
Oxalis montana	White Wood-Sorrel	4 secure	x		
Pannicum boreale	Pannicum boreale	4 secure		x	
Picea rubens	Red Spruce	4 secure	x		x

Pinus strobus	Eastern White Pine	4 secure	x		x
Plantago major	Nipple-Seed Plantain	4 secure			x
Populus grandidentata	Large-Tooth Aspen	4 secure			x
Populus tremuloides	Quaking Aspen	4 secure			x
Potentilla simplex	Old-Field Cinquefoil	4 secure		x	x
Prenanthes trifoliolata	Three-Leaved Rattlesnake-root	4 secure			x
Prunella vulgaris	Self-Heal	exotic			x
Pteridium aquilinum	Bracken Fern	4 secure	x		x
Radiola linoides	Tiny All Seed	exotic			x
Rhododendron canadense	Rhodora	4 secure		x	x
Rhus typhina	Staghorn Sumac	4 secure			x
Rhynchospora fusca	Brown Beakrush	4 secure			x
Rubus allegheniensis	Allegheny Blackberry	4 secure			x
Rubus idaeus	Red Raspberry	4 secure		x	
Rubus pubescens	Dwarf Red Raspberry	4 secure		x	x
Rumex acetosella	Sheep Sorrel	4 secure		x	
Salix bebbiana	Bebb's Willow	4 secure			x
Scirpus cyperinus	Cottongrass Bulrush	4 secure		x	x
Sisyrinchium montanum	Strict Blue-Eyed-Grass	4 secure			x
Sonchus arvensis	Field Sowthistle	exotic			x
Spiraea alba	Narrow-Leaved Meadow-Sweet	4 secure		x	
Spiraea tomentosa	Hardhack Spiraea	4 secure		x	x
Symphyotrichum lateriflorum	Farewell-Summer	4 secure			x
Thelypteris noveboracensis	New York Fern	4 secure	x		
Thelypteris palustris	Marsh Fern	4 secure			x
Trientalis borealis	Northern Starflower	4 secure	x		
Trillum undulatum	Trillum undulatum	4 secure	x		
Tsuga canadensis	Eastern Hemlock	4 secure	x		x
Vaccinium macrocarpon	Large Cranberry	4 secure			x

Veronica officinalis	Gypsy-Weed	4 secure		x	
Viola cucullata	Marsh Blue Violet	4 secure			x

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Appendix 1: Directed Angling and Electrofishing Data Sheets

Electroseine Survey Data Form

East Coast Aquatics

P.O. Box 129 Bridgetown, NS B0S 1C0
(902)665-4682

Project: Eon Wind-Liverpool

Watershed: Herring Cove Brook **Site Description:** Started at head of pond and worked upstream. Mature riparian forest (hemlock & red maple). Series of chutes, rapids and runs over boulder and cobble substrate. Bedrock ledge at chutes.

Site: Liverpool EF1

UTM: 20T 0364175 4880510 to 0364095 4880681

Date: dd / mm / yy 16/9/2014 **Water Temp °C:** 17.3

Survey Length (m): 50 **Air Temp °C:** 12 overcast, no wind

pH: 4.45 **Conductivity:** 29.7 uS/cm

	Avg.'s	A:	B:	C:	Dw (m):	1/4	1/2	3/4	Individual Dw avg. (m)
Dbf (+m):	11.00	12	11	10	A:				
Wbf (m):	#DIV/0!				B:				
Ww (m):	7.00	7	7	7	C:				
Dw Avg:	#DIV/0!								
Dbf (m):	#DIV/0!								

	Electroseine setting	Start Time	End Time	Pass	Species	Total Length (mm)	Fork Length (mm)	Weight (g)	Comments
1	K5 500V	19999	20576	1	AE	170			An additional 21 AE observed but not caught,
2					AE	300			many smaller.
3					AE	250			
4					AE	180			
5									
6									
7									
8									
9									
10									
11									
12									
13									

Effort (sec)	
1st Pass Effort (sec):	577
2nd Pass Effort (sec):	0
3rd Pass Effort (sec):	0
4th Pass Effort (sec):	0
Total Effort (sec):	577

Surveyed Area (m^2): length	350
Total Fish / 100m^2: (100 / su	1.1
CPUE 1st Pass (fish/100sec)	0.2
Total CPUE (fish/100sec): tot	0.7

Species	Total No: Caught:	Fish / 100m2	Total Weight Caught	Biomass / 100m^2
Brook Trout	0	0.0	0	0
Rainbow Trout	0	0.0	0	0
Brown Trout	0	0.0	0	0
Atlantic Salmon	0	0.0	0	0
Creek Chub	0	0.0	0	0
Yellow Perch	0	0.0	0	0
Smallmouth Bass	0	0.0	0	0
Banded Killifish	0	0.0	0	0
Brown Bullhead	0	0.0	0	0
White Sucker	0	0.0	0	0
Eel	4	1.1	0	0
Totals :	**4**	**1.1**	**0**	**0**

Electroseine Survey Data Form

East Coast Aquatics

P.O. Box 129 Bridgetown, NS B0S 1C0
(902)665-4682

Project: Eon Wind-Liverpool
Watershed: Unnamed tributary to H
Site: Liverpool EF2
UTM: 20T 0365150 4884227
Date: dd / mm / yy 16/9/2014
Survey Length (m): 20
pH: 4.53

Site Description: Small, unnamed tributary to Halfway Brook crossing gravel access road to site. 900mm plastic culvert with scour pool 0.6m deep x 2.4m x 5.5m. Gravel and cobble substrate. Limited flow.

Water Temp °C: 12.6
Air Temp °C: 12 overcast, no wind
Conductivity: 39.5 uS/cm

	Avg.'s	A:	B:	C:	Dw (m):	1/4	1/2	3/4	Individual Dw avg. (m)
Dbf (+m):	#DIV/0!				A:				
Wbf (m):	#DIV/0!				B:				
Ww (m):	#DIV/0!				C:				
Dw Avg:	#DIV/0!								
Dbf (m):	#DIV/0!								

	Electroseine setting	Start Time	End Time	Pass	Species	Total Length (mm)	Fork Length (mm)	Weight (g)	Comments
1	K5 500V	20576	20667	1	AE	300			One additional eel observed but not caught
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									

Effort (sec)	
1st Pass Effort (sec):	91
2nd Pass Effort (sec):	0
3rd Pass Effort (sec):	0
4th Pass Effort (sec):	0
Total Effort (sec):	91

Surveyed Area (m²): length	#DIV/0!
Total Fish / 100m²: (100 / su	#DIV/0!
CPUE 1st Pass (fish/100sec)	1.1
Total CPUE (fish/100sec): to	1.1

Species	Total No: Caught:	Fish / 100m2	Total Weight Caught	Biomass / 100m²
Brook Trout	0	#DIV/0!	0	#DIV/0!
Rainbow Trout	0	#DIV/0!	0	#DIV/0!
Brown Trout	0	#DIV/0!	0	#DIV/0!
Atlantic Salmon	0	#DIV/0!	0	#DIV/0!
Creek Chub	0	#DIV/0!	0	#DIV/0!
Yellow Perch	0	#DIV/0!	0	#DIV/0!
Smallmouth Bass	0	#DIV/0!	0	#DIV/0!
Banded Killifish	0	#DIV/0!	0	#DIV/0!
Brown Bullhead	0	#DIV/0!	0	#DIV/0!
White Sucker	0	#DIV/0!	0	#DIV/0!
Eel	1	#DIV/0!	0	#DIV/0!
Totals :	**1**	**#DIV/0!**	**0**	**#DIV/0!**

Directed Angling Survey Data Form

Project: Liverpool Wind Farm

East Coast Aquatics

P.O. Box 129 Bridgetown, NS B0S 1C0
(902)665-4682

Date	Station	Watercourse	Gear Used	No. of Fishers	Effort (min	Species	Total Leng	Fork Leng	Fish caught	Comments
16/9/2015	LP1	Herring Cove	Fly	1	8.0	BS	390.0	370.0	1	2 fish hooked but not landed
		above dam								
16/9/2015	LP2	Herring Cove	Fly	1	5.0	nil	nil	nil	0	
		below dam								
				Total Effort	13.0		**Total Fish**		1	

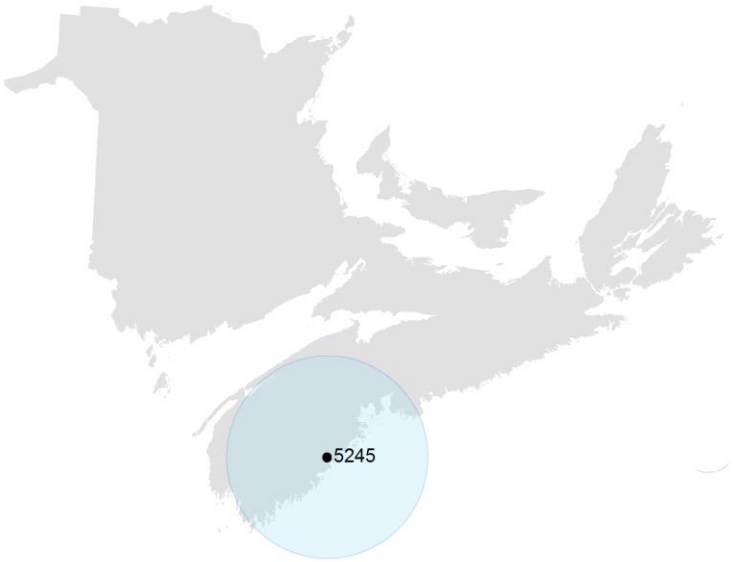
Appendix I – ACCDC Report

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

DATA REPORT 5245: Liverpool, NS

Prepared 26 June 2014
by J. Churchill, Data Manager

CONTENTS OF REPORT



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
LiverpoolNS_5245ob.xls	All Rare and legally protected *Flora and Fauna* within 5 km of your study area
LiverpoolNS_5245ob100km.xls	A list of Rare and legally protected *Flora and Fauna* within 100 km of your study area
LiverpoolNS_5245ma.xls	All *Managed Areas* in your study area
LiverpoolNS_5245sa.xls	All *Significant Natural Areas* in your study area

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, Botanist, Executive Director (effective 10 June, 2014)
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
Cindy Spicer
Tel: (506) 364-2665
cspicer@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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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

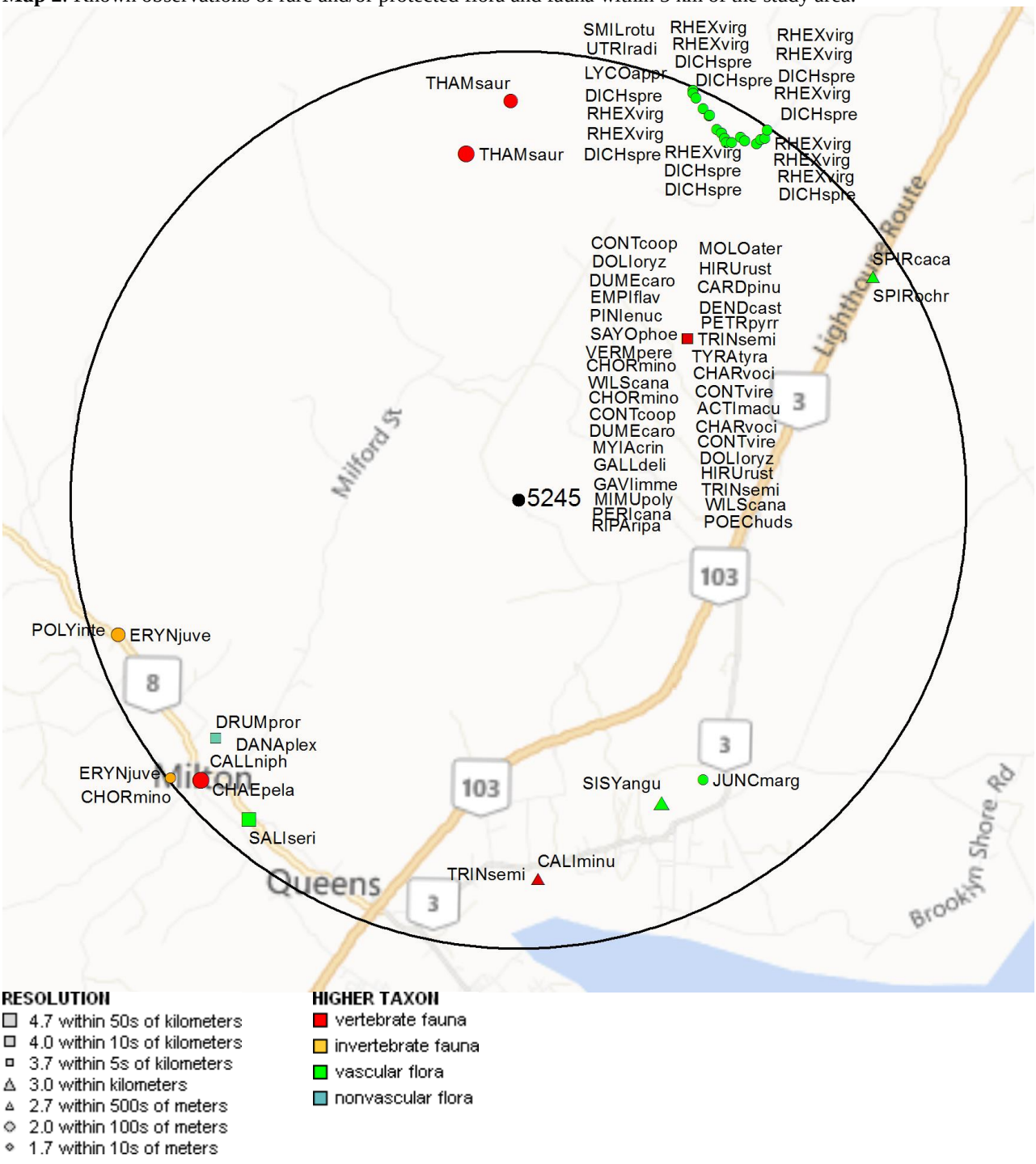
2.1 FLORA

A 5 km buffer around the study area contains 29 records of 10 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 47 records of 29 vertebrate, 6 records of 4 invertebrate fauna (Map 2 and attached data files - see 1.1 Data List). Please see section 4.3 to determine if "location-sensitive" species occur near your study site.

