

5.8 MARINE ENVIRONMENT

5.8.1 Marine Habitat

5.8.1.1 General Description

The marine habitat within the footprint of the 22.7 ha wharf (fill area not including area of influence) and in the general vicinity of the Project area is typical of Chedabucto Bay. The shoreline and intertidal zone is comprised primarily of cobble and pebbles with lesser amounts of sand. The vegetation is sparse in the intertidal zone consisting of furoid algae such as rockweed (*Ascophyllum nodosum*) and toothed wrack (*Fucus serratus*). The subtidal habitat, in the Project footprint, is a mix of ledge rock and soft sediment that consists mainly of silt and clay with some gravel and sand. The ledge provides excellent habitat for marine plants and subtidal fauna, but the soft substrate offers little habitat to anything other than eelgrass (*Zostera marina*) and periwinkles (*Littorina* sp.). Additional surveys in 2007 to the southeast of the footprint identified habitat consistent with that in the project area/footprint. The nearshore environment of the area is homogenous and beyond a certain depth (10-15m) the bottom type is barren and highly embedded and more complex habitats are not expected (Rutherford, pers.comm., 2008). The outer edge of the container terminal footprint is devoid of life and suitable habitat for juvenile crustaceans and other species is not present (Rutherford, pers.comm., 2008).

The habitat in the footprint of the proposed terminal varies widely according to depth. Two different underwater benthic habitat surveys have been undertaken in and around the project area. These surveys have revealed five unique habitats in the area, each of which will be described in more detail below. For more detail and photographs of each area please refer to the Habitat Compensation Plan in Appendix 6.8-A.

Intertidal and Immediate Sub Tidal

Tidal fluctuations are small (less than 2 m) thus the intertidal zone is a small band of cobble and gravel. Vegetation is limited to patchy macrophytic furoids due to the high mobility of the substrate.

Algal Cover

A substrate of large cobble with some boulder and ledge supports dense beds of macrophytic algae, primarily *F. serratus* in shallower areas. As the depth increases to the edge of the zone, approximately 5-6 m deep, the *F. serratus* becomes blended with other leafy macrophytes and coralline algae coats all hard substances.

Eelgrass Bed

An isolated eelgrass bed was observed in 3-5 m of water at the western edge of the project area on the periphery of the dense macrophytic algal zone. The substrate is comprised of coarse sand which is typical of an eelgrass bed.

Transition Zone

This zone, as the title implies is a transitional zone between the high algal cover in shallow water and the barren zone in deeper water. The zone begins in 6 m of water and extends to a depth of approximately 15 m. The substrate changes from gravel/cobble which is increasingly covered by sand and silt/clay. As the sand increases so does the growth of filamentous algae. At the outer edge of the zone a dense bed of horse mussel shell debris is found.

Barrens

The band on mussel debris marks the start of an area barren of flora and fauna. As water depth increases the concentration of shell debris becomes patchy. The shells are covered by a thin layer of silt/clay sediment and are associated with the growth of filamentous algae. The substrate is devoid of any rock/cobble or boulder sized material on the surface.

In 1970 the Greek tanker Arrow, carrying 16,200 tons of bunker C oil to a pulp mill at Point Tupper, struck Cerberus Rock in Chedabucto Bay, creating a massive oil spill which polluted half of the bay's 600-km coastline. Information regarding this disaster is sparse however, it was documented that high energy wave areas self cleaned quite quickly whereas some low energy areas (bays, estuaries) were took years to reach the same levels. The 'operation oil' cleanup did fix up a portion of shoreline but less than one third. Studies done showed little effect of bunker C on lobster and shellfish populations but fishing, and consequently the fish plant operations, were ceased in the area for a period of time. Twenty years later, BIO scientists studying Chedabucto Bay concluded that little evidence of this oil spill remained (NSMNH, 1996a).

5.8.1.2 Sediment Quality

Sediment samples taken from area to be dredged indicate that fine particles (silt and clay) make between 8 percent and 57 percent of the sediment. During the pre-causeway era, strong tidal currents (about 2m/s) in the Strait of Canso prevented the deposition of fine material, hence the presence of coarse material (gravel and sand). After construction of the causeway, tidal currents were reduced to just about a few cm/s and maximum observed bottom currents are only about 30cm/s. This drastic reduction in the strength of currents has allowed the slow deposition of the finer material from coastal erosion and possibly anthropogenic sources (Lewis and Keen, 1990; Parrot et al., 2005). Further information on sediment transport is available in Section 5.5.

Additionally, a marine sediment sampling program (MSSP) was undertaken in the footprint of the proposed terminal. A total of six samples were taken within the footprint and analysed for several chemical parameters including metals; polycyclic aromatic hydrocarbons (PAHs); polychlorinated biphenyls (PCBs); benzene, toluene, ethylbenzene, and xylene (BTEX); total petroleum hydrocarbons (TPHs); total inorganic carbon (TIC) and total organic carbon (TOC); total dichloro-diphenyltrichloroethane (DDT); and particle size.

The collected samples revealed negligible levels of PAHs, BTEX/TPH, DDT and metals in comparison to established ocean and land disposal criteria. PCB levels in three samples exceeded guidelines established by Ocean Disposal Guidelines under CEPA, for the Atlantic Region and one sample exceeded the CCME Marine Sediment Probable Effects Levels for the protection of marine aquatic life.

The laboratory-determined particle size distribution of the sediment samples collected at the proposed dredging area to be composed of varying degrees of gravel (12-62 percent), sand (20-45 percent), silt (5-32 percent), and clay (3-22 percent). A complete MSSP report can be found in Appendix 5.8-B.

5.8.1.3 Water Quality

Water quality parameters at six sampling stations within the footprint of the proposed terminal were measured using an YSI 600 Multi-Probe Data Logger at 1 m increments. The complete data set is attached in Appendix 5.8-B; however, the following provides a summary of those results:

- Temperature values ranged from 19.02 – 21.07 °C at the surface to 3.54 – 9.70 °C at depth;
- Salinity values ranged from 26.81 – 27.77 ppt at the surface to 29.29 – 30.21 ppt at depth;
- DO (%) values ranged from 48.2 – 61.4 percent at the surface to 38.2 – 45.7 percent at depth;
- DO (mg/L) values ranged from 3.73 – 4.83 mg/L at the surface to 4.08 – 4.37 mg/L at depth;
- pH values ranged from 8.15 – 8.22 at the surface to 8.13 – 8.30 at depth; and
- Conductivity values ranged from 41.82 – 43.82 at the surface to 45.40 – 47.69 at depth.

5.8.2 Marine Fauna

5.8.2.1 Fish

Fish species located in the Chedabucto Bay area can be grouped into three general classifications; demersal, pelagic, and diadromous. Demersal fish live the majority of their lives on or near the seabed. In some species the egg, larval and juvenile stages will make use of the upper portions of the water column but do settle to the bottom for the remainder of their lives. Pelagic fish spend their entire lifecycle in the water column or near the surface. This group contains several migratory species that migrate to the Atlantic coast in the spring and summer as the waters warm. Diadromous species spawn and hatch in freshwater environments and then migrate to the marine environment (Breeze et. al., 2002).

Tables 5.8-1, 5.8-2, and 5.8-3 list commercial and non-commercial fish species from each classification that are known to inhabit the waters surrounding the Project area.

Table 5.8-1: Demersal Fish Species of the Strait of Canso and Chedabucto Bay

| Common Name | Scientific Name |
|---------------------|--|
| Wolfish | <i>Anarhichas</i> sp. |
| Winter Flounder | <i>Pseudopleuronectes americanus</i> |
| Yellowtail flounder | <i>Limanda ferruginea</i> |
| Smooth flounder | <i>Liopsetta putnami</i> |
| American plaice | <i>Hypoglossoides platessoides</i> |
| Atlantic halibut | <i>Hippoglossus hippoglossus</i> |
| Winter skate | <i>Raja ocellata</i> |
| Haddock | <i>Melanogrammus aeglefinus</i> |
| Hake | <i>Urophycis</i> sp. |
| Pollock | <i>Pollachius virens</i> |
| Tomcod | <i>Microgadus tomcod</i> |
| Rock gunnel | <i>Pholis gunnellus</i> |
| Snake blenny | <i>Lumpenus lumpretaeformis</i> |
| Longhorn sculpin | <i>Myoxocephalus octodecemspinosus</i> |
| Wrymouth | <i>Cryptacanthodes maculatus</i> |

Table 5.8-1: Demersal Fish Species of the Strait of Canso and Chedabucto Bay

| Common Name | Scientific Name |
|---------------------|----------------------------|
| Northern sand lance | <i>Ammodytes dubius</i> |
| Redfish | <i>Sebastes faciatus</i> |
| Arctic shanny | <i>Stichaeus punctatus</i> |
| Viviparous blenny | <i>Zoarces viviparus</i> |
| Cusk | <i>Brosme brosme</i> |

Adapted from Jacques Whitford, 2004

Table 5.8-2: Pelagic Fish Species of the Strait of Canso and Chedabucto Bay

| Common Name | Scientific Name |
|-----------------------------|-------------------------------|
| American smelt ¹ | <i>Osmerus mordax</i> |
| Mummichog | <i>Fundulus heteroclitus</i> |
| Atlantic cod | <i>Gadus morhua</i> |
| Atlantic herring | <i>Clupea harengus</i> |
| Atlantic mackerel | <i>Scomber scombrus</i> |
| Cunner | <i>Tautoglabrus adspersus</i> |
| Radiate shanny | <i>Ulvaria subbifurcata</i> |
| Capelin | <i>Mallotus villosus</i> |
| Three-spine stickleback | <i>Gasterosteus aculeatus</i> |
| Four-spine stickleback | <i>Apeltes quadracus</i> |

Adapted from Jacques Whitford, 2004

Table 5.8-3: Diadromous Fish Species of the Strait of Canso and Chedabucto Bay

| Common Name | Scientific Name |
|-----------------------------|-----------------------------|
| Gaspereau | <i>Alosa pseudoharengus</i> |
| Shad | <i>Alosa sapidissima</i> |
| Atlantic salmon | <i>Salmo salar</i> |
| Sea-run trout | <i>Salmo trutta</i> |
| American smelt ¹ | <i>Osmerus mordax</i> |

Adapted from Jacques Whitford, 2004

Chedabucto Bay is home to a large congregation of winter herring (*Clupea* sp.) (Breeze et. al., 2002). The region has supported a strong commercial fishery which includes cod, haddock, pollock, American plaice, white hake and Atlantic herring. Herring and mackerel also support a bait fishery in the area (Stewart and White, 2001).

A summer survey by DFO does not sample in Chedabucto Bay but does survey nearby and has found fish species such as thorny skate, vahl's eelpout, daubed shanny, turbot, mailed sculpin, and 4 beard rockling. These species may be found in the study area as well.

The substrate and macroalgal cover in the proposed footprint is typical of the area and is not considered to be limiting habitat for any flora or fauna identified, although the habitat being removed does provide marine fauna with feeding areas and protection from predators.

¹ American smelt are considered to be both a pelagic and a diadromous species

5.8.2.2 Marine Mammals

The NSMNH (1996b) has identified 21 species of cetaceans (whales, dolphins, and porpoises) and 6 species of pinnipeds (seals) in the waters surrounding the province.

Five species of cetaceans have been identified by Breeze et. al. (2002) as possibly occurring in the Strait of Canso and Chedabucto Bay area. This includes three species of whales; the long-finned pilot whale (*Globicephala melas*), minke whale (*Balaenoptera acuterostrata*), and the fin whale (*Balaenoptera physalus*) and two species of dolphins; the common dolphin (*Depphinus delphis*) and the Atlantic white sided dolphin (*Lagenorhynchus acutus*). The harbour porpoise (*Phocoena phocoena*) is also known to be a resident of these waters (Jacques Whitford, 2004).

Seals are common throughout Nova Scotia waters and the area around the Project is home to four species. The harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*) are year round inhabitants while the hooded seal (*Cystophora cristata*) and harp seal (*Phoca groenlandicus*) breed further north and migrate to the area surrounding the Project area during the summer months.

5.8.2.3 Sea Turtles

Three species of sea turtle are known to occur off the Atlantic Canadian coast, including the leatherback (*Dermochelys coriacea*), Atlantic loggerhead (*Caretta caretta*), and Kemp's ridley (*Lepidochelys kempii*). A fourth species, the green turtle (*Chelonia mydas*) is a wide-ranging species and may be an occasional visitor to the area, but has yet to be positively identified.

