

# Section 4.0

## Wetlands and Vegetation



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## 4.0 WETLANDS AND VEGETATION

### 4.1 Rationale for Selection as a VEC

Both wetlands and vegetation species of conservation concern are considered important resources that may be present within the Project footprint. Wetlands are regulated according to the *Watercourse and Wetland Alteration Regulation* (under the New Brunswick *Clean Water Act*). Vegetation species of conservation concern are regulated according to the NBSRA, which lists species that are protected. If potential impacts on wetlands and vegetation species of conservation concern cannot be avoided then mitigation should be implemented to minimize or avoid impacts. Federal agencies who issue approvals or funding should consider the potential effects on wetlands and species at risk as identified in The Federal Policy on Wetland Conservation and the Canadian SARA. Both federal and provincial wetland policies include the fundamental objective of “no net loss” of wetland function. In the practical sense this translates into no net loss of wetland area; therefore, wetlands in the study area must be identified and delineated so that the potential area of impact may be estimated. Mitigation for a net loss of wetland area due to project activities is expected. The type and amount of mitigation is established in consultation with regulatory agencies. Mitigation for impacts on species of conservation concern (if required) is also established in consultation with regulators, based on the site-specific conditions and the species involved.

#### 4.1.1 Wetlands Definition

Wetlands, for the purpose of this study, includes all currently identified wetlands in the provincial digital mapping as shown on the GeoNB website (NBERD, 2016) plus field identified wetlands which have the wetland characteristics described in the NB Wetlands Conservation Policy, as follows:

*Land that has the water table at, near, or above the land's surface, or which is saturated, for a long enough period to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic vegetation, and various kinds of biological activities adapted to the wet environment.*

#### 4.1.2 Vegetation Species of Conservation Concern Definition

Responsibility for species at risk is shared between federal and provincial regulators as agreed upon nationally in 1996 in the Accord for the Protection of Species at Risk, and extends to species that may become “at risk” but are not currently listed in regulations. For the purpose of this study, vegetation species of conservation concern (SOCC) include all vascular plants that are listed in Schedule A of the NBSRA, and those designated by the ACCDC as SRANK’s “S1, S2, S3, SH, or SX”. These rankings have the following definitions:

- S1 - Extremely rare in province.
- S2 - Rare in province.
- S3 - Uncommon in province.
- SH - Historically occurring but currently undetected in province.
- SX - Extinct or extirpated in province.

## 4.2 Boundaries for Environmental Effects Assessment

The boundaries for assessment of potential impacts on wetlands and vegetation SOCC includes possible development in or within 30 m of a wetland, or in areas where vegetation SOCC are present or with high potential to support such species. The spatial and temporal boundaries for development are identified below.

### 4.2.1 Spatial Boundaries

The spatial boundary includes all undeveloped environments within the proposed Project limits (Figure 4.1) including:

- 75 m on either side of any new centerline alignment, including the interchange ramps.
- 75 m on either side of the service road centerline alignments.
- 75 m on either side of North Napan Road, South Napan Road and O'Donnell Road for 150 m extending from the centerline on either side of the main highway alignment.
- 75 m on either side of King St. between its intersection with the northern service road and its intersection with Springvale Avenue.
- 30 m on either side of the property access road centerline alignment.
- Any area encompassed by the proposed interchange and the northern service road, as well as any area encompassed by the southern service road, existing Route 11 and proposed highway.

In addition, a 5 km buffer zone surrounding the proposed Project ROW (Study Area) was used for identifying known occurrences of vegetation SOCC; which is a standard used by the ACCDC for database searches (Appendix 4A).

### 4.2.2 Temporal Boundaries

The temporal boundaries for this EIA is assumed to be composed of two phases:

- Clearing, Site Preparation and Construction (Construction) Phase; and
- OMR Phase.

In the construction phase, specific construction-related effects are anticipated to be short term whereas during the operational period, effects are anticipated to be long term.

## 4.3 Methodology

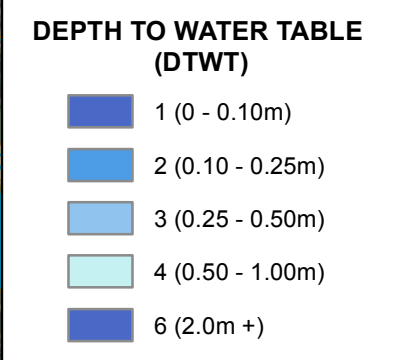
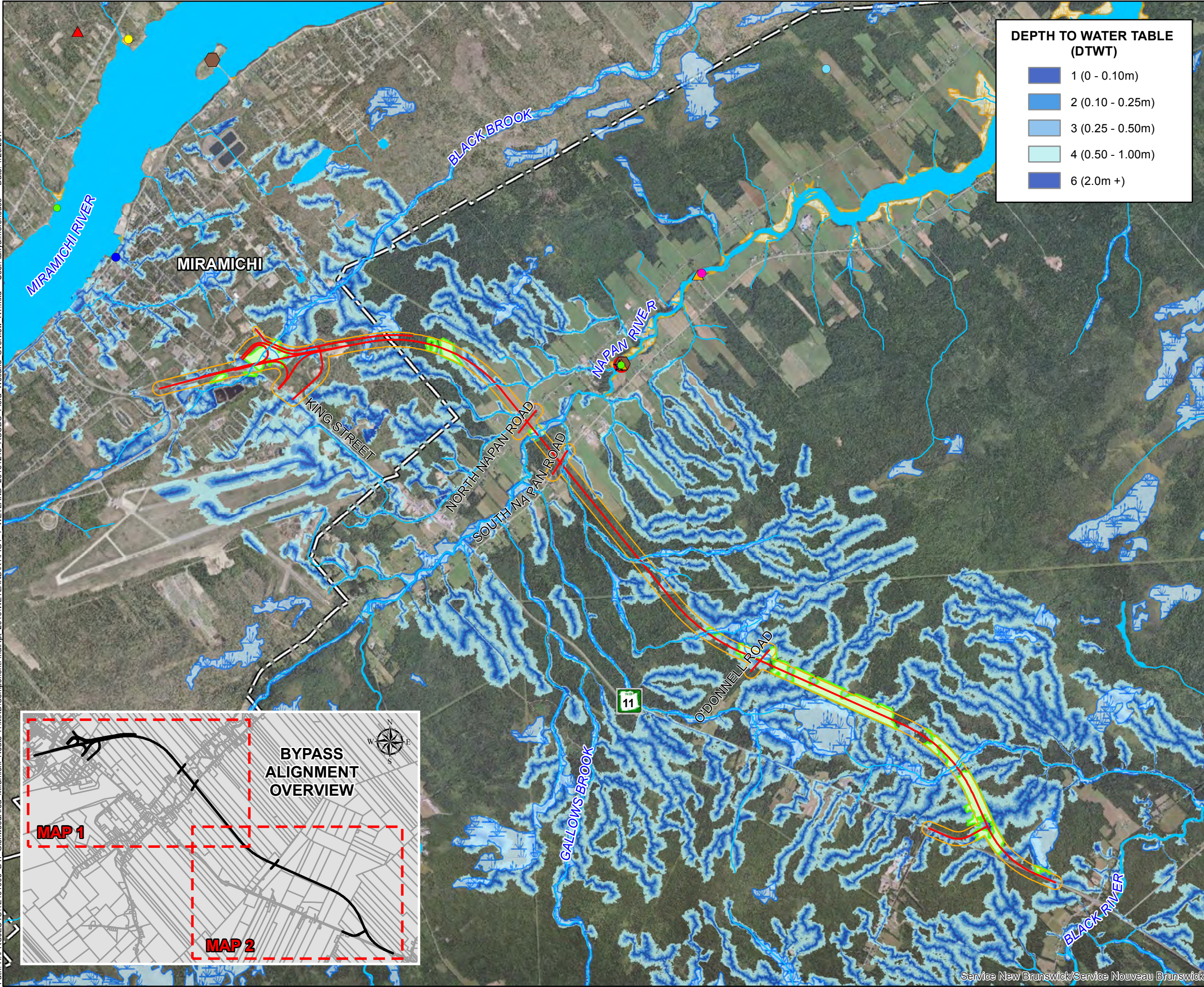
### 4.3.1 Wetlands

#### *Desktop Review*

At the beginning of the study, NBDTI provided digital mapping of provincially regulated wetlands and depth-to-water-table (DTWT). These wetlands are illustrated in Figure 4.1 and were used to identify probable unmapped wetlands within the Project Study Area.



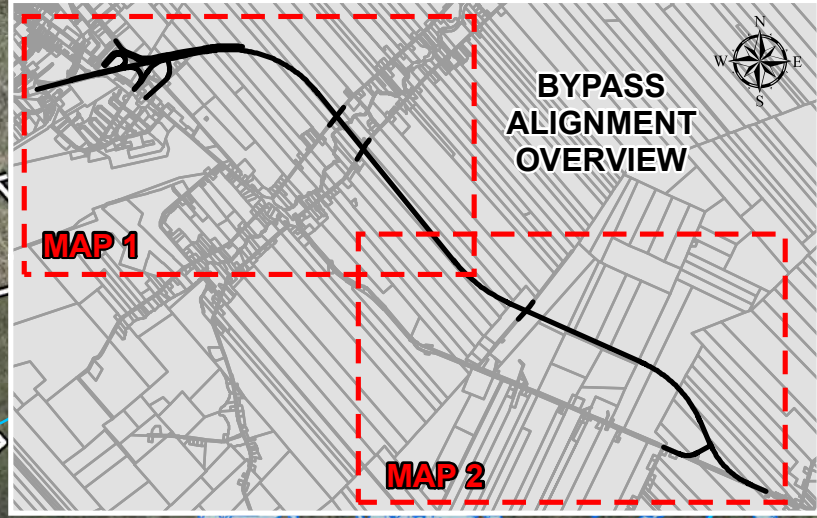
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**LEGEND:**

- Bathurst Aster - Bathurst pop.
- Estuary Beggarticks
- ★ Horned Pondweed
- ▲ Long-lobed Arrowhead
- Seaside Brookweed
- ▲ Showy Lady's-Slipper
- Small Yellow Lady's-Slipper
- Southern Mudwort
- Water Blinks
- Water Pygmyweed
- ↗ Bypass Alignment
- Wildlife and Wildlife Habitat Assessment Area
- Field Verified Wetland Area
- Provincially Significant Wetland
- Regulated Wetland
- ▭ Municipal Area (Miramichi)

SOURCE: ACCDC, 2016  
GeoNB (Wetland Data, 2016)  
GeoNB (DTWT Data, 2016)



CLIENT:

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PROJECT: ENVIRONMENTAL FIELD STUDIES  
VALUED ENVIRONMENTAL COMPONENT ASSESSMENT  
WETLANDS & VEGETATION  
ROUTE 11 GLENWOOD AREA TO  
MIRAMICHI BYPASS PROJECT

TITLE: WETLANDS AND  
FLORA SPECIES OF  
CONSERVATION CONCERN  
OVERVIEW

DATUM:	DWN BY:	DATE:
NAD 83 CSRS	TM	JAN 2017
PROJECTION:	CHK'D BY:	SCALE:
NB Stereographic	CL / JB	1:40,000
PROJECT NO:	REV NO:	FIGURE NO:
TE161006	R1	4.1

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### *Field Methodology*

Additional possible wetlands (not currently on provincial mapping) were identified during the reconnaissance survey in early spring. All identified areas of possible wetland were revisited between late June and early August (2016), to verify the presence/absence and to delineate the wetland boundaries according to the following methodology.

The wetland verification methodology was based on a two parameter (wetland hydrology and hydrophytic vegetation) approach. Wetland boundaries within the Project limits were delineated using this approach with waypoints/tracked lines recorded using a high resolution Global Positioning System (GPS) (rated for sub-metre accuracy). A description of vegetation, which includes the dominant species of each delineated wetland, hydrology and wetland type, was recorded using the NBDELG Wetland Verification Sheet as part of each wetland survey (see Appendix 4B).

### **4.3.2 Vegetation Species of Conservation Concern (SOCC)**

#### *Desktop Review*

A desktop review was conducted to identify the habitat types and areas of SOCC/rare plants located within the defined Project Study Area. A review of ACCDC records revealed ten (10) plant species of conservation concern known to occur within a 5 km radius of the site (Appendix 4A). Table 4.1 lists the previously identified species, their ranks, and the habitats they can be found in.

#### *Field Methodology*

A field reconnaissance was conducted in the early spring (concurrent with bird surveys) that was used to field verify the habitat present and assess the potential to support vegetation SOCC. The results of the habitat survey are presented above in Section 3.0 of this report.

Between 27<sup>th</sup> of June and 4<sup>th</sup> of August, 2016, areas of high potential to support flora SOCC within the Project Area were surveyed by two botanists: Christina LaFlamme, M.Sc. and Garrett Bell, C.E.T. All areas of the Project footprint were subject to a visual survey. Areas of apparent low potential to support SOCC, such as agricultural land, previously disturbed (forestry) mixed woods, and gravel pits were surveyed briefly and dismissed. Much greater effort was focussed on areas of unique habitat such as “Old” forest and watercourse crossings and wetlands; with which all of the previously recorded species are associated (see Table 4.1). Locations of any provincially sensitive SOCC plants within the Project Area were provided immediately to NBDTI. All plant species observed were recorded (Appendix 4C).

## **4.4 Description of Existing Environment**

### **4.4.1 Wetlands**

Twelve (12) wetlands were field verified and delineated within the Project Area as shown on Figures 4.2 and 4.3. These are summarized in Table 4.2. Detailed data sheets and site photos for each wetland are presented in Appendix 4B. One provincially mapped (GeoNB) wetland was discovered to be upland (mixed forest clear-cut) within the Project Area, located just west of the municipal boundary in Figure 4.2 (NBERD, 2016).

**Table 4.1 Flora Species of Conservation Concern Recorded within 5 km**

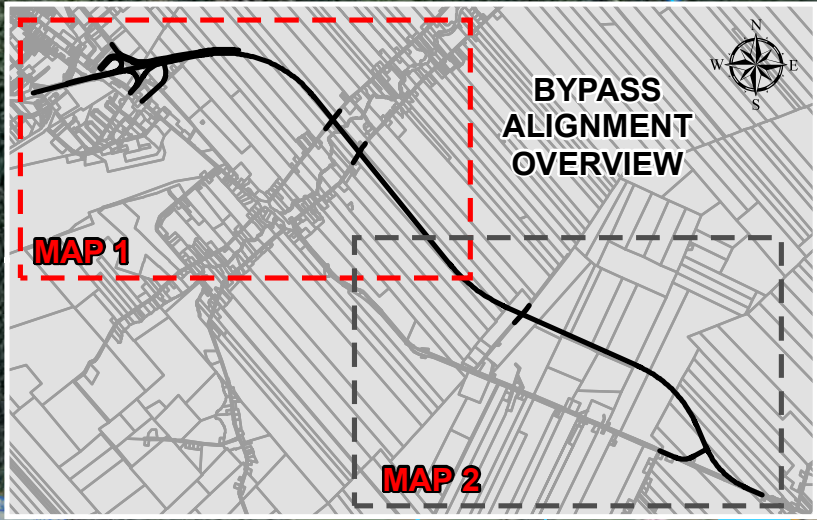
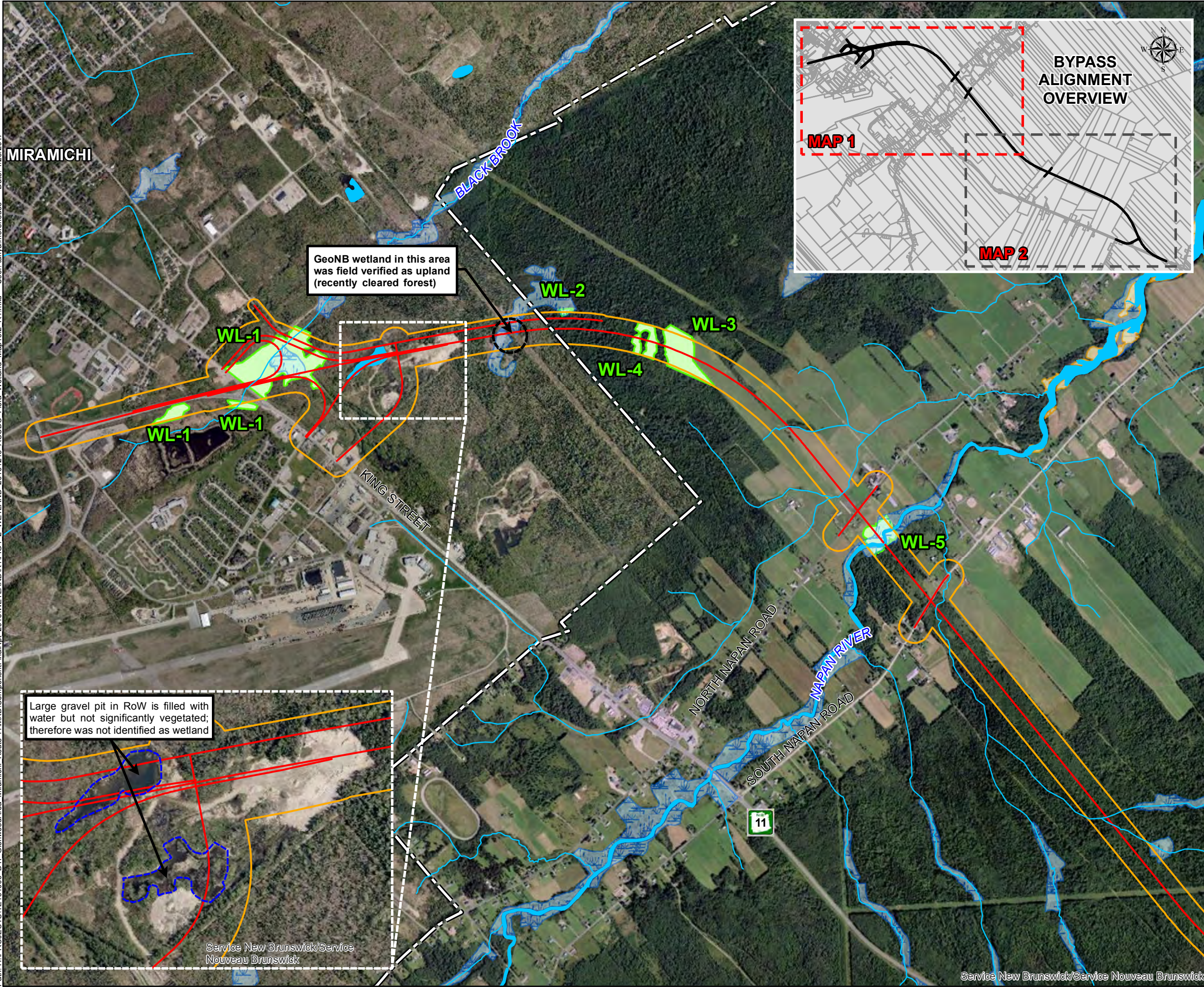
Scientific Name	Common Name	ACCDC Rank*	Federal SARA Rank	NB SARA Rank	Provincial General Status (GS) Rank	Habitat**
<i>Symphotrichum subulatum</i> (Bathurst pop)	Bathurst Aster - Bathurst pop.	S2	Special Concern	Endangered	At Risk	Estuary shorelines
<i>Sagittaria calycina</i> var. <i>spongiosa</i>	Long-lobed Arrowhead	S2	-	-	Secure	Estuary muddy shorelines
<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Small Yellow Lady's-Slipper	S2	-	-	May Be At Risk	Calcareous river banks
<i>Bidens hyperborea</i> var. <i>hyperborea</i>	Estuary Beggarticks	S3	-	-	Secure	River estuaries
<i>Crassula aquatica</i>	Water Pygmyweed	S3	-	-	Secure	Fresh/tidal muddy shores
<i>Samolus valerandi</i> ssp. <i>parviflorus</i>	Seaside Brookweed	S3	-	-	Secure	Estuary shorelines
<i>Limosella australis</i>	Southern Mudwort	S3	-	-	Secure	Brackish sands or mud
<i>Cypripedium reginae</i>	Showy Lady's-Slipper	S3	-	-	Sensitive	Calcareous bog/fen, and arborvitae swamps
<i>Zannichellia palustris</i>	Horned Pondweed	S3	-	-	Secure	Brackish pools
<i>Montia fontana</i>	Water Blinks	SH	-	-	May Be At Risk	Coastal shores/wet ledges

\*ACCDC Report 5555 (2016), Appendix 4A

\*\*Source: Hinds, H. 2000.



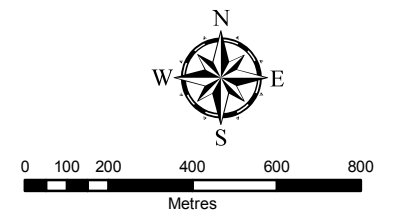
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**LEGEND:**

- Bypass Alignment
- Wildlife and Wildlife Habitat Assessment Area
- Field Verified Wetland Area
- Provincially Significant Wetland
- Regulated Wetland
- Municipal Area (Miramichi)

SOURCE: ACCDC, 2016  
GeoNB (Wetland Data, 2016)



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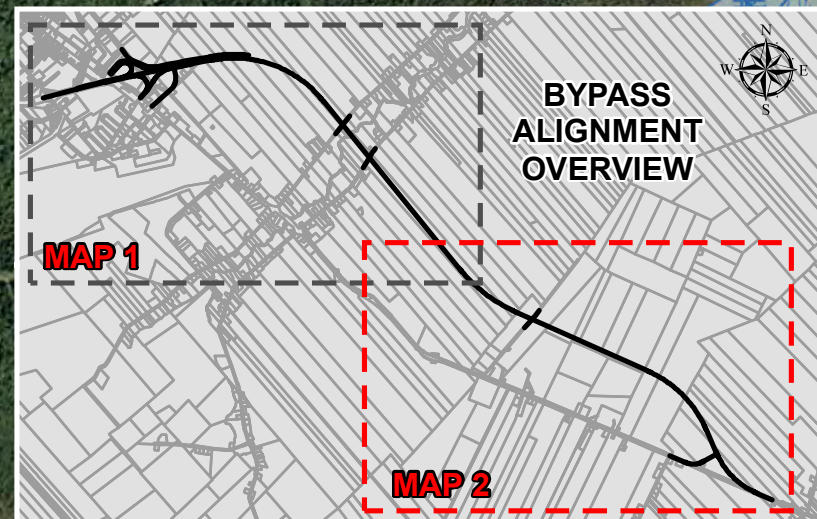
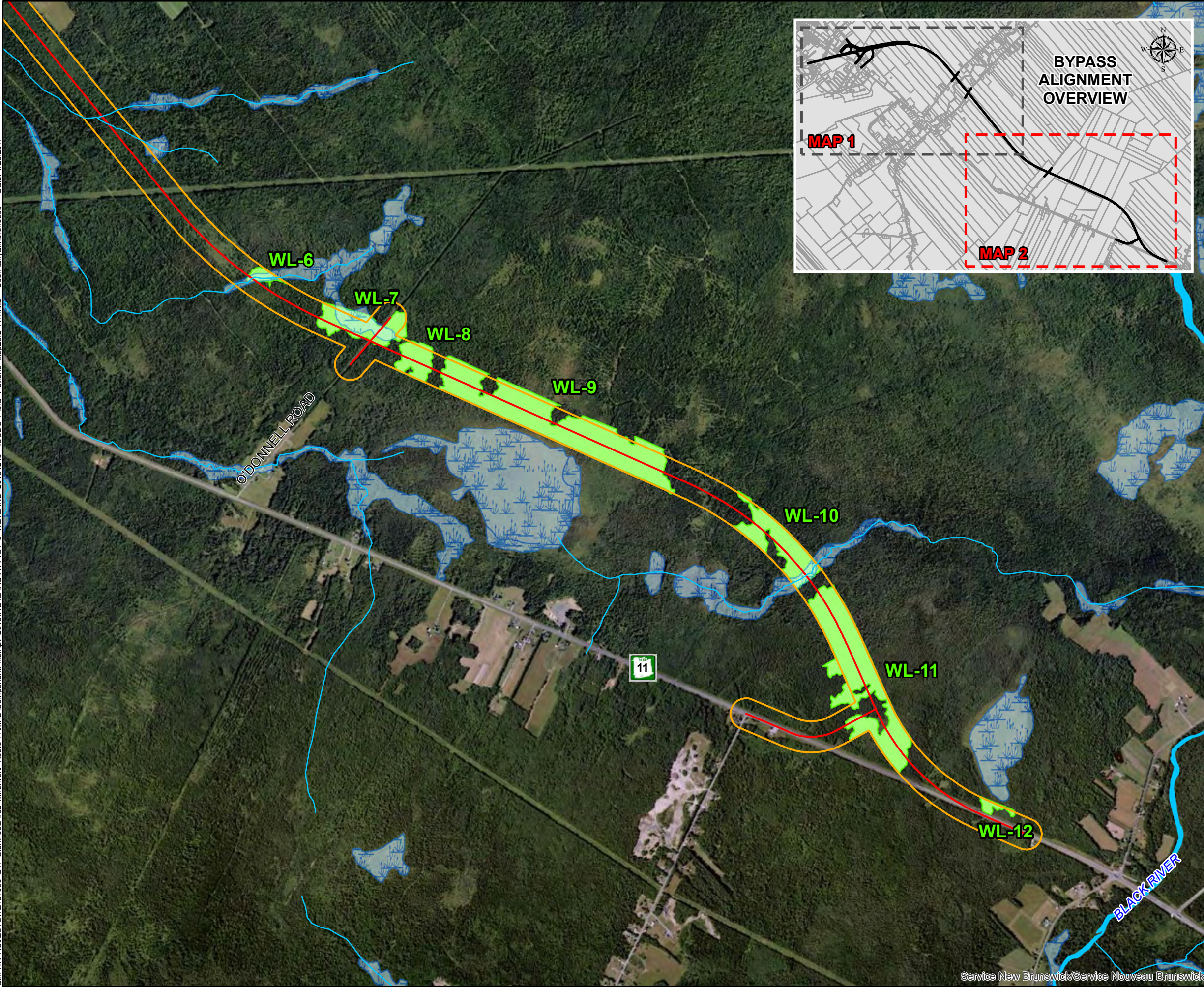
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MAP 1 of 2