Map 2: Known observations of rare and/or protected flora and fauna within 5 km of the study area.

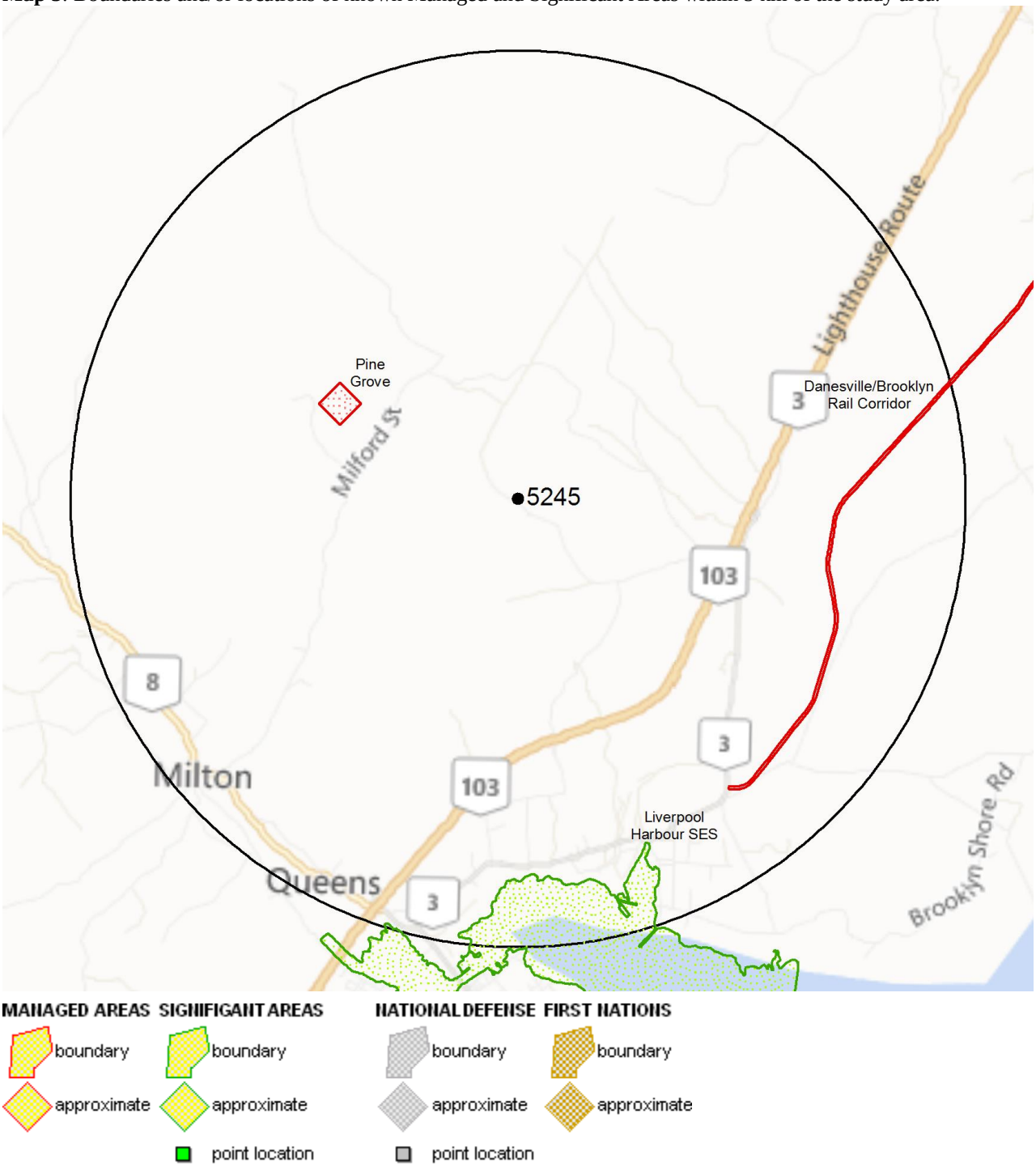


3.0 SPECIAL AREAS

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 2 biologically significant sites in the vicinity of the study area (Map 3 and attached file: *sa*.xls)

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. [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	*Drummondia prorepens*	a Moss				S2?	3 Sensitive	1	4.3 ± 5.0
P	*Smilax rotundifolia (Atlantic pop.)*	Round-leaved Greenbrier	Not At Risk			S3	4 Secure	1	5.0 ± 0.01
P	*Spiranthes casei var. casei*	Case's Ladies'-Tresses				S1	2 May Be At Risk	1	4.7 ± 0.5
P	*Salix sericea*	Silky Willow				S2	2 May Be At Risk	2	4.7 ± 3.0
P	*Spiranthes ochroleuca*	Yellow Ladies'-tresses				S2S3	3 Sensitive	1	4.7 ± 0.5
P	*Utricularia radiata*	Little Floating Bladderwort				S3	4 Secure	1	5.0 ± 0.01
P	*Rhexia virginica*	Virginia Meadow Beauty				S3	4 Secure	11	4.9 ± 0.01
P	*Juncus marginatus*	Grassleaf Rush				S3	3 Sensitive	1	3.7 ± 0.01
P	*Sisyrinchium angustifolium*	Narrow-leaved Blue-eyed-grass				S3S4	4 Secure	1	3.7 ± 2.5
P	*Dichanthelium spretum*	Eaton's Witchgrass				S3S4	4 Secure	9	5.0 ± 0.01
P	*Lycopodiella appressa*	Southern Bog Clubmoss				S3S4	4 Secure	1	4.8 ± 0.01

4.2 FAUNA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Thamnophis sauritus pop. 3*	Eastern Ribbonsnake - Atlantic pop.	Threatened	Threatened	Threatened	S2S3	1 At Risk	2	3.9 ± 0.1
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Endangered	S2S3B	1 At Risk	1	4.7 ± 0.1
A	*Hirundo rustica*	Barn Swallow	Threatened		Endangered	S3B	1 At Risk	2	2.6 ± 7.07
A	*Wilsonia canadensis*	Canada Warbler	Threatened	Threatened	Endangered	S3B	1 At Risk	2	2.6 ± 7.07
A	*Chordeiles minor*	Common Nighthawk	Threatened	Threatened	Threatened	S3B	1 At Risk	5	4.7 ± 0.1
A	*Contopus cooperi*	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3B	1 At Risk	2	2.6 ± 7.07
A	*Riparia riparia*	Bank Swallow	Threatened			S3B	2 May Be At Risk	1	2.6 ± 7.07
A	*Dolichonyx oryzivorus*	Bobolink	Threatened		Vulnerable	S3S4B	3 Sensitive	2	2.6 ± 7.07
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern		Vulnerable	S3S4B	3 Sensitive	4	2.6 ± 7.07
A	*Gavia immer*	Common Loon	Not At Risk			S3B,S4N	2 May Be At Risk	1	2.6 ± 7.07
A	*Calidris minutilla*	Least Sandpiper				S1B,S5M	4 Secure	1	4.2 ± 0.5
A	*Myiarchus crinitus*	Great Crested Flycatcher				S2B	2 May Be At Risk	1	2.6 ± 7.07
A	*Tringa semipalmata*	Willet				S2S3B	2 May Be At Risk	4	2.6 ± 7.07
A	*Molothrus ater*	Brown-headed Cowbird				S2S3B	4 Secure	1	2.6 ± 7.07
A	*Poecile hudsonica*	Boreal Chickadee				S3	3 Sensitive	1	2.6 ± 7.07
A	*Pinicola enucleator*	Pine Grosbeak				S3?B,S5N	2 May Be At Risk	1	2.6 ± 7.07
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S3B	2 May Be At Risk	1	2.6 ± 7.07
A	*Dumetella carolinensis*	Gray Catbird				S3B	2 May Be At Risk	2	2.6 ± 7.07
A	*Mimus polyglottos*	Northern Mockingbird				S3B	4 Secure	1	2.6 ± 7.07
A	*Perisoreus canadensis*	Gray Jay				S3S4	3 Sensitive	1	2.6 ± 7.07
A	*Charadrius vociferus*	Killdeer				S3S4B	3 Sensitive	3	2.6 ± 7.07
A	*Actitis macularius*	Spotted Sandpiper				S3S4B	3 Sensitive	1	2.6 ± 7.07
A	*Gallinago delicata*	Wilson's Snipe				S3S4B	3 Sensitive	1	2.6 ± 7.07
A	*Empidonax flaviventris*	Yellow-bellied Flycatcher				S3S4B	3 Sensitive	1	2.6 ± 7.07
A	*Sayornis phoebe*	Eastern Phoebe				S3S4B	3 Sensitive	1	2.6 ± 7.07
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	3 Sensitive	1	2.6 ± 7.07
A	*Vermivora peregrina*	Tennessee Warbler				S3S4B	3 Sensitive	1	2.6 ± 7.07
A	*Dendroica castanea*	Bay-breasted Warbler				S3S4B	3 Sensitive	1	2.6 ± 7.07
A	*Carduelis pinus*	Pine Siskin				S3S4B,S5N	3 Sensitive	1	2.6 ± 7.07
I	*Danaus plexippus*	Monarch	Special Concern	Special Concern		S2B	3 Sensitive	1	5.0 ± 0.01

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
I	*Callophrys niphon*	Eastern Pine Elfin				S2	4 Secure	1	5.0 ± 0.01
I	*Erynnis juvenalis*	Juvenal's Duskywing				S2S3	4 Secure	3	4.7 ± 0.05
I	*Polygonia interrogationis*	Question Mark				S3B	4 Secure	1	4.7 ± 0.05

4.3 LOCATION SENSITIVE SPECIES

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

Nova Scotia

Scientific *Name*	Common Name	SARA	Prov Legal Prot	Known within 5 km of Study Site?
Fraxinus nigra	Black Ash		Threatened	No
Glyptemys insculpta	Wood Turtle	Threatened	Threatened	No
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]	No

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
25	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
23	Blaney, C.S.; Mazerolle, D.M. 2009. Fieldwork 2009. Atlantic Canada Conservation Data Centre. Sackville NB, 13395 recs.
16	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 400,000 recs.
4	Klymko, J.J.D. 2014. Maritimes Butterfly Atlas, 2012 submissions. Atlantic Canada Conservation Data Centre, 8552 records.
3	Blaney, C.S.; Mazerolle, D.M.; Oberndorfer, E. 2007. Fieldwork 2007. Atlantic Canada Conservation Data Centre. Sackville NB, 13770 recs.
2	Catling, P.M. 1981. Taxonomy of autumn-flowering Spiranthes species of southern Nova Scotia in Can. J. Bot. , 59:1250-1273. 30 recs.
2	Klymko, J.J.D. 2012. Maritimes Butterfly Atlas, 2010 and 2011 records. Atlantic Canada Conservation Data Centre, 6318 recs.
2	McNeil, J.A. 2010. Ribbonsnake (Thamophis sauritus) sightings, 1900-2009. Parks Canada, 2521 recs of 716+ individuals.
2	Morrison, Guy. 2011. Maritime Shorebird Survey (MSS) database. Canadian Wildlife Service, Ottawa, 15939 surveys. 86171 recs.
2	Newell, R. E. E.C. Smith Digital Herbarium. E.C. Smith Herbarium, Irving Biodiversity Collection, Acadia University. 2013.
2	Pronych, G. & Wilson, A. 1993. Atlas of Rare Vascular Plants in Nova Scotia. Nova Scotia Museum, Halifax NS, I:1-168, II:169-331. 1446 recs.
1	Benjamin, L.K. (compiler) 2012. Significant Habitat & Species Database. NS Dept of Natural Resources.
1	NSDNR website
1	Staff, DNR 2007. Restricted & Limited Use Land Database (RLUL).