The Kemp's ridley turtle, and, to a lesser extent, the loggerhead turtle, are generally confined to more southern waters and are not found on the Scotian Shelf as frequently as the leatherback turtle, due to the fact that Kemp's ridley and loggerhead turtles largely lack the counter-current biophysical flow mechanism that allows active leatherback turtles to keep warm in very cold water. The average northern occurrence of loggerheads was thought to be much further south (38E 20'N), than for leatherbacks (40E 05'N) (Shoop and Kenney, 1992). However, recent accidental catch rates by pelagic longline operations in Atlantic Canadian waters indicate that loggerheads are, at least in some years, more common than previously thought (Smith, 2001; cited in Breeze et al., 2002). The American longline fleet reported catching 3,000 loggerheads off of Newfoundland from 1992 to 1995 (McAlpine, 2001; cited in Breeze et al., 2002).

Being land-nesters, sea turtles are particularly vulnerable to disturbance by human activities. Along with natural predation, the nesting success of sea turtles has been diminished by various anthropogenic factors, including egg collection, loss of nesting beaches to commercial development, illumination of nesting beaches, shoreline pollution, ingestion of plastic and other debris, illegal hunting, and entanglement in fishing gear. Turtles, particularly sea turtles, mature slowly and exhibit moderate reproductive effort. Considerable natural mortality occurs on eggs and small juveniles. Any loss of breeding adults, above that caused through natural predation and disease, can lead to profound declines in population sizes, and possibly extirpation and/or extinction.

In Nova Scotian waters, adult and larger juvenile turtles feeding in the area may be affected by entanglement in gear and ingestion of debris. Entanglements in fishing line, lobster pot lines, nets, and other fishing gear have been reported. Sea turtles are caught with some regularity on longlines targeting tuna, swordfish, or other large pelagics. Often these turtles have mistakenly swallowed the bait, as opposed to being foul hooked, and although are cut loose while still alive, the rate of survival after being caught and released is unknown (Breeze et. al. 2002).

5.8.2.4 Invertebrates/Plankton

As stated in Section 5.8.1.1 an underwater benthic habitat survey (UBHS) was undertaken in the footprint of the proposed terminal (Appendix 5.8-A). This survey identified several invertebrates including American lobster (*Homarus americanus*), sea scallops (*Placopecten magellanicus*), periwinkles (*Littorina* sp.), sea stars (*Asterias* sp.), moon snails (*Euspira heros*), green crabs (*Carcinus maenas*), Hermit crabs (*Pagurus* sp.), horse mussels (*Modiolus modiolus*), rock crab (*Cancer irroratus*), and frilled anemone (*Metridium senile*).

Breeze et. al. (2002) identified other invertebrates not observed in the study area in the Strait of Canso and Chedabucto Bay area that may occur within the Project area. These include snow crab (*Chionoecetes opilio*), pink shrimp (*Penaeus duorarum*), Northern shrimp (*Pandulus borealis*), oysters (*Crassostrea virginica*), soft shell and bar clams (*Mya arenaria*, *Spisula solidissima*) and blue mussels (*Mytilus edulis*).

The Chedabucto Bay area, former Crab Fishing Area 23A, has been noted as having an increase of abundance of mature females and thus high larval production (DFO, 2007).

The lobster is currently the most important commercial invertebrate that is fished in the area. Fisheries for sea scallop, rock crab, and soft shell clams also exist, albeit to a lesser extent than the lobster fishery (Stewart and White, 2001).

A benthic habitat survey was conducted at the same sampling stations randomly chosen for the MSSP. The sorting and identification process was undertaken by Sprytech Biological Services of Elmsdale, NS. Identified species represent 2 Phyla (Echinodermata and Nemertea), 6 Classes (Gastropoda, Bivalvia, Polyplacophora, Polychaeta, Oligochaeta, and Cirripedia), and 2 Orders (Amphipoda and Cumacea).

The survey identified a total of 79 unique taxa with an average of 26 taxa per sample (13-38). The samples averaged 120 unique species per square metre (m²) at each station, ranging from a low of 20/m² to a high of 277/m². Refer to Appendix 5.8-A for a full breakdown of all species observed in the collection.

The predominant species included the deep sea clam (*Thyasira flexuosus*), bamboo worm (Maldanidae), lumbrinerid worm (*Ninoe nigrirdpes*), and the common barnacle (*Semibalanus balanoides*). These species are not unique to the area and have previously been identified within the waters of coastal Nova Scotia (Mitchell, 2000).

A DFO summer survey in nearby waters has collected shortfin squid, starfish, *Pandalus montagui*, greater toad crab, lesser toad crab, sea urchins, sand dollars and sea cucumbers. It can be presumed that these species may be present in the study area.

The habitat is used by lobsters, an important economic fishery in the area. Although post-larval lobsters live in burrows until reaching a carapace length (CL) of about 25 mm, lobsters between 25-50 mm CL utilize a coarse substrate and require a suitable amount of cover. Lobsters with a CL of >50 mm prefer areas with algae, stones, and large crevices although some larger lobsters have been observed on compact sand or mud bottoms consolidated by eelgrass. All sizes of lobster have been observed co-existing in areas with large stone size and heavy algal cover (NOAA, 1994).

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Information regarding the phytoplankton and zooplankton populations in Chedabucto Bay and the Strait of Canso is limited although they are expected to be comparable to those in the nearby waters of the Atlantic Ocean (Table 5.8-4) (Stewart and White, 2001).

Table 5.8-4: Common Phytoplankton and Zooplankton Species in the Vicinity of Chedabucto Bay

| Phytoplankton | Zooplankton |
|--------------------------------------|---------------------------------|
| <i>Amphora</i> sp. | <i>Aglantha digitale</i> |
| <i>Dinophysis norvegica</i> | <i>Brachyuran larvae</i> |
| <i>Dinophysis acuminata</i> | <i>Calanus hyperboreus</i> |
| <i>Gymnodinium</i> sp. | <i>Calanus glacialis</i> |
| <i>Licmophora abbreviate</i> | <i>Limacina</i> sp. |
| <i>Microflagellates</i> | <i>Metridia longa</i> |
| <i>Navicula</i> sp. | <i>Parathemisto gaudichaudi</i> |
| <i>Nitzschia longissima</i> | <i>Pseudocalanus minutes</i> |
| <i>Picoplankton</i> | <i>Acartia</i> sp. |
| <i>Pleurosigma strigosum</i> | <i>Centropages hamatus</i> |
| <i>Pseudonitzschia delicatissima</i> | <i>Temora longicornis</i> |
| <i>Pseudonitzschia seriata</i> | <i>Acanthostomella gracilis</i> |
| <i>Pseudonitzschia pungens</i> | <i>Temora longicaudata</i> |
| <i>Skeletonema costatum</i> | <i>Microsetella norvegica</i> |
| <i>Thalassionema nitzschioides</i> | <i>Pseudocalanus</i> sp. |

Adapted from Stewart and White, 2001

5.8.3 Marine Flora

Portions of substrate within the footprint of the proposed terminal were ledge rock. This substrate provides an excellent base for marine plants (macroflora) to flourish. Several species of marine algae were identified during the UBHS (Appendix 5.8-A). The most predominant species are noted below in Table 5.8-5. Most of these species were found in all transects, however in areas where sandy substrate was prevalent, eelgrass (*Zostera marina*) was identified as a prominent species (Appendix 5.8-A).

Table 5.8-5: Dominant Marine Macroflora Species

| Common Name | Scientific Name |
|--------------|--|
| sea lettuce | <i>Ulva</i> sp. |
| bladderwrack | <i>Fucus vesiculosus</i> |
| rockweed | <i>Ascophyllum nodosum</i> |
| kelps | <i>Laminaria saccharina</i> , <i>Agarum clathratum</i> |
| eelgrass | <i>Zostera marina</i> |

5.8.4 Marine Species at Risk

Species at risk are defined as: “native wildlife species that are—or have become—most sensitive to human activity due to their rare occurrence, restricted range in Canada, dependence on specialized habitats or declining population or distribution” (CWS, 2004).

Species at risk include plant and animal species which are listed by COSEWIC as endangered, threatened or special concern, and those protected under the Federal *Species at Risk Act* (SARA), and the *Nova Scotia Endangered Species Act* (NSES).

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The EC SARA website (EC, 2005) lists plants and animals designated “at risk” by virtue of being “Extinct, Extirpated, Endangered, Threatened, or of Special Concern.” COSEWIC determines whether a species is at risk, following which the federal Cabinet will determine whether the species in question will be protected under SARA. It then becomes illegal to kill, harass, capture, or harm individuals of the species; their critical habitats are also protected from destruction.

A search of the SARA Species at Risk Web Mapping Application (EC, 2005) identified two species that could potentially occur in the vicinity of the Project area. The Blue whale and North Atlantic right whale are both listed as Endangered by SARA and COSEWIC. The fin whale had been identified as being in the general vicinity of the Project area but did not appear on the SARA mapping application. The fin whale is listed as a species of special concern by SARA and COSEWIC.

There is no reliable population estimate for the blue whale population in the western North Atlantic; however, it is thought to be in the low hundreds. The biggest factor responsible for low numbers of blue whales is the historical take in commercial whaling. Threats since the end of commercial whaling include ship strikes, disturbance from increasing whale watch activity, entanglement in fishing gear, and pollution. These species may also be vulnerable to long-term changes in climate change as a result of change in abundance of prey (i.e., zooplankton) (Sears and Calambokidis, 2002).

The North Atlantic right whale also suffered high mortality due to whaling. The total population is currently estimated to be about 322 individuals and continues to experience high mortality from ship strikes and entanglement in fishing gear. It has been estimated that the population could become extinct in about 200 years (COSEWIC, 2003).

There are five marine fish species found in the general area of the Project that are listed by COSEWIC. These are Atlantic wolfish (Special Concern), winter skate (Threatened), Atlantic cod (Special Concern), Atlantic salmon (Endangered), and Atlantic whitefish (Endangered). Atlantic wolfish (Special Concern), Atlantic salmon (Endangered), and Atlantic whitefish (Endangered) are listed by SARA. The Atlantic whitefish is listed as endangered under the NSESA. In addition DFO survey data has identified records of Northern wolfish (Threatened), cusk (Threatened) and spotted wolfish (Threatened) being caught in the vicinity of the project area.

Atlantic whitefish is an anadromous fish occupying estuarine and freshwater areas of the Tusket River drainage in southwestern Nova Scotia. There is no evidence that this species migrates to the proposed terminal area (Atlantic Whitefish Recovery Team, 2006).

The leatherback turtle is listed as endangered by COSEWIC (2002). The United States National Marine Fisheries Service and United States Fish and Wildlife Service list the leatherback and Kemp’s ridley turtles as endangered and the loggerhead turtle as threatened (National Marine Fisheries Service and United States Fish and Wildlife Service, 1991; United States Fish and Wildlife Service and National Marine Fisheries Service, 1992).

Peak leatherback occurrences in Canadian waters are during August-September but there are records for leatherbacks in Canadian waters for most months of the year primarily for feeding purposes (McAlpine et al., 2004; cited in Atlantic Leatherback Turtle Recovery Team, 2006). James et al. (2006) reveals a broad distribution of leatherbacks on the Scotian Shelf throughout the foraging seasons with most reported sightings occurring inshore from the continental shelf

break. This recent study suggests that coastal and slope waters of the western Atlantic should be considered critical foraging habitat for adults of the species.

A summary of all identified species of conservation concern and their current status is presented in Table 5.8-6.