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TE161006	R1	4.2

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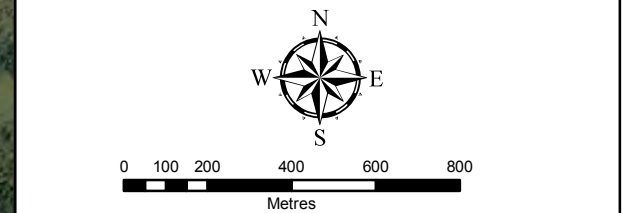
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**LEGEND:**

- Bypass Alignment
- Wildlife and Wildlife Habitat Assessment Area
- Field Verified Wetland Area
- Provincially Significant Wetland
- Regulated Wetland
- Municipal Area (Miramichi)

SOURCE: ACCDC, 2016  
GeoNB (Wetland Data, 2016)



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VALUED ENVIRONMENTAL COMPONENT ASSESSMENT  
WETLANDS & VEGETATION  
ROUTE 11 GLENWOOD AREA TO  
MIRAMICHI BYPASS PROJECT

TITLE: WETLANDS  
MAP 2 of 2

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PROJECT NO:	REV NO:	FIGURE NO:
TE161006	R1	4.3

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**Table 4.2 Wetland Areas**

Wetland No.	Wetland Type(s) in Project Area	Field Verified Wetland in Project Footprint (hectares, ha) <sup>1</sup>	Regulated (GeoNB) Wetland in Project Footprint (ha) <sup>1</sup>	Approx. Total Wetland Area (ha) <sup>2</sup>	Associated Watercourse	Connectivity <sup>3</sup>
WL-1	Fresh Marsh, Forested Swamp	3.68	0.61	>10	Black Bk	Riparian wetlands both upstream and downstream for several kilometres.
WL-2	Bog	0.003	0.003 <sup>4</sup>	3-4	N/A	May be isolated.
WL-3	Forested Swamp	0.92	0	5-6	N/A	May drain to Trib. of Napan Rv.
WL-4	Forested Swamp	0.47	0	3-4	N/A	May be isolated.
WL-5	Shrub Swamp	0.71	0.42	8-10	Napan Rv.	Riparian wetlands both upstream and downstream for several kilometres.
WL-6	Forested Swamp	0.24	0.26	>10	Trib. of Napan Rv.	Contiguous with WL-7, beyond Project Area.
WL-7	Forested Swamp	1.72	0.38	>10	Trib. of Napan Rv.	Contiguous with WL-6, beyond Project Area.
WL-8	Forested Swamp	0.95	0	3-4	N/A	May be isolated.
WL-9	Wetland Complex (softwood and hardwood forest swamp and fen)	6.63	0	>25	Trib. of both Napan Rv. & Black Rv.	Headwater to multiple streams, some with associated regulated (i.e., mapped) wetlands downstream.
WL-10	Wetland Complex (softwood forest swamp and fen, and riparian shrub swamp)	2.09	0.29	>15	Trib. of Black Rv.	Forest swamp/fen drains eastward into beaver impounded riparian shrub swamp.
WL-11	Forested Swamp	4.85	0	>15	N/A	May be isolated.
WL-12	Bog	0.06	0	>10	N/A	May be isolated
<b>Total:</b>		<b>22.32</b>	<b>1.96</b>			

- Notes: 1. The footprint approximations are provided for planning purposes, as a reasonable representation of the anticipated extent of construction and alterations. However, the actual footprint may vary from what is identified above in some areas once constructed. The final footprint of the Project will be determined when design drawings are prepared. Compensation requirements will be determined in consultation with regulators.
2. Minimum total area and size range estimated using aerial imagery and depth-to-water-table mapping.
3. Connectivity was based on field observations and depth-to-water-table mapping provided by NBDTI.
4. The GeoNB mapping shows a wetland area of approximately 0.63 hectares (ha) within the Project footprint, but this was field verified to be upland consisting of recently cleared forest. For conservation purposes, the footprint in WL-2 is practically negligible, and may be avoided entirely during construction.

All of the identified wetlands extend beyond the Project Area boundaries; therefore, the total area could not be field verified. Aerial imagery and DTWT mapping was used to infer minimum total area and size range (to the extent possible). Connectivity was based on field observations and DTWT mapping provided by NBDTI. Size estimates and connectivity is included in Table 4.2, as well as the approximate Project footprint within each wetland for both regulated (GeoNB) and field verified wetland areas (NBERD, 2016).

Ordinarily, the approximate total area of wetlands can be estimated relatively accurately based on the aerial imagery and DTWT mapping, but this was not true for the eastern part of the Project Area for the following reasons. Overall, there was a good correlation between areas of shallow groundwater predicted by the DTWT mapping and the field verified location of core wetland areas (Figure 4.1). However, the terrain in the eastern half of the Project Area has such low relief that the predicted boundaries are not reliable. Furthermore, forest characteristics are so similar between wetland and upland that wetland mapping (derived from aerial imagery) is not a good determinant of approximate wetland boundary, consistently underestimating the extent of wetlands.

There is a broad central plateau between the Napan River and the Black River that has very low relief. Drainage is poor and elevation along the ROW varies less than 5 m from wetland WL-6 to WL-12, a distance of 4.5 km (i.e., 0.1 % slope).

Within this plateau, the difference between upland and wetland is a matter of centimetres (cm), producing large swamps with “islands” and ridges of slightly dryer terrain. This includes wetlands WL-8, WL-9, WL-10, and WL-11, all of which are partly mosaic wetlands. The delineation of a wetland boundary for these wetlands required an approach that divides areas of predominantly wetland habitat (> 50%) from areas of predominantly upland habitat (that contains small swales). In general, where soils are consistently saturated, the forest is more open, with tall shrubs (mainly alder) and a lush ground cover of ferns, grasses and sedges, and sphagnum moss. Areas of higher terrain have denser forest and crown closure with relatively sparse ground cover and terrestrial mosses or well decomposed leaf litter. These two conditions blend together, producing many small islands of upland within a large network of swamp drainage paths. Conversely, the upland outside the delineated wetland boundary has progressively diminishing swales. Due to the subtle variation in local elevations, both wetland and upland vegetation is present throughout and side-by-side, changing only in relative abundance.

Many wetlands have been impacted by past timber harvesting activities. It is possible in some areas that surface hydrology has been altered by deep tracks, roads, and deforestation enough to transform former upland forest to swamp. Perhaps over time the drainage will revert, but the change may also be permanent.

The history of extensive timber harvesting has also left a network of old roads and trails that allow easy access to potentially effected wetlands by hunters and recreational all-terrain vehicles (ATVs).



### *Alien Invasive Species in Wetlands*

Alien invasive species are known to occur in the region and have a tendency to migrate along highway margins over time mainly by transport of seeds by regular traffic. Alien invasive species often compete aggressively with native species and may displace natural habitats with negative impacts on the associated wildlife populations. It should be noted the alien invasive species of wetlands, purple loosestrife (*Lythrum salicaria*), was observed in roadside ditches along the existing Route 11 in the surrounding region, but not within the Project Area. Reed canary grass (*Phalaris arundinacea*), considered by many to be invasive, was observed at several riparian wetlands within the Project Area. No other potential invasive plants of wetlands were observed during the study. The severity of eventual changes caused by alien invasive species is impossible to predict.

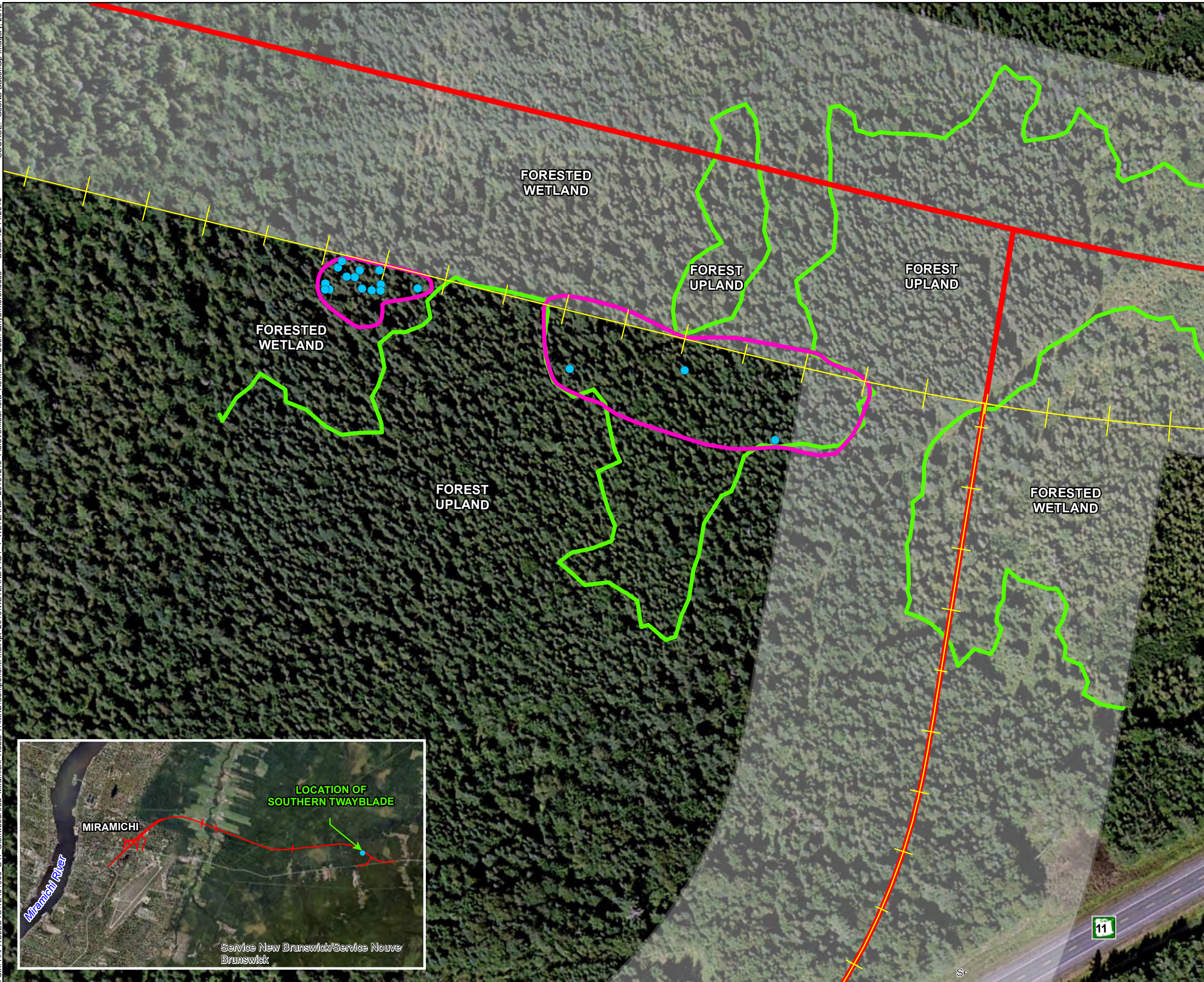
#### **4.4.2 Vegetation Species of Conservation Concern (SOCC)**

Between 27<sup>th</sup> of June and 04<sup>th</sup> of August (2016), vegetation surveys were conducted by two botanists; Christina LaFlamme, M.Sc. and Garrett Bell, C.E.T. All parts of the Project footprint were visually observed. Some potential “Old” forest areas were visited but were determined to be disturbed by past timber harvesting and not sufficiently regenerated to represent over-mature conditions. Watercourses and wetlands received the highest level of effort. None of the previously identified SOCC (Appendix 4A) were observed within the Project Area. A list of all flora species observed during the surveys is presented in Appendix 4C.

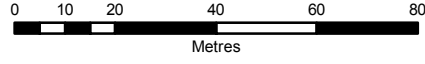
One vegetation SOCC was identified which had not been previously recorded by the ACCDC. A significant population of southern twayblade (*Listera australis*) was discovered near the preliminary Bypass alignment centreline (Figure 4.4). The southern twayblade is very rare, listed as Endangered under *NBSRA* and has a provincial GS Rank of “At Risk”. Approximately 30-40 individuals were observed at 17-recorded locations in two apparently separate high potential habitat zones.

The southern twayblade high potential areas occupy a somewhat peripheral part of the much larger forested bog / poor fen complex (WL-11), absent from open core wetland areas and apparently unsuited to very densely forested marginal areas as well. The site is generally bounded by mainly coniferous forest upland to the south and east and by forested wetland to the north and west. Portions of the upland and wetland have been subject to past timber harvesting but the southern twayblade occurrence appears to have been left uncut, perhaps due to non-merchantable timber size (tall but very narrow black spruce). Due to the very small number of known occurrences and the small size and area of local populations, the level of concern associated with the proposed highway construction would be high. NBDTI subsequently adjusted the Bypass alignment in order to avoid the identified population by at least 30 m, in consultation with NBERD (Hubert Askanas – Species at Risk Biologist, pers. comm., 2016).





- LEGEND:
- Southern Twayblade
  - High Potential Twayblade Habitat
  - ~ Field Verified Wetland Area
  - Preliminary Bypass Alignment
  - Revised Bypass Alignment
  - Revised Wildlife and Wildlife Habitat Assessment Area



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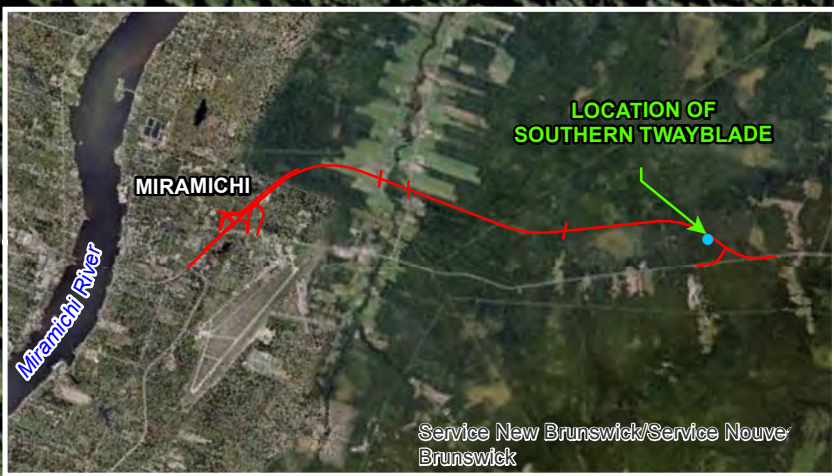
NEW BRUNSWICK DEPARTMENT OF TRANSPORTATION AND INFRASTRUCTURE

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PROJECT: ENVIRONMENTAL FIELD STUDIES  
VALUED ENVIRONMENTAL COMPONENT ASSESSMENT  
WETLANDS & VEGETATION  
ROUTE 11 GLENWOOD AREA TO  
MIRAMICHI BYPASS PROJECT

TITLE: FIELD VERIFIED FLORA SPECIES OF  
CONSERVATION CONCERN  
(SOUTHERN TWAYBLADE)

DATUM:	DWN BY:	DATE:
NAD 83 CSRS	TM	September 2016
PROJECTION:	CHK'D BY:	SCALE:
NB Stereographic	CL / JB	1:1,500
PROJECT NO:	REV NO:	FIGURE NO:
TE161006	R0	4.4





Halberd-leaved tearthumb (*Polygonum arifolium*) is assigned an SRANK of S3 by the ACCDC and has a provincial GS Rank of 4 (“Secure”). It was not previously identified within 5 km, but did have 15 records within 100 km, and it was observed many times within the Project Area. It is somewhat rare provincially but is apparently quite abundant locally. There were so many observations of this species between the Napan River and Black River that it was not practical to record every occurrence; at least 50 local patches (each containing dozens to hundreds of individuals) were identified within the sprawling swampland and riparian areas. It typically occurred in swamp and moist bottomland habitat, frequently in disturbed areas, including the survey cutline for the proposed ROW. Associated vegetation tended to be herbaceous and often sparse on partly bare organic soil (i.e., muck). The proposed right-of-way will overlap many of these local populations; which would be partly displaced. Given the apparently widespread distribution of suitable habitat and the size and health of local populations, it is considered unlikely that impacts from the proposed highway would significantly reduce the regional population. Moving the ROW alignment is not recommended since it is unlikely that the widespread population can be reasonably avoided.

Spotted coral-root (*Corallorhiza maculata*) is assigned an SRANK of S3S4 by the ACCDC and has a provincial GS Rank 3 (“Sensitive”). A few individuals were observed just outside the north edge of the Project Area, coincidentally within the wetland WL-4 boundary data site. It was not observed anywhere else within the Project footprint or field verification Project Area.

White fringed orchid (*Platanthera blepharoglottis*) is assigned an SRANK of S3 by the ACCDC and has a provincial GS Rank 4 (“Secure”). It was scattered throughout a 30 to 40 m zone around the wetland edge (over 30 plants). The Project footprint lies south of this zone, missing the observed plants by at least 20 m.

#### **4.5 Potential Effects Assessment**

All provincially sensitive populations of vegetation SOCC have been avoided; therefore, no interaction with Project activities is anticipated. While one “S3” species, Halberd-leaved tearthumb, has been observed in the Project footprint, the local population appears to be widespread and abundant; therefore, since it is considered provincially “Secure” (GS Rank 4), the risk of a population level impact is considered very low. It is important to note that all vegetation SOCC observed in this study are dependent on the associated wetland habitat for long-term survival; therefore, mitigation for potential impacts on wetlands also serves to protect these species in general.

The remainder of this section focuses on potential impacts on wetlands. Direct impacts on wildlife that use wetlands, such as migratory birds, are addressed in other component studies.

Wetlands can be adversely affected by direct removal, fragmentation, disturbance, erosion/sedimentation, and changes to hydrology, introduction of invasive species and release of hazardous materials. These impacts can interfere with wetland function, including species diversity. The effects can result from short-term activities during the construction phase and OMR phases.

#### 4.5.1 Construction Phase Potential Effects

Potential interactions with wetlands resulting from construction are summarized in Table 4.3.

**Table 4.3 Potential Project Construction Effects on Wetlands**

Valued Environmental Component	Project Interaction	Potential Effects
Wetlands	<ul style="list-style-type: none"> <li>• Clearing, grubbing, and excavation activities</li> <li>• Road construction</li> <li>• Culvert/bridge construction</li> <li>• Temporary work space/ access roads</li> <li>• Accidental spills</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of habitat</li> <li>• Altered hydrology</li> <li>• Erosion/sedimentation</li> <li>• Reduced water quality</li> <li>• Introduction of invasive species</li> </ul>

##### *Physical Impacts*

A number of large wetlands cross the entire Project Area and cannot be reasonably avoided. Therefore, some amount of wetland will be permanently lost within the new Bypass footprint. As identified in Table 4.2, this total impact area could be 22.32 ha of field verified wetland (only 1.96 ha represented in GeoNB mapping). These anticipated impacts are approximate and would be verified following construction. Compensation requirements will be determined in consultation with regulators.

In addition to the direct impacts due to infilling, wetlands in the Project Area could potentially be adversely affected by changes to the hydrology, due to altered drainage caused by the construction of the road embankment. Exposed soil due to site clearing, grubbing, grading, stripping and storing of topsoil or construction materials, may result in erosion and sedimentation. Sediments deposited in wetlands could smother existing vegetation, but may also contribute nutrients to the wetlands. Changes in nutrient levels may adversely affect plant communities in the wetlands. Effects would be greatest in low nutrient systems such as treed bogs and shrub bogs. Erosion and sedimentation may also occur in wetlands if associated beaver dams are removed/drained too quickly.

##### *Accidental Spills*

Wetlands in close proximity to the Project footprint may be adversely affected by accidental spills of deleterious substances such as fuels, lubricants or engine oil occur during the operation of construction and transportation equipment.

##### *Alien Invasive Species*

Where construction activities occur in wetlands, there is potential for introduction of alien invasive species seeds, roots or “rootable” fragments that may be stuck to construction equipment, transportation vehicles or shoes of workers. These propagules may be introduced into wetlands directly when equipment or people access the wetlands, or indirectly via runoff or dust from the roads. Invasive species such as purple loosestrife are known to degrade wetland habitat.

#### 4.5.2 Operation, Maintenance and Rehabilitation Phase Potential Effects

Potential Project interactions with wetlands during the Operation, Maintenance and Rehabilitation (OMR) phase are summarized in Table 4.4.

**Table 4.4 Potential Project OMR Effects on Wetlands**

Valued Environmental Component	Project Interaction	Potential Effects
Wetlands	<ul style="list-style-type: none"> <li>Traffic related emissions (dust, contaminants)</li> <li>Maintenance activities adjacent to wetlands (road salt, sedimentation)</li> <li>Rehabilitation activities (similar to construction)</li> </ul>	<ul style="list-style-type: none"> <li>Reduced water quality</li> <li>Introduction of invasive species</li> </ul>

##### *Physical Impacts*

Sediment runoff from roads during operation are not likely to adversely affect wetlands, since the amounts of material are expected to be very small. Maintenance of roadsides will involve vegetation management as described in the NBDTI EMM (NBDTI, 2010).

##### *Road Salt*

The use of road salt for winter safety may adversely affect vegetation and water quality in wetlands. Road salt is a toxic substance that can reduce water quality. Road salt runoff can influence vegetation species composition in wetlands, though the area would be very small.

##### *Alien Invasive Species*

The potential for introduction of invasive species carried on vehicles operated on roads is much lower than during construction, since disturbed wetland soils will be revegetated. During maintenance of culverts and bridges at wetland crossings, the potential for introducing invasive species would be similar to construction. Since invasive species are already present in roadside wetlands in the region, it is inevitable that small amounts will eventually occupy ditches and emergent wetlands nearby. The majority of wetlands are of the forested type in which typical invasive species, like purple loosestrife, are not likely to dominate.

#### 4.5.3 Accidents, Malfunctions and Unplanned Events

As noted in Table 4.3 and Table 4.4, a potential for accidents, malfunctions, and unplanned events to occur is possible in all phases of the Project, including failure of sediment and erosion control measures, chemical and fuel spills, and fires.

During construction, maintenance, or rehabilitation activities, a severe storm event could cause sediment protection measures and other on-site safeguards to fail; which could adversely affect surface water quality and wetland habitat.

During all phases of the Project, the transfer of fuel and chemicals from storage containers or tanker trucks, vehicle accidents and leaks from vehicles, storage facilities or delivery lines can result in spills of petroleum hydrocarbons, hazardous materials, or other substances. Such spills



could contaminate soils and groundwater and, through runoff, contaminate watercourses and wetlands. Contaminants may adversely affect surface water quality and wetland habitat.

During all phases of the Project, accidental fires may occur. Sources of fire include hot exhaust or equipment, discarded cigarettes, or sparks. In addition, during the operational phase motor vehicle accidents may result in fire. Accidental fires in wetlands (most are forested within the Project Area) may result in a temporary reduction of habitat function.

#### **4.6 Mitigation Measures**

Mitigation measures to be employed during the Construction and OMR Phases as well as in the event of an Accident, Malfunction and Unplanned Event, of the Project are presented in Table 4.5. These measures are presented in an effort to reduce the impact of the Project's interactions with wetlands and vegetation species of conservation concern.

#### **4.7 Significance of Residual Effects**

All flora species listed in federal and provincial regulations and those considered "sensitive" by the Province were avoided. Only one flora SOCC was identified in the proposed project footprint (Halberd-leaved tearthumb); which was found to be very abundant and widespread throughout the Study Area in wetlands and riparian zones. While the impact on individual plants within the project footprint is not expected to significantly reduce the regional population, the halberd-leaved tearthumb is highly dependent on the associated wetland habitat. Therefore, mitigation for impacts on wetlands will also mitigate potential impacts of habitat loss for vegetation SOCC. A significant adverse effect of Project components or activities on wetlands is defined as an effect that causes a permanent or uncompensated net loss in wetland function.

An adverse effect that does not cause a permanent net loss in wetland function and is considered to be not significant.

Table 4.6 provides a summary of the potential for proposed Project activities to cause significant adverse environmental effects after standard mitigation, as described in the EMM.