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 27415 records of 121 vertebrate and 480 records of 45 invertebrate fauna; 19965 records of 233 vascular, 660 records of 36 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.

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Morone saxatilis*	Striped Bass	Endangered			S1	2 May Be At Risk	6	14.6 ± 1.0
A	*Coregonus huntsmani*	Atlantic Whitefish	Endangered	Endangered	Endangered	S1	7 Exotic	9	23.3 ± 1.0
A	*Perimyotis subflavus*	Eastern Pipistrelle	Endangered		Endangered	S1	1 At Risk	24	47.9 ± 0.01
A	*Emydoidea blandingii*	Blanding's Turtle - Nova Scotia pop.	Endangered	Endangered	Endangered	S1	1 At Risk	7849	5.0 ± 0.01
A	*Morone saxatilis pop. 2*	Striped Bass- Bay of Fundy pop.	Endangered			S1	2 May Be At Risk	2	94.1 ± 1.0
A	*Charadrius melodus melodus*	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B	1 At Risk	1677	6.6 ± 0.4
A	*Sterna dougallii*	Roseate Tern	Endangered	Endangered	Endangered	S1B	1 At Risk	61	26.0 ± 0.2
A	*Dermochelys coriacea (Atlantic pop.)*	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered		S1S2N		3	47.8 ± 1.0
A	*Salmo salar pop. 1*	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered		S2	2 May Be At Risk	10	88.0 ± 1.0
A	*Calidris canutus rufa*	Red Knot rufa ssp	Endangered		Endangered	S2S3M	1 At Risk	568	16.8 ± 0.5
A	*Colinus virginianus*	Northern Bobwhite	Endangered	Endangered				7	30.9 ± 7.07
A	*Caprimulgus vociferus*	Whip-Poor-Will	Threatened	Threatened	Threatened	S1?B	1 At Risk	8	33.9 ± 0.15
A	*Hylocichla mustelina*	Wood Thrush	Threatened			S1B	5 Undetermined	18	8.4 ± 7.07
A	*Sturnella magna*	Eastern Meadowlark	Threatened			S1B	3 Sensitive	4	66.6 ± 7.07
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2	3 Sensitive	24	11.9 ± 10.0
A	*Thamnophis sauritus pop. 3*	Eastern Ribbonsnake - Atlantic pop.	Threatened	Threatened	Threatened	S2S3	1 At Risk	1951	3.9 ± 0.1
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Endangered	S2S3B	1 At Risk	261	4.7 ± 0.1
A	*Hirundo rustica*	Barn Swallow	Threatened		Endangered	S3B	1 At Risk	525	2.6 ± 7.07
A	*Wilsonia canadensis*	Canada Warbler	Threatened	Threatened	Endangered	S3B	1 At Risk	278	2.6 ± 7.07
A	*Chordeiles minor*	Common Nighthawk	Threatened	Threatened	Threatened	S3B	1 At Risk	351	2.6 ± 7.07
A	*Contopus cooperi*	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3B	1 At Risk	518	2.6 ± 7.07
A	*Riparia riparia*	Bank Swallow	Threatened			S3B	2 May Be At Risk	116	2.6 ± 7.07
A	*Dolichonyx oryzivorus*	Bobolink	Threatened		Vulnerable	S3S4B	3 Sensitive	166	2.6 ± 7.07
A	*Anguilla rostrata*	American Eel	Threatened			S5	4 Secure	253	13.4 ± 1.0
A	*Melanerpes erythrocephalus*	Red-headed Woodpecker	Threatened	Threatened		SNA	8 Accidental	1	99.6 ± 0.15
A	*Falco peregrinus pop. 1*	Peregrine Falcon - anatum/tundrius	Special Concern	Special Concern	Vulnerable	S1B	3 Sensitive	6	74.9 ± 0.15
A	*Bucephala islandica (Eastern pop.)*	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern		S1N	1 At Risk	1	98.4 ± 0.1
A	*Asio flammeus*	Short-eared Owl	Special Concern	Special Concern		S1S2	2 May Be At Risk	5	66.3 ± 0.15
A	*Histrionicus histrionicus pop. 1*	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S2N	1 At Risk	17	8.0 ± 1.1
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2S3B	2 May Be At Risk	160	12.0 ± 7.07
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern		Vulnerable	S3S4B	3 Sensitive	432	2.6 ± 7.07
A	*Phocoena phocoena (NW Atlantic pop.)*	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		4	36.5 ± 1.0
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S5	4 Secure	78	23.3 ± 10.0
A	*Tryngites subruficollis*	Buff-breasted Sandpiper	Special Concern			SNA	8 Accidental	45	16.8 ± 0.5
A	*Odobenus rosmarus rosmarus*	Atlantic Walrus	Special Concern					1	98.1 ± 5.0
A	*Lynx canadensis*	Canadian Lynx	Not At Risk		Endangered	S1	1 At Risk	2	33.8 ± 1.0
A	*Fulica americana*	American Coot	Not At Risk			S1B	5 Undetermined	4	92.4 ± 7.07
A	*Glaucomys volans*	Southern Flying Squirrel	Not At Risk	Special Concern		S2S3	3 Sensitive	7	50.2 ± 0.2

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Hemidactylium scutatum*	Four-toed Salamander	Not At Risk			S3	4 Secure	22	6.2 ± 0.5
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B	3 Sensitive	250	8.4 ± 0.15
A	*Sialia sialis*	Eastern Bluebird	Not At Risk			S3B	3 Sensitive	12	33.5 ± 7.07
A	*Gavia immer*	Common Loon	Not At Risk			S3B,S4N	2 May Be At Risk	756	2.6 ± 7.07
A	*Accipiter gentilis*	Northern Goshawk	Not At Risk			S3S4	4 Secure	47	12.0 ± 7.07
A	*Lagenorhynchus acutus*	Atlantic White-sided Dolphin	Not At Risk			S3S4		1	77.0 ± 1.0
A	*Puma concolor pop. 1*	Cougar - Eastern pop.	Data Deficient			SH	5 Undetermined	18	31.1 ± 1.0
A	*Martes americana*	American Marten			Endangered	S1	1 At Risk	11	7.2 ± 0.25
A	*Alces americanus*	Moose			Endangered	S1	1 At Risk	80	32.3 ± 1.0
A	*Toxostoma rufum*	Brown Thrasher				S1?B	5 Undetermined	3	19.9 ± 7.07
A	*Vireo gilvus*	Warbling Vireo				S1?B	5 Undetermined	1	96.0 ± 7.07
A	*Tringa solitaria*	Solitary Sandpiper				S1?B,S4S5M	4 Secure	20	16.8 ± 0.5
A	*Larus delawarensis*	Ring-billed Gull				S1?B,S5N	4 Secure	6	29.1 ± 0.15
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1B	2 May Be At Risk	1	96.4 ± 7.07
A	*Gallinula chloropus*	Common Moorhen				S1B	5 Undetermined	5	92.4 ± 7.07
A	*Haematopus palliatus*	American Oystercatcher				S1B	5 Undetermined	7	50.2 ± 0.5
A	*Progne subis*	Purple Martin				S1B	2 May Be At Risk	2	67.9 ± 7.07
A	*Cistothorus palustris*	Marsh Wren				S1B	5 Undetermined	5	38.6 ± 7.07
A	*Alca torda*	Razorbill				S1B,S4N	3 Sensitive	21	51.7 ± 0.15
A	*Fratercula arctica*	Atlantic Puffin				S1B,S4S5N	3 Sensitive	22	51.7 ± 0.15
A	*Calidris minutilla*	Least Sandpiper				S1B,S5M	4 Secure	903	4.2 ± 0.5
A	*Passerina cyanea*	Indigo Bunting				S1S2B	5 Undetermined	17	8.4 ± 7.07
A	*Eremophila alpestris*	Horned Lark				S1S2B,S4N	4 Secure	1	99.9 ± 0.15
A	*Charadrius semipalmatus*	Semipalmated Plover				S1S2B,S5M	4 Secure	1237	7.6 ± 0.5
A	*Asio otus*	Long-eared Owl				S2	2 May Be At Risk	11	35.6 ± 7.07
A	*Salmo salar*	Atlantic Salmon				S2	2 May Be At Risk	21	13.4 ± 0.5
A	*Pekania pennanti*	Fisher				S2	3 Sensitive	8	7.9 ± 0.95
A	*Vireo philadelphicus*	Philadelphia Vireo				S2?B	5 Undetermined	5	32.8 ± 7.07
A	*Anas acuta*	Northern Pintail				S2B	2 May Be At Risk	11	12.0 ± 7.07
A	*Anas clypeata*	Northern Shoveler				S2B	2 May Be At Risk	7	92.4 ± 7.07
A	*Anas strepera*	Gadwall				S2B	2 May Be At Risk	22	92.4 ± 7.07
A	*Rallus limicola*	Virginia Rail				S2B	5 Undetermined	11	41.2 ± 0.15
A	*Empidonax traillii*	Willow Flycatcher				S2B	3 Sensitive	15	28.2 ± 7.07
A	*Myiarchus crinitus*	Great Crested Flycatcher				S2B	2 May Be At Risk	28	2.6 ± 7.07
A	*Piranga olivacea*	Scarlet Tanager				S2B	5 Undetermined	38	24.8 ± 7.07
A	*Rissa tridactyla*	Black-legged Kittiwake				S2B,S4S5N	3 Sensitive	7	60.9 ± 7.07
A	*Bucephala clangula*	Common Goldeneye				S2B,S5N	4 Secure	98	9.2 ± 8.2
A	*Cathartes aura*	Turkey Vulture				S2S3B	3 Sensitive	5	83.4 ± 7.07
A	*Tringa semipalmata*	Willet				S2S3B	2 May Be At Risk	1365	2.6 ± 7.07
A	*Pooecetes gramineus*	Vesper Sparrow				S2S3B	2 May Be At Risk	2	21.9 ± 7.07
A	*Molothrus ater*	Brown-headed Cowbird				S2S3B	4 Secure	88	2.6 ± 7.07
A	*Icterus galbula*	Baltimore Oriole				S2S3B	2 May Be At Risk	49	5.2 ± 0.15
A	*Phalaropus lobatus*	Red-necked Phalarope				S2S3M	3 Sensitive	4	16.8 ± 0.5
A	*Phalaropus fulicarius*	Red Phalarope				S2S3M	3 Sensitive	2	29.6 ± 0.5
A	*Phalacrocorax carbo*	Great Cormorant				S3	3 Sensitive	30	19.9 ± 7.07
A	*Poecile hudsonica*	Boreal Chickadee				S3	3 Sensitive	222	2.6 ± 7.07
A	*Sorex maritimensis*	Maritime Shrew				S3	4 Secure	1	95.5 ± 0.95
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3?B	2 May Be At Risk	34	11.8 ± 0.15
A	*Dendroica tigrina*	Cape May Warbler				S3?B	3 Sensitive	28	48.1 ± 7.07
A	*Pinicola enucleator*	Pine Grosbeak				S3?B,S5N	2 May Be At Risk	65	2.6 ± 7.07
A	*Podilymbus podiceps*	Pied-billed Grebe				S3B	3 Sensitive	29	39.8 ± 7.07
A	*Anas discors*	Blue-winged Teal				S3B	2 May Be At Risk	32	12.0 ± 7.07
A	*Sterna paradisaea*	Arctic Tern				S3B	2 May Be At Risk	78	8.2 ± 0.15
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S3B	2 May Be At Risk	147	2.6 ± 7.07
A	*Dumetella carolinensis*	Gray Catbird				S3B	2 May Be At Risk	256	2.6 ± 7.07
A	*Mimus polyglottos*	Northern Mockingbird				S3B	4 Secure	12	2.6 ± 7.07
A	*Tringa melanoleuca*	Greater Yellowlegs				S3B,S5M	3 Sensitive	1157	7.6 ± 0.5