Table 5.8-6: Summary of Marine Species of Conservation Concern Identified in the Vicinity of the Project Area

| Species | SARA | COSEWIC | NS Endangered Species Act |
|----------------------------|-----------------|-----------------|---------------------------|
| Blue whale | Endangered | Endangered | N/A |
| North Atlantic right whale | Endangered | Endangered | N/A |
| Fin whale | Special Concern | Special Concern | N/A |
| Harbour porpoise | N/A | Special Concern | N/A |
| Atlantic wolffish | Special Concern | Special Concern | N/A |
| Winter skate | N/A | Threatened | N/A |
| Northern wolffish | Threatened | Threatened | N/A |
| Spotted wolffish | Threatened | Threatened | N/A |
| Cusk | N/A | Threatened | N/A |
| Atlantic cod | N/A | Special Concern | N/A |
| Atlantic salmon | Endangered | Endangered | N/A |
| Atlantic whitefish | Endangered | Endangered | Endangered |
| Leatherback turtle | Endangered | Endangered | N/A |

5.8.5 Fisheries

5.8.5.1 Commercial Fishery including First Nations

The Project area is within Statistical District 14, which encompasses the area from Mulgrave to Guysborough. Statistical District 9, which encompasses the area around Isle Madame and St. Peters in Richmond County, has been included also. The dominant fishery in District 14 in 2005 and 2006 was shellfish; including clams (unspecified species), lobster, and snow crab (Table 5.8-7). District 9 landings were more diverse in species with shrimp, snow crab and redfish as the primary catch (Table 5.8-7). The landings for District 14 include only that portion of the District east of the Canso Causeway (Scotia-Fundy Region) and do not include the portion of the District west of the causeway which is in the Gulf Region. It should be noted that landings in these statistical districts are not necessarily caught within them.

Table 5.8-7: Fisheries Landing Data for Statistical Districts 9 and 14

| Species | District 9 (metric tonnes) | | District 14 (metric tonnes) | |
|-------------------------|----------------------------|-------|-----------------------------|-------|
| | 2005 | 2006* | 2005 | 2006* |
| Groundfish | | | | |
| Cod | 64 | 159 | --- | --- |
| Haddock | 1 | 1 | --- | --- |
| Redfish | 248 | 844 | --- | --- |
| Halibut | --- | 4 | --- | --- |
| American plaice | --- | 7 | --- | --- |
| Greysole/witch flounder | 1 | 6 | --- | --- |
| Greenland halibut | 7 | 5 | --- | --- |
| Pollock | 4 | 10 | --- | --- |

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Table 5.8-7: Fisheries Landing Data for Statistical Districts 9 and 14

| Species | District 9 (metric tonnes) | | District 14 (metric tonnes) | |
|-------------------------------|----------------------------|--------------|-----------------------------|--------------|
| | 2005 | 2006* | 2005 | 2006* |
| White hake | 5 | 8 | --- | --- |
| Monkfish | 1 | 2 | --- | --- |
| Pelagic and Estuarial | | | | |
| Herring | 5 | --- | --- | --- |
| Mackerel | 3 | --- | --- | 1 |
| Alewife/Gaspereau | 1 | --- | --- | --- |
| Eels | 2 | --- | 2 | --- |
| Smelt | 1 | --- | 1 | --- |
| Mollusc and Crustacean | | | | |
| Soft shell clams | 15 | 33 | 8 | 3 |
| Propellor clams | --- | --- | 62 | 73 |
| Unspecified clams | --- | --- | 477 | 972 |
| Sea Scallop | 3 | 8 | 1 | 2 |
| Lobster | 294 | 370 | 75 | 136 |
| Shrimp (<i>Pandulus</i> sp.) | 1,569 | 1,522 | --- | --- |
| Rock crab | --- | 1 | --- | --- |
| Snow crab | 1,506 | 966 | --- | 248 |
| Cockles | --- | --- | 673 | |
| Unspecified species | --- | --- | 18 | 37 |
| Total | 3,730 | 3,946 | 1,317 | 1,472 |

*2006 data is preliminary
 (E. Walker, pers. comm., 2007)

Both District 9 and 14 showed a modest increase in catch volume from 2005 to 2006 (Table 5.8-7). It should be noted that the Project area is extremely small in comparison to the area of these adjacent districts, and the landings presented in the table above were not necessarily caught near the proposed terminal.

Table 5.8-8 presents a summary of the commercial fishery licenses in the general Project area. It should be noted that the summary of commercial fishing licenses is based on a regional scale and does not necessarily establish that a viable commercial fishery exists at the study area.

Table 5.8-8: License Types and Totals for Statistical District 14

| Home Port | Species Description | License Type | License Type Total | |
|-----------|-------------------------------------|--------------------------|--------------------|------|
| | | | 2005 | 2006 |
| Melford | Groundfish, unspecified | Vessel Based Limited | 1 | 1 |
| | Herring | Vessel Based Limited | 1 | 1 |
| | Herring/Mackerel | Bait | 1 | 1 |
| | Lobster | Vessel Based Limited | 1 | 1 |
| | Mackerel | Vessel Based Limited | 1 | 1 |
| | Seal Skins/Grey (NO.) | Non-Vessel Based Limited | 1 | 1 |
| | Shrimp (<i>Pandulus borealis</i>) | Vessel Based Limited | 1 | 1 |
| | Squid, unspecified | Vessel Based Limited | 1 | 1 |
| Mulgrave | Alewives/Gasepereau | Non-Vessel Based Limited | 1 | 1 |

Table 5.8-8: License Types and Totals for Statistical District 14

| Home Port | Species Description | License Type | License Type Total | |
|-------------|-------------------------|--------------------------|--------------------|------|
| | | | 2005 | 2006 |
| | Groundfish, unspecified | Vessel Based Limited | 2 | 2 |
| | Herring | Vessel Based Limited | 2 | 2 |
| | Herring/Mackerel | Bait | 3 | 3 |
| | Lobster | Vessel Based Limited | 4 | 4 |
| | Mackerel | Vessel Based Limited | 2 | 2 |
| | Scallops, Sea | Vessel Based Limited | 1 | 1 |
| | Seal Skins/Grey (NO.) | Non-Vessel Based Limited | 1 | 1 |
| | Squid, unspecified | Vessel Based Limited | 2 | 2 |
| | Swordfish | Vessel Based Limited | 2 | 2 |
| Sand Point | Groundfish, unspecified | Vessel Based Limited | 2 | 2 |
| | Herring | Vessel Based Limited | 2 | 2 |
| | Herring/Mackerel | Bait | 3 | 3 |
| | Lobster | Vessel Based Limited | 5 | 5 |
| | Mackerel | Fixed Gear | 2 | 2 |
| | | Vessel Based Limited | 3 | 3 |
| | Scallops, Sea | Vessel Based Limited | 1 | 1 |
| | Seal Skins/Grey (NO.) | Non-Vessel Based Limited | 2 | 2 |
| | Squid, unspecified | Vessel Based Limited | 2 | 2 |
| Swordfish | Vessel Based Limited | 1 | 1 | |
| Steep Creek | Herring | Vessel Based Limited | 1 | 1 |
| | Mackerel | Vessel Based Limited | 1 | 1 |

(E. Walker, pers. comm., 2007)

Correspondence with DFO (J. Schyuler, pers. comm., 2007) revealed that a limited Aboriginal fishery operates out of the St. Peters area, which is located in District 9. These fishers have rights to access the water of District 14 as well and may do so in the vicinity of the Project area.

5.8.5.2 Aquaculture

A search of Nova Scotia's aquaculture lease database (NSDAF, 2007) identified six leases in the Chedabucto Bay area. An Atlantic salmon and rainbow trout farm is located in Sand Point, approximately six km from the Project area. The remainder, four shellfish sites and one salmon/trout site, are located along the southern edge of Isle Madame. These sites are located from LeBlanc Harbour to Arichat Harbour, approximately 15 to 23 km from the Project site. There are no conflicting aquaculture leases in the area of the Project (Bent, pers. comm. 2007) nor are there any sites proposed to be opened in the area (Vezina, pers. comm. 2008).

5.8.5.3 Recreational Fishery

A small recreational fishery exists within District 14, mainly for sea scallops, herring, and mackerel (J. Schyuler, pers. comm., 2007). Local residents typically do this fishing from shore or small recreational watercraft.

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5.9 AQUATIC ENVIRONMENT (FRESHWATER)

5.9.1 General Description

The Atlantic coast is dissected by many fault-controlled river and lake systems that drain into the ocean. At the mouths of most rivers, wetlands receive both tidal and freshwater influences. Surface waters tend to be soft and acidic. Many small to medium-sized lakes are scattered throughout the Sedimentary Lowlands District, and pH ranges between 6.0 and 7.0 (NSMNH 1996a).

Nova Scotia supports 20 different species of freshwater fish, and 18 species that are found in both freshwater and marine environments (Towers 1995). Freshwater fish species diversity in the peninsula of Nova Scotia shows a marked decrease moving away from the mainland. Species with some degree of tolerance to salt water tend to be more widely distributed, as they are more readily able to move between river systems via estuaries. In Nova Scotia, redbelly dace (*Phoxinus eos*, formerly *Chrosomus eos*), white sucker (*Catostomus commersoni*), and introduced species such as brown trout (*Salmo trutta*) tend to be found in slow-moving streams (NSMNH1996a and 1996b). Fast-moving streams provide habitat for brook trout (*Salvelinus fontinalis*), Atlantic salmon (parr) (*Salmo salar*), common shiner (*Notropis cornutus*), white sucker, and yellow perch (*Perca flavescens*) (NSMNH1996a and 1996b).

A review of *Freshwater Fishes of Eastern Canada* (Scott 1967), which includes diadromous species as well as references to some common inshore marine species, indicated that a total of 34 species may be found in Nova Scotia. Further refinement of this number was achieved by checking the more detailed distribution maps provided for most of these species on the University of New Brunswick's web-site which has posted the recent document [Inland Fishes of New Brunswick](#) (Curry et. al. 2007). This document includes distribution maps covering Nova Scotia and indicates that there are 16 species which may be found in or around the project area.

5.9.2 Fish Habitat

A habitat survey of watercourses visible on 1:10,000 scale mapping was conducted between July 26, 2007, and August 4, 2007 (Figure 5.9-1). The habitat survey consisted of a site visit to each of the proposed watercourse crossings along the rail corridor, and 8 sites within the Logistics Park footprint. Physical habitat characteristics observed at each survey point are listed in Tables 5.9-1 and 5.9-3. Tables 5.9-2 and 5.9-4 provide the water quality results. As part of the habitat survey at each stream crossing point, a habitat site sketch was completed and photos were also taken. Additional information (sketches and photographs) is provided in Appendix 5.9-A.

For this habitat assessment, tolerances of the Atlantic salmon were used as an index of the relative health of the river for fish populations. The Atlantic salmon was chosen as an indicator species for the following reasons:

- Salmon inhabit areas targeted for the assessments (riffle and pool habitat);
- Salmon are sensitive to acidification;
- Salmon are a predatory species at the top of the food chain; and
- Data exists that defines preferred habitat conditions for this species.

The classification schemes defined by Sooley et al. (1998), and accepted by DFO, were used to define “good” and “poor” habitat and are provided in Appendix 5.9-B.

A benthic macroinvertebrate survey was also conducted at each survey site. Benthic samples were collected from shallow riffle areas using a Surber sampler with an area of 0.1 m², and a mesh size of 700 µm. Samples were sent to Sprytech Biological Services for identification to the lowest possible level. Detailed results of the benthic macroinvertebrate results are provided in Appendix 5.9-C, however summaries are provided in the following sections

Logistics Park

Melford Brook and the associated tributaries drain most of the area of the footprint. The watercourse flows through a primarily forested area, and discharges into a coastal saline pond. Portions of this watercourse are heavily silted, likely due to recent land clearing, and are considered poor fish habitat (S#18, S#20 and S#21) (Table 5.9-1).

A second small, unnamed watercourse originates from a wetland at Melford Loop and flows through a residential lawn and a grassy field before discharging through a pebble-cobble beach. This is considered very poor fish passage and unlikely to provide good-quality fish habitat (Tables 5.9-1 and 5.9-2).

Benthic macroinvertebrate samples collected from shallow riffle areas at S#22 contained a total of 18 identified taxa, dominated by larval sand flies (Diptera: Chironomidae) and water penny beetles (Coleoptera: Psephenidae). Ephemeroptera (mayflies) and Trichoptera (caddisflies) were also well-represented.