**Table 4.5 Summary of Mitigation Measures for Wetlands**

Environmental and Project Component	Summary of Potential Effects	Standard NBDTI EMM Mitigation Measures <sup>1</sup>	Additional Recommended Mitigation Measures
<b>Construction</b>			
<p>All aspects of highway construction, including clearing, roadbed construction, surfacing, temporary work areas and access roads where there is the potential to encroach upon wetland habitat.</p> <p>Storm water management.</p>	<ul style="list-style-type: none"> <li>• Loss (infilling) of wetland habitat.</li> <li>• Alteration of wetland hydrology.</li> <li>• Erosion/sedimentation in wetlands.</li> <li>• Reduction in water quality.</li> <li>• Introduction of invasive species in wetlands.</li> </ul>	<p>5.1 Asphalt Concrete</p> <p>5.2 Beaver and Beaver Dam Removal</p> <p>5.3 Clearing</p> <p>5.4 Culverts</p> <p>5.5 Detouring</p> <p>5.6 Dust Control</p> <p>5.7 Erosion and Sediment Management</p> <p>5.8 Excavation, Blasting and Aggregate Production</p> <p>5.10 Fire Prevention and Contingency</p> <p>5.11 Grubbing</p> <p>5.12 Spill Management</p> <p>5.13 Storage and Handling of Petroleum Products</p> <p>5.14 Storage and Handling of Other Hazardous Materials</p> <p>5.15.1 Structures Construction</p> <p>5.16.3 Ditch Maintenance</p> <p>5.17.2 Pits</p> <p>5.17.3 Stockpiling</p> <p>5.17.4 Quarries</p> <p>5.17.5 Temporary Access Roads</p> <p>5.17.6 Temporary Watercourse/Wetland Crossings</p> <p>5.17.7 Marshalling Yards and Laydown Areas</p> <p>5.17.9 Work Camps</p> <p>5.17.10 Decommissioning Temporary Ancillary Facilities</p> <p>5.18 Topsoil</p> <p>5.19 Vehicle and Equipment Management</p> <p>5.20.1 Disposal Areas</p> <p>5.20.3 Garbage and Other Wastes</p> <p>5.20.4 Litter Barrels and Litter Pick-up</p> <p>5.20.6 Vegetation Waste</p> <p>5.22 Work Progression</p> <p>5.23.8 Watercourses, Fish and Fish Habitat</p> <p>5.23.10 Wetlands</p> <p>5.23.11 Wildlife and Wildlife Habitat</p>	<ul style="list-style-type: none"> <li>• No additional protective measures required.</li> </ul>



**Table 4.5 Summary of Mitigation Measures for Wetlands**

Environmental and Project Component	Summary of Potential Effects	Standard NBDTI EMM Mitigation Measures <sup>1</sup>	Additional Recommended Mitigation Measures
<b>Operation, Maintenance and Rehabilitation (OMR)</b>			
Traffic related emissions (dust, contaminants).  Maintenance activities adjacent to wetlands (road salt, vegetation maintenance, sedimentation).  Rehabilitation activities (similar to construction).	<ul style="list-style-type: none"> <li>Reduced water quality.</li> <li>Introduction of invasive species.</li> <li>Reduction in habitat value.</li> </ul>	5.2 Beaver Dam Removal 5.4.4 Culvert Maintenance 5.5 Detouring 5.6 Dust Control 5.7 Erosion and Sediment Management 5.10 Fire Prevention and Contingency 5.12 Spill Management 5.13 Storage and Handling of Petroleum Products 5.14 Storage and Handling of Other Hazardous Materials 5.15.2 Structure Maintenance 5.15.3 Removal of Structures 5.16 Summer Highway Maintenance 5.19 Vehicle and Equipment Management 5.20 Waste Management 5.21 Winter Highway Maintenance	<ul style="list-style-type: none"> <li>Compensation for permanent loss of wetland area that is displaced by the Project footprint.</li> </ul>
<b>Accidents, Malfunctions and Unplanned Events (during Construction and OMR activities)</b>			
Accidental spills of hazardous materials or pollutants in/near wetlands.	<ul style="list-style-type: none"> <li>Contaminants may adversely affect water quality and wetland habitat.</li> </ul>	5.12 Spill Management 5.13 Storage and Handling of Petroleum Products 5.14 Storage and Handling of Other Hazardous Materials	<ul style="list-style-type: none"> <li>No additional protective measures required.</li> </ul>
Failure of erosion/sedimentation control measures.	<ul style="list-style-type: none"> <li>Degradation of water quality and wetland habitat.</li> </ul>	5.7 Erosion and Sediment Management	<ul style="list-style-type: none"> <li>No additional protective measures required.</li> </ul>
Fire	<ul style="list-style-type: none"> <li>Reduction of forest wetland habitat.</li> </ul>	5.10 Fire Prevention and Contingency 5.13 Storage and Handling of Petroleum Products 5.14 Storage and Handling of Other Hazardous Materials 5.24 Working Near Pipelines and Other Underground Services	<ul style="list-style-type: none"> <li>No additional protective measures required.</li> </ul>

Note:

1. Source: NBDTI EMM (2010)

**Table 4.6 Significance of Residual Effects to Wetlands and Flora SOCC after Standard Mitigation**

Project Related Environmental Effect	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological Context	Significant Effect
<b>Construction – Activities / Interactions</b>						
<b>Flora Species of Conservation Concern</b>						
Direct mortality of halberd-leaved tearthumb individuals during construction will reduce local population by a very small proportion, based on the apparent abundance within the Study Area and the vast expanse of similar wetland habitat in adjacent areas.	M	M	One temporary impact during clearing (population may recover)	Yes	Halberd-leaved tearthumb is uncommon in some regions but provincially “secure”. In the Study Area, it is very abundant and widespread and suitable habitat is abundant both within and outside the proposed project footprint. The regional population can be expected to recover from a moderate impact, provided suitable habitat (primarily wetlands) is available.	No
<b>Wetlands</b>						
Displacement of wetland habitat by the new road embankment.	M	M	Permanent	No	Net loss of wetland will be replaced through compensation according to regulatory requirements.	No
<b>Operation, Maintenance and Rehabilitation (OMR) – Activities / Interactions</b>						
<b>Wetlands</b>						
Erosion/ sedimentation.	L	L	OMR Period	Yes	Expected impacts are negligible.	No
Reduced water quality, change in roadside vegetation due to road salt.	L	L	OMR Period	Yes	Wetlands will purify water over time.	No
Introduction of invasive species.	L	L	Permanent	No	Invasive species already occur in roadside wetlands in the region.	No

Notes:

**Magnitude:**

- High (H)* Total loss of wetland function and/or affecting overall hydrology; Any reduction in a SOCC population considered “sensitive” by the Province.
- Moderate (M)* Partial loss of wetland function in the core of the wetland that does not affect overall hydrology; A reduction in regional SOCC population considered “secure” by the Province.
- Low (L)* *Partial loss of wetland function in an extremity of the wetland that does not affect overall hydrology; Reduction in local SOCC population considered “secure” by the Province.*

**Geographic Extent:**

- High (H)* Entire wetland affected (typically by altered hydrology); Project impacts entire SOCC habitat area (primarily wetlands).
- Moderate (M)* Greater than 10% of wetland affected or affecting overall hydrology; Project impacts >10% of SOCC habitat area (primarily wetlands).
- Low (L)* *Less than 10 % of wetland area and not affecting overall hydrology, or wetland area < 1 ha; Project impacts <10% of SOCC habitat area (primarily wetlands).*



## **4.8 Monitoring and Follow-up Requirements**

As identified in the EMM (Section 5.23.10), wetlands remaining following partial impacts by highway construction shall be monitored after construction to visually assess the wetland hydrology, the introduction of invasive plant species, the chloride levels in the soil, and the use by recreational vehicles.

Additional monitoring and follow-up requirements prescribed by regulators in conditions of approval and WAWA permits, including wetland compensation (if applicable), shall be conducted.

## **4.9 Wetlands and Vegetation - References**

Atlantic Canada Conservation Data Center (ACCDC). 2016. Data Request. Data report 5555: Miramichi, NB- Response to a data request; Species of Conservation Concern within a 5 km radius May, 2016.

Hinds, H. 2000. Flora of New Brunswick, Second Ed. University of New Brunswick, Fredericton, New Brunswick.

New Brunswick Department of Transportation (NBDTI). 2010. Environmental Management Manual. Fourth Edition. Accessed online: <http://www.gnb.ca/0113/publications/EMM/EMM-e.pdf>.

New Brunswick Department of Energy and Resource Development (NBERD). 2016. New Brunswick's Crown Land Conservation Areas – Interactive Map. Hosted by GeoNB. Accessed 23 August, 2016 from [http://www.snb.ca/GeoNB1/e/map-carte/DNR\\_cf\\_E.asp](http://www.snb.ca/GeoNB1/e/map-carte/DNR_cf_E.asp).

### **4.9.1 Personal Communications**

Askanas, Hubert. New Brunswick Department of Energy and Resource Development (NBDERD) Species at Risk Biologist. Contacted regarding Species at Risk on 04 October, 2016.



**APPENDIX 4A**  
**ACCDC Report 5555: Miramichi, NB**



## DATA REPORT 5555: Miramichi, NB

Prepared 13 May 2016  
by J. Churchill, Data Manager

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#### 2.0 Rare and Endangered Species

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- 2.2 Fauna
- Map 2: Flora and Fauna

#### 3.0 Special Areas

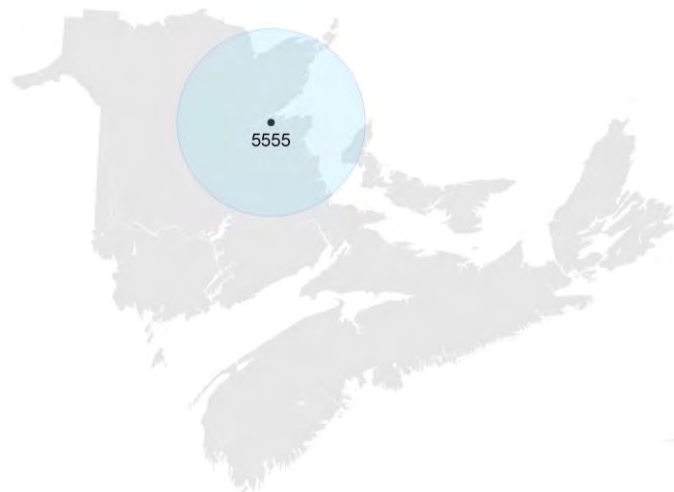
- 3.1 Managed Areas
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Map 1. A 100 km buffer around the study area

## 1.0 PREFACE

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

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

### 1.1 DATA LIST

Included datasets:

Filename	Contents
MiramichiNB_5555ob.xls	All Rare and legally protected <i>Flora and Fauna</i> within 5 km of your study area
MiramichiNB_5555ob100km.xls	A list of Rare and legally protected <i>Flora and Fauna</i> within 100 km of your study area
MiramichiNB_5555ma.xls	All <i>Managed Areas</i> in your study area
MiramichiNB_5555sa.xls	All <i>Significant Natural Areas</i> in your study area
MiramichiNB_5555ff.xls	Rare and common <i>Freshwater Fish</i> in your study area (DFO database)



## 1.2 RESTRICTIONS

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

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

## 1.3 ADDITIONAL INFORMATION

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

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

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

Sean Blaney, Senior Scientist, Executive Director

Tel: (506) 364-2658

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

### Animals (Fauna)

John Klymko, Zoologist

Tel: (506) 364-2660

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

### Plant Communities

Sarah Robinson, Community Ecologist

Tel: (506) 364-2664

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

### Data Management, GIS

James Churchill, Data Manager

Tel: (902) 679-6146

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

### Billing

Jean Breau

Tel: (506) 364-2657

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

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

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in New Brunswick, please contact Stewart Lusk, Natural Resources: (506) 453-7110.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in Nova Scotia, please contact Sherman Boates, NSDNR: (902) 679-6146. To determine if location-sensitive species (section 4.3) occur near your study site please contact a NSDNR Regional Biologist:

**Western:** Duncan Bayne

(902) 648-3536

[baynedz@gov.ns.ca](mailto:baynedz@gov.ns.ca)

**Western:** Donald Sam

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**Eastern:** Donald Anderson

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**Eastern:** Terry Power

(902) 563-3370

[powertd@gov.ns.ca](mailto: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 Garry Gregory, PEI Dept. of Communities, Land and Environment: (902) 569-7595.

## 2.0 RARE AND ENDANGERED SPECIES

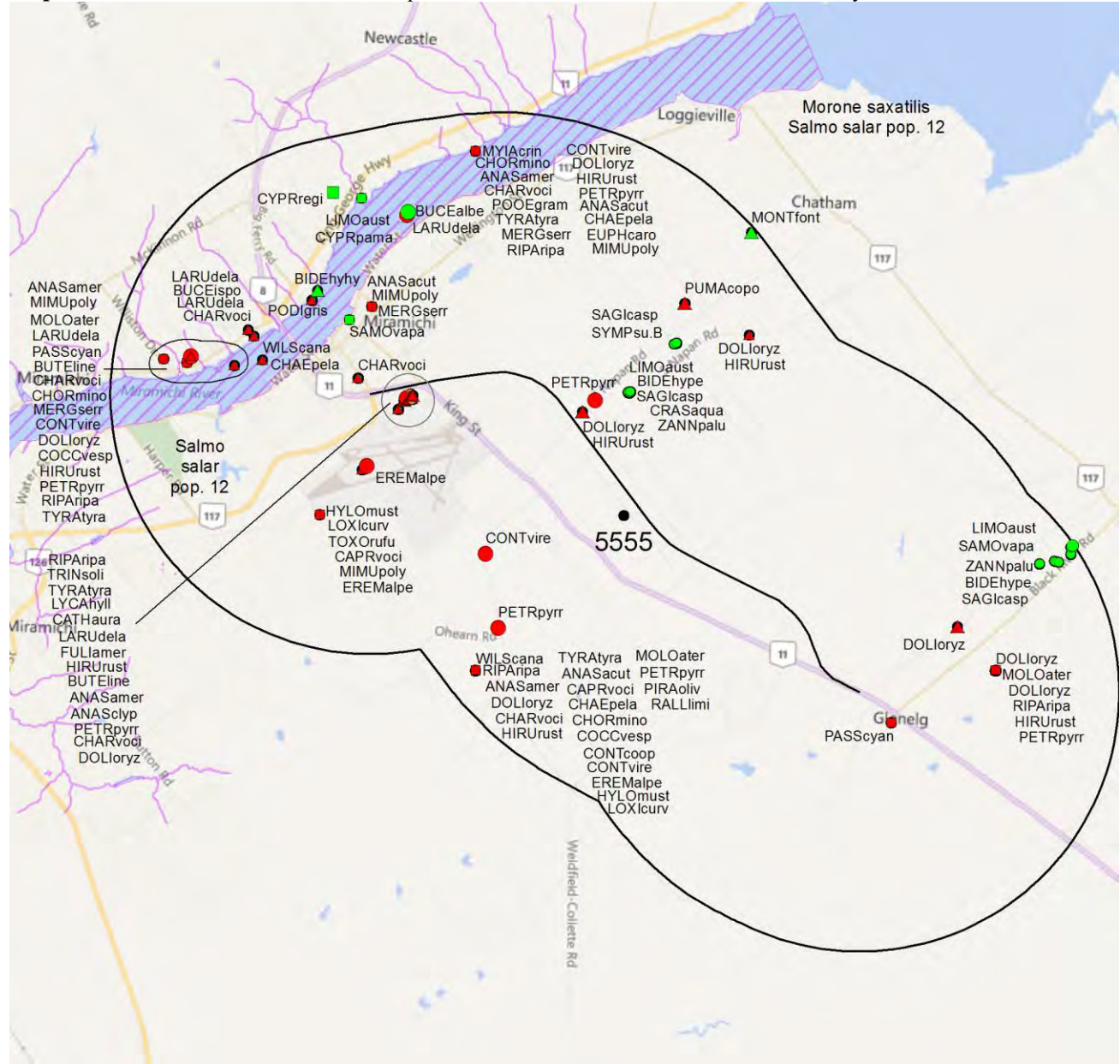
### 2.1 FLORA

A 5 km buffer around the study area contains 21 records of 11 vascular, no records of nonvascular flora (Map 2 and attached: \*ob.xls).

### 2.2 FAUNA

A 5 km buffer around the study area contains 228 records of 38 vertebrate, 2 records of 1 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.



#### RESOLUTION

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

#### HIGHER TAXON

- vertebrate fauna
- invertebrate fauna
- vascular flora
- nonvascular flora

### 3.0 SPECIAL AREAS

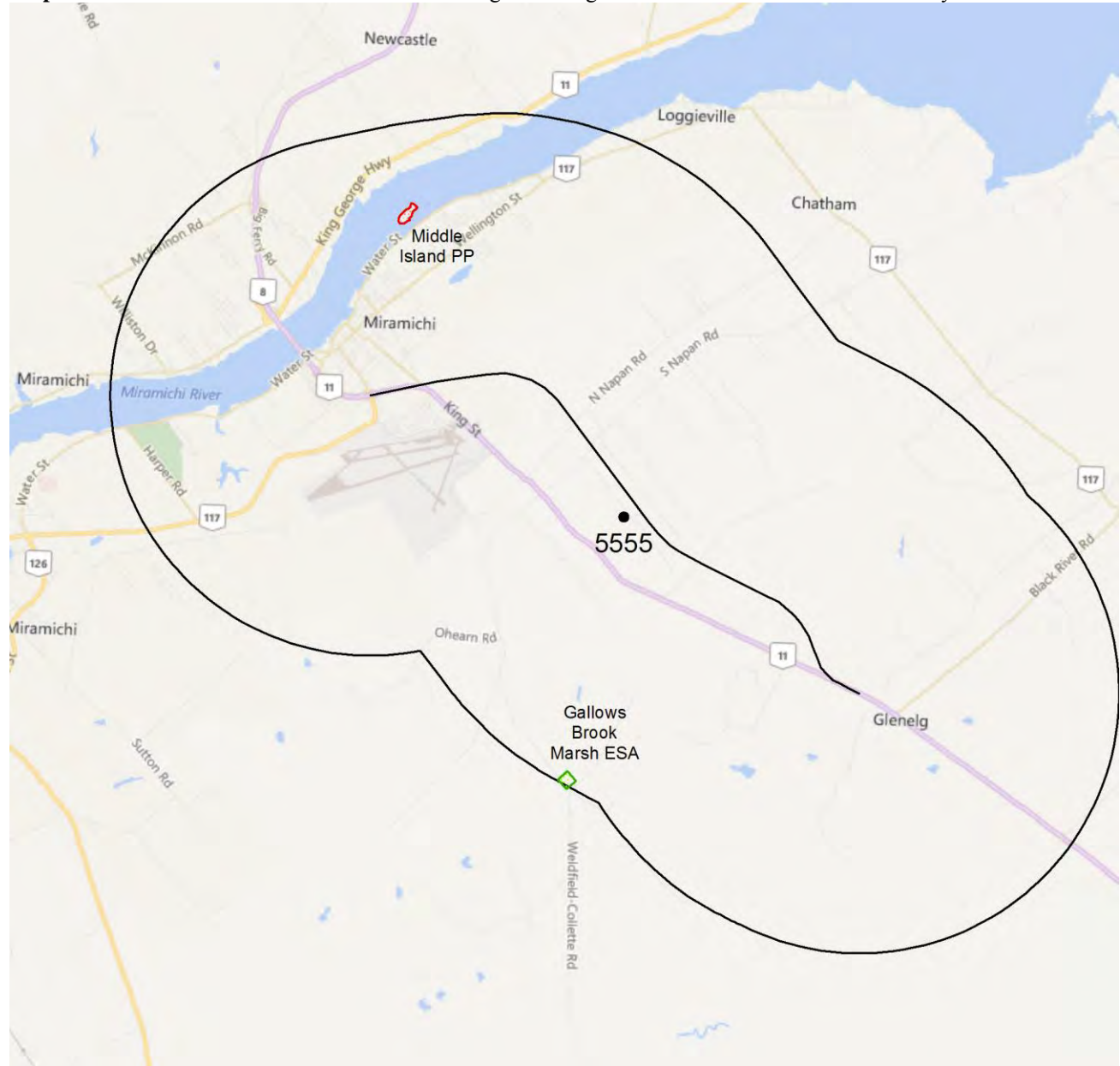
#### 3.1 MANAGED AREAS

The GIS scan identified 1 managed area in the vicinity of the study area (Map 3 and attached file: \*ma\*.xls)

#### 3.2 SIGNIFICANT AREAS

The GIS scan identified 1 biologically significant site 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.



#### MANAGED AREAS SIGNIFIGANT AREAS

- boundary
- boundary
- approximate
- approximate
- point location

#### NATIONAL DEFENSE FIRST NATIONS

- boundary
- boundary
- approximate
- approximate
- point location



## 4.0 RARE SPECIES LISTS

Rare and/or endangered taxa (excluding “location-sensitive” species, section 4.3) 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 ( $\pm$  the precision, in km, of the record). [P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community. Note: records are from attached files \*ob.xls/\*ob.shp only.

### 4.1 FLORA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	<i>Symphotrichum subulatum</i> (Bathurst pop)	Bathurst Aster - Bathurst pop.	Special Concern	Special Concern	Endangered	S2	1 At Risk	1	3.5 $\pm$ 0.0
P	<i>Sagittaria calycina</i> var. <i>spongiosa</i>	Long-lobed Arrowhead				S2	4 Secure	4	2.4 $\pm$ 0.0
P	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	1	7.9 $\pm$ 5.0
P	<i>Bidens hyperborea</i>	Estuary Beggarticks				S3	4 Secure	2	2.4 $\pm$ 0.0
P	<i>Bidens hyperborea</i> var. <i>hyperborea</i>	Estuary Beggarticks				S3	4 Secure	1	7.3 $\pm$ 1.0
P	<i>Crassula aquatica</i>	Water Pygmyweed				S3	4 Secure	1	2.4 $\pm$ 0.0
P	<i>Samolus valerandi</i> ssp. <i>parviflorus</i>	Seaside Brookweed				S3	4 Secure	3	6.5 $\pm$ 5.0
P	<i>Limosella australis</i>	Southern Mudwort				S3	4 Secure	4	2.4 $\pm$ 0.0
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S3	3 Sensitive	1	8.4 $\pm$ 10.0
P	<i>Zannichellia palustris</i>	Horned Pondweed				S3	4 Secure	2	2.4 $\pm$ 0.0
P	<i>Montia fontana</i>	Water Blinks				SH	2 May Be At Risk	1	6.0 $\pm$ 1.0

### 4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Hylocichla mustelina</i>	Wood Thrush	Threatened		Threatened	S1S2B	2 May Be At Risk	2	4.1 $\pm$ 7.0
A	<i>Caprimulgus vociferus</i>	Whip-Poor-Will	Threatened	Threatened	Threatened	S2B	1 At Risk	4	4.1 $\pm$ 7.0
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Threatened	S2S3B	1 At Risk	3	4.1 $\pm$ 7.0
A	<i>Chordeiles minor</i>	Common Nighthawk	Threatened	Threatened	Threatened	S3B	1 At Risk	6	4.1 $\pm$ 7.0
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened		Threatened	S3B	3 Sensitive	29	2.1 $\pm$ 1.0
A	<i>Riparia riparia</i>	Bank Swallow	Threatened			S3B	3 Sensitive	12	4.1 $\pm$ 7.0
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3S4B	1 At Risk	1	4.1 $\pm$ 7.0
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Threatened	S3S4B	1 At Risk	2	4.1 $\pm$ 7.0
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened		Threatened	S3S4B	3 Sensitive	23	2.1 $\pm$ 1.0
A	<i>Bucephala islandica</i> (Eastern pop.)	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern	Special Concern	S2N	3 Sensitive	1	7.9 $\pm$ 0.0
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S3B	2 May Be At Risk	1	7.6 $\pm$ 7.0
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern		Special Concern	S4B	4 Secure	7	2.8 $\pm$ 0.0
A	<i>Buteo lineatus</i>	Red-shouldered Hawk	Not At Risk	Special Concern		S2B	2 May Be At Risk	2	4.8 $\pm$ 0.0
A	<i>Fulica americana</i>	American Coot	Not At Risk			S2B	3 Sensitive	1	4.7 $\pm$ 1.0
A	<i>Podiceps grisegena</i>	Red-necked Grebe	Not At Risk			S3M,S2N	3 Sensitive	1	7.3 $\pm$ 0.0
A	<i>Puma concolor</i> pop. 1	Cougar - Eastern pop.	Data Deficient		Endangered	SU	5 Undetermined	1	4.3 $\pm$ 1.0
A	<i>Anas clypeata</i>	Northern Shoveler				S2B	4 Secure	1	4.8 $\pm$ 1.0
A	<i>Eremophila alpestris</i>	Horned Lark				S2B	2 May Be At Risk	7	4.1 $\pm$ 7.0
A	<i>Toxostoma rufum</i>	Brown Thrasher				S2B	3 Sensitive	1	5.8 $\pm$ 7.0
A	<i>Pooecetes gramineus</i>	Vesper Sparrow				S2B	2 May Be At Risk	1	7.6 $\pm$ 7.0
A	<i>Tringa solitaria</i>	Solitary Sandpiper				S2B,S5M	4 Secure	2	4.7 $\pm$ 0.0
A	<i>Loxia curvirostra</i>	Red Crossbill				S3	4 Secure	2	4.1 $\pm$ 7.0
A	<i>Anas acuta</i>	Northern Pintail				S3B	3 Sensitive	3	4.1 $\pm$ 7.0
A	<i>Anas americana</i>	American Wigeon				S3B	4 Secure	15	4.1 $\pm$ 7.0
A	<i>Cathartes aura</i>	Turkey Vulture				S3B	4 Secure	1	4.7 $\pm$ 0.0
A	<i>Rallus limicola</i>	Virginia Rail				S3B	3 Sensitive	1	4.1 $\pm$ 7.0
A	<i>Charadrius vociferus</i>	Killdeer				S3B	3 Sensitive	17	4.1 $\pm$ 7.0
A	<i>Larus delawarensis</i>	Ring-billed Gull				S3B	4 Secure	24	4.7 $\pm$ 0.0
A	<i>Myiarchus crinitus</i>	Great Crested Flycatcher				S3B	3 Sensitive	1	7.6 $\pm$ 7.0
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S3B	3 Sensitive	6	5.8 $\pm$ 7.0

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Passerina cyanea</i>	Indigo Bunting				S3B	4 Secure	2	6.5 ± 7.0
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S3B	2 May Be At Risk	11	4.1 ± 7.0
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3B,S4S5N	4 Secure	4	6.3 ± 7.0
A	<i>Bucephala albeola</i>	Bufflehead				S3N	3 Sensitive	1	7.1 ± 0.0
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3S4B	3 Sensitive	15	4.1 ± 7.0
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S3S4B	3 Sensitive	12	2.3 ± 0.0
A	<i>Piranga olivacea</i>	Scarlet Tanager				S3S4B	4 Secure	1	4.1 ± 7.0
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak				S3S4B,S4S5N	3 Sensitive	4	4.1 ± 7.0
I	<i>Lycaena hyllus</i>	Bronze Copper				S3	3 Sensitive	2	4.6 ± 0.0

### 4.3 LOCATION SENSITIVE SPECIES

The Department of Natural Resources in each Maritimes province considers a number of species “location sensitive”. Concern about exploitation of location-sensitive species precludes inclusion of precise coordinates in this report. Those intersecting a 5 km buffer of your study area are indicated below with “YES”.