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	*Mergus serrator*	Red-breasted Merganser				S3B,S5N	4 Secure	53	9.2 ± 8.2
A	*Branta bernicla*	Brant				S3M	3 Sensitive	1	81.6 ± 12.4
A	*Pluvialis dominica*	American Golden-Plover				S3M	3 Sensitive	187	16.8 ± 0.5
A	*Numenius phaeopus hudsonicus*	Hudsonian Whimbrel				S3M	3 Sensitive	277	12.4 ± 0.5
A	*Limosa haemastica*	Hudsonian Godwit				S3M	3 Sensitive	129	16.8 ± 0.5
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	3 Sensitive	1143	12.4 ± 0.5
A	*Calidris maritima*	Purple Sandpiper				S3N	3 Sensitive	170	11.8 ± 0.5
A	*Cepphus grylle*	Black Guillemot				S3S4	4 Secure	57	24.9 ± 7.07
A	*Picoides arcticus*	Black-backed Woodpecker				S3S4	3 Sensitive	63	19.9 ± 0.15
A	*Perisoreus canadensis*	Gray Jay				S3S4	3 Sensitive	274	2.6 ± 7.07
A	*Cardinalis cardinalis*	Northern Cardinal				S3S4	4 Secure	80	5.1 ± 0.15
A	*Botaurus lentiginosus*	American Bittern				S3S4B	3 Sensitive	98	24.8 ± 7.07
A	*Charadrius vociferus*	Killdeer				S3S4B	3 Sensitive	232	2.6 ± 7.07
A	*Actitis macularius*	Spotted Sandpiper				S3S4B	3 Sensitive	518	2.6 ± 7.07
A	*Gallinago delicata*	Wilson's Snipe				S3S4B	3 Sensitive	223	2.6 ± 7.07
A	*Empidonax flaviventris*	Yellow-bellied Flycatcher				S3S4B	3 Sensitive	227	2.6 ± 7.07
A	*Sayornis phoebe*	Eastern Phoebe				S3S4B	3 Sensitive	93	2.6 ± 7.07
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	3 Sensitive	114	2.6 ± 7.07
A	*Vermivora peregrina*	Tennessee Warbler				S3S4B	3 Sensitive	91	2.6 ± 7.07
A	*Dendroica castanea*	Bay-breasted Warbler				S3S4B	3 Sensitive	177	2.6 ± 7.07
A	*Dendroica striata*	Blackpoll Warbler				S3S4B	3 Sensitive	34	12.0 ± 7.07
A	*Wilsonia pusilla*	Wilson's Warbler				S3S4B	3 Sensitive	35	21.9 ± 7.07
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3S4B	3 Sensitive	132	8.3 ± 7.07
A	*Passerella iliaca*	Fox Sparrow				S3S4B	4 Secure	36	14.3 ± 7.07
A	*Carduelis pinus*	Pine Siskin				S3S4B,S5N	3 Sensitive	182	2.6 ± 7.07
A	*Leucophaeus atricilla*	Laughing Gull				SHB	4 Secure	1	16.4 ± 0.15
I	*Alasmidonta varicosa*	Brook Floater	Special Concern		Threatened	S1S2	3 Sensitive	2	37.8 ± 0.1
I	*Danaus plexippus*	Monarch	Special Concern	Special Concern		S2B	3 Sensitive	60	5.0 ± 0.01
I	*Polygonia satyrus*	Satyr Comma				S1	3 Sensitive	1	91.9 ± 1.0
I	*Ophiogomphus aspersus*	Brook Snaketail				S1	2 May Be At Risk	3	39.2 ± 1.0
I	*Ophiogomphus mainensis*	Maine Snaketail				S1	2 May Be At Risk	9	19.6 ± 0.05
I	*Somatochlora franklini*	Delicate Emerald				S1	3 Sensitive	1	77.5 ± 1.0
I	*Williamsonia fletcheri*	Ebony Boghaunter				S1	2 May Be At Risk	2	6.5 ± 0.1
I	*Enallagma signatum*	Orange Bluet				S1	2 May Be At Risk	5	76.6 ± 0.1
I	*Tramea carolina*	Carolina Saddlebags				S1B	5 Undetermined	3	47.7 ± 0.1
I	*Callophrys lanoraieensis*	Bog Elfin				S1S2	2 May Be At Risk	9	36.1 ± 1.0
I	*Nymphalis l-album*	Compton Tortoiseshell				S1S2	4 Secure	2	45.3 ± 1.0
I	*Ophiogomphus rupinsulensis*	Rusty Snaketail				S1S2	2 May Be At Risk	11	12.8 ± 0.1
I	*Somatochlora kennedyi*	Kennedy's Emerald				S1S2	2 May Be At Risk	4	6.5 ± 0.1
I	*Stylurus scudderi*	Zebra Clubtail				S1S2	2 May Be At Risk	1	98.0 ± 0.1
I	*Amblyscirtes hegon*	Pepper and Salt Skipper				S2	4 Secure	2	53.1 ± 1.0
I	*Amblyscirtes vialis*	Common Roadside-Skipper				S2	4 Secure	5	13.7 ± 1.0
I	*Pieris oleracea*	Mustard White				S2	3 Sensitive	8	47.6 ± 0.03
I	*Satyrium calanus*	Banded Hairstreak				S2	5 Undetermined	2	76.4 ± 1.0
I	*Callophrys henrici*	Henry's Elfin				S2	4 Secure	11	36.1 ± 1.0
I	*Callophrys niphon*	Eastern Pine Elfin				S2	4 Secure	17	5.0 ± 0.01
I	*Strymon melinus*	Grey Hairstreak				S2	4 Secure	7	58.5 ± 1.0
I	*Chlosyne nycteis*	Silvery Checkerspot				S2	5 Undetermined	4	76.4 ± 1.0
I	*Epitheca princeps*	Prince Baskettail				S2	3 Sensitive	10	6.8 ± 1.0
I	*Somatochlora forcipata*	Forcipate Emerald				S2	2 May Be At Risk	3	6.5 ± 0.1
I	*Pantala hymenaea*	Spot-Winged Glider				S2B	3 Sensitive	3	62.1 ± 0.1
I	*Erynnis juvenalis*	Juvenal's Duskywing				S2S3	4 Secure	55	4.7 ± 0.05
I	*Enallagma vesperum*	Vesper Bluet				S2S3	3 Sensitive	13	11.1 ± 0.1
I	*Hesperia comma*	Common Branded Skipper				S3	4 Secure	2	92.9 ± 0.05
I	*Satyrium liparops*	Striped Hairstreak				S3	5 Undetermined	1	26.2 ± 1.0
I	*Polygonia faunus*	Green Comma				S3	4 Secure	2	94.4 ± 1.0
I	*Lethe anthedon*	Northern Pearly-Eye				S3	4 Secure	11	31.8 ± 0.25

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
I	*Ophiogomphus carolus*	Riffle Snaketail				S3	4 Secure	31	12.8 ± 0.1
I	*Aeshna clepsydra*	Mottled Darner				S3	4 Secure	21	6.5 ± 0.1
I	*Aeshna constricta*	Lance-Tipped Darner				S3	4 Secure	1	97.7 ± 1.0
I	*Boyeria grafiana*	Ocellated Darner				S3	3 Sensitive	13	12.8 ± 0.1
I	*Gomphaeschna furcillata*	Harlequin Darner				S3	3 Sensitive	23	6.5 ± 0.1
I	*Somatochlora tenebrosa*	Clamp-Tipped Emerald				S3	4 Secure	16	6.5 ± 0.1
I	*Erythrodiplax berenice*	Seaside Dragonlet				S3	3 Sensitive	14	17.2 ± 0.05
I	*Nannothemis bella*	Elfin Skimmer				S3	4 Secure	23	6.5 ± 0.1
I	*Amphiagrion saucium*	Eastern Red Damsel				S3	4 Secure	3	90.7 ± 1.0
I	*Polygonia interrogationis*	Question Mark				S3B	4 Secure	21	4.7 ± 0.05
I	*Feniseca tarquinius*	Harvester				S3S4	4 Secure	10	26.2 ± 1.0
I	*Callophrys polios*	Hoary Elfin				S3S4	4 Secure	20	36.1 ± 1.0
I	*Speyeria aphrodite*	Aphrodite Fritillary				S3S4	4 Secure	11	36.1 ± 1.0
I	*Polygonia progne*	Grey Comma				S3S4	4 Secure	4	36.1 ± 1.0
N	*Erioderma mollissimum*	Graceful Felt Lichen	Endangered		Endangered	S1S2	2 May Be At Risk	46	18.1 ± 0.1
N	*Erioderma pedicellatum (Atlantic pop.)*	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	S1S2	1 At Risk	42	31.8 ± 0.01
N	*Sclerophora peronella (Nova Scotia pop.)*	Frosted Glass-whiskers Lichen - Nova Scotia pop.	Special Concern	Special Concern		S1?		9	30.3 ± 0.01
N	*Degelia plumbea*	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S2	4 Secure	181	13.1 ± 0.1
N	*Pseudevernia cladonia*	Ghost Antler Lichen	Not At Risk			S2S3	3 Sensitive	16	16.9 ± 0.1
N	*Pannaria lurida*	Veined Shingle Lichen				S1?	2 May Be At Risk	16	15.3 ± 0.1
N	*Parmelinopsis horrescens*	Hairy-spined Shield Lichen				S1?	2 May Be At Risk	1	75.8 ± 0.1
N	*Parmeliella parvula*	Poor-man's Shingles Lichen				S1?	2 May Be At Risk	16	31.6 ± 0.1
N	*Everniastrum catawbiense*	Powder-tipped Antler Lichen				S1S2	2 May Be At Risk	2	16.2 ± 0.01
N	*Fuscopannaria leucosticta*	Rimmed Shingles Lichen				S1S2	2 May Be At Risk	41	15.0 ± 0.1
N	*Nephroma resupinatum*	a lichen				S1S2	2 May Be At Risk	1	15.6 ± 0.1
N	*Polychidium muscicola*	Eyed Mossthorns Woollybear Lichen				S1S2	2 May Be At Risk	1	91.6 ± 0.01
N	*Sticta limbata*	Powdered Moon Lichen				S1S2	2 May Be At Risk	5	48.5 ± 0.01
N	*Leptogium subtile*	Appressed Jellyskin Lichen				S1S3	3 Sensitive	6	15.6 ± 0.1
N	*Aulacomnium heterostichum*	One-sided Groove Moss				S2?	3 Sensitive	1	47.7 ± 5.0
N	*Campylostelium saxicola*	a Moss				S2?	3 Sensitive	1	22.0 ± 1.0
N	*Conardia compacta*	Coast Creeping Moss				S2?	3 Sensitive	1	78.0 ± 2.0
N	*Drummondia prorepens*	a Moss				S2?	3 Sensitive	1	4.3 ± 5.0
N	*Plagiothecium latebricola*	Alder Silk Moss				S2?	3 Sensitive	1	65.6 ± 5.0
N	*Thamnobryum alleghaniense*	a Moss				S2?	3 Sensitive	1	47.7 ± 1.0
N	*Thelia hirtella*	a Moss				S2?	3 Sensitive	8	12.7 ± 6.0
N	*Platylomella lescurii*	a Moss				S2?	3 Sensitive	3	79.0 ± 1.0
N	*Hygrohypnum luridum*	Drab Brook Moss				S2S3	3 Sensitive	1	79.6 ± 1.0
N	*Sphagnum wulfianum*	Wulf's Peat Moss				S2S3	3 Sensitive	1	99.9 ± 0.01
N	*Tetraplodon angustatus*	Toothed-leaved Nitrogen Moss				S2S3	3 Sensitive	1	71.8 ± 0.01
N	*Collema leptaleum*	Crumpled Bat's Wing Lichen				S2S3	3 Sensitive	1	14.6 ± 0.1
N	*Collema nigrescens*	Blistered Tarpaper Lichen				S2S3	3 Sensitive	17	17.0 ± 0.1
N	*Heterodermia squamulosa*	Scaly Fringe Lichen				S2S3	3 Sensitive	1	37.7 ± 0.1
N	*Leptogium corticola*	Blistered Jellyskin Lichen				S2S3	3 Sensitive	87	13.1 ± 0.1
N	*Leptogium milligranum*	Stretched Jellyskin Lichen				S2S3	3 Sensitive	12	35.0 ± 0.1
N	*Physconia detersa*	Bottlebrush Frost Lichen				S2S3	3 Sensitive	2	37.1 ± 0.01
N	*Usnea ceratina*	Warty Beard Lichen				S2S3	3 Sensitive	1	79.7 ± 3.0
N	*Anzia colpodes*	Black-foam Lichen				S3?	3 Sensitive	35	32.0 ± 0.01
N	*Sticta fuliginosa*	Peppered Moon Lichen				S3?	3 Sensitive	91	15.6 ± 0.1
N	*Nephroma bellum*	Naked Kidney Lichen				S3?	3 Sensitive	9	13.7 ± 0.1
N	*Collema furfuraceum*	Blistered Tarpaper Lichen				S3?	3 Sensitive	1	31.9 ± 0.1
P	*Coreopsis rosea*	Pink Coreopsis	Endangered	Endangered	Endangered	S1	1 At Risk	374	88.4 ± 0.01
P	*Drosera filiformis*	Thread-leaved Sundew	Endangered	Endangered	Endangered	S1	1 At Risk	30	76.9 ± 0.01
P	*Sabatia kennedyana*	Plymouth Gentian	Endangered	Threatened	Endangered	S1	1 At Risk	919	85.6 ± 1.5
P	*Hydrocotyle umbellata*	Water-pennywort	Threatened	Threatened	Endangered	S1	1 At Risk	181	48.7 ± 0.1