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Table 5.9-1: Fish Habitat Characteristics

| Stream | Flow (L/min) | Substrate Material | Instream Cover | Channel Width (m) | Wetted Width (m) | Average Depth (cm) | Maximum Depth (cm) | Slope (%) |
|-------------------|--------------|----------------------------------|---|-------------------|------------------|--------------------|--------------------|-----------|
| S#1 | .6 | Boulder, cobble, large gravel | Good (pool, boulder) | 2.5 | 1.2 | 10 | 16 | 5 |
| S#2 | 2.3 | Cobble, boulder | Fair (woody debris, boulder) | 3 | 2 | 10 | 20 | 2 |
| S#3 | 6.6 | Fines | Fair (emergent vegetation, woody debris) | 2 | 2 | 8 | 12 | 1 |
| S#4 | 0 | Bedrock, gravel, sand | Fair (woody debris) | 3.5 | 3 | 10 | 50 | 2 |
| S#5 | 1.8 | Cobble, boulder | Good (boulders, undercut banks) | 3 | 2.5 | 8 | 12 | 2 |
| S#6 | 2.2 | Large gravel, cobble | Fair (woody debris, boulder) | 3 | 2 | 10 | 24 | 1 |
| S#7 | 2.2 | Gravel, cobble | Poor (overhanging vegetation) | 2.5 | 2 | 10 | 24 | 2 |
| S#8 | 14.3 | Cobble, boulder | Good (boulders, woody debris) | 4.5 | 3.5 | 15 | 24 | 2 |
| S#9 | 3.7 | Large gravel, cobble | Good (boulder, woody debris, undercut banks) | 3 | 1.3 | 12 | 16 | 1 |
| S#10 | DRY CHANNEL | | | | | | | |
| S#11 | DRY CHANNEL | | | | | | | |
| S#12 | 3.1 | Large gravel, cobble | Good (boulders, woody debris) | 1.8 | 1 | 12 | 14 | 1.5 |
| S#13 | 17.2 | Cobble, boulder, bedrock | Fair (boulders) | 5 | 3.5 | 20 | 28 | 3 |
| S#14 | 18.2 | Cobble, large gravel | Good (boulders, undercut banks, woody debris) | 3.5 | 2.5 | 15 | 21 | 1 |
| S#15 | 11.1 | Sandy gravel, sand | Fair (undercut banks, woody debris, overhanging vegetation) | 3 | 2 | 15 | 20 | 0.5 |
| S#16 | 1.5 | Sandy gravel, large gravel, sand | Poor (overhanging and emergent vegetation) | 2 | 1.3 | 6 | 8 | 1 |
| S#17 | 1.5 | Cobble, gravel, sand | Good (overhanging and instream vegetation, pool) | 1 | 0.5 | 5 | 50 | 2 |
| S#18 | 5.0 | Silt | Fair (woody debris, undercut banks) | 2.5 | 1.5 | 6 | 8 | 1 |
| S#19 | 532.5 | Cobble, gravel | Poor | 10 | 10 | 40 | 96 | 1 |
| S#20 | 0 | Silt, sand | Fair (woody debris) | 1.5 | 1 | 8 | 10 | 1 |
| S#21 | 7.4 | Silt, sand, sandy gravel | Fair (woody debris, undercut bank) | 2.5 | 1.5 | 14 | 20 | 1 |
| S#22 | 56.8 | Cobble | Good (undercut bank, boulder, woody debris) | 5.5 | 4.3 | 15 | 30 | 0.5 |
| S#23 | DRY CHANNEL | | | | | | | |
| S#24 ¹ | 316.3 | Silt | Poor (some overhanging vegetation) | 5.7 | 5.7 | 45 | 60 | 0.5 |
| S#26 | 0 | Silt | Fair (instream vegetation, woody debris) | 0.2 | 0.2 | 2 | 5 | 0 |

¹ S#24 is a man-made channel originating under an unmarked building. There is a cleared path leading to Englands Lake, possibly a pipeline and at the downstream end, water rushes from a culvert, approximately 75 m down a steep, rocky ravine into S#19 (Melford Brook).

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Table 5.9-2: Chemical Fish Habitat Results

| Stream Crossing Site | Water Quality | | | |
|----------------------|----------------------|-----------|---------------------------|------|
| | Conductivity (µS/cm) | TDS (g/L) | Dissolved Oxygen (DO) (%) | pH |
| S#1 | 53 | 0.035 | 93.7 | 6.74 |
| S#2 | 85 | 0.055 | 96.1 | 6.60 |
| S#3 | 31 | 0.020 | 78.4 | 5.46 |
| S#4 | 33 | 0.021 | 101.1 | 5.06 |
| S#5 | 36 | 0.023 | 88.6 | 5.63 |
| S#6 | 47 | 0.031 | 89.4 | 6.71 |
| S#7 | 39 | 0.025 | 76.3 | 6.53 |
| S#8 | 37 | 0.024 | 89.7 | 6.47 |
| S#9 | 108 | 0.070 | 98.5 | 7.39 |
| S#12 | 101 | 0.066 | 97.2 | 7.55 |
| S#13 | 79 | 0.051 | 93.4 | 7.51 |
| S#14 | 85 | 0.055 | 92.8 | 7.39 |
| S#15 | 22 | 0.020 | 92.1 | 7.33 |
| S#16 | 63 | 0.041 | 89.8 | 6.89 |
| S#17 | 290 | -- | 82.6 | 7.38 |
| S#18 | 55 | 0.036 | 91.5 | 6.47 |
| S#19 | 38 | 0.025 | 96.5 | 6.48 |
| S#20 | 83 | 0.054 | 37.9 | 6.39 |
| S#21 | 1 | 0.001 | 80.9 | 6.48 |
| S#22 | 36 | -- | 89.9 | 6.88 |
| S#24 | 33 | | 93.7 | 5.66 |
| S#26 | 151 | 0.099 | 48.3 | 7.04 |

Rail Corridor

East Brook, West Brook and the unnamed watercourses south of the community of Mulgrave flow through primarily forested habitat. Forest harvesting appears to have impacted the watercourses in some areas, rendering two of the unnamed streams unsuitable as fish habitat (S#10 and S#11). However, the other watercourses provide good-quality fish habitat (Tables 5.9-3 and 5.9-4).

Murray Brook originates in Grant Lake. The watercourse follows Old Mulgrave Road through primarily forested habitat and through the Town of Mulgrave before discharging into the Strait of Canso. Berrys River originates in Grants Lake and flows in a northerly direction, and discharges into Georges Bay. The upstream reaches of these watercourses do not appear to be greatly impacted by human activities, and provide good fish habitat (Tables 5.9-3 and 5.9-4).

Benthic macroinvertebrate samples collected from shallow riffle areas at four of the stream crossing sites contained a total of twenty-six identified taxa. Dipterans (true flies) were predominant in West Brook (S#08) and the unnamed tributary in Steep Creek (S#04), while Trichoptera and Ephemeroptera were most common at S#13 (the unnamed Murray Brook tributary). Oligochaetes and chironomids (Diptera: Chironomidae) were most common at Murray Brook (S#14), with Plecoptera and Ephemeroptera also well-represented.

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Table 5.9-3: Physical Fish Habitat Characteristics at Proposed Stream Crossing Locations along the Rail Corridor

| Stream Crossing Site | Flow Characteristics | Bed Material | Average Width/Depth (m) | Instream Cover |
|----------------------|----------------------|----------------------------------|-------------------------|---|
| S#01 | Riffle-pool | Boulder, cobble, large gravel | 2.5 / 0.1 | Good (pool, boulder) |
| S#02 | Riffle-run | Cobble, boulder | 2 / 0.1 | Fair (woody debris, boulder) |
| S#03 | Run | Fines | 2 / 0.08 | Fair (emergent vegetation, woody debris) |
| S#04 | Run-riffle | Bedrock, gravel, sand | 3 / 0.1 | Fair (woody debris) |
| S#05 | Run-riffle | Cobble, boulder | 2.5 / 0.08 | Good (boulders, undercut banks) |
| S#06 | Run-riffle | Large gravel, cobble | 2 / 0.1 | Fair (woody debris, boulder) |
| S#07 | Run-riffle-flat | Gravel, cobble | 2 / 0.1 | Poor (overhanging vegetation) |
| S#08 | Riffle-run | Cobble, boulder | 3.5 / 0.15 | Good (boulders, woody debris) |
| S#09 | Run-riffle | Large gravel, cobble | 1.3 / 0.12 | Good (boulders, woody debris, undercut banks) |
| S#12 | Riffle-run | Large gravel, cobble | 1 / 0.12 | Good (boulders, woody debris) |
| S#13 | Riffle-run | Cobble, boulder, bedrock | 3.5 / 0.2 | Fair (boulders) |
| S#14 | Riffle-run | Cobble, large gravel | 2.5 / 0.15 | Good (boulders, undercut banks, woody debris) |
| S#15 | Run-riffle | Sandy gravel, sand | 2 / 0.15 | Fair (undercut banks, woody debris, overhanging vegetation) |
| S#16 | Run-riffle | Sandy gravel, large gravel, sand | 1.3 / 0.06 | Poor (overhanging and emergent vegetation) |

Table 5.9-4: Chemical Fish Habitat Results at Proposed Stream Crossing Locations along the Rail Corridor

| Stream Crossing Site | Water Quality | | | |
|----------------------|----------------------|-----------|---------------------------|------|
| | Conductivity (µS/cm) | TDS (g/L) | Dissolved Oxygen (DO) (%) | pH |
| S#01 | 53 | 0.035 | 93.7 | 6.74 |
| S#02 | 85 | 0.055 | 96.1 | 6.60 |
| S#03 | 31 | 0.020 | 78.4 | 5.46 |
| S#04 | 33 | 0.021 | 101.1 | 5.06 |
| S#05 | 36 | 0.023 | 88.6 | 5.63 |
| S#06 | 47 | 0.031 | 89.4 | 6.71 |
| S#07 | 39 | 0.025 | 76.3 | 6.53 |
| S#08 | 37 | 0.024 | 89.7 | 6.47 |
| S#09 | 108 | 0.070 | 98.5 | 7.39 |
| S#12 | 101 | 0.066 | 97.2 | 7.55 |
| S#13 | 79 | 0.051 | 93.4 | 7.51 |
| S#14 | 85 | 0.055 | 92.8 | 7.39 |
| S#15 | 22 | 0.020 | 92.1 | 7.33 |
| S#16 | 63 | 0.041 | 89.8 | 6.89 |

Sediment samples were not taken during the habitat surveys. However, the NSMNH (1996b) describes freshwater sediments in the province as comprised mainly of sedimentary rock and thick glacial till in the bottom of slow-moving streams. Soils consist of fluvial sediments; silt, mud, sand, gravel and varying amounts of organic material. In fast-moving streams, the bedrock is primarily resistant metamorphic or igneous rocks, with boulder or coarse gravel bottom and soils consisting of sand and gravel, some mobile organic material due to water velocity (NSMNH 1996b).

5.9.3 Fish Communities

Fish sampling was conducted at the proposed stream crossing sites between 27 July and 4 August, 2007 using the electrofishing method, conducted under a scientific permit (License # 2007-521) in accordance with the conditions outlined Section 52 of the *Fisheries Act* (General) Regulations. Five-minute spot checks were conducted to determine presence or absence of fish species where possible. Four sites were eliminated because watercourses were dry (see Section 5.7), too narrow (S#26), or because water temperatures exceeded allowable limits stated in the conditions of the license (S#03). The channels that were not fished are considered to be poor salmonid habitat (i.e., too small, ephemeral, or flowed through shrubby wetland).

The most commonly identified species for both sites was brook trout. Brook trout live in cold, clear streams and lakes, and eat organisms such as worms, leeches, aquatic insects and many species of fish (Scott and Crossman, 1973). Spawning occurs in the gravelly headwaters of rivers and streams, but they will spawn in open water areas if suitable locations such as upwellings are available. The species is listed as a Yellow species on the NSDNR rare species list, indicating that it is sensitive to human activities.

American eel (*Anguilla rostrata*) was also captured at both sites. The presence of this catadromous species suggests that pathways for migratory fish that utilize both fresh and marine water environments may be present and therefore that anadromous species such as Atlantic salmon and gaspereau (alewife) (*Alosa pseudoharengus*) may also be present.

Supplemental information on fish species and stocking activities in the area was obtained from records for Goose Harbour Lake (NSDAF, 2007).

Logistics Park

Brook trout were captured at 3 of the 7 sites fished (Table 5.9-5). Unidentified salmonids were observed but not captured at two additional stream crossing sites; however, it is noted that brook trout were identified at other stream crossings on the same watercourse in both cases, and it is likely that these were of the same species.

American eel and ninespine stickleback (*Pungitius pungitius*) were identified in the unnamed watercourse at Melford Loop (S#17), and at the man-made channel leading from the unmarked building to Melford Brook (S#24), respectively (Table 5.9-5). All of the fish that were caught live were in very good condition, but the stickleback was found dead with a large parasite attached to its body.