#### New Brunswick

Scientific Name	Common Name	SARA	Prov Legal Prot	Known within 5 km of Study Site?
<i>Chrysemys picta picta</i>	Eastern Painted Turtle			No
<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	No
<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	YES
<i>Haliaeetus leucocephalus</i>	Bald Eagle		Endangered	YES
<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Endangered	No
<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	Endangered	Endangered	No
<i>Coenonympha nipsisquit</i>	Maritime Ringlet	Endangered	Endangered	No
<i>Bat Hibernaculum</i>		[Endangered] <sup>1</sup>	[Endangered] <sup>1</sup>	No

<sup>1</sup> *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all Endangered under the Federal Species at Risk Act and the NB Species at Risk 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
124	eBird. 2014. eBird Basic Dataset. Version: EBD_relNov-2014. Ithaca, New York. Nov 2014. Cornell Lab of Ornithology, 25036 recs.
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7	Coursol, F. 2005. Dataset from New Brunswick fieldwork for <i>Eriocaulon parkeri</i> COSEWIC report. Coursol, Pers. comm. to C.S. Blaney, Aug 26. 110 recs.
3	Hinds, H.R. 1986. Notes on New Brunswick plant collections. Connell Memorial Herbarium, unpubl, 739 recs.
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2	Klymko, J.J.D. 2014. Maritimes Butterfly Atlas, 2012 submissions. Atlantic Canada Conservation Data Centre, 8552 records.
1	Bradford, R.G. et al. 1999. Update on the Status of Striped bass ( <i>Morone saxatilis</i> ) in eastern Canada in 1998.
1	EMR Place Names
1	Scott, Fred W. 1998. Updated Status Report on the Cougar ( <i>Puma Concolor cougar</i> ) [ Eastern population]. Committee on the Status of Endangered Wildlife in Canada, 298 recs.
1	Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc, 6042 recs.
1	Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc.



## 5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 15426 records of 102 vertebrate and 572 records of 53 invertebrate fauna; 3902 records of 253 vascular, 113 records of 60 nonvascular flora (attached: \*ob100km.xls).

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

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Myotis lucifugus</i>	Little Brown Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	2	40.6 $\pm$ 1.0	NB
A	<i>Dermochelys coriacea</i> (Atlantic pop.)	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered	Endangered	S1S2N	1 At Risk	4	36.3 $\pm$ 1.0	NB
A	<i>Morone saxatilis</i>	Striped Bass	Endangered			S2	2 May Be At Risk	14	9.1 $\pm$ 10.0	NB
A	<i>Charadrius melodus melodus</i>	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S2B	1 At Risk	2216	11.3 $\pm$ 0.0	NB
A	<i>Calidris canutus rufa</i>	Red Knot rufa ssp	Endangered		Endangered	S3M	1 At Risk	298	16.7 $\pm$ 0.0	NB
A	<i>Rangifer tarandus pop. 2</i>	Woodland Caribou (Atlantic-Gasp -rsie pop.)	Endangered	Endangered	Extirpated	SX	0.1 Extirpated	5	33.0 $\pm$ 5.0	NB
A	<i>Hylocichla mustelina</i>	Wood Thrush	Threatened		Threatened	S1S2B	2 May Be At Risk	51	4.1 $\pm$ 7.0	NB
A	<i>Sturnella magna</i>	Eastern Meadowlark	Threatened		Threatened	S1S2B	2 May Be At Risk	7	12.9 $\pm$ 7.0	NB
A	<i>Caprimulgus vociferus</i>	Whip-Poor-Will	Threatened	Threatened	Threatened	S2B	1 At Risk	47	4.1 $\pm$ 7.0	NB
A	<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	Threatened	S2S3	1 At Risk	544	3.0 $\pm$ 0.0	NB
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Threatened	S2S3B	1 At Risk	192	4.1 $\pm$ 7.0	NB
A	<i>Catharus bicknelli</i>	Bicknell's Thrush	Threatened	Special Concern	Threatened	S2S3B	1 At Risk	121	41.1 $\pm$ 13.0	NB
A	<i>Chordeiles minor</i>	Common Nighthawk	Threatened	Threatened	Threatened	S3B	1 At Risk	319	4.1 $\pm$ 7.0	NB
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened		Threatened	S3B	3 Sensitive	598	2.1 $\pm$ 1.0	NB
A	<i>Riparia riparia</i>	Bank Swallow	Threatened		Threatened	S3B	3 Sensitive	434	4.1 $\pm$ 7.0	NB
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3S4B	1 At Risk	414	4.1 $\pm$ 7.0	NB
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Threatened	S3S4B	1 At Risk	390	4.1 $\pm$ 7.0	NB
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened		Threatened	S3S4B	3 Sensitive	585	2.1 $\pm$ 1.0	NB
A	<i>Anguilla rostrata</i>	American Eel	Threatened		Threatened	S5	4 Secure	12	7.4 $\pm$ 1.0	NB
A	<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius	Special Concern	Special Concern	Endangered	S1B	1 At Risk	11	12.8 $\pm$ 20.0	NB
A	<i>Histrionicus histrionicus pop. 1</i>	Harlequin Duck - Eastern pop.	Special Concern	Special Concern	Endangered	S1B,S1N	1 At Risk	4	61.9 $\pm$ 1.0	NB
A	<i>Bucephala islandica</i> (Eastern pop.)	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern	Special Concern	S2N	3 Sensitive	72	7.9 $\pm$ 0.0	NB
A	<i>Asio flammeus</i>	Short-eared Owl	Special Concern	Special Concern	Special Concern	S3B	3 Sensitive	11	33.9 $\pm$ 0.0	NB
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S3B	2 May Be At Risk	162	7.6 $\pm$ 7.0	NB
A	<i>Phalaropus lobatus</i>	Red-necked Phalarope	Special Concern			S3M	3 Sensitive	5	68.6 $\pm$ 1.0	NB
A	<i>Phocoena phocoena</i> (NW Atlantic pop.)	Harbour Porpoise - Northwest Atlantic pop.	Special Concern	Threatened		S4		1	94.7 $\pm$ 5.0	NB
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern		Special Concern	S4B	4 Secure	370	2.8 $\pm$ 0.0	NB
A	<i>Podiceps auritus</i>	Horned Grebe	Special Concern		Special Concern	S4M,S4N	4 Secure	3	60.0 $\pm$ 3.0	NB
A	<i>Odobenus rosmarus rosmarus</i>	Atlantic Walrus	Special Concern		Extirpated	SX		4	33.2 $\pm$ 1.0	NB
A	<i>Falco rusticolus</i>	Gyr Falcon	Not At Risk			S1N	5 Undetermined	3	78.0 $\pm$ 0.0	NB
A	<i>Accipiter cooperii</i>	Cooper's Hawk	Not At Risk			S1S2B	2 May Be At Risk	2	95.6 $\pm$ 5.0	NB
A	<i>Aegolius funereus</i>	Boreal Owl	Not At Risk			S1S2B	2 May Be At Risk	14	27.2 $\pm$ 7.0	NB
A	<i>Sorex dispar</i>	Long-tailed Shrew	Not At Risk	Special Concern		S2	3 Sensitive	8	84.9 $\pm$ 1.0	NB
A	<i>Buteo lineatus</i>	Red-shouldered Hawk	Not At Risk	Special Concern		S2B	2 May Be At Risk	10	4.8 $\pm$ 0.0	NB
A	<i>Fulica americana</i>	American Coot	Not At Risk			S2B	3 Sensitive	5	4.7 $\pm$ 1.0	NB
A	<i>Chlidonias niger</i>	Black Tern	Not At Risk			S2B	3 Sensitive	5	38.0 $\pm$ 7.0	NB
A	<i>Globicephala melas</i>	Long-finned Pilot Whale	Not At Risk			S2S3		1	29.0 $\pm$ 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Lynx canadensis</i>	Canadian Lynx	Not At Risk		Endangered	S3	1 At Risk	39	12.2 ± 1.0	NB
A	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Not At Risk		Endangered	S3B	1 At Risk	358	1.9 ± 0.0	NB
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk			S3B	3 Sensitive	608	16.4 ± 1.0	NB
A	<i>Podiceps grisegena</i>	Red-necked Grebe	Not At Risk			S3M,S2N	3 Sensitive	8	7.3 ± 0.0	NB
A	<i>Canis lupus</i>	Gray Wolf	Not At Risk		Extirpated	SX	0.1 Extirpated	1	40.3 ± 100.0	NB
A	<i>Puma concolor pop. 1</i>	Cougar - Eastern pop.	Data Deficient		Endangered	SU	5 Undetermined	44	4.3 ± 1.0	NB
A	<i>Salvelinus alpinus</i>	Arctic Char				S1	3 Sensitive	5	84.9 ± 1.0	NB
A	<i>Synaptomys borealis</i>	Northern Bog Lemming				S1	5 Undetermined	3	65.3 ± 1.0	NB
A	<i>Lasionycteris noctivagans</i>	Silver-haired Bat				S1?	5 Undetermined	2	94.6 ± 1.0	NB
A	<i>Bartramia longicauda</i>	Upland Sandpiper				S1B	3 Sensitive	14	43.3 ± 7.0	NB
A	<i>Phalaropus tricolor</i>	Wilson's Phalarope				S1B	3 Sensitive	13	68.1 ± 7.0	NB
A	<i>Leucophaeus atricilla</i>	Laughing Gull				S1B	3 Sensitive	1	39.9 ± 0.0	NB
A	<i>Sterna paradisaea</i>	Arctic Tern				S1B	2 May Be At Risk	37	16.4 ± 0.0	NB
A	<i>Troglodytes aedon</i>	House Wren				S1B	5 Undetermined	4	13.2 ± 7.0	NB
A	<i>Aythya marila</i>	Greater Scaup				S1B,S2N	4 Secure	14	35.2 ± 1.0	NB
A	<i>Uria aalge</i>	Common Murre				S1B,S3N	4 Secure	3	85.0 ± 0.0	NB
A	<i>Alca torda</i>	Razorbill				S1B,S3N	4 Secure	7	87.8 ± 14.0	NB
A	<i>Oxyura jamaicensis</i>	Ruddy Duck				S1B,S4N	4 Secure	17	35.7 ± 0.0	NB
A	<i>Rissa tridactyla</i>	Black-legged Kittiwake				S1B,S4N	4 Secure	24	84.0 ± 0.0	NB
A	<i>Butorides virescens</i>	Green Heron				S1S2B	3 Sensitive	2	68.1 ± 7.0	NB
A	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron				S1S2B	3 Sensitive	191	34.8 ± 1.0	NB
A	<i>Empidonax traillii</i>	Willow Flycatcher				S1S2B	3 Sensitive	20	12.9 ± 7.0	NB
A	<i>Progne subis</i>	Purple Martin				S1S2B	2 May Be At Risk	13	36.8 ± 7.0	NB
A	<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow				S1S2B	2 May Be At Risk	5	41.1 ± 1.0	NB
A	<i>Salmo salar</i>	Atlantic Salmon				S2	2 May Be At Risk	2081	7.4 ± 1.0	NB
A	<i>Lasiurus cinereus</i>	Hoary Bat				S2?	5 Undetermined	13	36.1 ± 0.0	NB
A	<i>Anas clypeata</i>	Northern Shoveler				S2B	4 Secure	76	4.8 ± 1.0	NB
A	<i>Anas strepera</i>	Gadwall				S2B	4 Secure	65	13.0 ± 0.0	NB
A	<i>Eremophila alpestris</i>	Horned Lark				S2B	2 May Be At Risk	120	4.1 ± 7.0	NB
A	<i>Toxostoma rufum</i>	Brown Thrasher				S2B	3 Sensitive	33	5.8 ± 7.0	NB
A	<i>Pooecetes gramineus</i>	Vesper Sparrow				S2B	2 May Be At Risk	70	7.6 ± 7.0	NB
A	<i>Tringa solitaria</i>	Solitary Sandpiper				S2B,S5M	4 Secure	92	4.7 ± 1.0	NB
A	<i>Chroicocephalus ridibundus</i>	Black-headed Gull				S2M,S1N	3 Sensitive	7	68.3 ± 0.0	NB
A	<i>Somateria spectabilis</i>	King Eider				S2N	4 Secure	2	60.0 ± 1.0	NB
A	<i>Asio otus</i>	Long-eared Owl				S2S3	5 Undetermined	13	33.5 ± 1.0	NB
A	<i>Tringa semipalmata</i>	Willet				S2S3B	3 Sensitive	454	9.6 ± 0.0	NB
A	<i>Pinicola enucleator</i>	Pine Grosbeak				S2S3B,S4S5N	3 Sensitive	56	16.4 ± 0.0	NB
A	<i>Branta bernicla</i>	Brant				S2S3M,S2S3N	4 Secure	64	33.3 ± 10.0	NB
A	<i>Cephus grylle</i>	Black Guillemot				S3	4 Secure	41	58.3 ± 3.0	NB
A	<i>Loxia curvirostra</i>	Red Crossbill				S3	4 Secure	102	4.1 ± 7.0	NB
A	<i>Salvelinus namaycush</i>	Lake Trout				S3	3 Sensitive	1	98.8 ± 0.0	NB
A	<i>Sorex maritimensis</i>	Maritime Shrew				S3	4 Secure	39	18.3 ± 0.0	NB
A	<i>Picoides dorsalis</i>	American Three-toed Woodpecker				S3?	3 Sensitive	63	35.6 ± 0.0	NB
A	<i>Anas acuta</i>	Northern Pintail				S3B	3 Sensitive	174	4.1 ± 7.0	NB
A	<i>Anas americana</i>	American Wigeon				S3B	4 Secure	362	4.1 ± 7.0	NB
A	<i>Cathartes aura</i>	Turkey Vulture				S3B	4 Secure	14	4.7 ± 0.0	NB
A	<i>Rallus limicola</i>	Virginia Rail				S3B	3 Sensitive	13	4.1 ± 7.0	NB
A	<i>Charadrius vociferus</i>	Killdeer				S3B	3 Sensitive	728	4.1 ± 7.0	NB
A	<i>Larus delawarensis</i>	Ring-billed Gull				S3B	4 Secure	392	4.7 ± 0.0	NB
A	<i>Myiarchus crinitus</i>	Great Crested Flycatcher				S3B	3 Sensitive	27	7.6 ± 7.0	NB
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S3B	3 Sensitive	62	5.8 ± 7.0	NB
A	<i>Passerina cyanea</i>	Indigo Bunting				S3B	4 Secure	22	6.5 ± 7.0	NB
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S3B	2 May Be At Risk	161	4.1 ± 7.0	NB



Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3B,S4S5N	4 Secure	268	6.3 ± 7.0	NB
A	<i>Pluvialis dominica</i>	American Golden-Plover				S3M	3 Sensitive	65	8.1 ± 2.0	NB
A	<i>Phalaropus fulicarius</i>	Red Phalarope				S3M	3 Sensitive	5	16.7 ± 0.0	NB
A	<i>Melanitta nigra</i>	Black Scoter				S3M,S2S3N	3 Sensitive	141	16.4 ± 0.0	NB
A	<i>Calidris maritima</i>	Purple Sandpiper				S3M,S3N	4 Secure	13	68.5 ± 1.0	NB
A	<i>Bucephala albeola</i>	Bufflehead				S3N	3 Sensitive	48	7.1 ± 0.0	NB
A	<i>Synaptomys cooperi</i>	Southern Bog Lemming				S3S4	4 Secure	12	18.3 ± 0.0	NB
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3S4B	3 Sensitive	246	4.1 ± 7.0	NB
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S3S4B	3 Sensitive	291	2.3 ± 0.0	NB
A	<i>Piranga olivacea</i>	Scarlet Tanager				S3S4B	4 Secure	73	4.1 ± 7.0	NB
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak				S3S4B,S4S5N	3 Sensitive	355	4.1 ± 7.0	NB
A	<i>Morus bassanus</i>	Northern Gannet				SHB,S5M,S5N	4 Secure	185	11.6 ± 0.0	NB
I	<i>Coenonympha nipisiquit</i>	Maritime Ringlet	Endangered	Endangered	Endangered	S1	1 At Risk	60	67.1 ± 20.0	NB
I	<i>Gomphus ventricosus</i>	Skillet Clubtail	Endangered		Endangered	S1S2	2 May Be At Risk	1	92.4 ± 0.0	NB
I	<i>Alasmidonta varicosa</i>	Brook Floater	Special Concern		Special Concern	S1S2	3 Sensitive	16	35.9 ± 0.0	NB
I	<i>Ophiogomphus howei</i>	Pygmy Snaketail	Special Concern	Special Concern	Special Concern	S2	2 May Be At Risk	26	43.5 ± 0.0	NB
I	<i>Lampsilis cariosa</i>	Yellow Lampmussel	Special Concern	Special Concern	Special Concern	S2	3 Sensitive	3	92.3 ± 0.0	NB
I	<i>Danaus plexippus</i>	Monarch	Special Concern	Special Concern	Special Concern	S3B	3 Sensitive	18	13.7 ± 0.0	NB
I	<i>Bombus terricola</i>	Yellow-banded Bumblebee	Special Concern			SU	3 Sensitive	4	53.5 ± 0.0	NB
I	<i>Somatochlora septentrionalis</i>	Muskeg Emerald				S1	2 May Be At Risk	3	95.7 ± 0.0	NB
I	<i>Leucorrhinia patricia</i>	Canada Whiteface				S1	2 May Be At Risk	8	40.6 ± 1.0	NB
I	<i>Coccinella transversoguttata richardsoni</i>	Transverse Lady Beetle				S1S2	2 May Be At Risk	10	40.8 ± 1.0	NB
I	<i>Plebejus saepiolus</i>	Greenish Blue				S1S2	4 Secure	12	46.9 ± 1.0	NB
I	<i>Strymon melinus</i>	Grey Hairstreak				S2	4 Secure	8	30.0 ± 1.0	NB
I	<i>Aeshna juncea</i>	Rush Darner				S2	3 Sensitive	1	95.7 ± 0.0	NB
I	<i>Somatochlora brevicincta</i>	Quebec Emerald				S2	5 Undetermined	2	92.6 ± 0.0	NB
I	<i>Somatochlora tenebrosa</i>	Clamp-Tipped Emerald				S2	5 Undetermined	5	39.5 ± 0.0	NB
I	<i>Ladona exusta</i>	White Corporal				S2	5 Undetermined	1	53.0 ± 0.0	NB
I	<i>Coenagrion interrogatum</i>	Subarctic Bluet				S2	3 Sensitive	6	20.9 ± 0.0	NB
I	<i>Alasmidonta undulata</i>	Triangle Floater				S2	3 Sensitive	3	35.9 ± 1.0	NB
I	<i>Cicindela hirticollis</i>	Hairy-necked Tiger Beetle				S2S3	4 Secure	2	32.4 ± 0.0	NB
I	<i>Callophrys henrici</i>	Henry's Elfin				S2S3	4 Secure	11	21.9 ± 1.0	NB
I	<i>Hesperia sassacus</i>	Indian Skipper				S3	4 Secure	3	41.7 ± 5.0	NB
I	<i>Euphyes bimacula</i>	Two-spotted Skipper				S3	4 Secure	9	52.0 ± 0.0	NB
I	<i>Papilio brevicauda</i>	Short-tailed Swallowtail				S3	4 Secure	40	32.6 ± 0.0	NB
I	<i>Papilio brevicauda bretonensis</i>	Short-tailed Swallowtail				S3	4 Secure	16	33.0 ± 0.0	NB
I	<i>Lycaena hyllus</i>	Bronze Copper				S3	3 Sensitive	5	4.6 ± 0.0	NB
I	<i>Lycaena dospassosi</i>	Salt Marsh Copper				S3	4 Secure	97	9.3 ± 0.0	NB
I	<i>Satyrrium acadica</i>	Acadian Hairstreak				S3	4 Secure	2	72.7 ± 0.0	NB
I	<i>Callophrys polios</i>	Hoary Elfin				S3	4 Secure	8	15.6 ± 0.0	NB
I	<i>Callophrys eryphon</i>	Western Pine Elfin				S3	4 Secure	5	34.2 ± 10.0	NB
I	<i>Plebejus idas</i>	Northern Blue				S3	4 Secure	24	39.8 ± 0.0	NB
I	<i>Plebejus idas empetri</i>	Crowberry Blue				S3	4 Secure	8	43.7 ± 0.0	NB
I	<i>Speyeria aphrodite</i>	Aphrodite Fritillary				S3	4 Secure	5	36.9 ± 1.0	NB
I	<i>Boloria eunomia</i>	Bog Fritillary				S3	5 Undetermined	5	47.9 ± 2.0	NB
I	<i>Boloria chariclea</i>	Arctic Fritillary				S3	4 Secure	9	20.3 ± 1.0	NB
I	<i>Boloria chariclea</i>	Purple Lesser Fritillary				S3	4 Secure	4	34.2 ± 10.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
I	<i>Polygonia satyrus grandis</i>	Satyr Comma				S3	4 Secure	12	33.6 ± 0.0	NB
I	<i>Polygonia gracilis</i>	Hoary Comma				S3	4 Secure	17	11.6 ± 1.0	NB
I	<i>Nymphalis l-album</i>	Compton Tortoiseshell				S3	4 Secure	3	33.4 ± 10.0	NB
I	<i>Gomphus abbreviatus</i>	Spine-crowned Clubtail				S3	4 Secure	14	33.2 ± 0.0	NB
I	<i>Dorocordulia lepida</i>	Petite Emerald				S3	4 Secure	3	92.2 ± 0.0	NB
I	<i>Somatochlora albicincta</i>	Ringed Emerald				S3	4 Secure	8	72.6 ± 1.0	NB
I	<i>Somatochlora cingulata</i>	Lake Emerald				S3	4 Secure	5	42.9 ± 0.0	NB
I	<i>Somatochlora forcipata</i>	Forcipate Emerald				S3	4 Secure	11	12.2 ± 1.0	NB
I	<i>Williamsonia fletcheri</i>	Ebony Boghaunter				S3	4 Secure	8	23.5 ± 0.0	NB
I	<i>Lestes eurinus</i>	Amber-Winged Spreadwing				S3	4 Secure	17	24.6 ± 1.0	NB
I	<i>Enallagma geminatum</i>	Skimming Bluet				S3	5 Undetermined	4	96.8 ± 0.0	NB
I	<i>Enallagma signatum</i>	Orange Bluet				S3	4 Secure	1	96.8 ± 0.0	NB
I	<i>Stylurus scudleri</i>	Zebra Clubtail				S3	4 Secure	3	47.0 ± 0.0	NB
I	<i>Leptodea ochracea</i>	Tidewater Mucket				S3	4 Secure	1	98.8 ± 0.0	NB
I	<i>Pantala hymenaea</i>	Spot-Winged Glider				S3B	4 Secure	2	90.9 ± 0.0	NB
I	<i>Satyrium liparops</i>	Striped Hairstreak				S3S4	4 Secure	14	20.3 ± 1.0	NB
I	<i>Satyrium liparops strigosum</i>	Striped Hairstreak				S3S4	4 Secure	8	35.6 ± 1.0	NB
I	<i>Cupido comyntas</i>	Eastern Tailed Blue				S3S4	4 Secure	1	58.0 ± 1.0	NB
N	<i>Aulacomnium heterostichum</i>	One-sided Groove Moss				S1	2 May Be At Risk	1	36.5 ± 0.0	NB
N	<i>Cinclidium stygium</i>	Sooty Cupola Moss				S1	2 May Be At Risk	1	91.1 ± 0.0	NB
N	<i>Dicranum bonjeanii</i>	Bonjean's Broom Moss				S1	2 May Be At Risk	1	45.4 ± 1.0	NB
N	<i>Homomallium adnatum</i>	Adnate Hairy-gray Moss				S1	2 May Be At Risk	1	34.6 ± 0.0	NB
N	<i>Meesia triquetra</i>	Three-ranked Cold Moss				S1	2 May Be At Risk	1	81.5 ± 10.0	NB
N	<i>Paludella squarrosa</i>	Tufted Fen Moss				S1	2 May Be At Risk	1	91.1 ± 0.0	NB
N	<i>Seligeria recurvata</i>	a Moss				S1	2 May Be At Risk	1	96.7 ± 15.0	NB
N	<i>Zygodon viridissimus var. viridissimus</i>	a Moss				S1	2 May Be At Risk	1	34.5 ± 0.0	NB
N	<i>Fuscopannaria ahlneri</i>	Corrugated Shingles Lichen				S1	2 May Be At Risk	1	42.5 ± 0.0	NB
N	<i>Pohlia filum</i>	a Moss				S1?	5 Undetermined	2	59.9 ± 7.0	NB
N	<i>Anacamptodon splachnoides</i>	a Moss				S1S2	3 Sensitive	1	53.2 ± 1.0	NB
N	<i>Bryum pallescens</i>	Pale Bryum Moss				S1S2	5 Undetermined	1	41.6 ± 100.0	NB
N	<i>Tetradontium brownianum</i>	Little Georgia				S1S2	3 Sensitive	5	35.0 ± 0.0	NB
N	<i>Trichodon cylindricus</i>	Cylindric Hairy-teeth Moss				S1S2	3 Sensitive	1	96.7 ± 15.0	NB
N	<i>Collema leptaleum</i>	Crumpled Bat's Wing Lichen				S1S2	5 Undetermined	1	36.1 ± 0.0	NB
N	<i>Calypogeia neesiana</i>	Nees' Pouchwort				S1S3	6 Not Assessed	1	59.9 ± 1.0	NB
N	<i>Cephaloziella spinigera</i>	Spiny Threadwort				S1S3	6 Not Assessed	2	83.6 ± 0.0	NB
N	<i>Lophozia ascendens</i>	Small Notchwort				S1S3	6 Not Assessed	1	36.6 ± 1.0	NB
N	<i>Odontoschisma sphagni</i>	Bog-Moss Flapwort				S1S3	6 Not Assessed	1	37.3 ± 0.0	NB
N	<i>Orthotrichum speciosum</i>	Showy Bristle Moss				S2	4 Secure	4	34.6 ± 0.0	NB
N	<i>Platydictya jungermannioides</i>	False Willow Moss				S2	3 Sensitive	1	96.7 ± 15.0	NB
N	<i>Pohlia elongata</i>	Long-necked Nodding Moss				S2	3 Sensitive	4	35.0 ± 0.0	NB
N	<i>Pohlia prolifera</i>	Cottony Nodding Moss				S2	3 Sensitive	9	35.0 ± 0.0	NB
N	<i>Pohlia sphagnicola</i>	a moss				S2	3 Sensitive	1	40.1 ± 0.0	NB
N	<i>Scorpidium scorpioides</i>	Hooked Scorpion Moss				S2	3 Sensitive	2	78.6 ± 1.0	NB
N	<i>Sphagnum lindbergii</i>	Lindberg's Peat Moss				S2	3 Sensitive	1	48.8 ± 0.0	NB
N	<i>Sphagnum flexuosum</i>	Flexuous Peatmoss				S2	3 Sensitive	2	54.4 ± 10.0	NB
N	<i>Zygodon viridissimus</i>	a Moss				S2	2 May Be At Risk	1	34.6 ± 0.0	NB