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Baccharis halimifolia*	Eastern Baccharis	Threatened		Threatened	S1	2 May Be At Risk	1	98.9 ± 0.01
P	*Clethra alnifolia*	Coast Pepper-Bush	Special Concern	Special Concern	Vulnerable	S1	3 Sensitive	269	53.9 ± 0.01
P	*Lilaeopsis chinensis*	Eastern Lilaeopsis	Special Concern	Special Concern	Vulnerable	S2	3 Sensitive	151	8.0 ± 0.01
P	*Eleocharis tuberculosa*	Tubercled Spike-rush	Special Concern	Threatened	Vulnerable	S2	1 At Risk	477	13.0 ± 0.01
P	*Lachnanthes caroliniana*	Redroot	Special Concern	Threatened	Vulnerable	S2	1 At Risk	1379	23.3 ± 0.01
P	*Lophiola aurea*	Goldencrest	Special Concern	Threatened	Vulnerable	S2	1 At Risk	748	23.3 ± 5.0
P	*Isoetes prototypus*	Prototype Quillwort	Special Concern	Special Concern	Vulnerable	S2	3 Sensitive	2	96.6 ± 0.05
P	*Scirpus longii*	Long's Bulrush	Special Concern	Special Concern	Vulnerable	S2S3	3 Sensitive	333	11.2 ± 0.05
P	*Smilax rotundifolia (Atlantic pop.)*	Round-leaved Greenbrier	Not At Risk			S3	4 Secure	582	5.0 ± 0.01
P	*Helianthemum canadense*	Long-branched Frostweed			Endangered	S1	1 At Risk	14	23.3 ± 0.01
P	*Salix candida*	Sage Willow			Endangered	S1	2 May Be At Risk	1	81.2 ± 1.0
P	*Toxicodendron vernix*	Poison Sumac				S1	2 May Be At Risk	34	35.0 ± 0.01
P	*Antennaria parlinii*	a Pussytoes				S1	2 May Be At Risk	5	32.0 ± 0.01
P	*Hieracium scabrum var. leucocaule*	Rough Hawkweed				S1	2 May Be At Risk	6	97.5 ± 14.0
P	*Arabis glabra*	Tower Mustard				S1	5 Undetermined	1	71.8 ± 0.5
P	*Lobelia spicata*	Pale-Spiked Lobelia				S1	2 May Be At Risk	1	86.6 ± 50.0
P	*Stellaria crassifolia*	Fleshy Stitchwort				S1	2 May Be At Risk	1	6.7 ± 2.5
P	*Suaeda maritima ssp. richii*	White Sea-blite				S1	5 Undetermined	1	98.1 ± 0.1
P	*Hypericum majus*	Large St John's-wort				S1	2 May Be At Risk	3	31.2 ± 0.01
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S1	2 May Be At Risk	3	43.6 ± 0.01
P	*Lyonia ligustrina*	Maleberry				S1	2 May Be At Risk	5	95.9 ± 0.01
P	*Desmodium canadense*	Canada Tick-trefoil				S1	2 May Be At Risk	7	51.8 ± 1.0
P	*Desmodium glutinosum*	Large Tick-Trefoil				S1	2 May Be At Risk	4	51.1 ± 0.15
P	*Proserpinaca intermedia*	Intermediate Mermaidweed				S1	2 May Be At Risk	5	8.4 ± 5.0
P	*Trichostema dichotomum*	Forked Bluecurls				S1	2 May Be At Risk	3	37.7 ± 0.01
P	*Fraxinus pennsylvanica*	Red Ash				S1	2 May Be At Risk	4	11.5 ± 10.0
P	*Polygala polygama*	Racemed Milkwort				S1	5 Undetermined	9	87.9 ± 1.0
P	*Polygonum achoreum*	Leathery Knotweed				S1	5 Undetermined	1	94.9 ± 10.0
P	*Podostemum ceratophyllum*	Horn-leaved Riverweed				S1	2 May Be At Risk	4	47.2 ± 0.1
P	*Anagallis minima*	Chaffweed				S1	2 May Be At Risk	6	54.1 ± 0.01
P	*Lysimachia quadrifolia*	Whorled Yellow Loosestrife				S1	5 Undetermined	1	94.1 ± 0.01
P	*Amelanchier nantucketensis*	Nantucket Serviceberry				S1	2 May Be At Risk	1	59.2 ± 0.1
P	*Galium aparine*	Common Bedstraw				S1	7 Exotic	2	62.9 ± 0.1
P	*Scrophularia lanceolata*	Lance-leaved Figwort				S1	5 Undetermined	2	97.1 ± 1.0
P	*Boehmeria cylindrica*	Small-spike False-nettle				S1	2 May Be At Risk	45	36.4 ± 0.01
P	*Carex digitalis*	Slender Wood Sedge				S1	2 May Be At Risk	4	35.1 ± 0.01
P	*Carex haydenii*	Hayden's Sedge				S1	2 May Be At Risk	2	40.3 ± 0.01
P	*Carex laxiflora*	Loose-Flowered Sedge				S1	2 May Be At Risk	3	56.3 ± 2.0
P	*Carex ormostachya*	Necklace Spike Sedge				S1	2 May Be At Risk	2	66.8 ± 0.01
P	*Carex wiegandii*	Wiegand's Sedge				S1	2 May Be At Risk	1	90.8 ± 1.0
P	*Cyperus diandrus*	Low Flatsedge				S1	5 Undetermined	3	90.5 ± 0.1
P	*Rhynchospora macrostachya*	Tall Beakrush				S1	2 May Be At Risk	57	32.0 ± 0.01
P	*Schoenoplectus torreyi*	Torrey's Bulrush				S1	2 May Be At Risk	8	24.7 ± 0.01
P	*Sisyrinchium fuscatum*	Coastal Plain Blue-eyed-grass				S1	2 May Be At Risk	3	22.9 ± 0.1
P	*Juncus secundus*	Secund Rush				S1	2 May Be At Risk	2	31.4 ± 1.0
P	*Juncus bulbosus*	Bulbous Rush				S1	5 Undetermined	5	97.5 ± 14.0
P	*Allium tricoccum*	Wild Leek				S1	2 May Be At Risk	3	97.8 ± 0.01
P	*Spiranthes casei var. casei*	Case's Ladies'-Tresses				S1	2 May Be At Risk	3	4.7 ± 0.5
P	*Cinna arundinacea*	Sweet Wood Reed Grass				S1	2 May Be At Risk	34	36.5 ± 0.01
P	*Dichanthelium xanthophysum*	Slender Panic Grass				S1	2 May Be At Risk	9	36.8 ± 1.6
P	*Torreyochloa pallida var. pallida*	Pale False Manna Grass				S1	0.1 Extirpated	1	83.8 ± 0.01
P	*Potamogeton oblongus*	Oblong-leaved Pondweed				S1	2 May Be At Risk	5	97.5 ± 14.0
P	*Adiantum pedatum*	Northern Maidenhair Fern				S1	2 May Be At Risk	1	95.7 ± 1.5
P	*Chenopodium rubrum*	Red Pigweed				S1?	2 May Be At Risk	9	29.6 ± 0.5
P	*Proserpinaca palustris var. palustris*	Marsh Mermaidweed				S1?	2 May Be At Risk	2	37.9 ± 0.01
P	*Crataegus submollis*	Quebec Hawthorn				S1?	5 Undetermined	1	73.3 ± 7.07
P	*Rubus flagellaris*	Northern Dewberry				S1?	5 Undetermined	1	98.9 ± 0.15

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P	*Carex longii*	Long's Sedge				S1?	2 May Be At Risk	10	34.3 ± 10.0
P	*Schoenoplectus robustus*	Sturdy Bulrush				S1?	5 Undetermined	1	96.3 ± 5.0
P	*Triglochin gaspensis*	Gasp ├ Arrowgrass				S1?	5 Undetermined	10	32.6 ± 0.01
P	*Dichanthelium acuminatum var. lindheimeri*	Woolly Panic Grass				S1?	5 Undetermined	5	35.7 ± 5.0
P	*Panicum dichotomiflorum var. puritanorum*	Fall Panic Grass				S1?	2 May Be At Risk	16	34.0 ± 0.01
P	*Thuja occidentalis*	Eastern White Cedar			Vulnerable	S1S2	1 At Risk	68	9.2 ± 1.0
P	*Cornus suecica*	Swedish Bunchberry				S1S2	3 Sensitive	2	21.6 ± 0.1
P	*Utricularia resupinata*	Inverted Bladderwort				S1S2	2 May Be At Risk	27	25.3 ± 0.01
P	*Conopholis americana*	American Cancer-root				S1S2	2 May Be At Risk	25	30.9 ± 7.07
P	*Hepatica nobilis var. obtusa*	Round-lobed Hepatica				S1S2	2 May Be At Risk	3	36.8 ± 1.6
P	*Ranunculus sceleratus*	Cursed Buttercup				S1S2	2 May Be At Risk	3	10.2 ± 0.5
P	*Galium obtusum*	Blunt-leaved Bedstraw				S1S2	2 May Be At Risk	16	39.8 ± 0.01
P	*Agalinis maritima*	Saltmarsh Agalinis				S1S2	2 May Be At Risk	12	96.8 ± 0.25
P	*Carex pensylvanica*	Pennsylvania Sedge				S1S2	5 Undetermined	1	35.1 ± 10.0
P	*Carex tenera*	Tender Sedge				S1S2	3 Sensitive	2	36.9 ± 0.01
P	*Juncus greenei*	Greene's Rush				S1S2	2 May Be At Risk	8	85.1 ± 0.01
P	*Najas gracillima*	Thread-Like Naiad				S1S2	2 May Be At Risk	20	8.3 ± 7.07
P	*Platanthera flava var. herbiola*	Pale Green Orchid				S1S2	4 Secure	9	8.1 ± 0.01
P	*Potamogeton pulcher*	Spotted Pondweed				S1S2	2 May Be At Risk	43	7.9 ± 0.8
P	*Conioselinum chinense*	Chinese Hemlock-parsley				S2	3 Sensitive	2	17.8 ± 0.5
P	*Eupatorium dubium*	Coastal Plain Joe-pye-weed				S2	2 May Be At Risk	122	25.9 ± 0.05
P	*Iva frutescens ssp. oraria*	Big-leaved Marsh-elder				S2	3 Sensitive	14	98.0 ± 0.02
P	*Lactuca hirsuta var. sanguinea*	Hairy Lettuce				S2	3 Sensitive	4	22.3 ± 5.0
P	*Rudbeckia laciniata*	Cut-Leaved Coneflower				S2	3 Sensitive	1	99.9 ± 5.0
P	*Senecio pseudoarnica*	Seabeach Ragwort				S2	3 Sensitive	4	97.5 ± 14.0
P	*Symphyotrichum undulatum*	Wavy-leaved Aster				S2	3 Sensitive	122	5.6 ± 1.0
P	*Caulophyllum thalictroides*	Blue Cohosh				S2	2 May Be At Risk	2	96.9 ± 7.07
P	*Betula michauxii*	Michaux's Dwarf Birch				S2	3 Sensitive	34	24.3 ± 0.01
P	*Cardamine parviflora var. arenicola*	Small-flowered Bittercress				S2	3 Sensitive	3	78.9 ± 1.0
P	*Minuartia groenlandica*	Greenland Stitchwort				S2	3 Sensitive	68	37.1 ± 0.01
P	*Hudsonia ericoides*	Pinebarren Golden Heather				S2	3 Sensitive	26	18.2 ± 0.01
P	*Crassula aquatica*	Water Pygmyweed				S2	3 Sensitive	7	58.4 ± 0.1
P	*Vaccinium boreale*	Northern Blueberry				S2	2 May Be At Risk	1	41.9 ± 0.5
P	*Vaccinium caespitosum*	Dwarf Bilberry				S2	3 Sensitive	27	44.3 ± 0.01
P	*Myriophyllum farwellii*	Farwell's Water Milfoil				S2	3 Sensitive	8	22.9 ± 0.1
P	*Oenothera fruticosa ssp. glauca*	Narrow-leaved Evening Primrose				S2	5 Undetermined	6	19.9 ± 7.07
P	*Polygonum arifolium*	Halberd-leaved Tearthumb				S2	3 Sensitive	2	48.2 ± 0.01
P	*Rumex salicifolius var. mexicanus*	Triangular-valve Dock				S2	3 Sensitive	3	35.5 ± 1.0
P	*Plantago rugelii*	Rugel's Plantain				S2	5 Undetermined	2	62.0 ± 0.01
P	*Samolus valerandi ssp. parviflorus*	Seaside Brookweed				S2	3 Sensitive	54	8.0 ± 0.01
P	*Anemone canadensis*	Canada Anemone				S2	2 May Be At Risk	4	9.2 ± 1.0
P	*Anemone quinquefolia*	Wood Anemone				S2	3 Sensitive	5	94.8 ± 0.2
P	*Galium boreale*	Northern Bedstraw				S2	2 May Be At Risk	3	78.4 ± 0.5
P	*Salix pedicellaris*	Bog Willow				S2	3 Sensitive	86	10.7 ± 1.0
P	*Salix sericea*	Silky Willow				S2	2 May Be At Risk	166	4.7 ± 3.0
P	*Viola nephrophylla*	Northern Bog Violet				S2	3 Sensitive	1	55.2 ± 1.0
P	*Carex atlantica ssp. capillacea*	Atlantic Sedge				S2	5 Undetermined	26	33.5 ± 7.07
P	*Carex hystericina*	Porcupine Sedge				S2	2 May Be At Risk	1	97.5 ± 1.0
P	*Eriophorum gracile*	Slender Cottongrass				S2	3 Sensitive	1	95.6 ± 1.5
P	*Vallisneria americana*	Wild Celery				S2	2 May Be At Risk	10	36.2 ± 0.01
P	*Goodyera pubescens*	Downy Rattlesnake-Plantain				S2	2 May Be At Risk	31	35.4 ± 0.01
P	*Listera australis*	Southern Twayblade				S2	2 May Be At Risk	87	16.8 ± 1.0
P	*Platanthera flava*	Southern Rein-Orchid				S2	3 Sensitive	29	8.4 ± 5.0
P	*Platanthera flava var. flava*	Southern Rein Orchid				S2	3 Sensitive	329	8.2 ± 0.1
P	*Platanthera macrophylla*	Large Round-Leaved Orchid				S2	3 Sensitive	1	69.8 ± 0.01
P	*Spiranthes casei*	Case's Ladies'-Tresses				S2	3 Sensitive	4	31.2 ± 0.01