A 1974 survey of nearby Goose Harbour Lake identified golden shiner (*Notemigonus chrysoleucas*), rainbow trout (*Oncorhynchus mykiss*), and white sucker, in addition to the three

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species found in the present survey. Stocking records from 1988 to 2004 show that brook trout, Atlantic salmon and rainbow trout have all been introduced to Goose Harbour Lake (NSDAF, 2007).

Table 5.9-5 Identified Fish Species at Proposed Stream Crossing Locations in the Logistics Park footprint

| Stream Crossing Site | Fish Identified | | |
|----------------------|-----------------------------------|--------|----------------------------|
| | Species | Number | Approx. Total Lengths (cm) |
| S#17 | Brook trout | 1 | 6.5 |
| | American eel | 1 | 20 |
| S#18 | Brook trout | 2 | 5.5-6.5 |
| S#19 | None captured. One salmonid seen. | | |
| S#20 | None | | |
| S#21 | None captured. One salmonid seen. | | |
| S#22 | Brook trout | 4 | 11.5-20 |
| S#24 | Ninespine stickleback | 1 | 5 |
| S#26 | Channel too small to fish. | | |

Rail Corridor

Brook trout were captured at 8 of the 13 sites fished and American eel was caught in Byers Brook (S#02) (Table 5.9-6). The fish were in very good condition overall, though two brook trout displayed slight damage to the caudal fins.

Table 5.9-6 Identified Fish Species at Proposed Stream Crossing Locations in the Rail Corridor

| Stream Crossing Site | Fish Identified | | |
|----------------------|---|--------|----------------------------|
| | Species | Number | Approx. Total Lengths (cm) |
| S#1 | Brook trout | 6 | 4-13 |
| S#2 | Brook trout | 11 | 5-12.5 |
| | American eel | 2 | 18-22 |
| S#3 | Not fished due to high water temperature. | | |
| S#4 | None | | |
| S#5 | None | | |
| S#6 | None | | |
| S#7 | None | | |
| S#8 | Brook trout | 6 | 6-17.5 |
| S#9 | None | | |
| S#10 | Dry channel | | |
| S#11 | Dry channel | | |
| S#12 | Brook trout | 12 | 4-16.5 |
| S#13 | Brook trout | 10 | 5-17 |
| S#14 | Brook trout | 17 | 4-11 |
| S#15 | Brook trout | 14 | 6-16.5 |

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Table 5.9-6 Identified Fish Species at Proposed Stream Crossing Locations in the Rail Corridor

| Stream Crossing Site | Fish Identified | | |
|----------------------|-----------------|--------|----------------------------|
| | Species | Number | Approx. Total Lengths (cm) |
| S#16 | Brook trout | 8 | 5-14 |

5.9.4 Fish Species at Risk

As noted above, brook trout are listed as a Yellow species on the NSDNR rare species list, indicating that they are sensitive to human activities. According to the Atlantic Canada Conservation Data Centre (ACCDC) (2007), Atlantic salmon have been observed within a 5 km radius of the Project area. Atlantic salmon are listed as a Red species on the NSDNR rare species list, indicating that they are known or thought to be at risk, and ACCDC lists the species as an S2 species, meaning it is rare throughout its range in the province (6 to 20 occurrences, or few remaining individuals), and may be vulnerable to extirpation due to rarity or other factors. It is noted that Atlantic salmon were not found during fish sampling; however, potential salmon habitat has been observed. Young salmon usually live in shallow riffle areas 25-65 cm deep that have gravel, rubble, rock, or boulder bottoms (Species fact sheet for Atlantic Salmon; NSDAF, 2007).

5.9.5 References

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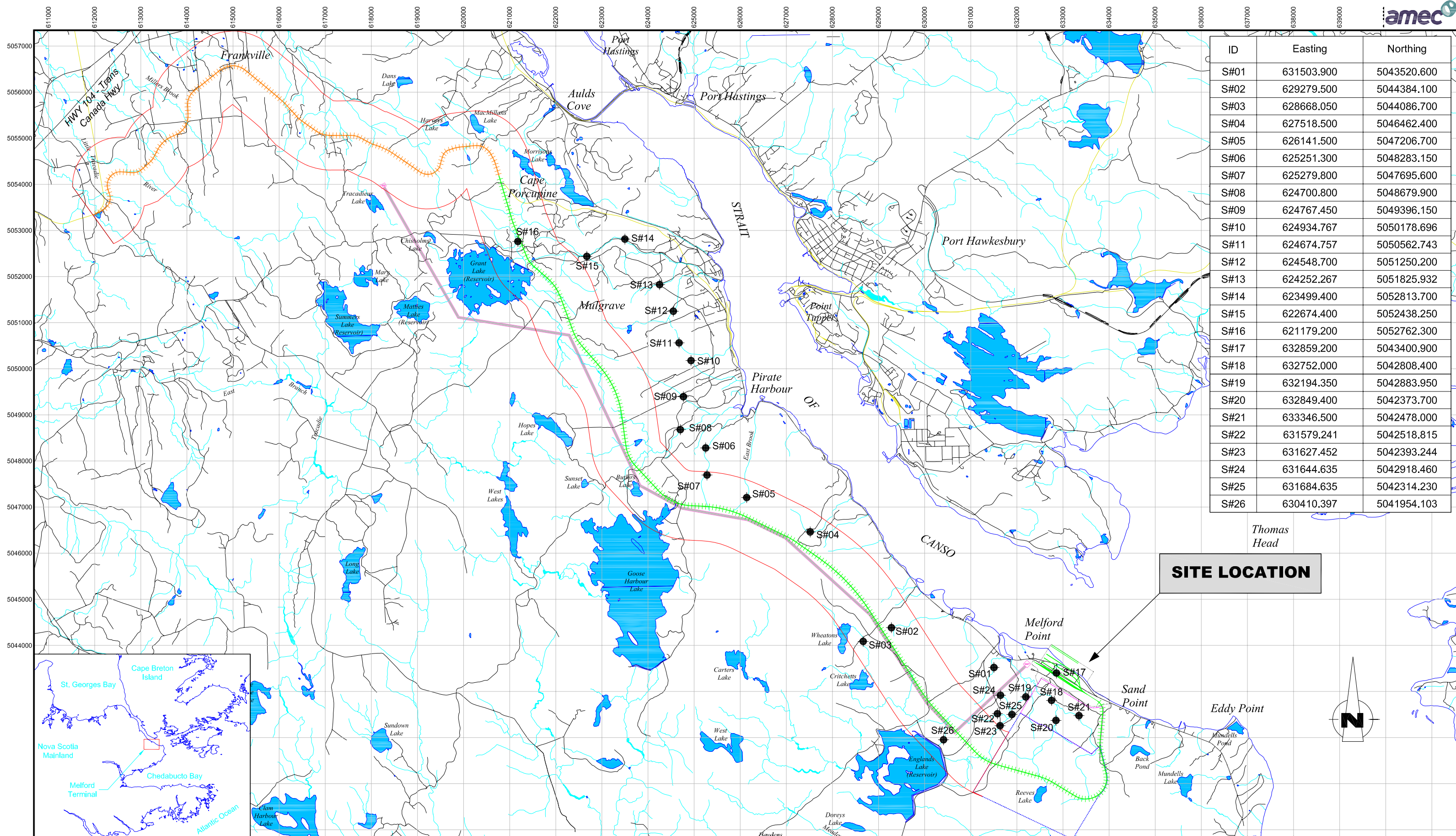
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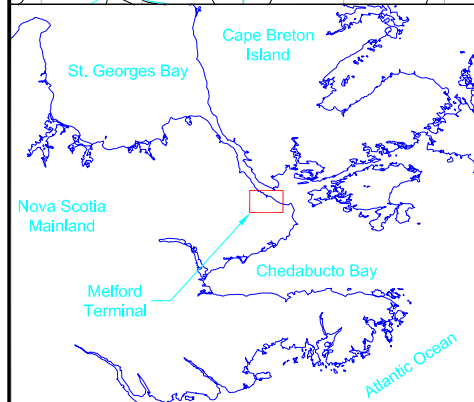
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| ID | Easting | Northing |
|------|------------|-------------|
| S#01 | 631503.900 | 5043520.600 |
| S#02 | 629279.500 | 5044384.100 |
| S#03 | 628668.050 | 5044086.700 |
| S#04 | 627518.500 | 5046462.400 |
| S#05 | 626141.500 | 5047206.700 |
| S#06 | 625251.300 | 5048283.150 |
| S#07 | 625279.800 | 5047695.600 |
| S#08 | 624700.800 | 5048679.900 |
| S#09 | 624767.450 | 5049396.150 |
| S#10 | 624934.767 | 5050178.696 |
| S#11 | 624674.757 | 5050562.743 |
| S#12 | 624548.700 | 5051250.200 |
| S#13 | 624252.267 | 5051825.932 |
| S#14 | 623499.400 | 5052813.700 |
| S#15 | 622674.400 | 5052438.250 |
| S#16 | 621179.200 | 5052762.300 |
| S#17 | 632859.200 | 5043400.900 |
| S#18 | 632752.000 | 5042808.400 |
| S#19 | 632194.350 | 5042883.950 |
| S#20 | 632849.400 | 5042373.700 |
| S#21 | 633346.500 | 5042478.000 |
| S#22 | 631579.241 | 5042518.815 |
| S#23 | 631627.452 | 5042393.244 |
| S#24 | 631644.635 | 5042918.460 |
| S#25 | 631684.635 | 5042314.230 |
| S#26 | 630410.397 | 5041954.103 |

SITE LOCATION



LEGEND:

- Proposed Melford Rail Track
- Proposed Melford International Terminal
- GPS Locations
- Proposed Melford Rail Track (On Existing Rail Bed)
- Environmental Baseline Study Corridor
- Initial Logistics Park
- Existing Route 344
- Future Logistics Park Expansion
- Road Network
- Proposed NSPI Easement
- Railroad Network

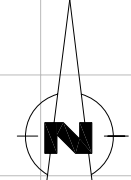


Figure 5.9-1
 GPS Points of River Crossings
 Melford International Terminal
 Environmental Assessment Services
 July 2008

5.10 TERRESTRIAL BIOLOGICAL ENVIRONMENT

The description of the terrestrial biological environment includes the proposed Project Site (the study area), including the Logistics Park footprint (initial and future expansion areas), Marine/Container Terminal, and the rail and transmission corridors. Additional field surveys to supplement the current data will be completed in 2008.

Information includes habitat, plants and animals found in the Project area and is based on field surveys and a review of available existing information, including species at risk databases, federal and provincial government departments and agencies, non-profit groups, internet websites, existing reports, and knowledgeable individuals. Sources include:

- ACCDC;
- Natural Resources Canada (NRCAN);
- NSMNH;
- Canadian Wildlife Service (CWS)/ EC;
- NSDNR;
- Sable Island Natural Gas Pipeline Environmental Assessment Report; and
- First Nations (TEK/LEC).

5.10.1 Existing Habitat

While the forestry inventory mapping available from NSDNR is based on the most recent available aerial photography (1988 to 2000), more parcels are clear cut than indicated on the maps. A large part of the proposed Project Site footprint is subject to Crown Land License holdings of NewPage (formerly Stora Enso), a pulp and paper mill. Therefore, it is possible that some of the clear-cut area was originally soft wood forest. Logging is ongoing and clear-cuts include an area that was mapped as softwood forest in the provincial forest inventory. During the June 2007 field surveys, one softwood polygon located near Steep Creek and selected as a survey site, had been clear-cut since the forest inventory maps were established. Based on the size of the woody plants, the cutting occurred at least three to four years ago.

Desk top reviews and field surveys (carried out in June 2007, and again in late August/early September 2007) were completed in order to:

- describe existing habitats and confirm forest types for a limited number of forest polygons;
- identify high potential habitats for plant species of conservation concern¹;
- confirm and identify plant species of conservation concern¹ including those with late phenology (grasses, sedges and late flowering plants);
- confirm, identify, and describe significant habitats including wetlands;
- identify and describe any indications of previous disturbance; and
- note any wildlife sightings.

Field survey methodology and photos of existing habitat are available in Appendix 5.10-A.