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N	<i>Dendroica caerulea</i>	a lichen				S2S3	3 Sensitive	1	34.9 ± 0.0	NB
N	<i>Barbilophozia lycopodioides</i>	Greater Pawwort				S2S4	6 Not Assessed	1	91.7 ± 1.0	NB
N	<i>Bazzania tricrenata</i>	Three-toothed Whipwort				S2S4		1	40.0 ± 100.0	NB
N	<i>Jungermannia pumila</i>	Dwarf Flapwort				S2S4	6 Not Assessed	1	35.6 ± 1.0	NB
N	<i>Aulacomnium androgynum</i>	Little Groove Moss				S3	4 Secure	5	36.5 ± 0.0	NB
N	<i>Dicranum majus</i>	Greater Broom Moss				S3	4 Secure	4	36.7 ± 0.0	NB
N	<i>Heterocladium dimorphum</i>	Dimorphous Tangle Moss				S3	4 Secure	2	34.6 ± 0.0	NB
N	<i>Pleuridium subulatum</i>	a Moss				S3	3 Sensitive	1	11.8 ± 0.0	NB
N	<i>Pogonatum dentatum</i>	Mountain Hair Moss				S3	4 Secure	1	35.6 ± 0.0	NB
N	<i>Sphagnum compactum</i>	Compact Peat Moss				S3	4 Secure	1	35.2 ± 1.0	NB
N	<i>Sphagnum torreyanum</i>	a Peatmoss				S3	4 Secure	1	60.8 ± 0.0	NB
N	<i>Tetraphis geniculata</i>	Geniculate Four-tooth Moss				S3	4 Secure	3	43.0 ± 0.0	NB
N	<i>Schistidium maritimum</i>	a Moss				S3	4 Secure	1	39.5 ± 0.0	NB
N	<i>Rauvolfia scita</i>	Smaller Fern Moss				S3	3 Sensitive	1	38.0 ± 0.0	NB
N	<i>Collema nigrescens</i>	Blistered Tarpaper Lichen				S3	3 Sensitive	1	34.9 ± 0.0	NB
N	<i>Ahtiana aurescens</i>	Eastern Candlewax Lichen				S3	5 Undetermined	1	39.0 ± 0.0	NB
N	<i>Dicranella rufescens</i>	Red Forklet Moss				S3?	5 Undetermined	1	59.9 ± 7.0	NB
N	<i>Sphagnum contortum</i>	Twisted Peat Moss				S3?	4 Secure	1	60.8 ± 0.0	NB
N	<i>Atrichum tenellum</i>	Slender Smoothcap Moss				S3S4	4 Secure	3	34.8 ± 0.0	NB
N	<i>Barbula convoluta</i>	Lesser Bird's-claw Beard Moss				S3S4	4 Secure	1	73.3 ± 15.0	NB
N	<i>Dicranella subulata</i>	Awl-leaved Forklet Moss				S3S4	4 Secure	4	36.4 ± 0.0	NB
N	<i>Dicranum leioneuron</i>	a Dicranum Moss				S3S4	4 Secure	1	41.2 ± 10.0	NB
N	<i>Fissidens bryoides</i>	Lesser Pocket Moss				S3S4	4 Secure	1	52.3 ± 5.0	NB
N	<i>Pohlia annotina</i>	a Moss				S3S4	4 Secure	1	52.2 ± 4.0	NB
N	<i>Tortula truncata</i>	a Moss				S3S4	4 Secure	1	11.8 ± 1.0	NB
N	<i>Sphagnum majus</i>	Olive Peat Moss				S3S4	4 Secure	7	36.0 ± 0.0	NB
N	<i>Tetraplodon angustatus</i>	Toothed-leaved Nitrogen Moss				S3S4	4 Secure	1	36.5 ± 0.0	NB
N	<i>Hylocomiastrum pyrenaicum</i>	a Feather Moss				S3S4	4 Secure	1	43.1 ± 0.0	NB
N	<i>Pseudocyphellaria perpetua</i>	Gilded Specklebelly Lichen				S3S4	3 Sensitive	3	36.1 ± 0.0	NB
N	<i>Stereocaulon paschale</i>	Easter Foam Lichen				S3S4	5 Undetermined	1	76.1 ± 1.0	NB
N	<i>Leucodon brachypus</i>	a Moss				SH	2 May Be At Risk	9	34.5 ± 0.0	NB
N	<i>Splachnum luteum</i>	Yellow Collar Moss				SH	5 Undetermined	1	41.6 ± 100.0	NB
P	<i>Juglans cinerea</i>	Butternut	Endangered	Endangered	Endangered	S1	1 At Risk	23	37.0 ± 0.0	NB
P	<i>Symphotrichum laurentianum</i>	Gulf of St Lawrence Aster	Threatened	Threatened	Endangered	S1	1 At Risk	20	39.5 ± 0.0	NB
P	<i>Symphotrichum subulatum</i> (Bathurst pop)	Bathurst Aster - Bathurst pop.	Special Concern	Special Concern	Endangered	S2	1 At Risk	105	3.5 ± 0.0	NB
P	<i>Lechea maritima</i> var. <i>subcylindrica</i>	Beach Pinweed	Special Concern			S2	3 Sensitive	411	31.5 ± 0.0	NB
P	<i>Eriocaulon parkeri</i>	Parker's Pipewort	Not At Risk		Endangered	S2	1 At Risk	82	17.0 ± 1.0	NB
P	<i>Cryptotaenia canadensis</i>	Canada Honewort				S1	2 May Be At Risk	1	62.7 ± 1.0	NB
P	<i>Bidens eatonii</i>	Eaton's Beggarticks				S1	2 May Be At Risk	7	19.9 ± 0.0	NB
P	<i>Pseudognaphalium obtusifolium</i>	Eastern Cudweed				S1	2 May Be At Risk	3	76.4 ± 5.0	NB
P	<i>Betula glandulosa</i>	Glandular Birch				S1	2 May Be At Risk	8	80.9 ± 0.0	NB
P	<i>Betula michauxii</i>	Michaux's Dwarf Birch				S1	2 May Be At Risk	3	35.6 ± 0.0	NB
P	<i>Cynoglossum virginianum</i> var.	Wild Comfrey				S1	2 May Be At Risk	3	66.1 ± 0.0	NB

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P	<i>boreale</i> <i>Cardamine parviflora</i> <i>var. arenicola</i>	Small-flowered Bittercress				S1	2 May Be At Risk	1	52.8 ± 0.0	NB
P	<i>Draba incana</i>	Twisted Whitlow-grass				S1	2 May Be At Risk	2	93.5 ± 0.0	NB
P	<i>Stellaria crassifolia</i>	Fleshy Stitchwort				S1	2 May Be At Risk	1	16.0 ± 10.0	NB
P	<i>Stellaria longipes</i>	Long-stalked Starwort				S1	2 May Be At Risk	1	85.1 ± 1.0	NB
P	<i>Cuscuta pentagona</i>	Five-angled Dodder				S1	2 May Be At Risk	3	35.3 ± 0.0	NB
P	<i>Vaccinium boreale</i>	Northern Blueberry				S1	2 May Be At Risk	12	80.9 ± 0.0	NB
P	<i>Vaccinium uliginosum</i>	Alpine Bilberry				S1	2 May Be At Risk	5	82.1 ± 0.0	NB
P	<i>Chamaesyce polygonifolia</i>	Seaside Spurge				S1	2 May Be At Risk	6	42.7 ± 5.0	NB
P	<i>Bartonia virginica</i>	Yellow Bartonnia				S1	2 May Be At Risk	3	46.2 ± 0.0	NB
P	<i>Ranunculus lapponicus</i>	Lapland Buttercup				S1	2 May Be At Risk	1	95.9 ± 0.0	NB
P	<i>Ranunculus sceleratus</i>	Cursed Buttercup				S1	2 May Be At Risk	1	68.1 ± 100.0	NB
P	<i>Crataegus jonesiae</i>	Jones' Hawthorn				S1	2 May Be At Risk	1	81.2 ± 1.0	NB
P	<i>Potentilla canadensis</i>	Canada Cinquefoil				S1	5 Undetermined	1	99.9 ± 0.0	NB
P	<i>Rosa acicularis</i> ssp. <i>sayi</i>	Prickly Rose				S1	2 May Be At Risk	102	51.3 ± 0.0	NB
P	<i>Salix serissima</i>	Autumn Willow				S1	2 May Be At Risk	4	90.0 ± 0.0	NB
P	<i>Agalinis paupercula</i> <i>var. borealis</i>	Small-flowered Agalinis				S1	2 May Be At Risk	7	32.5 ± 0.0	NB
P	<i>Agalinis tenuifolia</i>	Slender Agalinis				S1	2 May Be At Risk	2	33.6 ± 0.0	NB
P	<i>Carex bigelowii</i>	Bigelow's Sedge				S1	2 May Be At Risk	1	81.0 ± 0.0	NB
P	<i>Carex glareosa</i> var. <i>amphigena</i>	Gravel Sedge				S1	2 May Be At Risk	2	83.5 ± 1.0	NB
P	<i>Carex viridula</i> var. <i>elatior</i>	Greenish Sedge				S1	2 May Be At Risk	11	90.0 ± 0.0	NB
P	<i>Cyperus diandrus</i>	Low Flatsedge				S1	2 May Be At Risk	2	25.4 ± 0.0	NB
P	<i>Cyperus bipartitus</i>	Shining Flatsedge				S1	2 May Be At Risk	13	12.3 ± 0.0	NB
P	<i>Scirpus pendulus</i>	Hanging Bulrush				S1	2 May Be At Risk	1	86.9 ± 0.0	PE
P	<i>Schoenoplectus smithii</i>	Smith's Bulrush				S1	2 May Be At Risk	18	19.8 ± 0.0	NB
P	<i>Juncus greenei</i>	Greene's Rush				S1	2 May Be At Risk	2	16.3 ± 1.0	NB
P	<i>Juncus stygius</i>	Moor Rush				S1	2 May Be At Risk	1	39.8 ± 0.0	NB
P	<i>Juncus stygius</i> ssp. <i>americanus</i>	Moor Rush				S1	2 May Be At Risk	3	52.9 ± 5.0	NB
P	<i>Juncus subtilis</i>	Creeping Rush				S1	2 May Be At Risk	3	72.5 ± 0.0	NB
P	<i>Juncus trifidus</i>	Highland Rush				S1	2 May Be At Risk	5	80.9 ± 0.0	NB
P	<i>Allium canadense</i>	Canada Garlic				S1	2 May Be At Risk	1	34.8 ± 1.0	NB
P	<i>Malaxis brachypoda</i>	White Adder's-Mouth				S1	2 May Be At Risk	2	90.0 ± 0.0	NB
P	<i>Calamagrostis stricta</i> ssp. <i>inexpansa</i>	Slim-stemmed Reed Grass				S1	2 May Be At Risk	1	41.6 ± 0.0	NB
P	<i>Catabrosa aquatica</i> var. <i>laurentiana</i>	Water Whorl Grass				S1	2 May Be At Risk	1	93.7 ± 5.0	PE
P	<i>Dichanthelium xanthophysum</i>	Slender Panic Grass				S1	2 May Be At Risk	7	60.4 ± 0.0	NB
P	<i>Puccinellia ambigua</i>	Dwarf Alkali Grass				S1	5 Undetermined	1	93.0 ± 0.0	NB
P	<i>Zizania aquatica</i> var. <i>brevis</i>	Indian Wild Rice				S1	2 May Be At Risk	16	12.1 ± 0.0	NB
P	<i>Potamogeton nodosus</i>	Long-leaved Pondweed				S1	2 May Be At Risk	2	32.6 ± 0.0	NB
P	<i>Cystopteris laurentiana</i>	Laurentian Bladder Fern				S1	2 May Be At Risk	1	75.9 ± 0.0	NB
P	<i>Huperzia selago</i>	Northern Firmoss				S1	2 May Be At Risk	2	81.0 ± 0.0	NB
P	<i>Bidens heterodoxa</i>	Connecticut Beggar-Ticks				S1?	2 May Be At Risk	2	39.6 ± 0.0	NB
P	<i>Cuscuta cephalanthi</i>	Buttonbush Dodder				S1?	2 May Be At Risk	23	34.8 ± 1.0	NB
P	<i>Carex laxiflora</i>	Loose-Flowered Sedge				S1?	5 Undetermined	1	94.2 ± 2.0	NB
P	<i>Humulus lupulus</i> var. <i>lupuloides</i>	Common Hop				S1S2	3 Sensitive	3	33.8 ± 0.0	NB



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P	<i>Rumex aquaticus</i> var. <i>fenestratus</i>	Western Dock				S1S2	2 May Be At Risk	2	66.5 ± 0.0	NB
P	<i>Carex crawei</i>	Crawe's Sedge				S1S2	2 May Be At Risk	1	56.2 ± 0.0	NB
P	<i>Carex rostrata</i>	Narrow-leaved Beaked Sedge				S1S2	3 Sensitive	5	52.1 ± 5.0	NB
P	<i>Thelypteris simulata</i>	Bog Fern				S1S2	2 May Be At Risk	1	9.6 ± 1.0	NB
P	<i>Listera australis</i>	Southern Twayblade			Endangered	S2	1 At Risk	23	40.0 ± 0.0	NB
P	<i>Osmorhiza depauperata</i>	Blunt Sweet Cicely				S2	3 Sensitive	3	36.9 ± 1.0	NB
P	<i>Pseudognaphalium macounii</i>	Macoun's Cudweed				S2	3 Sensitive	40	62.5 ± 5.0	NB
P	<i>Ionactis linariifolius</i>	Stiff Aster				S2	3 Sensitive	61	21.1 ± 1.0	NB
P	<i>Betula minor</i>	Dwarf White Birch				S2	3 Sensitive	4	80.9 ± 0.0	NB
P	<i>Arabis drummondii</i>	Drummond's Rockcress				S2	3 Sensitive	4	12.8 ± 1.0	NB
P	<i>Barbarea orthoceras</i>	American Yellow Rocket				S2	3 Sensitive	1	54.6 ± 0.0	NB
P	<i>Sagina nodosa</i>	Knotted Pearlwort				S2	3 Sensitive	2	76.3 ± 1.0	NB
P	<i>Stellaria longifolia</i>	Long-leaved Starwort				S2	3 Sensitive	4	54.3 ± 0.0	NB
P	<i>Atriplex franktonii</i>	Frankton's Saltbush				S2	4 Secure	4	32.6 ± 5.0	NB
P	<i>Chenopodium rubrum</i>	Red Pigweed				S2	3 Sensitive	11	32.3 ± 0.0	NB
P	<i>Callitriche hermaphroditica</i>	Northern Water-starwort				S2	4 Secure	4	28.0 ± 0.0	NB
P	<i>Hypericum dissimulatum</i>	Disguised St John's-wort				S2	3 Sensitive	1	76.3 ± 1.0	NB
P	<i>Astragalus eucosmus</i>	Elegant Milk-vetch				S2	2 May Be At Risk	1	32.6 ± 0.0	NB
P	<i>Oxytropis campestris</i> var. <i>johannensis</i>	Field Locoweed				S2	3 Sensitive	1	55.3 ± 10.0	NB
P	<i>Gentiana linearis</i>	Narrow-Leaved Gentian				S2	3 Sensitive	20	58.2 ± 50.0	NB
P	<i>Myriophyllum humile</i>	Low Water Milfoil				S2	3 Sensitive	1	72.5 ± 1.0	NB
P	<i>Nuphar lutea</i> ssp. <i>rubrodiscalis</i>	Red-disked Yellow Pond-lily				S2	3 Sensitive	5	35.7 ± 0.0	NB
P	<i>Orobanche uniflora</i>	One-Flowered Broomrape				S2	3 Sensitive	2	44.3 ± 1.0	NB
P	<i>Polygala sanguinea</i>	Blood Milkwort				S2	3 Sensitive	22	40.3 ± 0.0	NB
P	<i>Polygonum amphibium</i> var. <i>emersum</i>	Water Smartweed				S2	3 Sensitive	1	32.6 ± 0.0	NB
P	<i>Polygonum careyi</i>	Carey's Smartweed				S2	3 Sensitive	2	91.8 ± 1.0	NB
P	<i>Podostemum ceratophyllum</i>	Horn-leaved Riverweed				S2	3 Sensitive	8	34.5 ± 1.0	NB
P	<i>Hepatica nobilis</i> var. <i>obtusa</i>	Round-lobed Hepatica				S2	3 Sensitive	3	40.6 ± 0.0	NB
P	<i>Ranunculus longirostris</i>	Eastern White Water-Crowfoot				S2	5 Undetermined	1	94.2 ± 1.0	NB
P	<i>Crataegus scabrida</i>	Rough Hawthorn				S2	3 Sensitive	2	60.4 ± 1.0	NB
P	<i>Sanguisorba canadensis</i>	Canada Burnet				S2	4 Secure	43	71.2 ± 5.0	NB
P	<i>Salix candida</i>	Sage Willow				S2	3 Sensitive	21	75.1 ± 0.0	NB
P	<i>Viola novae-angliae</i>	New England Violet				S2	3 Sensitive	1	99.4 ± 1.0	NB
P	<i>Sagittaria calycina</i> var. <i>spongiosa</i>	Long-lobed Arrowhead				S2	4 Secure	111	2.4 ± 0.0	NB
P	<i>Carex granularis</i>	Limestone Meadow Sedge				S2	3 Sensitive	7	52.8 ± 5.0	NB
P	<i>Carex gynocrates</i>	Northern Bog Sedge				S2	3 Sensitive	9	90.0 ± 0.0	NB
P	<i>Carex hirtifolia</i>	Pubescent Sedge				S2	3 Sensitive	12	33.8 ± 0.0	NB
P	<i>Carex salina</i>	Saltmarsh Sedge				S2	3 Sensitive	5	49.3 ± 0.0	NB
P	<i>Carex sprengelii</i>	Longbeak Sedge				S2	3 Sensitive	1	54.8 ± 0.0	NB
P	<i>Carex tenuiflora</i>	Sparse-Flowered Sedge				S2	2 May Be At Risk	5	37.0 ± 0.0	NB
P	<i>Carex albicans</i> var. <i>emmonsii</i>	White-tinged Sedge				S2	3 Sensitive	8	32.4 ± 0.0	NB
P	<i>Carex vacillans</i>	Estuarine Sedge				S2	3 Sensitive	3	11.7 ± 10.0	NB
P	<i>Eriophorum gracile</i>	Slender Cottongrass				S2	2 May Be At Risk	2	54.4 ± 10.0	NB

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P	<i>Blysmus rufus</i>	Red Bulrush				S2	3 Sensitive	24	44.8 ± 1.0	NB
P	<i>Juncus vaseyi</i>	Vasey Rush				S2	3 Sensitive	33	6.8 ± 0.0	NB
P	<i>Lemna trisulca</i>	Star Duckweed				S2	4 Secure	2	82.1 ± 2.0	NB
P	<i>Amerorchis rotundifolia</i>	Small Round-leaved Orchis				S2	2 May Be At Risk	9	78.9 ± 1.0	NB
P	<i>Calypso bulbosa</i> var. <i>americana</i>	Calypso				S2	2 May Be At Risk	7	40.6 ± 0.0	NB
P	<i>Coeloglossum viride</i> var. <i>virescens</i>	Long-bracted Frog Orchid				S2	2 May Be At Risk	1	97.1 ± 1.0	NB
P	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Small Yellow Lady's-Slipper				S2	2 May Be At Risk	1	7.9 ± 5.0	NB
P	<i>Goodyera oblongifolia</i>	Menzies' Rattlesnake-plantain				S2	3 Sensitive	14	37.5 ± 1.0	NB
P	<i>Spiranthes cernua</i>	Nodding Ladies'-Tresses				S2	3 Sensitive	1	77.3 ± 0.0	NB
P	<i>Spiranthes lucida</i>	Shining Ladies'-Tresses				S2	3 Sensitive	5	22.2 ± 0.0	NB
P	<i>Agrostis mertensii</i>	Northern Bent Grass				S2	2 May Be At Risk	57	51.5 ± 0.0	NB
P	<i>Dichanthelium linearifolium</i>	Narrow-leaved Panic Grass				S2	3 Sensitive	3	35.7 ± 0.0	NB
P	<i>Piptatherum canadense</i>	Canada Rice Grass				S2	3 Sensitive	5	60.2 ± 0.0	NB
P	<i>Puccinellia laurentiana</i>	Nootka Alkali Grass				S2	3 Sensitive	2	30.9 ± 0.0	NB
P	<i>Zizania aquatica</i> var. <i>aquatica</i>	Indian Wild Rice				S2	5 Undetermined	7	13.6 ± 1.0	NB
P	<i>Piptatherum pungens</i>	Slender Rice Grass				S2	2 May Be At Risk	11	55.3 ± 5.0	NB
P	<i>Stuckenia filiformis</i>	Thread-leaved Pondweed				S2	3 Sensitive	1	84.4 ± 1.0	NB
P	<i>Potamogeton richardsonii</i>	Richardson's Pondweed				S2	3 Sensitive	5	57.6 ± 0.0	NB
P	<i>Woodwardia virginica</i>	Virginia Chain Fern				S2	3 Sensitive	9	34.6 ± 1.0	NB
P	<i>Woodsia alpina</i>	Alpine Cliff Fern				S2	3 Sensitive	1	71.5 ± 0.0	NB
P	<i>Lycopodium sitchense</i>	Sitka Clubmoss				S2	3 Sensitive	2	80.8 ± 0.0	NB
P	<i>Selaginella selaginoides</i>	Low Spikemoss				S2	3 Sensitive	14	90.0 ± 0.0	NB
P	<i>Toxicodendron radicans</i>	Poison Ivy				S2?	3 Sensitive	3	54.2 ± 0.0	NB
P	<i>Osmorhiza longistylis</i>	Smooth Sweet Cicely				S2?	3 Sensitive	2	49.5 ± 0.0	NB
P	<i>Epilobium coloratum</i>	Purple-veined Willowherb				S2?	3 Sensitive	3	35.0 ± 10.0	NB
P	<i>Crataegus macrosperma</i>	Big-Fruit Hawthorn				S2?	5 Undetermined	1	60.4 ± 0.0	NB
P	<i>Rubus pensilvanicus</i>	Pennsylvania Blackberry				S2?	4 Secure	5	68.1 ± 100.0	NB
P	<i>Rubus recurvicaulis</i>	Arching Dewberry				S2?	4 Secure	1	97.9 ± 0.0	NB
P	<i>Galium obtusum</i>	Blunt-leaved Bedstraw				S2?	4 Secure	9	41.4 ± 0.0	NB
P	<i>Salix myricoides</i>	Bayberry Willow				S2?	3 Sensitive	4	26.5 ± 5.0	NB
P	<i>Platanthera huronensis</i>	Fragrant Green Orchid				S2?	5 Undetermined	1	56.6 ± 0.0	NB
P	<i>Ceratophyllum echinatum</i>	Prickly Hornwort				S2S3	3 Sensitive	1	23.3 ± 0.0	NB
P	<i>Elatine americana</i>	American Waterwort				S2S3	3 Sensitive	19	12.9 ± 0.0	NB
P	<i>Bartonia paniculata</i> ssp. <i>iodandra</i>	Branched Bartonia				S2S3	3 Sensitive	1	36.8 ± 0.0	NB
P	<i>Geranium robertianum</i>	Herb Robert				S2S3	4 Secure	47	82.9 ± 0.0	PE
P	<i>Rumex maritimus</i> var. <i>persicarioides</i>	Peach-leaved Dock				S2S3	5 Undetermined	1	44.0 ± 0.0	NB
P	<i>Rumex pallidus</i>	Seabeach Dock				S2S3	3 Sensitive	7	42.5 ± 0.0	NB
P	<i>Galium labradoricum</i>	Labrador Bedstraw				S2S3	3 Sensitive	17	77.8 ± 5.0	NB
P	<i>Valeriana uliginosa</i>	Swamp Valerian				S2S3	3 Sensitive	7	90.0 ± 0.0	NB
P	<i>Carex adusta</i>	Lesser Brown Sedge				S2S3	4 Secure	8	46.7 ± 3.0	NB
P	<i>Juncus brachycephalus</i>	Small-Head Rush				S2S3	3 Sensitive	2	90.0 ± 0.0	NB
P	<i>Corallorhiza maculata</i>	Spotted Coralroot				S2S3	3 Sensitive	3	48.4 ± 1.0	NB