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P	*Spiranthes casei var. novaescotiae*	Case's Ladies'-Tresses				S2	3 Sensitive	18	28.0 ± 0.01
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S2	2 May Be At Risk	4	89.6 ± 7.07
P	*Piptatherum canadense*	Canada Rice Grass				S2	3 Sensitive	20	22.0 ± 0.01
P	*Piptatherum pungens*	Slender Rice Grass				S2	3 Sensitive	10	24.4 ± 1.0
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S2	3 Sensitive	3	90.0 ± 1.5
P	*Hieracium kalmii*	Kalm's Hawkweed				S2?	5 Undetermined	2	62.0 ± 0.5
P	*Hieracium kalmii var. kalmii*	Kalm's Hawkweed				S2?	5 Undetermined	2	60.8 ± 5.0
P	*Symphyotrichum boreale*	Boreal Aster				S2?	3 Sensitive	6	14.1 ± 5.0
P	*Ceratophyllum echinatum*	Prickly Hornwort				S2?	2 May Be At Risk	3	22.9 ± 0.05
P	*Epilobium coloratum*	Purple-veined Willowherb				S2?	3 Sensitive	3	10.2 ± 100.0
P	*Amelanchier fernaldii*	Fernald's Serviceberry				S2?	5 Undetermined	2	43.5 ± 7.07
P	*Carex houghtoniana*	Houghton's Sedge				S2?	3 Sensitive	6	30.4 ± 0.01
P	*Eleocharis ovata*	Ovate Spikerush				S2?	3 Sensitive	4	48.7 ± 0.5
P	*Juncus dudleyi*	Dudley's Rush				S2?	3 Sensitive	6	37.7 ± 0.01
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S2?	3 Sensitive	7	43.5 ± 0.01
P	*Fraxinus nigra*	Black Ash			Threatened	S2S3	3 Sensitive	41	20.1 ± 0.5
P	*Asclepias incarnata ssp. pulchra*	Swamp Milkweed				S2S3	5 Undetermined	15	7.9 ± 1.0
P	*Sagina nodosa*	Knotted Pearlwort				S2S3	4 Secure	17	11.4 ± 5.0
P	*Sagina nodosa ssp. borealis*	Knotted Pearlwort				S2S3	4 Secure	2	20.2 ± 1.0
P	*Suaeda calceoliformis*	Horned Sea-blite				S2S3	4 Secure	9	55.6 ± 1.0
P	*Hypericum dissimulatum*	Disguised St John's-wort				S2S3	3 Sensitive	8	27.0 ± 0.01
P	*Empetrum eamesii ssp. atropurpureum*	Pink Crowberry				S2S3	3 Sensitive	1	80.9 ± 7.07
P	*Hedeoma pulegioides*	American False Pennyroyal				S2S3	3 Sensitive	5	28.2 ± 1.0
P	*Polygala sanguinea*	Blood Milkwort				S2S3	3 Sensitive	6	85.1 ± 0.01
P	*Polygonum buxiforme*	Small's Knotweed				S2S3	5 Undetermined	1	66.6 ± 7.07
P	*Polygonum raii*	Sharp-fruited Knotweed				S2S3	5 Undetermined	12	10.1 ± 2.0
P	*Carex adusta*	Lesser Brown Sedge				S2S3	3 Sensitive	1	52.8 ± 7.07
P	*Carex swanii*	Swan's Sedge				S2S3	3 Sensitive	7	21.5 ± 0.01
P	*Eleocharis olivacea*	Yellow Spikerush				S2S3	3 Sensitive	18	23.1 ± 5.0
P	*Coeloglossum viride var. virescens*	Long-bracted Frog Orchid				S2S3	2 May Be At Risk	4	97.5 ± 14.0
P	*Spiranthes ochroleuca*	Yellow Ladies'-tresses				S2S3	3 Sensitive	36	4.7 ± 0.5
P	*Panicum tuckermanii*	Tuckerman's Panic Grass				S2S3	3 Sensitive	27	20.9 ± 0.01
P	*Stuckenia filiformis ssp. alpina*	Thread-leaved Pondweed				S2S3	5 Undetermined	1	84.8 ± 7.07
P	*Woodwardia areolata*	Netted Chain Fern				S2S3	3 Sensitive	264	20.4 ± 0.01
P	*Botrychium lanceolatum var. angustisegmentum*	Lance-Leaf Grape-Fern				S2S3	3 Sensitive	3	94.8 ± 1.2
P	*Botrychium simplex*	Least Moonwort				S2S3	3 Sensitive	3	10.4 ± 1.0
P	*Ophioglossum pusillum*	Northern Adder's-tongue				S2S3	3 Sensitive	4	22.2 ± 0.5
P	*Asclepias incarnata*	Swamp Milkweed				S3	4 Secure	385	8.0 ± 0.01
P	*Asclepias incarnata ssp. incarnata*	Swamp Milkweed				S3	4 Secure	1	93.9 ± 1.0
P	*Hieracium paniculatum*	Panicled Hawkweed				S3	4 Secure	22	23.3 ± 0.02
P	*Megalodonta beckii*	Water Beggarticks				S3	3 Sensitive	22	36.8 ± 0.01
P	*Solidago latissimifolia*	Elliott's Goldenrod				S3	4 Secure	136	10.9 ± 0.01
P	*Alnus serrulata*	Smooth Alder				S3	3 Sensitive	641	5.7 ± 0.01
P	*Stellaria longifolia*	Long-leaved Starwort				S3	3 Sensitive	1	60.8 ± 5.0
P	*Empetrum eamesii*	Pink Crowberry				S3	3 Sensitive	5	77.4 ± 1.0
P	*Vaccinium corymbosum*	Highbush Blueberry				S3	4 Secure	434	20.1 ± 0.01
P	*Chamaesyce polygonifolia*	Seaside Spurge				S3	4 Secure	8	21.2 ± 5.0
P	*Bartonia virginica*	Yellow Bartonia				S3	4 Secure	53	10.3 ± 0.01
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	4 Secure	10	36.1 ± 5.0
P	*Proserpinaca palustris*	Marsh Mermaidweed				S3	4 Secure	18	9.8 ± 1.5
P	*Proserpinaca palustris var. crebra*	Marsh Mermaidweed				S3	4 Secure	4	16.5 ± 0.1
P	*Proserpinaca pectinata*	Comb-leaved Mermaidweed				S3	3 Sensitive	78	8.2 ± 0.6
P	*Teucrium canadense*	Canada Germander				S3	3 Sensitive	60	15.5 ± 1.0
P	*Utricularia radiata*	Little Floating Bladderwort				S3	4 Secure	208	5.0 ± 0.01
P	*Utricularia subulata*	Zigzag Bladderwort				S3	4 Secure	267	21.4 ± 0.01
P	*Decodon verticillatus*	Swamp Loosestrife				S3	3 Sensitive	224	10.3 ± 0.01

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Rhexia virginica*	Virginia Meadow Beauty				S3	4 Secure	1581	4.6 ± 0.01
P	*Epilobium strictum*	Downy Willowherb				S3	3 Sensitive	2	7.7 ± 0.5
P	*Polygonum pensylvanicum*	Pennsylvania Smartweed				S3	4 Secure	7	42.4 ± 5.0
P	*Polygonum scandens*	Climbing False Buckwheat				S3	3 Sensitive	7	41.0 ± 0.01
P	*Pyrola asarifolia*	Pink Pyrola				S3	4 Secure	1	93.7 ± 7.07
P	*Agrimonia gryposepala*	Hooked Agrimony				S3	4 Secure	30	31.7 ± 5.0
P	*Rosa palustris*	Swamp Rose				S3	4 Secure	498	10.7 ± 0.01
P	*Cephalanthus occidentalis*	Common Buttonbush				S3	3 Sensitive	1447	7.9 ± 0.5
P	*Salix petiolaris*	Meadow Willow				S3	4 Secure	4	34.4 ± 0.01
P	*Agalinis neoscotica*	Nova Scotia Agalinis				S3	4 Secure	140	8.1 ± 5.0
P	*Limosella australis*	Southern Mudwort				S3	3 Sensitive	11	8.9 ± 0.5
P	*Verbena hastata*	Blue Vervain				S3	4 Secure	34	9.2 ± 1.0
P	*Carex lupulina*	Hop Sedge				S3	4 Secure	23	8.0 ± 0.5
P	*Carex rosea*	Rosy Sedge				S3	4 Secure	3	99.2 ± 4.0
P	*Eleocharis nitida*	Quill Spikerush				S3	4 Secure	4	79.9 ± 1.0
P	*Eleocharis rostellata*	Beaked Spikerush				S3	3 Sensitive	27	80.6 ± 0.01
P	*Schoenoplectus americanus*	Olney's Bulrush				S3	3 Sensitive	19	17.8 ± 0.01
P	*Juncus marginatus*	Grassleaf Rush				S3	3 Sensitive	36	3.7 ± 0.01
P	*Juncus subcaudatus var. planisepalus*	Woods-Rush				S3	3 Sensitive	11	8.1 ± 5.0
P	*Corallorhiza trifida*	Early Coralroot				S3	4 Secure	10	14.1 ± 3.3
P	*Goodyera repens*	Lesser Rattlesnake-plantain				S3	3 Sensitive	7	22.3 ± 0.01
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	4 Secure	1	99.5 ± 1.0
P	*Platanthera hookeri*	Hooker's Orchid				S3	4 Secure	11	22.5 ± 100.0
P	*Platanthera orbiculata*	Small Round-leaved Orchid				S3	4 Secure	24	12.0 ± 7.07
P	*Dichanthelium clandestinum*	Deer-tongue Panic Grass				S3	4 Secure	209	33.3 ± 10.0
P	*Panicum rigidulum var. pubescens*	Redtop Panic Grass				S3	3 Sensitive	1721	7.9 ± 1.0
P	*Panicum virgatum var. spissum*	Switch Grass				S3	3 Sensitive	1	88.7 ± 0.01
P	*Equisetum variegatum*	Variegated Horsetail				S3	4 Secure	3	38.1 ± 2.5
P	*Isoetes acadiensis*	Acadian Quillwort				S3	3 Sensitive	24	7.9 ± 0.1
P	*Botrychium dissectum*	Cut-leaved Moonwort				S3	4 Secure	3	45.6 ± 0.5
P	*Schizaea pusilla*	Little Curlygrass Fern				S3	4 Secure	121	21.4 ± 0.01
P	*Amelanchier stolonifera*	Running Serviceberry				S3?	4 Secure	36	21.2 ± 5.0
P	*Potentilla canadensis*	Canada Cinquefoil				S3?	5 Undetermined	8	5.6 ± 2.0
P	*Carex cryptolepis*	Hidden-scaled Sedge				S3?	4 Secure	5	20.8 ± 2.5
P	*Carex tribuloides*	Blunt Broom Sedge				S3?	4 Secure	1	49.5 ± 0.07
P	*Carex foenea*	Fernald's Hay Sedge				S3?	4 Secure	5	51.3 ± 0.5
P	*Elodea canadensis*	Canada Waterweed				S3?	4 Secure	1	95.8 ± 0.03
P	*Lycopodium sabinifolium*	Ground-Fir				S3?	4 Secure	1	99.5 ± 0.25
P	*Polypodium appalachianum*	Appalachian Polypody				S3?	5 Undetermined	4	22.5 ± 0.01
P	*Pseudognaphalium obtusifolium*	Eastern Cudweed				S3S4	4 Secure	37	10.1 ± 1.0
P	*Utricularia gibba*	Humped Bladderwort				S3S4	4 Secure	85	23.6 ± 0.01
P	*Polygonum robustius*	Stout Smartweed				S3S4	4 Secure	234	7.9 ± 1.0
P	*Rumex fueginus*	Tierra del Fuego Dock				S3S4	4 Secure	1	29.3 ± 5.0
P	*Lindernia dubia*	Yellow-seeded False Pimperel				S3S4	4 Secure	3	42.2 ± 3.0
P	*Viola sagittata var. ovata*	Arrow-Leaved Violet				S3S4	4 Secure	21	28.9 ± 0.01
P	*Symplocarpus foetidus*	Eastern Skunk Cabbage				S3S4	4 Secure	185	47.5 ± 0.01
P	*Carex argyrantha*	Silvery-flowered Sedge				S3S4	4 Secure	17	20.5 ± 4.0
P	*Cyperus dentatus*	Toothed Flatsedge				S3S4	4 Secure	570	20.8 ± 0.01
P	*Eriophorum chamissonis*	Russet Cotton-Grass				S3S4	4 Secure	8	10.0 ± 1.0
P	*Sisyrinchium angustifolium*	Narrow-leaved Blue-eyed-grass				S3S4	4 Secure	144	3.7 ± 2.5
P	*Sisyrinchium atlanticum*	Eastern Blue-Eyed-Grass				S3S4	4 Secure	304	7.2 ± 5.0
P	*Juncus acuminatus*	Sharp-Fruit Rush				S3S4	3 Sensitive	9	12.8 ± 5.0
P	*Liparis loeselii*	Loesel's Twayblade				S3S4	4 Secure	8	10.4 ± 1.0
P	*Dichanthelium spretum*	Eaton's Witchgrass				S3S4	4 Secure	788	4.6 ± 0.01
P	*Cystopteris bulbifera*	Bulblet Bladder Fern				S3S4	4 Secure	1	47.7 ± 1.0
P	*Equisetum hyemale var. affine*	Common Scouring-rush				S3S4	4 Secure	1	91.8 ± 5.0