¹ The term “species of conservation concern” refers to those species that are legally listed under SARA, COSEWIC, NSESA and those species also listed under the General Status of NSDNR (Red and Yellow rankings)

5.10.1.1 Habitat Types

Eleven types of possible existing habitats were identified within the study area using available mapping and aerial photography (NSDNR 2000; NSDNR 1988-2000; NRCAN, 1998). These habitat types are summarized in Table 5.10-1. Confirmed habitat types for the study area are shown on Figures 5.10-1 and 5.10-2 and are described in detail below.

Table 5.10-1: Habitat Types

| Type | Description |
|-----------------------------|---|
| Mixed Forest | Forest stands composed of no more than 75% of one tree type (deciduous or coniferous). |
| Hardwood Forest | Forest stands composed of more than 75% deciduous trees. |
| Softwood Forest | Forest stands composed of more than 75% coniferous trees. |
| Regenerating Forest* | Areas of re-growth, most often following forestry activity, but also abandoned agricultural fields and after other disturbance. Dominated by young trees (seedlings, saplings) and shrubs (often alders). |
| Clear-cut** | Stands completely cut and residuals make up less than 25 % of crown closure, with little or no indication of regeneration. For the purpose of this survey, early stages of regeneration as seen within a few years of cutting are included here. Dominated by small woody plants and herbaceous vegetation. |
| Urban | Areas of human habitation; residential, industrial and related structures, lawns, city parks, cemeteries, golf courses, etc. |
| Agriculture and Blueberries | Hayfields, pasture, agricultural field, orchards; blueberry fields. |
| Riparian* | Habitat along watercourses. |
| Miscellaneous Non-forested | Non-forested areas not covered by any of the other types, including old mill sides, rifle range, tower site, quarry (but not gravel pit), mining activity, dams, wharfs, etc. Vegetation may be sparse, dominated by grasses and other herbaceous plants. |
| Wetlands | Including bogs, fens, marshes, swamps, lakeshore wetlands and (wet) meadows. |
| Marine wetlands | Marine Flat (level or gently sloping shoreline areas, intertidal or subtidal), estuarine flat, coastal saline pond, salt marsh, beach, dune, etc. |

* Habitat type not used in the Forest Inventory

** Definition extended beyond Forest Inventory Map Definition

Most of the study area and surrounding lands is forested (Figure 5.10-1). Southeast of Pirate Harbour, softwood and mixed wood stands dominate the forest cover, while northwest of Pirate Harbour, hardwood stands cover the majority of the study area, followed by mixed wood stands. Other existing habitats include urban areas, agricultural areas, riparian habitats, and miscellaneous un-treed sections. A significant number of forest parcels are marked as clear-cut. These clear cut areas are in various stages of regeneration, depending on the time elapsed since cutting. Other areas of regeneration include abandoned farmland or otherwise disturbed areas, such as former gravel pits. There are no blueberry plantations or agricultural areas in the study area. There are numerous freshwater and marine wetlands (Figure 5.10-2) which are further discussed in Section 5.10.1.3. The descriptions of these various types of terrestrial environments, not including wetlands, are as follows:

- Hardwood Forests are forest stands composed of more than 75 percent deciduous trees. Light-conditions vary between dark and dappled shade, and influence the abundance of ground vegetation. In the Project area tree species in hardwood forest were dominated by maple (*Acer rubrum* and *A. saccharum*), accompanied by beech (*Fagus grandifolia*) and white ash (*Fraxinus americana*), as well as yellow birch (*Betula allegheniensis*), moose maple (*Acer pensylvanicum*) and spruce (*Picea* ssp.), among

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others. The soil is covered with leaf litter and patches of mosses. Ground vegetation is sparse. The shrub-layer is sparse and often essentially absent (Appendix 5.10-A June plant survey).

- Mixed Forest stands are composed of no more than 75 percent of one tree type (deciduous or coniferous). The vegetation observed is dominated by trees such as red maple (*Acer rubrum*), white birch (*Betula cordifolia*), mountain ash (*Sorbus americana*), white spruce (*Picea glauca*), black spruce (*Picea glauca*) and balsam fir (*Abies balsamea*), among others. Ground cover may be sparse. The soil is also covered with leaf litter and patches of mosses including peat moss (*Sphagnum sp.*). The shrub-layer is sparse and often essentially absent (Appendix 5.10-A June plant survey).
- Soft wood forests are composed of more than 75 percent coniferous trees. Light-conditions vary between dark and dappled shade, and influence the abundance of ground vegetation. Coniferous trees are dominated by spruce (*Picea sp.*), accompanied by balsam fir (*Abies balsamea*), and sometimes larch (*Larix laricina*), as well as deciduous trees such as red maple (*Acer rubrum*), beech (*Fagus grandifolia*) or yellow birch (*Betula allegheniensis*). The ground is covered with needle- or leaf litter and patches of mosses including peat moss (*Sphagnum sp.*), and ground vegetation is sparse to very sparse. The shrub-layer is sparse or absent (Appendix 5.10-A June plant survey).
- Regenerating forests are areas of re-growth, usually following forestry activity, but also occur in abandoned agricultural fields and following other disturbances. These forests are dominated by young trees (seedlings, saplings) and shrubs (often alders). Regeneration areas such as oldfield or abandoned farmland carry a mixture of native and introduced species. Vegetation is dominated by shrubs, mostly alder (*Alnus incana*), interspersed with wild roses (*Rosa sp.*), and a few trees. Vegetation in regenerating forest after clearcut or other disturbance consists largely of shrubs and young trees, but is generally dominated by alders and meadowsweet. Trees include white birch (*Betula cordifolia*), spruce (*Picea glauca*, *P. mariana*), red maple (*Acer rubrum*), trembling aspen (*Populus tremuloides*), mountainash (*Sorbus americana*), larch (*Larix laricina*) and willows (*Salix ssp.*). Ground vegetation is often sparse due to the density of the woody vegetation (NSDNR forest inventory does not use the category “regenerating forest”).
- Clear cut areas include those stands that are completely cut and residuals make up less than 25 percent of crown closure, with little or no indication of regeneration. In this report, early stages of regeneration as seen within a few years of cutting are included. Clear-cuts at the start of regeneration are characterized by tree stumps, a few seed trees and luxuriating herbaceous ground vegetation. Seedlings of a variety of trees are usually present after a few years, as well as small shrubs. However, woody vegetation is small and not dense enough to inhibit herbaceous ground vegetation. Vegetation depends on the type of forest that has been cut and the soil conditions.
- Urban habitat includes areas of human habitation, e.g. residential, industrial and related structures, lawns, city parks, cemeteries and golf courses, among others. Urban areas were not surveyed, except for an area with a species composition similar to an abandoned pasture, located between one of the residences and the beach within the proposed Logistics site footprint. Pasture- like vegetation is dominated by grasses,

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introduced agricultural plants such as red and alsike clover (*Trifolium pratense* and *Trifolium hybridum*), and introduced weeds. Most flora are introduced species associated with disturbed or agricultural areas. There are some native species, though in much smaller abundance (Appendix 5.10-A June plant survey).

- Agriculture and Blueberries. Agricultural areas include hayfields, pasture, agricultural field and orchards. Blueberry fields are listed separate from general agricultural uses. No land parcels within the study area are used for agriculture or blueberry production.
- Riparian habitats accompany watercourses and within the study area are generally located within forested habitats or wetlands. Most watercourses are accompanied by wooded floodplains, which are often narrow (2 m or less wide). Species composition is described in respective sections of the report, as the dominant species are the same as in the surrounding habitats. Very few submergent aquatic vascular plants, such as *Sparganium sp.*, were found.
- Miscellaneous un-treed areas are non-forested areas not covered by any of the other types. Areas include old mill sides, rifle range, tower site, quarry (but not gravel pit), mining activity, dams, wharfs, etc. Vegetation may be sparse and is dominated by grasses and other herbaceous plants. There were few such habitats in the Study area.

5.10.1.2 Plants Species of Conservation Concern

A complete list of vascular plants identified during the surveys is provided in Appendix 5.10-A along with the provincial status of each species (Table A1). Several vascular plant and lichen species of conservation concern, as well as a lichen species of interest, were identified during the surveys. These species are identified in shaded rows in Appendix 5.10-A (Table A1). Overall, three (3) vascular plant species at risk, two (2) lichen species at risk, and one (1) lichen species of interest were found during field surveys. Plants of conservation concern are discussed further in Section 5.10.5.1.

5.10.1.3 Wetlands

Numerous freshwater and marine wetlands are located in the Project study area. However, only a small number of the wetlands are in contact with, and thus potentially impacted by, proposed Project infrastructure. Freshwater wetlands in the study area include bogs, fens, swamps and marshes. All wetlands (freshwater and marine) were surveyed in conjunction with the plant surveys in order to confirm the provincial wetlands database classification and to record to presence of any plant species of conservation concern (Appendix 5.10-A). Wetlands are classed based on dominant vegetation and hydrology (National Wetlands Working Group, 1997; NSDNR, 2000). The classification and size is included in the provincial Wetlands Data Base (NSDNR, 2000).

Freshwater Wetlands within the Proposed Marine Terminal and Logistics Park Footprint

A total of three (3) wetlands were described during the field surveys in the early planning stages of the Project (Appendix 5.10-A (Table A2)). WL# 1 and WL #3 are located within the proposed footprint of the Marine Terminal and Logistics Park (Table 5.10-2) (Figure 5.10-4). These two wetlands are not included in provincial Wetlands Data Base (NSDNR, 2000). Another wetland (WL#2) was not included in the Wetlands Data Base, but is located in the potential future expansion area of the Logistics Park, and was identified during previous surveys. However, WL# 2 is connected to WL# 1 by a stream and thus may be impacted by Project activities.

Another small wetland (WL #4) identified during the June 2007 surveys (Appendix 5.10-A) near the proposed Terminal, has no obvious connection to the wetlands in the proposed Terminal footprint and is not included in the current assessment (Appendix 5.10-A). However, mitigative measures outlined for wetlands identified in the rail and transmission corridors would be the same for wetlands within the Terminal footprint (refer to Sections 6.11 and 11.0).

Table 5.10-2: Field-identified Freshwater Wetlands in the Terminal and Logistics Park Footprint

| Wetland ID | Type | Description | Area (hectare) | Note |
|------------|------|------------------------------|----------------|----------------------------------|
| WL # 1 | RDM | Robust- Emergents Deep Marsh | 0.9 | |
| WL # 2* | RDM | Robust- Emergents Deep Marsh | 0.35 | Connected to WL # 1 via a stream |
| WL # 3 | TSS | Tall Shrub swamp | Less than 0.5 | |
| WL # 4 | RDM | Robust- Emergents Deep Marsh | 0.1ha | |

Note: * Wetland not located in the proposed Project footprint.
 Due to considerable precipitation before and during the field surveys, water levels may have been unusually high. Therefore, the RDM may be RSM).

The three wetlands in the footprint of the Marine Terminal and Logistics Park belong to wetland classes that are common in Nova Scotia and the Project study area. No plant species of conservation concern were found in the above wetlands and the potential for these types of plants species is low (Appendix 5.10-A (Table A2)). The wetlands are rather small with less than two (2) hectares surface area each (Table 5.10-2) (Figure 5.10-3). Further, these wetlands do not provide critical habitat (as defined under SARA) to rare or endangered species.

Freshwater Wetlands in the Proposed Rail and Transmission Corridors

Although there were no marine wetlands identified in either the rail or the transmission corridors, there are numerous freshwater wetlands (Figure 5.10-3) (Table 5.10-3). It should be noted that although small, adjacent wetlands appear to be separate, there could be a hydrological connectiveness that may result in one large wetland, with synergistically greater functionality and value. Part of the 2008 field studies will be to complete a wetland functional analysis at specific sites. Furthermore, an environmental effects monitoring program will be implemented to identify any signs of changed hydrologic regime (refer to Section 6.11).

A perusal of the Nova Scotia Wetland Data Base (NSDNR, 2000) shows the freshwater wetlands in the study area as belonging to wetland classes that are common in Nova Scotia (Figure 5.10-3). The wetlands are grouped into the following classes:

- Compact Shrub Deep Marsh (CDM);

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- Compact Shrub Swamp (CSS);
- Dead Woody Deep Marsh (DDM);
- Deciduous Wooded Swamp (DWS);
- Emergents Deep Marsh (EDM);
- Emergents Shallow Marsh (ESM);
- Open bog (OBG);
- Open Fen (OFE);
- Robust- Emergents Deep Marsh (RDM);
- Robust- Emergents Shallow Marsh (RSM);
- Shrub Bog (SBG);
- Shrub Fen (SFE);
- Treed Bog (TBG);
- Treed Fen (TFE); and
- Tall Shrub Swamp (TSS).