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P	<i>var. occidentalis</i>									
P	<i>Listera auriculata</i>	Auricled Twayblade				S2S3	3 Sensitive	16	37.8 ± 0.0	NB
P	<i>Potamogeton praelongus</i>	White-stemmed Pondweed				S2S3	4 Secure	3	77.6 ± 0.0	NB
P	<i>Isoetes acadensis</i>	Acadian Quillwort				S2S3	3 Sensitive	1	69.7 ± 0.0	NB
P	<i>Panax trifolius</i>	Dwarf Ginseng				S3	3 Sensitive	13	20.6 ± 5.0	NB
P	<i>Arnica lanceolata</i>	Lance-leaved Arnica				S3	4 Secure	34	36.8 ± 0.0	NB
P	<i>Artemisia campestris ssp. caudata</i>	Field Wormwood				S3	4 Secure	4	35.2 ± 0.0	NB
P	<i>Bidens hyperborea</i>	Estuary Beggarticks				S3	4 Secure	63	2.4 ± 0.0	NB
P	<i>Bidens hyperborea var. hyperborea</i>	Estuary Beggarticks				S3	4 Secure	13	7.3 ± 1.0	NB
P	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane				S3	4 Secure	5	58.8 ± 0.0	NB
P	<i>Symphyotrichum boreale</i>	Boreal Aster				S3	3 Sensitive	5	60.8 ± 0.0	NB
P	<i>Betula pumila</i>	Bog Birch				S3	4 Secure	100	35.5 ± 5.0	NB
P	<i>Arabis glabra</i>	Tower Mustard				S3	5 Undetermined	9	53.2 ± 0.0	NB
P	<i>Cardamine maxima</i>	Large Toothwort				S3	4 Secure	3	70.1 ± 0.0	NB
P	<i>Subularia aquatica var. americana</i>	Water Awlwort				S3	4 Secure	1	85.4 ± 1.0	NB
P	<i>Stellaria humifusa</i>	Saltmarsh Starwort				S3	4 Secure	8	20.3 ± 0.0	NB
P	<i>Hudsonia tomentosa</i>	Woolly Beach-heath				S3	4 Secure	167	20.3 ± 5.0	NB
P	<i>Crassula aquatica</i>	Water Pygmyweed				S3	4 Secure	49	2.4 ± 0.0	NB
P	<i>Elatine minima</i>	Small Waterwort				S3	4 Secure	5	19.8 ± 0.0	NB
P	<i>Hedysarum alpinum</i>	Alpine Sweet-vetch				S3	4 Secure	5	53.2 ± 0.0	NB
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	4 Secure	9	22.2 ± 0.0	NB
P	<i>Myriophyllum farwellii</i>	Farwell's Water Milfoil				S3	4 Secure	6	33.9 ± 0.0	NB
P	<i>Myriophyllum verticillatum</i>	Whorled Water Milfoil				S3	4 Secure	5	12.8 ± 1.0	NB
P	<i>Myriophyllum sibiricum</i>	Siberian Water Milfoil				S3	4 Secure	7	41.6 ± 0.0	NB
P	<i>Teucrium canadense</i>	Canada Germander				S3	3 Sensitive	56	13.9 ± 5.0	NB
P	<i>Nuphar lutea ssp. pumila</i>	Small Yellow Pond-lily				S3	4 Secure	5	13.3 ± 0.0	NB
P	<i>Epilobium hornemannii</i>	Hornemann's Willowherb				S3	4 Secure	18	33.9 ± 10.0	NB
P	<i>Epilobium strictum</i>	Downy Willowherb				S3	4 Secure	3	56.3 ± 0.0	NB
P	<i>Polygonum arifolium</i>	Halberd-leaved Tearthumb				S3	4 Secure	15	28.6 ± 5.0	NB
P	<i>Polygonum punctatum</i>	Dotted Smartweed				S3	4 Secure	1	43.5 ± 2.0	NB
P	<i>Polygonum punctatum var. confertiflorum</i>	Dotted Smartweed				S3	4 Secure	37	12.3 ± 0.0	NB
P	<i>Polygonum scandens</i>	Climbing False Buckwheat				S3	4 Secure	29	22.2 ± 0.0	NB
P	<i>Littorella uniflora</i>	American Shoreweed				S3	4 Secure	1	99.3 ± 1.0	NB
P	<i>Primula mistassinica</i>	Mistassini Primrose				S3	4 Secure	1	99.2 ± 0.0	NB
P	<i>Samolus valerandi</i>	Seaside Brookweed				S3	4 Secure	1	42.9 ± 0.0	NB
P	<i>Samolus valerandi ssp. parviflorus</i>	Seaside Brookweed				S3	4 Secure	129	6.5 ± 5.0	NB
P	<i>Pyrola minor</i>	Lesser Pyrola				S3	4 Secure	11	28.0 ± 0.0	NB
P	<i>Clematis occidentalis</i>	Purple Clematis				S3	4 Secure	1	66.1 ± 1.0	NB
P	<i>Ranunculus gmelinii</i>	Gmelin's Water Buttercup				S3	4 Secure	14	51.5 ± 0.0	NB
P	<i>Thalictrum venulosum</i>	Northern Meadow-rue				S3	4 Secure	1	54.6 ± 0.0	NB
P	<i>Agrimonia gryposepala</i>	Hooked Agrimony				S3	4 Secure	20	53.4 ± 0.0	NB
P	<i>Amelanchier canadensis</i>	Canada Serviceberry				S3	4 Secure	5	41.6 ± 0.0	NB
P	<i>Rosa palustris</i>	Swamp Rose				S3	4 Secure	4	16.1 ± 1.0	NB
P	<i>Rubus chamaemorus</i>	Cloudberry				S3	4 Secure	80	25.6 ± 0.0	NB
P	<i>Salix interior</i>	Sandbar Willow				S3	4 Secure	1	80.5 ± 1.0	NB
P	<i>Salix pedicellaris</i>	Bog Willow				S3	4 Secure	9	36.8 ± 0.0	NB
P	<i>Comandra umbellata</i>	Bastard's Toadflax				S3	4 Secure	59	24.6 ± 1.0	NB

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P	<i>Comandra umbellata</i> <i>ssp. umbellata</i>	Bastard's Toadflax				S3	4 Secure	6	88.1 ± 0.0	NB
P	<i>Geocaulon lividum</i>	Northern Comandra				S3	4 Secure	73	13.5 ± 0.0	NB
P	<i>Parnassia glauca</i>	Fen Grass-of-Parnassus				S3	4 Secure	14	33.4 ± 0.0	NB
P	<i>Limosella australis</i>	Southern Mudwort				S3	4 Secure	92	2.4 ± 0.0	NB
P	<i>Veronica serpyllifolia</i> <i>ssp. humifusa</i>	Thyme-Leaved Speedwell				S3	4 Secure	11	20.2 ± 1.0	NB
P	<i>Boehmeria cylindrica</i>	Small-spike False-nettle				S3	3 Sensitive	7	31.6 ± 0.0	NB
P	<i>Pilea pumila</i>	Dwarf Clearweed				S3	4 Secure	10	23.3 ± 0.0	NB
P	<i>Viola adunca</i>	Hooked Violet				S3	4 Secure	7	66.1 ± 0.0	NB
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S3	4 Secure	7	90.0 ± 0.0	NB
P	<i>Carex arcta</i>	Northern Clustered Sedge				S3	4 Secure	1	42.8 ± 0.0	NB
P	<i>Carex atratiformis</i>	Scabrous Black Sedge				S3	4 Secure	3	56.7 ± 0.0	NB
P	<i>Carex capillaris</i>	Hairlike Sedge				S3	4 Secure	3	66.1 ± 0.0	NB
P	<i>Carex conoidea</i>	Field Sedge				S3	4 Secure	2	58.3 ± 10.0	NB
P	<i>Carex garberi</i>	Garber's Sedge				S3	3 Sensitive	20	35.2 ± 0.0	NB
P	<i>Carex haydenii</i>	Hayden's Sedge				S3	4 Secure	4	41.6 ± 0.0	NB
P	<i>Carex lupulina</i>	Hop Sedge				S3	4 Secure	1	61.2 ± 1.0	NB
P	<i>Carex michauxiana</i>	Michaux's Sedge				S3	4 Secure	5	43.7 ± 0.0	NB
P	<i>Carex ormostachya</i>	Necklace Spike Sedge				S3	4 Secure	8	9.5 ± 1.0	NB
P	<i>Carex tenera</i>	Tender Sedge				S3	4 Secure	3	27.5 ± 0.0	NB
P	<i>Carex tuckermanii</i>	Tuckerman's Sedge				S3	4 Secure	9	33.2 ± 0.0	NB
P	<i>Carex vaginata</i>	Sheathed Sedge				S3	3 Sensitive	6	90.0 ± 0.0	NB
P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	4 Secure	22	15.9 ± 1.0	NB
P	<i>Carex recta</i>	Estuary Sedge				S3	4 Secure	15	22.3 ± 0.0	NB
P	<i>Cyperus dentatus</i>	Toothed Flatsedge				S3	4 Secure	2	41.9 ± 10.0	NB
P	<i>Cyperus esculentus</i>	Perennial Yellow Nutsedge				S3	4 Secure	3	35.9 ± 0.0	NB
P	<i>Eleocharis intermedia</i>	Matted Spikerush				S3	4 Secure	2	41.7 ± 0.0	NB
P	<i>Eriophorum russeolum</i>	Russet Cottongrass				S3	4 Secure	66	17.4 ± 1.0	NB
P	<i>Rhynchospora capitellata</i>	Small-headed Beakrush				S3	4 Secure	64	34.5 ± 0.0	NB
P	<i>Rhynchospora fusca</i>	Brown Beakrush				S3	4 Secure	3	55.4 ± 0.0	NB
P	<i>Trichophorum clintonii</i>	Clinton's Clubrush				S3	4 Secure	66	51.7 ± 0.0	NB
P	<i>Schoenoplectus torreyi</i>	Torrey's Bulrush				S3	4 Secure	9	31.9 ± 0.0	NB
P	<i>Triglochin gaspensis</i>	Gasp [- Arrowgrass				S3	4 Secure	56	31.4 ± 0.0	NB
P	<i>Triantha glutinosa</i>	Sticky False-Asphodel				S3	4 Secure	9	39.4 ± 0.0	NB
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S3	3 Sensitive	27	8.4 ± 10.0	NB
P	<i>Liparis loeselii</i>	Loesel's Twayblade				S3	4 Secure	5	35.1 ± 0.0	NB
P	<i>Platanthera blephariglottis</i>	White Fringed Orchid				S3	4 Secure	53	6.7 ± 0.0	NB
P	<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid				S3	3 Sensitive	18	40.6 ± 5.0	NB
P	<i>Bromus latiglumis</i>	Broad-Glumed Brome				S3	3 Sensitive	6	54.6 ± 0.0	NB
P	<i>Calamagrostis pickeringii</i>	Pickering's Reed Grass				S3	4 Secure	4	92.3 ± 0.0	NB
P	<i>Dichanthelium depauperatum</i>	Starved Panic Grass				S3	4 Secure	28	32.0 ± 0.0	NB
P	<i>Poa glauca</i>	Glaucous Blue Grass				S3	4 Secure	3	75.9 ± 0.0	NB
P	<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed				S3	4 Secure	10	51.3 ± 1.0	NB
P	<i>Xyris montana</i>	Northern Yellow-Eyed-Grass				S3	4 Secure	42	20.5 ± 5.0	NB
P	<i>Zannichellia palustris</i>	Horned Pondweed				S3	4 Secure	41	2.4 ± 0.0	NB
P	<i>Adiantum pedatum</i>	Northern Maidenhair Fern				S3	4 Secure	2	49.5 ± 0.0	NB
P	<i>Cryptogramma stelleri</i>	Steller's Rockbrake				S3	4 Secure	2	63.0 ± 0.0	NB
P	<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort				S3	4 Secure	2	72.4 ± 0.0	NB
P	<i>Dryopteris fragrans</i> <i>var. remotiuscula</i>	Fragrant Wood Fern				S3	4 Secure	32	36.5 ± 0.0	NB



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P	<i>Isoetes tuckermanii</i>	Tuckerman's Quillwort				S3	4 Secure	5	19.9 ± 0.0	NB
P	<i>Lycopodium sabinifolium</i>	Ground-Fir				S3	4 Secure	13	32.9 ± 1.0	NB
P	<i>Huperzia appalachiana</i>	Appalachian Fir-Clubmoss				S3	3 Sensitive	7	12.8 ± 1.0	NB
P	<i>Botrychium dissectum</i>	Cut-leaved Moonwort				S3	4 Secure	2	88.0 ± 5.0	PE
P	<i>Botrychium lanceolatum</i> var. <i>angustisegmentum</i>	Lance-Leaf Grape-Fern				S3	3 Sensitive	2	42.9 ± 0.0	NB
P	<i>Botrychium simplex</i>	Least Moonwort				S3	4 Secure	6	41.4 ± 0.0	NB
P	<i>Lobelia kalmii</i>	Brook Lobelia				S3S4	4 Secure	8	39.4 ± 0.0	NB
P	<i>Suaeda calceoliformis</i>	Horned Sea-blite				S3S4	4 Secure	42	24.7 ± 1.0	NB
P	<i>Utricularia gibba</i>	Humped Bladderwort				S3S4	4 Secure	1	35.9 ± 1.0	NB
P	<i>Rumex maritimus</i>	Sea-Side Dock				S3S4	4 Secure	31	23.6 ± 0.0	NB
P	<i>Rumex maritimus</i> var. <i>fueginus</i>	Tierra del Fuego Dock				S3S4	4 Secure	3	39.5 ± 0.0	NB
P	<i>Potentilla arguta</i>	Tall Cinquefoil				S3S4	4 Secure	3	44.1 ± 50.0	NB
P	<i>Cladium mariscoides</i>	Smooth Twigrush				S3S4	4 Secure	3	67.9 ± 0.0	NB
P	<i>Corallorhiza maculata</i>	Spotted Coralroot				S3S4	3 Sensitive	12	34.6 ± 1.0	NB
P	<i>Distichlis spicata</i>	Salt Grass				S3S4	4 Secure	64	11.7 ± 0.0	NB
P	<i>Potamogeton oakesianus</i>	Oakes' Pondweed				S3S4	4 Secure	1	83.1 ± 10.0	NB
P	<i>Stuckenia pectinata</i>	Sago Pondweed				S3S4	4 Secure	9	11.3 ± 1.0	NB
P	<i>Polygonum rail</i>	Sharp-fruited Knotweed				SH	0.1 Extirpated	3	67.6 ± 10.0	NB
P	<i>Montia fontana</i>	Water Blinks				SH	2 May Be At Risk	1	6.0 ± 1.0	NB
P	<i>Agalinis maritima</i>	Saltmarsh Agalinis				SX	0.1 Extirpated	2	48.7 ± 50.0	NB

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

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**APPENDIX 4B**  
**Wetland Data Sheets and Site Photographs**



<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-1</b> (data point 1 at boundary with old agricultural field)	
PID(s): 40205817, 40201311, 40206823, 40206815, 40509903, 40204372	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points w11-up1, w11-w11)	
Type/Class of Wetland (circle or highlight):  Shrub Forested <b>Fresh Marsh</b> Aquatic Bed Fen Bog Coastal Marsh Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Numerous common sedges including <i>Scirpus microcarpus</i> , <i>Carex stipata</i> , <i>Juncus effusus</i> . Common wet-meadow herbs including spotted jewelweed ( <i>Impatiens capensis</i> ), purple-stemmed aster ( <i>Symphyotrichum puniceum</i> ), blue flag ( <i>Iris versicolor</i> ), joe-pye weed ( <i>Eupatorium maculatum</i> ). Narrow leaved emergents such as cattail ( <i>Typha</i> sp.), Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), reed canary grass ( <i>Phalaris arundinacea</i> ), halberd-leaved tearthumb ( <i>Polygonum arifolium</i> )	
Dominant Upland Vegetation: Agronomic grasses including timothy ( <i>Phleum pratense</i> ), brome ( <i>Bromus</i> sp.), redtop ( <i>Agrostis gigantea</i> ). Common weeds including stinging nettle ( <i>Urtica dioica</i> ), cleavers ( <i>Galium aperine</i> ), cow vetch ( <i>Vicia cracca</i> ). Few sapling trembling aspen ( <i>Populus tremuloides</i> ) and grey birch ( <i>Betula populifolia</i> ).	
Vascular Plants of Conservation Concern: Halberd-leaved tearthumb ( <i>Polygonum arifolium</i> ) – S3 (ACCDC)/Provincial GS Rank 4 "Secure"; was scattered throughout the wetland.	
Open Water Information: WL-1 is associated with Black Brook. The watercourse is 1-2 m wide, 0.5-1 m deep and slow moving. There is a broad riparian zone, partly created by beaver dams and man-made impoundments (old railway, roads, etc., and partly due to the low relief of the local terrain. Upstream of the delineated wetland, there is a mad-made pond (possibly Ducks Unlimited), on the south side of the existing highway, outside the ROW.	

**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

The entire wetland is part of the Black Brook flood plain. Black Brook flows north to the Miramichi River, near where it enters the ocean.

**Wildlife Observations:**

Beaver, deer tracks and beds, racoon tracks, black ducks, red-winged black birds, teal

**Description of Any Observed Impacts to Wetland:**

The road and rail construction has obviously some footprint in the historic wetland, but likely has also promoted impoundment, thus increasing wetland area. There are ATV tracks in WL-1 on the north side of existing Rte 11. There is considerable noise from traffic and minor trash blown or tossed into the wetland at road/trail-side. The west side of Black Brook has been utilized for agriculture, including aggressive drainage at some locations. The east side of the brook is currently forested, subject to timber management practices.

**Additional Comments:**

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-1</b> (data point 2 at boundary with upland forest habitat)	
PID(s): 40205817, 40201311, 40206823, 40206815, 40509903, 40204372	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points w11-up2, w11-w12)	
Type/Class of Wetland (circle or highlight):  Shrub <b>Forested</b> Fresh Marsh Aquatic Bed Fen Bog Coastal Marsh Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Black spruce ( <i>Picea mariana</i> ), tamarack ( <i>Larix laricina</i> ), red maple ( <i>Acer rubrum</i> ), dead hardwoods Speckled alder ( <i>Alnus incana</i> ), Northern wild raisin ( <i>Viburnum nudum</i> ), velvet leaf blueberry ( <i>Vaccinium myrtilloides</i> ), Common Labrador tea ( <i>Ledum groenlandicum</i> ) and sheep laurel ( <i>Kalmia angustifolium</i> ) Cinnamon fern ( <i>Osmunda cinnamomea</i> ), spotted jewelweed ( <i>Impatiens capensis</i> ), dwarf red raspberry ( <i>Rubus pubescens</i> ), bittersweet nightshade ( <i>Solanum dulcamara</i> ), halberd-leaved tearthumb ( <i>Polygonum arifolium</i> )	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), red spruce ( <i>Picea rubens</i> ) Rhodora ( <i>Rhododendron canadense</i> ), red oak saplings ( <i>Quercus rubra</i> ) Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bracken fern ( <i>Pteridium aquilinum</i> ), bunchberry ( <i>Cornus canadensis</i> ), Gall-of-the-earth ( <i>Prenanthes trifoliolata</i> ), one-flowered pyrola ( <i>Moneses uniflora</i> )	
Vascular Plants of Conservation Concern: Halberd-leaved tearthumb ( <i>Polygonum arifolium</i> ) – S3 (ACCDC)/Provincial GS Rank 4 "Secure"; was scattered throughout the wetland.	
Open Water Information: WL-1 is associated with Black Brook. The watercourse is 1-2 m wide, 0.5-1 m deep and slow moving. There is a broad riparian zone, partly created by beaver dams and man-made impoundments (old railway, roads, etc., and partly due to the low relief of the local terrain. Upstream of the delineated wetland, there is a mad-made pond (possibly Ducks Unlimited), on the south side of the existing highway, outside the ROW.	



**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

The entire wetland is part of the Black Brook flood plain. Black Brook flows north to the Miramichi River, near where it enters the ocean.

In the forest fen part of the wetland, water stained leaves and mucky drainage channels were observed.

**Wildlife Observations:**

Beaver, deer tracks and beds, racoon tracks, black ducks, red-winged black birds, teal

**Description of Any Observed Impacts to Wetland:**

The road and rail construction has obviously some footprint in the historic wetland, but likely has also promoted impoundment, thus increasing wetland area. There are ATV tracks in WL-1 on the north side of existing Rte 11. There is considerable noise from traffic and minor trash blown or tossed into the wetland at road/trail-side. The west side of Black Brook has been utilized for agriculture, including aggressive drainage at some locations. The east side of the brook is currently forested, subject to timber management practices.

**Additional Comments:**

The northeast edge of the wetland has a fen margin with open forest that gradually changes to alder shrub swamp and shallow marsh closer to Black Brook. This transition is more abrupt in the south near Rte 11, changing directly to marsh.

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-2</b>	
PID(s): 40052862	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl2-up1, wl2-wl1)	
Type/Class of Wetland (circle or highlight):  Shrub   Forested   Fresh Marsh   Aquatic Bed   Fen <b>Bog</b> Coastal Marsh   Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Black spruce ( <i>Picea mariana</i> ), tamarack ( <i>Larix laricina</i> ), grey birch ( <i>Betula populifolia</i> ), eastern white cedar ( <i>Thuja occidentalis</i> ) Mountain holly ( <i>Nemopanthus mucronatus</i> ), rhodora ( <i>Rhododendron canadense</i> ), common Labrador tea ( <i>Ledum groenlandicum</i> ) Cinnamon fern ( <i>Osmunda cinnamomea</i> ), three-seeded sedge ( <i>Carex trisperma</i> )	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), eastern white pine ( <i>Pinus strobus</i> ), Black spruce ( <i>Picea mariana</i> ) Northern wild raisin ( <i>Viburnum nudum</i> ) Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bracken fern ( <i>Pteridium aquilinum</i> ), bunchberry ( <i>Cornus canadensis</i> ), pink lady's-slipper ( <i>Cypripedium acaule</i> )	
Vascular Plants of Conservation Concern: N/A	
Open Water Information: N/A	

**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

The wetland soil is fully saturated with variable depth of organics. Water stained leaves were observed in depressions around the wetland margin, indicating seasonal high water.

Wetland 2 may be isolated, but was not confirmed. There is no mapped surface drainage from the wetland to the local watershed but the DTI depth-to-water-table mapping implies drainage (perhaps seasonally) to the north.

**Wildlife Observations:**

Deer tracks and scat, passerine birds, wood frog

**Description of Any Observed Impacts to Wetland:**

There are ATV trails in the wetland extending from the network of timber harvest roads in the adjacent upland forest. Some forestry activity has been done in the edge of the wetland.

**Additional Comments:**



<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-3</b> (data point 1 at eastern boundary with agricultural field)	
PID(s): 40052839, 40052847	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl3-up1, wl3-wl1)	
Type/Class of Wetland (circle or highlight):  Shrub <b>Forested</b> Fresh Marsh Aquatic Bed Fen Bog Coastal Marsh Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Red maple ( <i>Acer rubrum</i> ), Black spruce ( <i>Picea mariana</i> ), tamarack ( <i>Larix laricina</i> ) Speckled alder ( <i>Alnus incana</i> ), mountain holly ( <i>Nemopanthus mucronatus</i> ) Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), Sensitive fern ( <i>Onoclea sensibilis</i> ), cattail ( <i>Typha sp.</i> ), three-leaved false solomon's seal ( <i>Maianthemum trifolium</i> ), crested wood fern ( <i>Dryopteris cristata</i> ), Boot's fern (a hybrid wood fern)( <i>Dryopteris x boottii</i> ), horsetails ( <i>Equisetum sp.</i> ), bugleweed ( <i>Lycopus uniflorus</i> ), halberd-leaved tearthumb ( <i>Polygonum arifolium</i> )	
Dominant Upland Vegetation: A few grey birch ( <i>Betula populifolia</i> ) saplings, Speckled alder ( <i>Alnus incana</i> ), and meadowsweet ( <i>Spiraea alba</i> ) around the edge of the field. Pasture hay species including redtop ( <i>Agrostis gigantea</i> ), white clover ( <i>Trifolium alsike</i> ), tall butter-cup ( <i>Ranunculus acris</i> ), cow vetch ( <i>Vicia cracca</i> ).	
Vascular Plants of Conservation Concern: Halberd-leaved tearthumb ( <i>Polygonum arifolium</i> ) – S3 (ACCDC)/Provincial GS Rank 4 "Secure"; was scattered throughout the wetland.	
Open Water Information: There is a small pool of shallow open water in the small bog. No other drainage was observed within the study area.	

**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

The wetland soil was fully saturated. Wetland 3 may drain eastward but this was not confirmed. No connection was observed with nearby Wetland 4 or local drainage, within the study area. However, it seems likely that there should be drainage on the steep slope to the east (at least seasonally) toward the Napan River, and this is strongly implied by DTI depth-to-water table mapping.

**Wildlife Observations:**

Red squirrel, passerine birds, cow droppings in field. An electric fence surrounds the field boundary.

**Description of Any Observed Impacts to Wetland:**

The pasture footprint likely has extended into the historic wetland area. Field ditches may have drained a small portion of the wetland.

**Additional Comments:**

The majority of the delineated wetland is mixed forest swamp with a small open bog in the northeast part of the ROW. The small bog is not part of the boundary but lies entirely inside the forested swamp. The bog contains some open standing water and supports a number of common bog orchids.

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-3</b> (data point 2 at western boundary with upland forest habitat)	
PID(s): 40052839, 40052847	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl3-up2, wl3-wl2)	
Type/Class of Wetland (circle or highlight):  Shrub <b>Forested</b> Fresh Marsh Aquatic Bed Fen Bog Coastal Marsh Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Black spruce ( <i>Picea mariana</i> ), tamarack ( <i>Larix laricina</i> ) Speckled alder ( <i>Alnus incana</i> ), mountain holly ( <i>Nemopanthus mucronatus</i> ), eastern white pine sapling ( <i>Pinus strobus</i> ) Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), cinnamon fern ( <i>Osmunda cinnamomea</i> ), Sensitive fern ( <i>Onoclea sensibilis</i> ), cattail ( <i>Typha sp.</i> ), three-leaved false solomon's seal ( <i>Maianthemum trifolium</i> ), crested wood fern ( <i>Dryopteris cristata</i> ), Boot's fern (a hybrid wood fern)( <i>Dryopteris x boottii</i> ), horsetails ( <i>Equisetum sp.</i> ), bugleweed ( <i>Lycopus uniflorus</i> ) Sphagnum carpet	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), red spruce ( <i>Picea rubens</i> ) Rhodora ( <i>Rhododendron canadense</i> ), red oak saplings ( <i>Quercus rubra</i> ) Sparse herb layer and well decomposed leaf layer: wild sarsaparilla ( <i>Aralia nudicaulis</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), nodding trillium ( <i>Trillium cernuum</i> ), bunchberry ( <i>Cornus canadensis</i> ), interrupted fern ( <i>Osmunda claytoniana</i> ) Terrestrial mosses and lichens	
Vascular Plants of Conservation Concern: None observed	
Open Water Information: There is a small pool of shallow open water in the small bog. No other drainage was observed within the study area.	



**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

The wetland soil was fully saturated. Wetland 3 may drain eastward but this was not confirmed. No connection was observed with nearby Wetland 4 or local drainage, within the study area. However, it seems likely that there should be drainage on the steep slope to the east (at least seasonally) toward the Napan River, and this is strongly implied by DTI depth-to-water table mapping.

**Wildlife Observations:**

Red squirrel, passerine birds, cow droppings in field. An electric fence surrounds the field boundary.