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	*Lycopodium complanatum*	Northern Clubmoss				S3S4	4 Secure	6	75.1 ± 1.0
P	*Lycopodiella appressa*	Southern Bog Clubmoss				S3S4	4 Secure	951	4.8 ± 0.01
P	*Bidens discoidea*	Swamp Beggarticks				SH	0.1 Extirpated	1	65.5 ± 0.25
P	*Dichanthelium meridionale*	Matting Witchgrass				SH	0.1 Extirpated	1	99.6 ± 10.0

5.1 SOURCE BIBLIOGRAPHY (100 km)

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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Appendix J – Moose Surveys

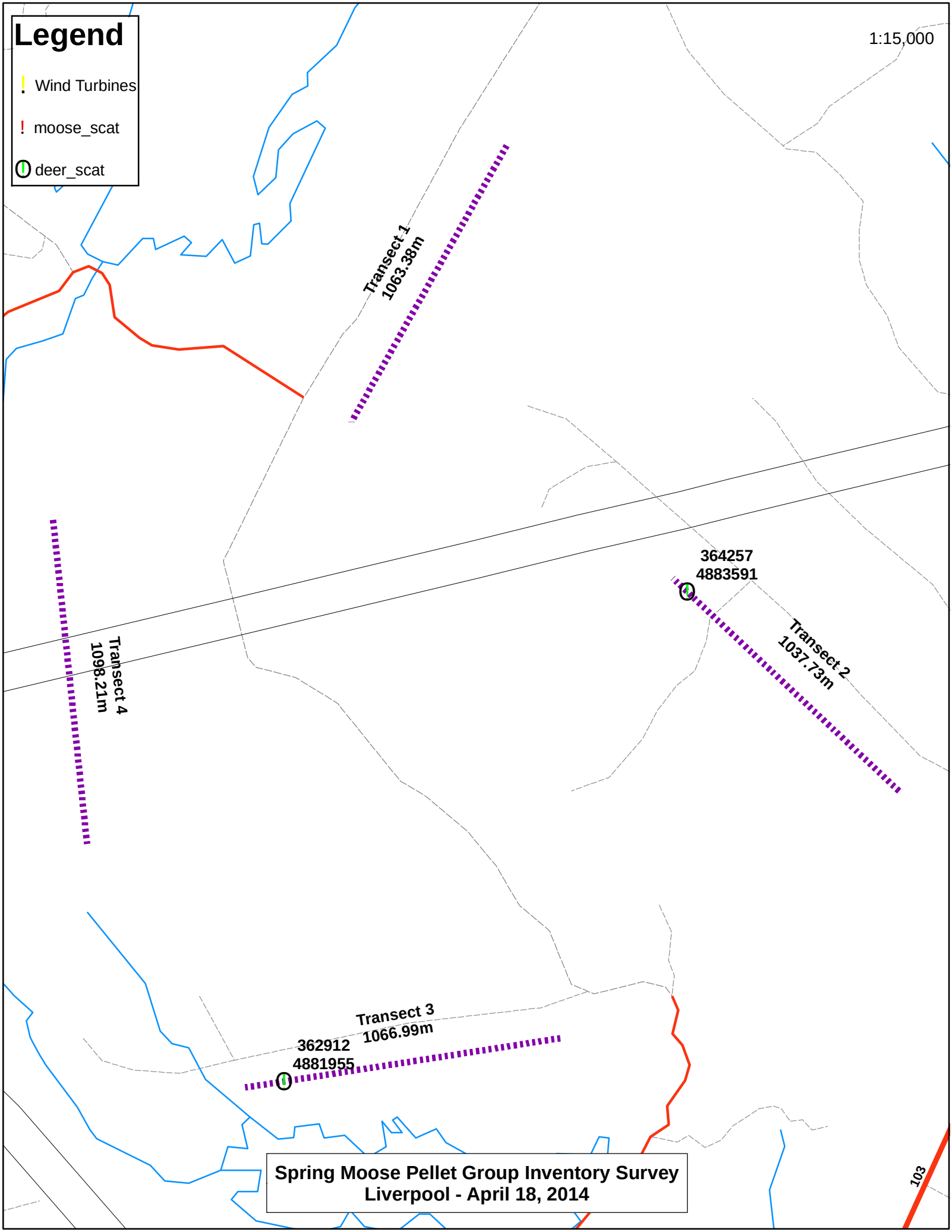
Liverpool Wind Farm

Spring Pellet Group Inventory Study

Summary

There was one pellet group survey done at this site in the spring of 2014

These transects varied in length and one meter on each side was observed. The results are shown on the attached maps.

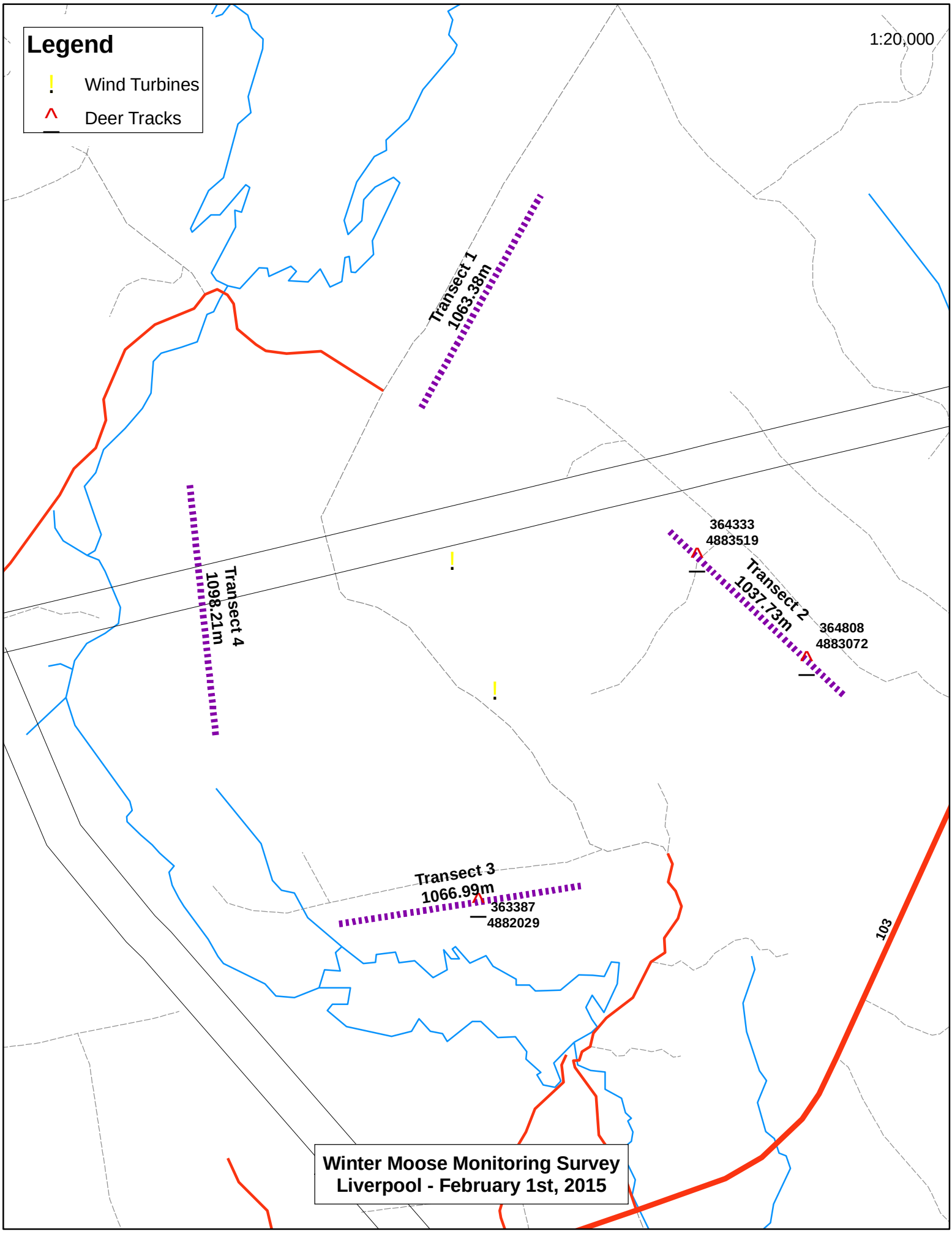

Legend
Wind Turbines
moose_scat
deer_scat
1:15,000
Transect 1
1063.38m
Transect 4
1098.21m
364257
4883591
Transect 2
1037.73m
Transect 3
1066.99m
362912
4881955
Spring Moose Pellet Group Inventory Survey
Liverpool - April 18, 2014
103

Liverpool Windfarm

Winter Moose Track Survey Report

Two moose track surveys were conducted in the winter of 2015. One was done in February and the other in March. The exact dates and information collected are on the attached maps.

The same transects were used as previous surveys. One meter on each side of the transect line was observed for tracks.