TBG are most common, followed by SBG (NSDNR, 2000) (Table 5.10-3). All of these wetlands belong to classes that are common in Nova Scotia. As noted in Table 5.10-3 some of the identified wetlands are connected (i.e., WL #19, #20, and #21), a matter that could effect the size of potentially impacted areas.

Table 5.10-3: Wetland Areas Identified in the study area

| ID # | Type | Description | Total Wetland Area (m ²) | Area (m ²) Within the study area |
|--------------------|------|------------------|--------------------------------------|--|
| #001 | TSS | Tall Shrub Swamp | 13272 | 0 |
| #002 | TBG | Treed Bog | 23974 | 0 |
| #003 | TSS | Tall Shrub Swamp | 25693 | 0 |
| #004 - #005 | TBG | Treed Bog | 12030 | 12030 |
| #005 - #006 | TBG | Treed Bog | 13956 | 13956 |
| #007 - #008 | TBG | Treed Bog | 80408 | 80408 |
| #009 | TBG | Treed Bog | 15450 | 15450 |
| #010 | SFE | Shrub Fen | 64004 | 28387 |
| #011 - #012 | SFE | Shrub Fen | 10693 | 10693 |
| #012 - #013 | TBG | Treed Bog | 17002 | 17002 |
| #014 - #015 - #016 | SBG | Shrub Bog | 30537 | 30537 |
| #017 - #018 | TBG | Treed Bog | 98404 | 70443 |
| #19 | TBG | Treed Bog | 80167 | 80167 |
| #20 | SBG | Shrub Bog | 24242 | 24242 |
| #21 | TBG | Treed Bog | 195924 | 183524 |
| #022 - #023 | TBG | Treed Bog | 117703 | 114065 |
| #024 - #025 | TBG | Treed Bog | 30149 | 30149 |
| #026 | SBG | Shrub Bog | 26790 | 26790 |
| #027 | SBG | Shrub Bog | 9269 | 9269 |
| #028 - #029 | TBG | Treed Bog | 81028 | 66802 |
| #030 - #031 - #032 | SBG | Shrub Bog | 324887 | 324887 |
| #033 - #034 - #035 | SFE | Shrub Fen | 157307 | 157307 |
| #036 - #037 | TBG | Treed Bog | 69765 | 69765 |

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Table 5.10-3: Wetland Areas Identified in the study area

| ID # | Type | Description | Total Wetland Area (m ²) | Area (m ²) Within the study area |
|-------------|------|-----------------------------|--------------------------------------|--|
| #040 | TBG | Treed Bog | 11471 | 11471 |
| #041 - #042 | SBG | Shrub Bog | 39764 | 39764 |
| #054 | TBG | Treed Bog | 10213 | 0 |
| #055 | DWS | Deciduous Wooded Swamp | 15697 | 0 |
| #056 | TSS | Tall Shrub Swamp | 16861 | 0 |
| #057 | TSS | Tall Shrub Swamp | 7060 | 0 |
| #058 | SBG | Shrub Bog | 7213 | 7213 |
| #072 | OBG | Emergents Deep Marsh | 1806 | 1806 |
| #081 | TBG | Treed Bog | 31429 | 31429 |
| #082 | TSS | Tall Shrub Swamp | 12634 | 12634 |
| #083 | DDM | Dead Woody Deep Marsh | 21484 | 21484 |
| #084 | CSS | Compact Shrub Swamp | 6381 | 6381 |
| #085 | SBG | Shrub Bog | 41408 | 41408 |
| #086 | TBG | Treed Bog | 31587 | 31587 |
| #087 | TBG | Treed Bog | 88717 | 88717 |
| #088 | TSS | Tall Shrub Swamp | 14717 | 10226 |
| #089 | RDM | Robust Emergents Deep Marsh | 3080 | 3080 |
| #090 | EDM | Emergents Deep Marsh | 52263 | 52263 |
| #091 | SBG | Shrub Bog | 26413 | 26413 |
| #092 | SBG | Shrub Bog | 8057 | 8057 |
| #093 | TBG | Treed Bog | 6872 | 0 |
| #094 | SBG | Shrub Bog | 14579 | 559 |
| #095 | TBG | Treed Bog | 11971 | 11971 |
| #096 | SBG | Shrub Bog | 540619 | 56982 |
| #097 | OFE | Open Fen | 9960 | 1933 |
| #098 | SFE | Shrub Fen | 8930 | 8930 |
| #099 | TFE | Treed Fen | 13764 | 13764 |
| #100 | DDM | Dead Woody Deep Marsh | 16303 | 16303 |
| #101 | TBG | Treed Bog | 7906 | 7906 |
| #102 | TBG | Treed Bog | 137422 | 12893 |
| #103 | TBG | Treed Bog | 29940 | 4596 |
| #104 | TBG | Treed Bog | 23522 | 23522 |
| #105 | TBG | Treed Bog | 20705 | 3649 |
| #106 | TBG | Treed Bog | 12428 | 12428 |
| #107 | TBG | Treed Bog | 59263 | 11995 |
| #108 | TBG | Treed Bog | 76384 | 76384 |
| #109 | SFE | Shrub Fen | 32864 | 756 |
| #110 | TBG | Treed Bog | 13608 | 3080 |
| #111 | SBG | Shrub Bog | 7764 | 4337 |
| #112 | SBG | Shrub Bog | 30722 | 30722 |
| #113 - #114 | TBG | Treed Bog | 815198 | 103326 |
| #115 | SBG | Shrub Bog | 19572 | 2511 |
| #116 | TBG | Treed Bog | 23142 | 19537 |

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Table 5.10-3: Wetland Areas Identified in the study area

| ID # | Type | Description | Total Wetland Area (m²) | Area (m²) Within the study area |
|---------------------------------------|-------------|-----------------------------------|---|---|
| #117 | DDM | Dead Woody Deep Marsh | 7601 | 7601 |
| #118 | TBG | Treed Bog | 75714 | 75714 |
| #119 | FLW | Floating-Leaved Lakeshore Wetland | 28892 | 28892 |
| #120 | TBG | Treed Bog | 21116 | 13212 |
| #121 | TBG | Treed Bog | 30873 | 30873 |
| #122 | TBG | Treed Bog | 43625 | 43625 |
| #123 | TBG | Treed Bog | 10881 | 10881 |
| #124 | TBG | Treed Bog | 14530 | 2541 |
| #125 | TBG | Treed Bog | 77987 | 22018 |
| #126 - #128 - #129 - #130 | TBG | Treed Bog | 227544 | 203689 |
| #127 | TBG | Treed Bog | 19925 | 19925 |
| #131 | SFE | Shrub Fen | 27794 | 27794 |
| #132 - #133 | SFE | Shrub Fen | 101894 | 101894 |
| #134 | SBG | Shrub Bog | 11917 | 11917 |
| #135 | TBG | Treed Bog | 31443 | 31443 |
| #136 | TBG | Treed Bog | 7841 | 7841 |
| #137 | EDM | Emergents Deep Marsh | 18495 | 18495 |
| #138 | TBG | Treed Bog | 59882 | 59882 |
| #139 | SFE | Shrub Fen | 27659 | 27659 |
| #140 | TBG | Treed Bog | 8081 | 8081 |
| #141 | TBG | Treed Bog | 10339 | 10339 |
| #142 | SBG | Shrub Bog | 7484 | 7484 |
| #143 | TBG | Treed Bog | 23526 | 6487 |
| #144 | TBG | Treed Bog | 22932 | 12802 |
| #145 | TSS | Tall Shrub Swamp | 6956 | 6956 |
| #146 | TBG | Treed Bog | 187680 | 58595 |
| #147 | TBG | Treed Bog | 24409 | 5770 |
| #148 | TBG | Treed Bog | 73637 | 73133 |
| #149 | TSS | Tall Shrub Swamp | 11161 | 11161 |
| #150 | TBG | 12319.9424 | 15445 | 15445 |
| #151 | ESM | Emergents Shallow Marsh | 15238 | 15238 |
| #200 | SFE | Shrub Fen | 37211 | 37211 |
| #201 | TBG | Treed Bog | 12320 | 12320 |
| #202 | SBG | Shrub Bog | 31787 | 19118 |
| #203 | DDM | Dead Woody Deep Marsh | 8489 | 8489 |
| #204 - #205 | CDM | Compact Shrub Deep Marsh | 35091 | 35091 |
| #206 | EDM | Emergents Deep Marsh | 12742 | 12742 |
| Marine Flat | MF | Marine Flat | 24967.40 | 24967.40 |
| Total Areas (m²) | | | 5319454 | 3315214 |
| (approximate) Total Areas (Ha) | | | 532 | 332 |

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All wetlands (freshwater and marine) located in the footprint of the Marine Terminal and the proposed rail and transmission corridors were surveyed in order to confirm the provincial wetlands database classification and to perform plant surveys for species of conservation concern (Appendix 5.10-A). Results of the surveys show that numerous freshwater and marine wetlands are located within and adjacent to the study area including the proposed rail and transmission corridor (Figure 5.10-3).

In most cases, the classification of wetlands as observed in the field agreed with the classification in the wetlands database. However, one wetland, wetland #41- #42, classed as SBG, has more characteristics of a SFE than a SBG, due to the dominance of sedges, though pitcher plants do occur. At least one stream drains from the wetland, and an open water channel with flowing water is present. Furthermore, four (4) wetlands not yet included in the provincial database were identified (WL#s 1, 2, 3 and 5) (Appendix 5.10-A (Table A2)) (Figure 10.4).

Vascular plant species of conservation concern were found in a few of the wetlands and are further discussed in Section 5.10.5.1.

Marine Wetlands within the Proposed Marine Terminal and Logistics Park Footprint

Marine wetlands encompass marine flats (aka beaches, level or gently sloping shoreline areas, intertidal or subtidal), estuarine flats, coastal saline ponds, salt marshes, beaches, and dunes, among others (NSDNR, 2000).

The provincial Wetlands Data Base identifies marine flats and beaches which are located within the proposed footprint of the Marine Terminal facility (NSDNR, 2000).

The beach consists mostly of cobble and pebble, interspersed by sand. Overall vegetation is sparse with wide stretches of beach devoid of vegetative species. Sea weeds (large algae) attached to boulders and cobble occur in the inter-tidal zone. Vascular plant vegetation is sparse and few native coastal species can be found. Near a meadow associated with human residences, plants typical of meadows or disturbed habitats invade the landward reaches of the beach.

Native and some introduced species, including tree saplings and shrubs, were found on the slopes between the beach and the forested or re-grown uplands. For the most part, the slopes take the form of 2 - 4 m high cliffs, the exposed face revealing surface till, but little bedrock. A few Scotch lovage (*Ligusticum scoticum*) plants were found on the small headland northwest of the western property boundary, accompanied by other plants typical of coastal areas as well as upland species, especially alien "weeds." Since the substrate consists mostly of sand, and this area is above the regular high water mark, the vegetation here is dense, but consists mostly of herbaceous, non-woody species. This location, however, is outside of the currently proposed footprint.

Coastal saline ponds and salt marshes are not found in the proposed study area (NSDNR, 2000). However, three saline ponds, and salt marsh, near the footprint of the proposed Marine Terminal were surveyed because these ponds/marsh form the estuaries of streams that originate in or flow through the study area. One saline pond is separated from the ocean by a sandbar and vegetation included coastal species such as American dune grass (*Elymus mollis*, syn. *Leymus mollis*), beach pea (*Lathyrus japonicus*), seaside goldenrod (*Solidago*

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sempervirens), seabeach sandwort (*Honckenya peploides*), seedlings of seablite (*Sueda* sp), as well as bittersweet nightshade (*Solanum dulcamara*).

No plant species of conservation concern were found in the marine wetlands in the study area (Appendix 5.10-A (Table A3). These wetlands also do not provide critical habitat, as defined under SARA, to rare or endangered species.

There are no marine wetlands within the study area of the rail and transmission corridors.