**Description of Any Observed Impacts to Wetland:**

Signs of past timber harvesting in both upland and wetland along the western edge.

**Additional Comments:**

The majority of the delineated wetland is mixed forest swamp with a small open bog in the northeast part of the ROW. The small bog is not part of the boundary but lies entirely inside the forested swamp. The bog contains some open standing water and supports a number of common bog orchids.

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-4</b>	
PID(s): 40052847	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl4-up1, wl4-wl1)	
Type/Class of Wetland (circle or highlight):  Shrub <b>Forested</b> Fresh Marsh   Aquatic Bed   Fen   Bog   Coastal Marsh   Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Black spruce ( <i>Picea mariana</i> ), red maple ( <i>Acer rubrum</i> ) Speckled alder ( <i>Alnus incana</i> ), mountain holly ( <i>Nemopanthus mucronatus</i> ) Cinnamon fern ( <i>Osmunda cinnamomea</i> ), sedges ( <i>Carex echinata</i> , <i>C. trisperma</i> ), bugleweed ( <i>Lycopus uniflorus</i> ), spotted coral-root ( <i>Corallorhiza maculata</i> ) Sphagnum carpet	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), red spruce ( <i>Picea rubens</i> ) Northern wild raisin ( <i>Viburnum nudum</i> ) Sparse herb layer and well decomposed leaf layer: Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bunchberry ( <i>Cornus canadensis</i> ), wintergreen ( <i>Gaultheria procumbens</i> ) Terrestrial mosses and lichens	
Vascular Plants of Conservation Concern: None observed	
Open Water Information: N/A	

**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

Wetland 4 may be isolated, but cannot be confirmed. No connection was observed with nearby Wetland 3, within the study area, and there is no mapped drainage from the wetland. DTI depth to water-table mapping does not imply drainage from Wetland 4.

**Wildlife Observations:**

Moose scat

**Description of Any Observed Impacts to Wetland:**

Signs of past timber harvesting in both upland and wetland including old roads/skidder trails.

**Additional Comments:**

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-5</b> (data point 1 at west boundary with agricultural field)	
PID(s): 40052821, 40071649	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl5-up1, wl5-wl1)	
Type/Class of Wetland (circle or highlight):  <b>Shrub</b> Forested Fresh Marsh Aquatic Bed Fen Bog Coastal Marsh Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Red maple ( <i>Acer rubrum</i> ), paper birch ( <i>Betula papyrifera</i> ), American elm, Speckled alder ( <i>Alnus incana</i> ), highbush cranberry ( <i>Viburnum opulus</i> ), chokecherry ( <i>Prunus virginiana</i> ) Sensitive fern ( <i>Onoclea sensibilis</i> ), ostrich fern ( <i>Matteuccia struthiopteris</i> ), spotted jewelweed ( <i>Impatiens capensis</i> ), Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), northern manna grass ( <i>Glyceria borealis</i> ), reed canary grass ( <i>Phalaris arundinacea</i> ), sedges ( <i>Carex crinita</i> , <i>C. stipata</i> , <i>C. projecta</i> , <i>Scirpus atrocintus</i> , <i>Scirpus microcarpus</i> ), tall meadow-rue ( <i>Thalictrum pubescens</i> ), Canada lily ( <i>Lilium canadense</i> ), jack-in-the-pulpit ( <i>Arisaema triphyllum</i> ), live-forever ( <i>Hylotelephium telephium</i> )	
Dominant Upland Vegetation: Agronomic apple trees Meadowsweet ( <i>Spirea alba</i> )(few) Agronomic grasses including red top ( <i>Agrostis gigantea</i> ) and timothy ( <i>Phleum pratense</i> ), tall buttercup ( <i>Ranunculus acris</i> ), cow vetch ( <i>Vicia cracca</i> ), rough-stemmed goldenrod ( <i>Solidago rugosa</i> ), yellow clover ( <i>Trifolium aureum</i> )	
Vascular Plants of Conservation Concern: N/A	
Open Water Information: The watercourse is 6-8 m wide, 0.5-1 m deep with moderate flow (less than bank full) at the time of the survey. The riparian zone includes strongly leveed banks and signs of overtopping (erosion/sedimentation) with any significant high flow event. The apparent floodplain extends a short distance (< 30 m) on the east bank to the base of a steep slope. On the west bank, the floodplain is up to 100 m wide, including the lower part of the currently used pasture/hay field. The Napan River flows northeast, approximately 7-8 km to the ocean through a landscape of small farms and rural residences.	



**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

Wetland 5 is associated with the Napan River floodplain. The wetland soil is variably saturated to well drained, depending on elevation above the wetted river bed. All soils are sandy with some gravel and few stones. Low areas have much bare eroded soil and water stained leaves.

**Wildlife Observations:**

Beaver, deer tracks and beds, racoon tracks, small bear tracks, bank burrows

**Description of Any Observed Impacts to Wetland:**

Past and current agriculture has been conducted in parts of the wetland on the west bank. ATV trails were observed on both sides of the river. An improvised ATV bridge had been constructed on top of a beaver dam in the river.

**Additional Comments:**

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-5</b> (data point 2 at east boundary with steep forest slope)	
PID(s): 40052821, 40071649	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl5-upwest, wl5-wlwest)	
Type/Class of Wetland (circle or highlight):  <b>Shrub</b> Forested Fresh Marsh Aquatic Bed Fen Bog Coastal Marsh Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Balsam poplar Speckled alder ( <i>Alnus incana</i> ) Sensitive fern ( <i>Onoclea sensibilis</i> ), tall meadow-rue ( <i>Thalictrum pubescens</i> )	
Dominant Upland Vegetation: Grey birch ( <i>Betula populifolia</i> ) Chokecherry ( <i>Prunus virginiana</i> ), beaked hazelnut, highbush cranberry ( <i>Viburnum opulus</i> ) Common blackberry ( <i>Rubus allegheniensis</i> ), red baneberry ( <i>Actaea rubra</i> ), nodding trillium ( <i>Trillium cernuum</i> )	
Vascular Plants of Conservation Concern: N/A	
Open Water Information: The watercourse is 6-8 m wide, 0.5-1 m deep with moderate flow (less than bank full) at the time of the survey. The riparian zone includes strongly leveed banks and signs of overtopping (erosion/sedimentation) with any significant high flow event. The apparent floodplain extends a short distance (< 30 m) on the east bank to the base of a steep slope. On the west bank, the floodplain is up to 100 m wide, including the lower part of the currently used pasture/hay field. The Napan River flows northeast, approximately 7-8 km to the ocean through a landscape of small farms and rural residences.	

**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

Wetland 5 is associated with the Napan River floodplain. The wetland soil is variably saturated to well drained, depending on elevation above the wetted river bed. All soils are sandy with some gravel and few stones. Low areas have much bare eroded soil and water stained leaves.

**Wildlife Observations:**

Beaver, deer tracks and beds, racoon tracks, small bear tracks, black ducks

**Description of Any Observed Impacts to Wetland:**

Past and current agriculture has been conducted in parts of the wetland on the west bank. ATV trails were observed on both sides of the river. An improvised ATV bridge had been constructed on top of a beaver dam in the river.

**Additional Comments:**

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-6</b>	
PID(s): 40071615, 40071649	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl6-up1, wl6-wl1)	
Type/Class of Wetland (circle or highlight):  Shrub <b>Forested</b> Fresh Marsh   Aquatic Bed   Fen   Bog   Coastal Marsh   Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Tamarack ( <i>Larix laricina</i> ), red maple ( <i>Acer rubrum</i> ), black spruce ( <i>Picea mariana</i> ) Speckled alder ( <i>Alnus incana</i> ) Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), stalk-grain sedge ( <i>Carex stipata</i> ), crested wood fern ( <i>Dryopteris cristata</i> ), spotted jewelweed ( <i>Impatiens capensis</i> ), horsetails ( <i>Equisetum</i> sp.), marsh st.johns-wort ( <i>Triadenum fraseri</i> ), swamp rose ( <i>Rosa nitida</i> ), tall northern green bog orchid ( <i>Platanthera aquilonis</i> ).	
Dominant Upland Vegetation: Red spruce ( <i>Picea rubens</i> ), red maple ( <i>Acer rubrum</i> ), balsam fir ( <i>Abies balsamea</i> ) Northern wild raisin ( <i>Viburnum nudum</i> ) Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bunchberry ( <i>Cornus canadensis</i> ), velvet-leaf blueberry ( <i>Vaccinium myrtiloides</i> )	
Vascular Plants of Conservation Concern: N/A	
Open Water Information: WL-6 is associated with a tributary of the Napan River. The watercourse is ~1 m wide, 0.5-1 m deep and slow moving. There is a broad riparian zone, created by a series of multiple beaver dams.	



**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

The wetland was flooded to variable depths by beaver dams. The wetland is associated with a tributary to the Napan River. The watercourse flows west to the Napan River, to a point downstream from Wetland 5. Upstream of Wetland 6, there is a relatively large provincially mapped wetland, outside the ROW. Wetland 7 is also part of the upstream wetland, approximately 500 m to the east.

**Wildlife Observations:**

Beaver dam (maintained), deer tracks, red squirrel, passerine birds, wood frog, bull frog

**Description of Any Observed Impacts to Wetland:**

The upland and wetland has been subject to past timber harvesting. Impacts are mainly related to old roads and tracks; which have altered local drainage in this relatively flat terrain.

**Additional Comments:**

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-7</b>	
PID(s): 40071615, 40074783, 40068603	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl7-up1, wl7-wl1)	
Type/Class of Wetland (circle or highlight):  Shrub <b>Forested</b> Fresh Marsh   Aquatic Bed   Fen   Bog   Coastal Marsh   Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Paper birch ( <i>Betula papyrifera</i> ), red maple ( <i>Acer rubrum</i> ) Speckled alder ( <i>Alnus incana</i> ), common winterberry ( <i>Ilex verticillata</i> ), swamp rose ( <i>Rosa nitida</i> ) Sensitive fern ( <i>Onoclea sensibilis</i> ), Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), northern manna grass ( <i>Glyceria borealis</i> ) ( <i>Glyceria striata</i> ), sedges ( <i>Carex stipata</i> , <i>C. crinita</i> , <i>C. projecta</i> , <i>Juncus effusus</i> ), jack-in-the-pulpit ( <i>Arisaema tryphillum</i> ), spotted joe-pye-weed ( <i>Eupatorium maculatum</i> ), horsetails ( <i>Equisetum sp.</i> ), crested wood fern ( <i>Dryopteris cristata</i> ), blue flag ( <i>Iris versicolor</i> ), halberd-leaved tearthumb ( <i>Polygonum arifolium</i> )	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), red spruce ( <i>Picea rubens</i> ), paper birch ( <i>Betula papyrifera</i> ) Northern wild raisin ( <i>Viburnum nudum</i> ) Sparse herb layer and well decomposed leaf layer: Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bunchberry ( <i>Cornus canadensis</i> ), interrupted fern ( <i>Osmunda claytoniana</i> ), whorled wood aster ( <i>Oclemena acuminata</i> ), Terrestrial mosses and lichens	
Vascular Plants of Conservation Concern: Halberd-leaved tearthumb ( <i>Polygonum arifolium</i> ) – S3 (ACCDC)/Provincial GS Rank 4 "Secure"; was scattered throughout the wetland.	
Open Water Information: N/A	

**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

Wetland soil is fully saturated and with frequent mucky channels where surface flows occur seasonally and during high precipitation events. Wetland 7 drains into a tributary of the Napan River; which flows downgradient through Wetland 6 approximately 500 m to the west.

**Wildlife Observations:**

Moose tracks, garter snake, oven bird, other passerine birds

**Description of Any Observed Impacts to Wetland:**

Signs of past timber harvesting in both upland and wetland including old roads/skidder trails.

**Additional Comments:**

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-8</b>	
PID(s): 40068603, 40068421	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl8-up1, wl8-wl1)	
Type/Class of Wetland (circle or highlight):  Shrub <b>Forested</b> Fresh Marsh   Aquatic Bed   Fen   Bog   Coastal Marsh   Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Paper birch ( <i>Betula papyrifera</i> ), red maple ( <i>Acer rubrum</i> ), Black spruce ( <i>Picea mariana</i> ) Speckled alder ( <i>Alnus incana</i> ) Sensitive fern ( <i>Onoclea sensibilis</i> ), Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), northern manna grass ( <i>Glyceria borealis</i> ), sedges ( <i>Carex stipata</i> , <i>C. crinita</i> , <i>C. projecta</i> , <i>Juncus effusus</i> ), jack-in-the-pulpit ( <i>Arisaema triphyllum</i> ), spotted joe-pye-weed ( <i>Eupatorium maculatum</i> ), horsetails ( <i>Equisetum sp.</i> ), crested wood fern ( <i>Dryopteris cristata</i> ), blue flag ( <i>Iris versicolor</i> ), halberd-leaved tearthumb ( <i>Polygonum arifolium</i> )	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), red spruce ( <i>Picea rubens</i> ), paper birch ( <i>Betula papyrifera</i> ) Northern wild raisin ( <i>Viburnum nudum</i> ) Sparse herb layer and well decomposed leaf layer: Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bunchberry ( <i>Cornus canadensis</i> ), bracken fern ( <i>Pteridium aquilinum</i> ), interrupted fern ( <i>Osmunda claytoniana</i> ), whorled wood aster ( <i>Oclemena acuminata</i> ), Terrestrial mosses and lichens	
Vascular Plants of Conservation Concern: Halberd-leaved tearthumb ( <i>Polygonum arifolium</i> ) – S3 (ACCDC)/Provincial GS Rank 4 "Secure"; was scattered throughout the wetland.	
Open Water Information: N/A	



**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

Wetland soil is fully saturated and with frequent mucky channels where surface flows occur seasonally and during high precipitation events. Wetland 8 may be connected to either the mapped wetland to the west (including Wetland 7) or to a large mapped wetland to the southeast (including Wetland 9), but this was not confirmed. No direct connection was observed in the study area. DTI depth-to-water-table mapping is uncertain and does not strongly support either possibility. See comment below on regional drainage.

**Wildlife Observations:**

Moose tracks, garter snake, oven bird, other passerine birds

**Description of Any Observed Impacts to Wetland:**

Signs of past timber harvesting in both upland and wetland including old roads/skidder trails.

**Additional Comments:**

Wetland 8 lies on the western edge of a broad central plateau between the Napan River and the Black River. The region has very low relief such that drainage is slow and elevation varies little over several kilometres. The difference between upland and wetland is a matter of centimetres, producing large swamps with “islands” and ridges of slightly dryer terrain. This includes Wetland 8, 9, 10, and 11, all of which are partly **mosaic wetlands**. The delineation of a wetland boundary for these wetlands required an approach that divides areas of predominantly wetland habitat (> 50 %) from areas of predominantly upland habitat (that contains small swales). In general, where soils are consistently saturated, the forest is more open, with tall shrubs (mainly Speckled alder (*Alnus incana*) and a lush ground cover of ferns, grasses and sedges, and sphagnum moss. Areas of higher terrain have denser forest and crown closure with relatively sparse ground cover and terrestrial mosses or well decomposed leaf litter. These two conditions blend together producing many small islands of upland within a large network of swamp drainage paths. Conversely, the upland outside the delineated wetland boundary has progressively diminishing swales. Due to the subtle variation in local elevations, both wetland and upland vegetation is present throughout and side-by-side, changing only in relative abundance.

It is possible in some areas that timber harvesting has altered drainage enough to transform former upland forest to swamp. Perhaps over time the drainage will revert, but the change may also be permanent.

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-9</b> (data point 1 at west boundary)	
PID(s): 40068397, 40068405, 40068413, 40068421, 40073926	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl9-up1, wl9-wl1)	
Type/Class of Wetland (circle or highlight):  Shrub Forested Fresh Marsh Aquatic Bed Fen Bog Coastal Marsh <b>Wetland Complex</b>	
Wetland Complex Information: Wetland 9 is part of a relatively large mapped wetland south of the ROW that occupies the drainage divide between the Napan River and the Black River, and drains both east and west. Within the study area, Wetland 9 contains both hardwood and softwood dominated swamp and fen habitat. The full extent of the wetland is unknown and difficult to estimate using aerial imagery since it is largely forested and the DTI depth-to-water-table mapping is less accurate in this very level terrain.	
Dominant Wetland Vegetation (3 species minimum): Paper birch ( <i>Betula papyrifera</i> ), red maple ( <i>Acer rubrum</i> ), Black spruce ( <i>Picea mariana</i> ) Speckled alder ( <i>Alnus incana</i> ) Sensitive fern ( <i>Onoclea sensibilis</i> ), Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), northern manna grass ( <i>Glyceria borealis</i> ), sedges ( <i>Carex stipata</i> , <i>C. crinita</i> , <i>C. projecta</i> , <i>Juncus effusus</i> ), jack-in-the-pulpit ( <i>Arisaema triphyllum</i> ), spotted joe-pye-weed ( <i>Eupatorium maculatum</i> ), horsetails ( <i>Equisetum sp.</i> ), crested wood fern ( <i>Dryopteris cristata</i> ), blue flag ( <i>Iris versicolor</i> ), halberd-leaved tearthumb ( <i>Polygonum arifolium</i> )	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), red spruce ( <i>Picea rubens</i> ), paper birch ( <i>Betula papyrifera</i> ) Northern wild raisin ( <i>Viburnum nudum</i> ) Sparse herb layer and well decomposed leaf layer: Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bunchberry ( <i>Cornus canadensis</i> ), bracken fern ( <i>Pteridium aquilinum</i> ), interrupted fern ( <i>Osmunda claytoniana</i> ), whorled wood aster ( <i>Oclemena acuminata</i> ), Terrestrial mosses and lichens	
Vascular Plants of Conservation Concern: Halberd-leaved tearthumb ( <i>Polygonum arifolium</i> ) – S3 (ACCDC)/Provincial GS Rank 4 "Secure"; was scattered throughout the wetland.	
Open Water Information: N/A	

**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

Wetland soil is fully saturated and with frequent mucky channels where surface flows occur seasonally and during high precipitation events. Wetland 9 is part of the large mapped wetland to the south. No direct connection to Wetland 8 was observed in the study area but DTI depth-to-water-table mapping indicates this may be possible. Wetland 10 is part of the downstream watershed of the tributary of Black River; which drains from Wetland-9. See comment below on regional drainage.

**Wildlife Observations:**

Moose tracks, garter snake, oven bird, other passerine birds

**Description of Any Observed Impacts to Wetland:**

Signs of past timber harvesting in both upland and wetland including old roads/skidder trails.

**Additional Comments:**

Wetland 9 lies in the middle of a broad central plateau between the Napan River and the Black River. The region has very low relief such that drainage is slow and elevation varies little over several kilometres. The difference between upland and wetland is a matter of centimetres, producing large swamps with “islands” and ridges of slightly dryer terrain. This includes Wetland 8, 9, 10, and 11, all of which are partly **mosaic wetlands**. The delineation of a wetland boundary for these wetlands required an approach that divides areas of predominantly wetland habitat (> 50 %) from areas of predominantly upland habitat (that contains small swales). In general, where soils are consistently saturated, the forest is more open, with tall shrubs (mainly Speckled alder (*Alnus incana*) and a lush ground cover of ferns, grasses and sedges, and sphagnum moss. Areas of higher terrain have denser forest and crown closure with relatively sparse ground cover and terrestrial mosses or well decomposed leaf litter. These two conditions blend together producing many small islands of upland within a large network of swamp drainage paths. Conversely, the upland outside the delineated wetland boundary has progressively diminishing swales. Due to the subtle variation in local elevations, both wetland and upland vegetation is present throughout and side-by-side, changing only in relative abundance.

It is possible in some areas that timber harvesting has altered drainage enough to transform former upland forest to swamp. Perhaps over time the drainage will revert, but the change may also be permanent.

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-9</b> (data point 2 at east boundary)	
PID(s): 40068397, 40068405, 40068413, 40068421, 40073926	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl9a-up1, wl9a-wl1)	
Type/Class of Wetland (circle or highlight):  Shrub Forested Fresh Marsh Aquatic Bed Fen Bog Coastal Marsh <b>Wetland Complex</b>	
Wetland Complex Information: Wetland 9 is part of a relatively large mapped wetland south of the ROW that occupies the drainage divide between the Napan River and the Black River, and drains both east and west. Within the study area, Wetland 9 contains both hardwood and softwood dominated swamp and fen habitat. The full extent of the wetland is unknown and difficult to estimate using aerial imagery since it is largely forested and the DTI depth-to-water-table mapping is less accurate in this very level terrain.	
Dominant Wetland Vegetation (3 species minimum): Black spruce ( <i>Picea mariana</i> ), red maple ( <i>Acer rubrum</i> ), eastern white cedar ( <i>Thuja occidentalis</i> ) Mountain holly ( <i>Nemopanthus mucronatus</i> ), Speckled alder ( <i>Alnus incana</i> ) Cinnamon fern ( <i>Osmunda cinnamomea</i> ), Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), northern manna grass ( <i>Glyceria borealis</i> ), dwarf red raspberry ( <i>Rubus pubescens</i> ), hairy flat-top white aster ( <i>Doellingeria umbellata</i> ), spotted joe-pye-weed ( <i>Eupatorium maculatum</i> ), stinging nettle ( <i>Urtica dioica</i> ), crested wood fern ( <i>Dryopteris cristata</i> ), spotted jewelweed ( <i>Impatiens capensis</i> ), halberd-leaved tearthumb ( <i>Polygonum arifolium</i> )	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), red spruce ( <i>Picea rubens</i> ), eastern white cedar ( <i>Thuja occidentalis</i> ) (few) Northern wild raisin ( <i>Viburnum nudum</i> ) Sparse herb layer (30-50%) and well decomposed leaf layer: Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bunchberry ( <i>Cornus canadensis</i> ), wood fern ( <i>Dryopteris</i> sp.) Terrestrial mosses and lichens	
Vascular Plants of Conservation Concern: Halberd-leaved tearthumb ( <i>Polygonum arifolium</i> ) – S3 (ACCDC)/Provincial GS Rank 4 "Secure"; was scattered throughout the wetland.	
Open Water Information: N/A	



**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

Wetland soil is fully saturated and with frequent mucky channels where surface flows occur seasonally and during high precipitation events. Wetland 9 is part of the large mapped wetland to the south. No direct connection to Wetland 8 was observed in the study area but DTI depth-to-water-table mapping indicates this may be possible. Wetland 10 is part of the downstream watershed of the tributary of Black River; which drains from Wetland-9. See comment below on regional drainage.

**Wildlife Observations:**

Moose tracks, garter snake, oven bird, other passerine birds

**Description of Any Observed Impacts to Wetland:**

Signs of past timber harvesting in both upland and wetland including old roads/skidder trails.

**Additional Comments:**

Wetland 9 lies in the middle of a broad central plateau between the Napan River and the Black River. The region has very low relief such that drainage is slow and elevation varies little over several kilometres. The difference between upland and wetland is a matter of centimetres, producing large swamps with “islands” and ridges of slightly dryer terrain. This includes Wetland 8, 9, 10, and 11, all of which are partly **mosaic wetlands**. The delineation of a wetland boundary for these wetlands required an approach that divides areas of predominantly wetland habitat (> 50 %) from areas of predominantly upland habitat (that contains small swales). In general, where soils are consistently saturated, the forest is more open, with tall shrubs (mainly Speckled alder (*Alnus incana*) and a lush ground cover of ferns, grasses and sedges, and sphagnum moss. Areas of higher terrain have denser forest and crown closure with relatively sparse ground cover and terrestrial mosses or well decomposed leaf litter. These two conditions blend together producing many small islands of upland within a large network of swamp drainage paths. Conversely, the upland outside the delineated wetland boundary has progressively diminishing swales. Due to the subtle variation in local elevations, both wetland and upland vegetation is present throughout and side-by-side, changing only in relative abundance.

It is possible in some areas that timber harvesting has altered drainage enough to transform former upland forest to swamp. Perhaps over time the drainage will revert, but the change may also be permanent.

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-10</b>	
PID(s): 40068314, 40254633	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl10-up1, wl10-w11)	
Type/Class of Wetland (circle or highlight):  Shrub   Forested   Fresh Marsh   Aquatic Bed   Fen   Bog   Coastal Marsh <b>Wetland Complex</b>	
Wetland Complex Information: Wetland 10 is part of a relatively large mapped wetland south of the ROW that is associated with a tributary of the Black River, and drains northeast. Within the study area, Wetland 10 contains mainly softwood dominated swamp and fen habitat. The full extent of the wetland is unknown and difficult to estimate using aerial imagery since it is largely forested and the DTI depth-to-water-table mapping is less accurate in this very level terrain.  The east end of the wetland is the beaver impounded alder shrub swamp floodplain of the tributary; which is fairly well defined on the east bank by a significant slope.	
Dominant Wetland Vegetation (3 species minimum): Eastern white cedar ( <i>Thuja occidentalis</i> ), Black spruce ( <i>Picea mariana</i> ), black ash ( <i>Fraxinus nigra</i> ) Speckled alder ( <i>Alnus incana</i> ) Cinnamon fern ( <i>Osmunda cinnamomea</i> ), Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), northern manna grass ( <i>Glyceria borealis</i> ), cattail ( <i>Typha sp.</i> ), tall meadow-rue, horsetails ( <i>Equisetum sp.</i> )	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red spruce ( <i>Picea rubens</i> ), eastern white pine ( <i>Pinus strobus</i> ), eastern white cedar ( <i>Thuja occidentalis</i> ) Chokecherry ( <i>Prunus virginiana</i> ) Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bunchberry ( <i>Cornus canadensis</i> ), bracken fern ( <i>Pteridium aquilinum</i> ), interrupted fern ( <i>Osmunda claytoniana</i> ), whorled wood aster ( <i>Oclemena acuminata</i> ), Terrestrial mosses and lichens	
Vascular Plants of Conservation Concern: None observed	
Open Water Information: The tributary of the Black River that forms the eastern boundary of the wetland within the study area is 1-2 m wide and 1+ m deep with a mucky bottom. The watercourse is beaver dammed and slow moving. The channel is broadly sinuous though the alder shrub swamp and braided with many smaller side channels. The pond upstream of the dam was small (less than 20 x 5 m in area) at the time of the survey.	