Legend
Wind Turbines
Deer Tracks
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Transect 2
1037.73m
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4883519
364808
4883072
Transect 3
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363387
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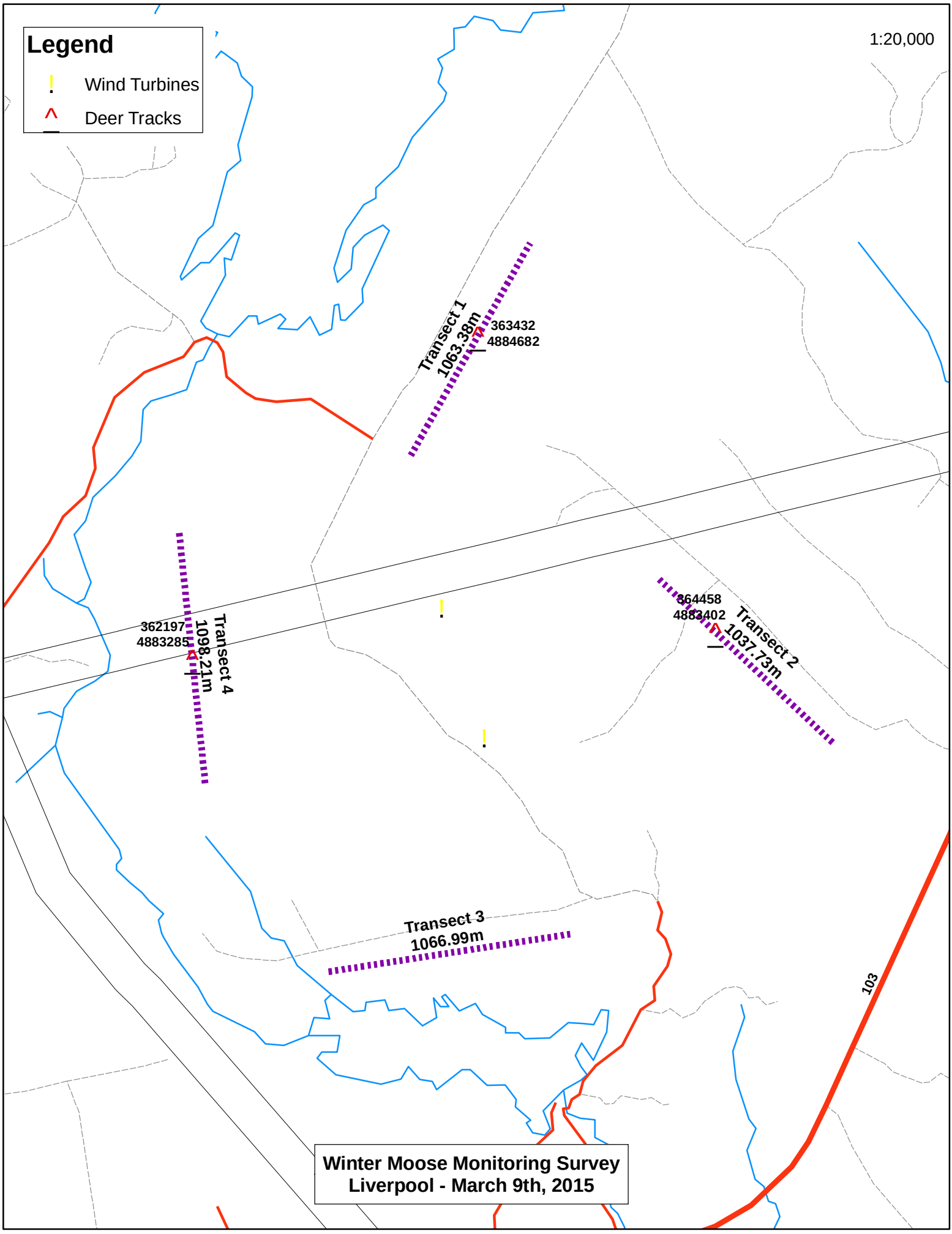
Transect 4
1098.21m
103
Winter Moose Monitoring Survey
Liverpool - February 1st, 2015


Legend
Wind Turbines
Deer Tracks
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1063.38m
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4884682
362197
4883285
Transect 4
1098.21m
364458
4883402
Transect 2
1037.73m
Transect 3
1066.99m
103
Winter Moose Monitoring Survey
Liverpool - March 9th, 2015

Appendix K – Community Engagement Documentation

Liverpool Wind Energy Storage Project

Project Information

Number of Turbines: 2

Location: Wind turbines – 1 km North of Nickerson's Pond
Energy Storage – Former Bowater Mersey Mill
(See attached map)

1.5 MW community owned turbine installed in 2011 by Watts Wind Energy Inc. in Watt Section, Nova Scotia

Project Description

This innovative project proposed in Liverpool will involve a wind farm and an energy storage system that uses compressed air as the storage medium. The project will be the first of its kind in the world. The storage will be located in the Innovacorp Demonstration Centre at the former site of the Bowater-Mersey Paper Mill. Approximately 5 km away the wind turbines will feed electricity to the local distribution grid when there is available capacity, and will otherwise provide power to charge the energy storage system. When the wind stops blowing, the energy storage system will feed electricity onto the grid to meet local demand. The result is a more reliable renewable energy source.

Environmental Assessment (EA)

Numerous field studies for the 2014 season have been completed (including birds, bats, archaeology, botany, biology, etc.) and Watts Wind Energy is planning to register an EA document to the NS Dept. of Environment in late March, 2015.

Socio-Economic Issues

An independent consultant was hired to complete detailed sound and shadow flicker assessments on the Project. Results from each study show that sound and shadow flicker levels from the proposed Project are well below Nova Scotia Environment guidelines.

Community Information Session

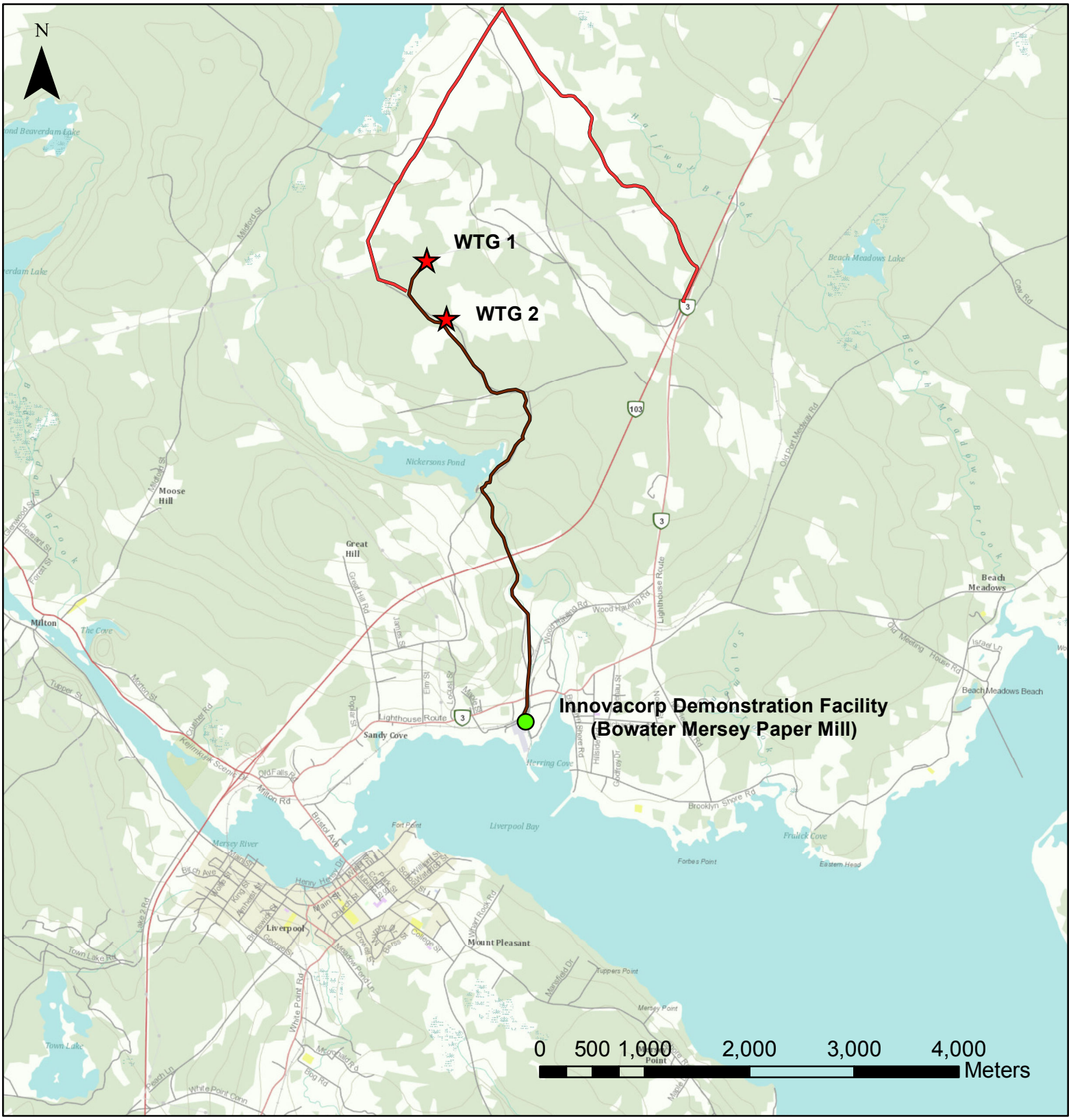
A community information session will be held in the Liverpool Fire Hall on **February 24th at 7 PM** where preliminary details of the Project with local residents will be discussed. The proposed construction schedule for the Liverpool Wind Project is included below.

Proposed Construction Schedule

Q1/2016 - Clearing of site
Q2/2016 - Civil/Electrical
Q3/2016 - Turbine Installation
Q4/2016 - Commercial Operation

For more information on the community wind energy project, please visit www.wattswind.com, or contact:

Trent MacDonald
E: tmacdonald@eonwind.com
P: 902-482-8687, ext. 201



Legend

- Turbine Location
- Access Road
- Utility Line

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Liverpool Wind Energy Storage Project

Map Parameters

Projection:UTM/NAD83/Z20
Project No: 122

Date: 2/9/2015

Wattswind
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Liverpool Community Information Session

Location: Liverpool Fire Hall, Liverpool

Date: February 24, 2015

Time: 7:00 pm to 9:00 pm

Hosted by: Stan Mason, P.Eng
Accompanied by: Sebastian Manchester, EIT

The following are details from the information session:

- The information session was attended by approximately 30 people
- The duration of the meeting was approximately 2 hours.
- The Proponent provided a background on Watts Wind Energy Inc., past and present projects, and the preliminary information on the proposed Liverpool Community Wind Farm.

The presentation was open for community questions throughout the project. The following concerns were raised in accordance to the information session and a following note is provided on how it was addressed:

Concern 1 – CEDIFs – who are the investor? How can we invest? What happens to our investment at the end of the project?

Addressed –

This concern was addressed by explaining how CEDIFs work by relating to Watts' experience as a CEDIF for over 4 years.

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Concern 2 – How long will the turbines last?

Addressed – It was explained that with regular service and maintenance turbines can last up to 30 years.

Concern 3 – Is the technology for storage proven?

Addressed – We explained that a team of experts are rigorously test the storage technology before deploying it in Liverpool. We also emphasized that part of the project's mandate is field testing the storage unit.

Concern 4 – How will this affect jobs in the region?

Addressed – This was addressed by describing the contractors required throughout the construction process, and the operations of the wind and storage project. We also described the spin offs the project will have.

Concern 5 - Will the wind Farm get bigger once these 2 turbines have been installed?

Addressed - We explained that the wind farm is limited in size due to distribution constraints, so the farm is not likely to get bigger.

Concern 6 - Will the project be "tour friendly"

Addressed - Since both the storage $ wind facilities are demonstrations, they are being designed to be safe $ accesible for tours.

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Liverpool Community Wind Farm Public Information Session
February 24th, 2015
Visitor Questionnaire

Your feedback as a valued stakeholder is important to us.

We appreciate that you have taken the time to attend this information session and fill out this questionnaire. Thank You! This information will help us plan the Liverpool Community Wind Farm and future wind energy developments in Nova Scotia.

Contact Information:

Name: (*Please circle:* Mr. / Mrs. / Ms.) _____

Address: _____ Town: _____ Postal code: _____

Is this your primary residence? **Yes** ☐ **No** ☐

Telephone number: _____ E-mail: _____

Did you receive the notice regarding this meeting in the mail? **Yes** ☐ **No** ☐

After attending this information session...

Do you have any questions about the Liverpool Community Wind Farm project?

_____

_____

_____

_____

Are there any issues that you feel should be addressed in regards to the community?

_____

_____

_____

_____

Has this information session answered your questions about the Liverpool Community Wind Farm project?

_____

_____

_____

Please continue on reverse side…

_____

Do you have any other comments about this information session or the project?

_____

_____

_____

_____

Please check the most appropriate response:

	Yes	No	Undecided
Do you support wind energy in general?	☐	☐	☐
Do you support wind energy in this county?	☐	☐	☐
Do you support the COMFIT program in NS?	☐	☐	☐
Did you find this information session informative?	☐	☐	
Did you take any of the provided educational brochures?	☐	☐	
Are you a civil/electrical contractor interested in helping construct the Liverpool Wind Farm (provide contact details below)?	☐	☐	
Interested in visiting Watt Section turbine?	☐	☐	
Would you be interesting in investing in the Watts CEDIF?	☐	☐	

Correspondence:

Would you like to be added to our **MAILING LIST** for future correspondence? **Yes** ☐ **No** ☐

How would you prefer to receive correspondence? **Regular Mail** ☐ **E-mail** ☐

(*Please ensure a full mailing address or e-mail address is clearly printed on the reverse side*.

Your phone number will only be used to clarify contact details in the event of an email or letter returned to sender)

Please tell us a little bit about yourself:

Occupation: _____

Age (check range): **Under 25** ☐ **25 – 34** ☐ **35 – 49** ☐ **50 – 64** ☐ **Over 65** ☐

Are you a member of any organizations in the area? **Yes** ☐ **No** ☐

If so, which one(s)? _____

Thank you for coming by the information session and filling out this questionnaire.
Please leave your completed questionnaire with a staff member or send it via fax or regular mail to:

Wattswind
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Watts Wind Energy Inc
4 MacDonald Avenue
Dartmouth, NS
B3B 1C5

Telephone: +1-902-482-0920
Fax: +1-866-314-5349

Contact Details
Contact Trent MacDonald: info@wattswind.com