**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

Forest wetland soil is fully saturated and with frequent mucky channels where surface flows occur seasonally and during high precipitation events. The alder shrub swamp associated with the tributary is partly flooded up to 1 m deep. Wetland 10 is part of the large mapped wetland to the south and east, associated with the tributary to the Black River (that drains out of Wetland 9 to the west). Drainage in Wetland 10 generally conforms to DTI depth-to-water-table mapping. See comment below on regional drainage.

**Wildlife Observations:**

Beaver, moose tracks, heavy browsing evident on trees and shrubs, passerine birds.

**Description of Any Observed Impacts to Wetland:**

Signs of past timber harvesting in both upland and wetland including old roads/skidder trails. The upland forest has been subject to thinning.

**Additional Comments:**

Wetland 10 lies on the eastern half of a broad central plateau between the Napan River and the Black River. The region has very low relief such that drainage is slow and elevation varies little over several kilometres. The difference between upland and wetland is a matter of centimetres, producing large swamps with “islands” and ridges of slightly dryer terrain. This includes Wetland 8, 9, 10, and 11, all of which are partly **mosaic wetlands**. The delineation of a wetland boundary for these wetlands required an approach that divides areas of predominantly wetland habitat (> 50 %) from areas of predominantly upland habitat (that contains small swales). In general, where soils are consistently saturated, the forest is more open, with tall shrubs (mainly alder) and a lush ground cover of ferns, grasses and sedges, and sphagnum moss. Areas of higher terrain have denser forest and crown closure with relatively sparse ground cover and terrestrial mosses or well decomposed leaf litter. These two conditions blend together producing many small islands of upland within a large network of swamp drainage paths. Conversely, the upland outside the delineated wetland boundary has progressively diminishing swales. Due to the subtle variation in local elevations, both wetland and upland vegetation is present throughout and side-by-side, changing only in relative abundance.

It is possible in some areas that timber harvesting has altered drainage enough to transform former upland forest to swamp. Perhaps over time the drainage will revert, but the change may also be permanent.

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-11</b> (data point 1 at west boundary)	
PID(s): 40068058, 40068074	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl11-up1, wl11-wl1)	
Type/Class of Wetland (circle or highlight):  Shrub <b>Forested</b> Fresh Marsh Aquatic Bed Fen Bog Coastal Marsh Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Black spruce ( <i>Picea mariana</i> ), eastern white cedar ( <i>Thuja occidentalis</i> ) Speckled alder ( <i>Alnus incana</i> ), red maple ( <i>Acer rubrum</i> ) saplings, sheep laurel ( <i>Kalmia angustifolium</i> ) Cinnamon fern ( <i>Osmunda cinnamomea</i> ), Bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), northern manna grass ( <i>Glyceria borealis</i> ), sedges ( <i>Carex stipata</i> , <i>Juncus effusus</i> , <i>Trichophorum cespitosum</i> ), horsetails ( <i>Equisetum</i> sp.)	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), red spruce ( <i>Picea rubens</i> ), eastern white cedar ( <i>Thuja occidentalis</i> ) Northern wild raisin ( <i>Viburnum nudum</i> ), rhodora ( <i>Rhododendron canadense</i> ) Sparse herb layer and well decomposed leaf layer: Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), bracken fern ( <i>Pteridium aquilinum</i> ), nodding trillium ( <i>Trillium cernuum</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bunchberry ( <i>Cornus canadensis</i> ) Terrestrial mosses and lichens	
Vascular Plants of Conservation Concern: A significant population of Southern Twayblade ( <i>Listera australis</i> ) was found in Wetland 11 in habitat dominated by black spruce ( <i>Picea mariana</i> ). The highway ROW was realigned downgradient to avoid the site.	
Open Water Information: N/A	



**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

Wetland soil is fully saturated and with frequent mucky channels where surface flows occur seasonally and during high precipitation events. Wetland 11 may drain toward the Black River, but this was not confirmed. No direct connection was observed in the study area. DTI depth-to-water-table mapping suggests possible drainage to the northeast. See comment below on regional drainage.

**Wildlife Observations:**

Moose scat, browsing on trees and shrubs, passerine birds

**Description of Any Observed Impacts to Wetland:**

Signs of past timber harvesting in both upland and wetland including old roads/skidder trails.

**Additional Comments:**

Wetland 11 lies on the eastern edge of a broad central plateau between the Napan River and the Black River. The region has very low relief such that drainage is slow and elevation varies little over several kilometres. The difference between upland and wetland is a matter of centimetres, producing large swamps with “islands” and ridges of slightly dryer terrain. This includes Wetland 8, 9, 10, and 11, all of which are partly **mosaic wetlands**. The delineation of a wetland boundary for these wetlands required an approach that divides areas of predominantly wetland habitat (> 50 %) from areas of predominantly upland habitat (that contains small swales). In general, where soils are consistently saturated, the forest is more open, with tall shrubs (mainly Speckled alder (*Alnus incana*) and a lush ground cover of ferns, grasses and sedges, and sphagnum moss. Areas of higher terrain have denser forest and crown closure with relatively sparse ground cover and terrestrial mosses or well decomposed leaf litter. These two conditions blend together producing many small islands of upland within a large network of swamp drainage paths. Conversely, the upland outside the delineated wetland boundary has progressively diminishing swales. Due to the subtle variation in local elevations, both wetland and upland vegetation is present throughout and side-by-side, changing only in relative abundance.

It is possible in some areas that timber harvesting has altered drainage enough to transform former upland forest to swamp. Perhaps over time the drainage will revert, but the change may also be permanent.

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-11</b> (data point 2 at east boundary)	
PID(s): 40068058, 40068074	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points w111-UPa, w111-WLa)	
Type/Class of Wetland (circle or highlight):  Shrub <b>Forested</b> Fresh Marsh Aquatic Bed Fen Bog Coastal Marsh Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Black spruce ( <i>Picea mariana</i> ), eastern white cedar ( <i>Thuja occidentalis</i> ), black ash ( <i>Fraxinus nigra</i> ), red maple ( <i>Acer rubrum</i> ) Speckled alder ( <i>Alnus incana</i> ), mountain holly ( <i>Nemopanthus mucronatus</i> ) Cinnamon fern ( <i>Osmunda cinnamomea</i> ), bluejoint reed grass ( <i>Calamagrostis canadensis</i> ), northern manna grass ( <i>Glyceria borealis</i> ), sedges ( <i>Carex stipata</i> , <i>C. trisperma</i> , <i>Juncus effusus</i> ), horsetails ( <i>Equisetum sp.</i> ) Sphagnum moss carpet	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), red spruce ( <i>Picea rubens</i> ) Northern wild raisin ( <i>Viburnum nudum</i> ), rhodora ( <i>Rhododendron canadense</i> ) Sparse herb layer and well decomposed leaf layer: Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), bracken fern ( <i>Pteridium aquilinum</i> ), nodding trillium ( <i>Trillium cernuum</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bunchberry ( <i>Cornus canadensis</i> ), pink lady's-slipper ( <i>Cypripedium acaule</i> ) Terrestrial mosses and lichens	
Vascular Plants of Conservation Concern: A significant population of Southern Twayblade ( <i>Listera australis</i> ) was found in Wetland 11 in habitat dominated by black spruce ( <i>Picea mariana</i> ). The highway ROW was realigned downgradient to avoid the site.	
Open Water Information: N/A	

**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

Wetland soil is fully saturated and with frequent mucky channels where surface flows occur seasonally and during high precipitation events. Wetland 11 may drain toward the Black River, but this was not confirmed. No direct connection was observed in the study area. DTI depth-to-water-table mapping suggests possible drainage to the northeast. See comment below on regional drainage.

**Wildlife Observations:**

Moose scat, browsing on trees and shrubs, passerine birds

**Description of Any Observed Impacts to Wetland:**

Signs of past timber harvesting in both upland and wetland including old roads/skidder trails.

**Additional Comments:**

Wetland 11 lies on the eastern edge of a broad central plateau between the Napan River and the Black River. The region has very low relief such that drainage is slow and elevation varies little over several kilometres. The difference between upland and wetland is a matter of centimetres, producing large swamps with “islands” and ridges of slightly dryer terrain. This includes Wetland 8, 9, 10, and 11, all of which are partly **mosaic wetlands**. The delineation of a wetland boundary for these wetlands required an approach that divides areas of predominantly wetland habitat (> 50 %) from areas of predominantly upland habitat (that contains small swales). In general, where soils are consistently saturated, the forest is more open, with tall shrubs (mainly Speckled alder (*Alnus incana*) and a lush ground cover of ferns, grasses and sedges, and sphagnum moss. Areas of higher terrain have denser forest and crown closure with relatively sparse ground cover and terrestrial mosses or well decomposed leaf litter. These two conditions blend together producing many small islands of upland within a large network of swamp drainage paths. Conversely, the upland outside the delineated wetland boundary has progressively diminishing swales. Due to the subtle variation in local elevations, both wetland and upland vegetation is present throughout and side-by-side, changing only in relative abundance.

It is possible in some areas that timber harvesting has altered drainage enough to transform former upland forest to swamp. Perhaps over time the drainage will revert, but the change may also be permanent.

<b>DELG Wetland Verification Data Sheet *</b>	
Wetland Project Description: NBDTI Route 11 Bypass – Glenwood to Miramichi (Construct 2-Lane Highway)	
Site Visit Date(s): June 27 to August 04, 2016	
Verifier's Name (WBV): Garrett Bell	
Wetland Location/Address: (see associated wetland map) <b>WL-12</b>	
PID(s): 40068058	Polygon or <b>Line Delineation</b> (circle or highlight)
Wetland Maps Used and Source: NBDTI provided project digital wetland and depth to water table mapping, GeoNB regulated wetlands	
GPS Point File Name: "GPSdata_WetlandVegSurveys_Rte11Glenwood-Miramichi2016" (data points wl2-up1, wl12-wl1)	
Type/Class of Wetland (circle or highlight):  Shrub   Forested   Fresh Marsh   Aquatic Bed   Fen <b>Bog</b> Coastal Marsh   Wetland Complex	
Wetland Complex Information: N/A	
Dominant Wetland Vegetation (3 species minimum): Black spruce ( <i>Picea mariana</i> ), tamarack ( <i>Larix laricina</i> ), grey birch ( <i>Betula populifolia</i> ), eastern white cedar ( <i>Thuja occidentalis</i> ) Speckled alder ( <i>Alnus incana</i> ), common Labrador tea ( <i>Ledum groenlandicum</i> ), sheep laurel ( <i>Kalmia angustifolium</i> ) Spotted jewelweed ( <i>Impatiens capensis</i> ), three-leaved false solomon's seal ( <i>Maianthemum trifolium</i> ), cinnamon fern ( <i>Osmunda cinnamomea</i> ), three-seeded sedge ( <i>Carex trisperma</i> ), white fringed orchid ( <i>Platanthera blepharoglottis</i> )	
Dominant Upland Vegetation: Balsam fir ( <i>Abies balsamea</i> ), red maple ( <i>Acer rubrum</i> ), grey birch ( <i>Betula populifolia</i> ), red spruce ( <i>Picea rubens</i> ), eastern white cedar ( <i>Thuja occidentalis</i> ) Wild sarsaparilla ( <i>Aralia nudicaulis</i> ), northern starflower ( <i>Trientalis borealis</i> ), yellow bluebead lilly ( <i>Clintonia borealis</i> ), bracken fern ( <i>Pteridium aquilinum</i> ), bunchberry ( <i>Cornus canadensis</i> ), nodding trillium ( <i>Trillium cernuum</i> ), interrupted fern ( <i>Osmunda claytoniana</i> )	
Vascular Plants of Conservation Concern: White fringed orchid ( <i>Platanthera blepharoglottis</i> ) – S3 (ACCDC)/Provincial GS Rank 4 "Secure"; was scattered throughout a 30 to 40 m zone around the wetland edge. This area partially overlaps the Project footprint (about 10 m x 30 m) but extends well beyond the study area boundaries.	
Open Water Information: N/A	

**DELG Wetland Verification Data Sheet \***

**Wetland Hydrology and Connectivity:**

The wetland soil is fully saturated with variable depth of organics. Water stained leaves were observed in depressions around the wetland margin, indicating seasonal high water.

Wetland 12 may be isolated, but was not confirmed. There is no mapped surface drainage from the wetland to the local watershed. DTI depth-to-water-table mapping may imply drainage to the northeast.

**Wildlife Observations:**

Moose tracks and scat, passerine birds

**Description of Any Observed Impacts to Wetland:**

Some forestry activity has been done in the edge of the wetland.

**Additional Comments:**





**APPENDIX 4C**  
**Vegetation Species Observed**

**Plant Species Observed 27 June to 04 August, 2016  
Route 11 Bypass Glenwood to Miramichi**

Scientific Name	Common Name
<i>Abies balsamea</i>	Balsam Fir
<i>Acer negundo</i>	Manitoba Maple
<i>Acer pennsylvanicum</i>	Striped Maple
<i>Acer rubrum</i>	Red Maple
<i>Acer sacharrinum</i>	Sugar Maple
<i>Acer spicatum</i>	Mountain Maple
<i>Actaea rubra</i>	Red Baneberry
<i>Agrostis gigantea</i>	Red Top
<i>Agrostis stolonifera</i>	Creeping Bent Grass
<i>Alnus incana</i>	Speckled Alder
<i>Amelanchier sp.</i>	Shadbush
<i>Amelanchier interior</i>	Wiegands Serviceberry
<i>Anaphalis margaritacea</i>	Pearly Everlasting
<i>Anemone canadensis</i>	Canada Anemone
<i>Apocynum androsaemifolium</i>	Spreading Dog-bane
<i>Aralia nudicaulis</i>	Wild Sarsaparilla
<i>Arctium lappa</i>	Great burdock
<i>Arisaema stewardsonii</i>	Northern Jack-in-the-pulpit
<i>Arethusa bulbosa</i>	Arethusa
<i>Aster sp.</i>	Aster Species
<i>Aster acuminatus</i>	Whorled Wood Aster
<i>Aster macrophyllus</i>	Large-leaf Aster
<i>Aster nemoralis</i>	Bog Aster
<i>Aster novi-belgii</i>	New York Aster
<i>Aster puniceus</i>	Purple-stemmed Aster
<i>Aster umbellatus</i>	Flat-topped Aster
<i>Athyrium filix-femina</i>	Lady Fern
<i>Avena fatua</i>	Wild Oat
<i>Betula papyrifera</i>	White Birch
<i>Betula populifolia</i>	Grey Birch
<i>Bidens cernua</i>	Nodding Beggar-ticks
<i>Bromus inermis</i>	Smooth Brome

Scientific Name	Common Name
<i>Calamagrostis canadensis</i>	Blue-node Grass
<i>Calopogon tuberosus</i>	Calopogon or Grass-Pink
<i>Calystegia sepium</i>	Wild Morning Glory
<i>Carex canescens</i>	Silvery Sedge
<i>Carex crinita</i>	Fringed Sedge
<i>Carex disperma</i>	Two-seeded Sedge
<i>Carex echinata</i>	Star Sedge
<i>Carex intumescens</i>	Bladder Sedge
<i>Carex magellanica var. irrigua</i>	Boreal Bog Sedge
<i>Carex michauxiana</i>	Michaux's Sedge
<i>Carex projecta</i>	Spreading Sedge
<i>Carex retrorsa</i>	Retrorse Sedge
<i>Carex scoparia</i>	Pointed Broom Sedge
<i>Carex stricta</i>	Stiff Sedge
<i>Carex stipata</i>	Stalk-grain Sedge
<i>Carex tribuloides</i>	Blunt Broom Sedge
<i>Carex trisperma</i>	Three-seeded Sedge
<i>Carex vesicaria</i>	Lesser Bladder Sedge
<i>Chamaedaphne calyculata</i>	Leather Leaf
<i>Chelone glabra</i>	Turtlehead
<i>Circaea alpina</i>	Small Enchanter's-Nightshade
<i>Cirsium arvense</i>	Canada Thistle
<i>Clematis virginiana</i>	Clematis
<i>Clintonia borealis</i>	Blue-bead Lily
<i>Comptonia peregrina</i>	Sweet Fern
<i>Coptis trifolia</i>	Goldthread
<i>Corallorhiza maculata</i>	Spotted Coral-Root
<i>Cornus canadensis</i>	Bunchberry
<i>Cornus sericea</i>	Red Osier
<i>Corylus cornuta</i>	Beaked Hazelnut
<i>Cyperidium acaule</i>	Pink Lady's Slipper
<i>Danthonia spicata</i>	Poverty Grass

**Plant Species Observed 27 June to 04 August, 2016  
Route 11 Bypass Glenwood to Miramichi**

Scientific Name	Common Name
<i>Dryopteris xbootii</i>	Boott's Wood Fern
<i>Dryopteris carthusiana</i>	Spinulose Wood Fern
<i>Dryopteris cristata</i>	Crested Wood Fern
<i>Dryopteris intermedia</i>	Glandular Wood Fern / Fancy Fern
<i>Dulichium arundinaceum</i>	Three-Way Sedge
<i>Echinochloa crus-galli</i>	Barnyard Grass
<i>Eleocharis ovata</i>	Ovoid Spikerush
<i>Eleocharis palustris</i>	Common Spikerush
<i>Epilobium palustre</i>	Swamp Willow Herb
<i>Epipactis helleborine</i>	Helliborine
<i>Equisetum fluviatile (forma linaeum)</i>	River Horsetail
<i>Equisetum pratense</i>	Meadow Horsetail
<i>Equisetum sylvaticum</i>	Wood Horsetail
<i>Erigeron annuus</i>	Daisy Fleabane
<i>Eriophorum tenellum</i>	Five-Nerve Cotton-Grass
<i>Eriophorum virginicum</i>	Tawny Cotton-Grass
<i>Eupatorium maculatum</i>	Joe-Pye Weed
<i>Eupatorium perfoliatum</i>	Boneset
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod
<i>Festuca pratensis</i>	Meadow Fescue
<i>Festuca rubra</i>	Red Fescue
<i>Fragaria virginiana</i>	Wild Strawberry
<i>Fraxinus americana</i>	White Ash
<i>Fraxinus nigra</i>	Black Ash
<i>Galeopsis tetrahit</i>	Common Hemp-nettle
<i>Galium sp.</i>	Bedstraw Species
<i>Galium aperiene</i>	Cleavers
<i>Galium asprellum</i>	Rough Bedstraw
<i>Gaultheria hispida</i>	Creeping Snowberry
<i>Gaultheria procumbens</i>	Wintergreen

Scientific Name	Common Name
<i>Geum aleppicum</i>	Yellow Avens
<i>Glyceria canadensis</i>	Rattlesnake Grass
<i>Glyceria grandis</i>	Reed Manna Grass
<i>Glyceria striata</i>	Fowl Manna Grass
<i>Gnaphalium uliginosum</i>	Low cudweed
<i>Gymnocarpium dryopteris</i>	Oak Fern
<i>Hieracium canadense</i>	Canada Hawkweed
<i>Hieracium piloselloides</i>	Tall Hawkweed
<i>Hyotelephium telephium</i>	Live-Forever
<i>Hypericum canadense</i>	Canada St-John's Wort
<i>Ilex verticellata</i>	Canada Holly
<i>Impatiens capensis</i>	Spotted Touch-me-not
<i>Iris versicolor</i>	Blue-flag Iris
<i>Juncus bufonius</i>	Toad Rush
<i>Juncus effuses</i>	Soft Rush
<i>Kalmia angustifolia</i>	Sheep Laurel
<i>Lactuca serriola</i>	Prickly Lettuce
<i>Larix laricina</i>	American Larch
<i>Lemna minor</i>	Duckweed
<i>Lilium canadense</i>	Canada Lily
<i>Linnaea borealis</i>	Twinflower
<i>Listera australis</i>	Southern Twayblade
<i>Lonicera canadensis</i>	Fly Honeysuckle
<i>Lycopodium luckidulum</i>	Shiny Clubmoss
<i>Lycopus americanus</i>	Cut-leaved Water-horehound
<i>Lycopus uniflorus</i>	Bugleweed
<i>Lysimachia terrestris</i>	Swamp Candles
<i>Maianthemum canadense</i>	Wild Lily-of-the-Valley
<i>Maianthemum trifolium</i>	Three-leaf false Solomon's Seal
<i>Malaxis unifolia</i>	Green Adder's Mouth
<i>Malus pumilis</i>	Apple
<i>Matteuccia Struthiopteris</i>	Ostrich Fern

**Plant Species Observed 27 June to 04 August, 2016  
Route 11 Bypass Glenwood to Miramichi**

Scientific Name	Common Name
<i>Mentha sp.</i>	Mint
<i>Mitchella repens</i>	Partridge Berry
<i>Moneses uniflora</i>	One-Flowered Pyrola
<i>Myrica gale</i>	Sweet Gale
<i>Myosotis arvensis</i>	Rough Forget-Me-Not
<i>Nemopanthus mucronatus</i>	Mountain Holly
<i>Onoclea sensibilis</i>	Sensitive Fern
<i>Osmunda cinnamomea</i>	Cinnamon Fern
<i>Osmunda claytoniana</i>	Interrupted Fern
<i>Oxalis stricta</i>	Yellow Wood-Sorrel
<i>Parthenocissus quinquefolia</i>	Virginia Creeper
<i>Persicaria hydropiper</i>	Marshweed
<i>Persicaria arifolia</i>	Halberd-leaved Tearthumb
<i>Petasites frigidus</i>	Arctic Sweet Coltsfoot
<i>Phalaris arundinacea</i>	Reed Canary Grass
<i>Phegopteris connectilis</i>	Northern Beech Fern
<i>Phleum pratense</i>	Timothy
<i>Picea mariana</i>	Black Spruce
<i>Picea rubens</i>	Red Spruce
<i>Pinus strobus</i>	White Pine
<i>Plantago major</i>	Common Plantain
<i>Platanthera aquilonis</i>	Tall Northern Green Bog Orchid
<i>Platanthera blephariglottis</i>	White Fringed Orchid
<i>Platanthera clavellata</i>	Club-Spur Orchid
<i>Platanthera obtusata</i>	Blunt-leaf Rein Orchid
<i>Pogonia ophioglossoides</i>	Rose Pogonia
<i>Populus balsamifera</i>	Balsam Poplar
<i>Populus tremuloides</i>	Trembling Aspen
<i>Potentilla simplex</i>	Old Field Cinquefoil
<i>Prenanthes trifoliata</i>	Gall-Of-the-Earth
<i>Prunella vulgaris</i>	Heal All
<i>Prunus pennsylvanica</i>	Pin Cherry

Scientific Name	Common Name
<i>Prunus virginiana</i>	Choke Cherry
<i>Pteridium aquilinum</i>	Bracken Fern
<i>Pyrola asarifolia</i>	Pink Pyrola
<i>Quercus rubra</i>	Red Oak
<i>Ranunculus acris</i>	Common Buttercup
<i>Rhododendron canadense</i>	Rhodora
<i>Rhododendron groelandicum</i>	Labrador-Tea
<i>Rhynchospora alba</i>	White Beak Rush
<i>Ribes lacustre</i>	Bristley or Swamp Currant
<i>Rosa nitida</i>	Bristly or Swamp Rose
<i>Rubus allegheniensis</i>	Common Blackberry
<i>Rubus hispida</i>	Swamp Dewberry
<i>Rubus idaeus</i>	Red Raspberry
<i>Rubus pubescens</i>	Dwarf Raspberry
<i>Rumex crispus</i>	Curled Dock
<i>Sagittaria cuneata</i>	Arrowhead
<i>Sagittaria latifolia</i>	Broad-Leaved Arrowleaf
<i>Salix sp.</i>	Willow Species
<i>Salix bebbiana</i>	Bebbs Willow
<i>Salix discolor</i>	Pussy Willow
<i>Sambucus racemosa</i>	Red Elderberry
<i>Sarracenia purpurea</i>	Pitcher Plant
<i>Scirpus atrocinctus</i>	Black-girdle Wool Grass
<i>Scirpus microcarpus</i>	Red-Tinge Bullrush
<i>Solanum dulcamara</i>	Bittersweet Nightshade
<i>Solidago sp.</i>	Goldenrod
<i>Solidago flexicaulis</i>	Zig Zag Goldenrod
<i>Solidago rugosa</i>	Rough Goldenrod
<i>Solidago uliginosa</i>	Bog Goldenrod
<i>Sorbus americana</i>	American Mountain-Ash
<i>Sparganium emersum</i>	Green Fruited Burreed
<i>Sphagnum sp.</i>	Moss

**Plant Species Observed 27 June to 04 August, 2016  
Route 11 Bypass Glenwood to Miramichi**

Scientific Name	Common Name
<i>Spiraea alba</i>	Meadow-Sweet
<i>Spiraea tomentosa</i>	Steeple-bush
<i>Spiranthes lacera</i>	Northern Slender Ladies'-Tresses
<i>Stachys palustris</i>	Hedge-Nettle
<i>Stellaria graminea</i>	Common Stichwort
<i>Thalictrum polygamum</i>	Tall Meadow Rue
<i>Thuja occidentalis</i>	Eastern White Cedar
<i>Triadenum fraseri</i>	Marsh St. John's-wort
<i>Tricophorum cespitosum</i>	Deer-Grass
<i>Trientalis borealis</i>	American Starflower
<i>Trifolium alsike</i>	Alsike Clover
<i>Trifolium aureum</i>	Yellow Clover
<i>Trifolium pratense</i>	Red Clover
<i>Trillium cernuum</i>	Nodding Trillium
<i>Trillium undulatum</i>	Painted Trillium
<i>Tussilago farfara</i>	Coltsfoot
<i>Typha latifolia</i>	Common Cattail
<i>Ulmus americana</i>	American Elm
<i>Urtica dioica</i>	Stinging nettle
<i>Vaccinium angustifolium</i>	Lowbush Blueberry
<i>Vaccinium myrtilloides</i>	Velvet-leaf Blueberry
<i>Vaccinium oxycoccos</i>	Small Cranberry
<i>Viola Species</i>	Violet Species
<i>Viburnum nudum (cassinoides)</i>	Wild Raisin
<i>Viburnum lantanoides</i>	Hobblebush
<i>Viburnum opulus americanum</i>	Highbush Cranberry
<i>Vicia cracca</i>	Cow Vetch