5.10.1.4 Significant Habitats

Significant habitats include sites where species at risk (SAR) or species of conservation concern occur, habitats that are rare in Nova Scotia, and sites where unusually large concentrations of wildlife occur (NSEL, 2005). Habitat that is critical for species that are not rare but valued by humans, as well as habitat for species that are not rare but sensitive to human developments, may also be considered here.

The NSDNR SigHab database was reviewed and Appendix 5.10-B (Tables B1 and B2) provides a completed list of significant habitats, including status rankings, identified for mainland Nova Scotia and Cape Breton. It should be noted however, that this database may not be comprehensive nor up to date for the Project Area. The review revealed that no significant habitats are known to exist within in the proposed Project Site footprint, including the proposed rail and transmission corridors (NSDNR, 2007 b). A large number of significant habitat polygons are located within 100 km of the proposed Project Site, both on mainland Nova Scotia and in Cape Breton (Figure 5.10-5). Due to the fact that several WLD numbers are listed multiple times, the total number of significant habitat areas within 100km of the proposed terminal is 431 (431WLD numbers) and includes:

- 47 deer wintering areas;
- 12 freshwater areas;
- 66 migratory bird areas;
- 102 areas with species of concern;
- 20 areas for species at risk;
- 5 rare plant areas;
- 1 ecological site; and
- 178 areas considered “other habitats” (NSDNR, 2007 b).

There are 56 significant habitats close to the Project Site area (within 20 km) (Table 5.10-4) including Cape Breton (Inverness and Richmond Counties), as well as within mainland Nova Scotia (Antigonish and Guysborough Counties). The majority of these significant habitats (48) occur within Cape Breton, and include several locations of species of conservation concern, deer wintering areas, and “other habitats” such as raptor nests (i.e., bald eagle and osprey). Within mainland Nova Scotia, the closest significant habitats to the proposed Project Site include locations of species conservation concern. At a greater distance from the site, there are accounts of several species of conservation of concern locations, deer wintering areas, and “other habitats.” In addition, polygons indicating species at risk (3), freshwater (1), migratory bird (4), and rare plants (1) were also noted at a greater distance from the proposed Project Site (Table 5.10-4) (Figure 5.10-5).

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The remaining 375 significant habitats identified from the NSDNR database are greater than 20km from the proposed Project Site. These areas include deer wintering areas, rare plant locations, and several “other habitats”, in addition to further locations for migratory birds, species at risk and species of conservation concern (Figure 5.10-5) (Appendix 5.10-B (Tables B1 and B2)).

Table 5.10-4: Significant Habitats Within Approximately 20 km of the Proposed Project Site Location

| WLD# | Approximate Location in relation to the Proposed Project Site ¹ | Type |
|-----------------------------|--|--|
| Mainland Nova Scotia | | |
| Antigonish County | | |
| AT436 | 16.5km NNW (Aulds Cove Area) | Other habitat (Saline pond - general wildlife values, coastal) |
| Guysborough County | | |
| GU855 | 13.25km SSW (SSW of Mansette Lake) | Other habitat (Migratory birds, waterfowl, staging and feeding) |
| GU898 | 21km SW (Between Tracadie Rd and North Riverside) | Deer wintering area |
| GU899 | 20.5 km SW (Between Tracadie Rd and North Riverside) | Other habitat (Bald Eagle) |
| GU914 | 20km SW (Havendale Area) | Migratory bird (Canada Geese staging and feeding) |
| GU963 | 18.6km SW (S of Boylston) | Rare plant (Sea Blite and Hare Figwort) |
| GU975 | 15.3km SSW (S of Port Shoreham) | Species of conservation concern (Saline pond, waterfowl, migratory birds staging, feeding) |
| GU977 | Nearest point is 8km SW (Channel NE of St.Francis Harbour) | Species of conservation concern (Atlantic salmon) |
| Cape Breton | | |
| Inverness County | | |
| IN97 | 19km NNE (ESE of Riverside) | Deer wintering area |
| IN101 | 14km NNE (N of MacIntyre Lake) | Species of conservation concern (Common loon nesting) |
| IN108 | 18km NNW (NNE of Macdale) | Deer wintering area |
| IN109 | 14.5km NNW (Between Port Hastings and Pleasant Hill) | Deer wintering area |
| IN112 | 21km NNW (S of Pleasant Hill) | Deer wintering area |
| IN113 | 10km NNE (N of St.Peters Junction) | Deer wintering area |
| IN117 | 15.3km NNW (Coastal waters N of Canso Causeway) | Seabird feeding area |
| IN118 | Nearest point 17km NNE (N of Port Hastings) | Freshwater (Smelt spawning area) |
| IN121 | 17km NNW (Small island NNW of Port Hastings) | Species of conservation concern (Unclassified Tern) |
| IN122 | 12.5km NNE (MacIntyre Lake area) | Deer wintering area |
| IN123 | Nearest point is 16km NNW (Askilton area) | Deer wintering area |
| IN285 | Nearest point is 15km NNE (E of Macdale, Crandall Rd) | Species at Risk (Wood turtle) |
| IN337 | 12km NNE (SSW of MacIntyre Lake) | Species of conservation concern (Common Loon) |
| IN343 | 16.5km NNE (Macdale Area) | Species at Risk (Wood Turtle) Species of conservation concern (Atlantic Salmon, Brook Trout, Rainbow Trout, Alewife-Gaspereau, Sea Lamprey) |
| IN409 | 14.5km NNW (E of Port Hastings) | Other habitat (Bald Eagle) |
| Richmond County | | |
| RI101 | 13km NNE (E of MacIntyre Lake) | Species of conservation concern (Common Loon) |
| R113 | 10km NNE (N of St. Peters) | Deer wintering area |
| RI276 | 15km NNE | Deer wintering area (White tailed deer) |
| RI318 | 12km NE | Other habitat (Bald Eagle) |
| RI322 | 19km ENE (Between Lennox and Arichat) | Species of conservation concern (Common Loon) |
| RI324 | 20km SE (Small Island SSW of Arichat) | Species of conservation concern (Common Tern, Artic Tern, |

Table 5.10-4: Significant Habitats Within Approximately 20 km of the Proposed Project Site Location

| WLD# | Approximate Location in relation to the Proposed Project Site ¹ | Type |
|-------|--|--|
| | | and Common Eider) |
| RI326 | 20km E (S of RI322) | Species of conservation concern (Common Loon) |
| RI329 | 20km NE (In the Grandique Area) | Other habitat (Bald Eagle) |
| RI332 | 20km NE (Between Grand Anse and Louisdale) | Migratory birds (Wood Duck, Unclassified Water Fowl and Ducks Unlimited Project) |
| RI336 | 9km NNE (Between Chapel Rd and L River Inhabitants) | Other habitat |
| RI337 | 11km NNE (West of Hureauville) | Species of conservation concern (Common Loon) |
| RI339 | 17.5km NE (West of Louisdale) | Other habitat (Osprey) |
| RI341 | 10km NE | Other habitat (Bald Eagle) |
| RI342 | 11km NNE (Near Evanston) | Other habitat (Bald Eagle and Great Blue Heron) |
| RI343 | 15km NNE (East of Grantville) | Species at Risk |
| RI344 | 10km NNE (In the Walkerville Area) | Species of conservation concern (Bald Eagle, Atlantic Salmon, Brook Trout, Rainbow Trout, and Sea Lamprey) |
| RI345 | 12km NE (Small Island East of Walkerville) | Species of conservation concern (Unclassified Tern) |
| RI346 | 11.3km NNE (South of Hureauville) | Other habitat (Bald Eagle) |
| RI347 | 5km N (Near Port Malcom and Port Richmond) | Species of conservation concern |
| RI348 | 11km NE | Other habitat (Bald Eagle) |
| RI349 | 12.5km ENE | Other habitat (Bald Eagle) |
| RI352 | 12.5km NEE (Coastal Area NE of St. Mary's) | Other habitat (Osprey) |
| RI358 | 12.5km ESE (Western Area of Island, W of Arichat) | Migratory bird |
| RI360 | 12.3km ESE (Eastern Area of Island, W of Arichat) | Species of conservation concern (Common Tern, Great Black Backed Gull, and Double-crested Cormorant) |
| RI361 | 13.5km NE | Other habitat (Bald Eagle) |
| RI364 | 10km SSE | Species of conservation concern (Unclassified Tern) |
| RI367 | 20km SE (Cape Auguet Area) | Migratory bird (Whimbrel) |
| RI435 | 13km NE (NE of St. Mary's) | Species of conservation concern |
| RI460 | 20km NE (Between Grand Anse and Louisdale) | Species of conservation concern (Alewife-Gaspereau) |
| RI461 | 19km NNE (SW of Balmoral) | Species of conservation concern (Rainbow Trout) |
| RI541 | 19.5km ESE (SSW of Arichat) | Species of conservation concern (Spurred Gentian and the Slender Cotton Grass) |
| RI547 | 14.5km NE (SW of Louisdale) | Other habitat |
| RI681 | 3km NNE (S of Port Malcom) | Species of conservation concern |

¹ To maintain consistency, all approximate distances provided in this table were estimated based on the location of the proposed Project Site

While no significant habitat polygons are known to exist within the borders of the Project footprint (NSDNR, 2007 b), discussions with NSDNR revealed that there is potential for deer wintering areas (DWAs) along coastal areas. DWAs are considered to be important habitat for white-tailed deer, a species that is not rare but valued by hunters. While deer are usually solitary, congregating in herds in suitable wintering areas greatly increases winter survival. In snow-rich winters (more than 30-45 cm of accumulated snow), deer move into coastal areas in order to supplement the food supply, e.g. with seaweeds found on the shores, resulting in increased numbers of deer in the area. DWAs usually are dense softwood stands close to water and regenerating hardwoods, which generally are found in riparian habitats, seashores or on south facing slopes at elevations under 150 m.

The significant habitat database indicates that there is no deer wintering habitat within the study area (NSDNR, 2007b), however, previous discussions with NSDNR indicated that the coastal

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area between Mulgrave and Red Head (East of Melford) is to be considered a deer wintering zone (Sable Offshore Energy Project (SOEP), 1996). The deer wintering zone delineated in the SOEP report appears to be generally restricted to the slopes near the coast, extending for 1 to 1.5 km from the coast inland. Therefore, it appears that the rail corridor concurs with the southern and western extent of this zone and that both the proposed Logistics Park and the Container Terminal are located within the SOEP deer wintering zone.

Significant habitat also includes bat hibernacula (i.e. caves where bats congregate in large numbers to hibernate) (NSMNH, 2007b). While only three of the seven species of bats known on the province are listed "at risk" by NSDNR (NSDNR, 2007a), all bats that hibernate in large congregations in caves are vulnerable to human development. In the event that hibernation sites are impacted or destroyed, a large part of the bat population would potentially be affected. There are no known bat hibernacula in the study area (M. Pulsifer, pers. comm., 2008).

5.10.1.5 Indications of Previous Disturbance

Indications of previous disturbance are common within the Project Area. Several habitat polygons marked as "miscellaneous un-treed", for example near Melford, are included in the NSDNR Forest Inventory. A site visit indicated man-made disturbance. One large area Southeast of Middle Melford was cleared and grubbed, and may have been a former gravel pit or sand pit. No tree stumps were noticed (Figure 5.10-1).

Numerous habitat polygons are mapped as clear-cut in the Forest Inventory Mapping and are now in various stages of regeneration (NSDNR, 2007). Additional areas are subject to Crown Land License holdings to Stora Enso (NewPage), and logging is ongoing.

The forest bordering Wetland #55, a DWS, has been clear-cut recently, including the fringes of the wetland. Based on tree stumps and state of regenerating vegetation, the cutting likely occurred within in the last 2-4 years.

Construction and maintenance of logging roads is connected to the wood harvesting activities. Numerous roads cross the study area. Most of these roads are included in the figures provided in this report, though it appeared during field surveys that there are more roads than are shown on available maps. Due to ongoing logging, it can be expected that new logging roads will be built.

In addition to logging roads, there are cart tracks and ATV trails, which provide access to the forests, the reservoirs, above ground water pipelines, a few cabins, and more remote forested areas. Several cabins/cottages are also located within the study area.

In addition to harvested forest habitats, there are indications that the area around Melford had previously been used for agriculture purposes, as apple trees, including large groups reminiscent of small orchards, were found in several forested areas, as well as overgrown cart tracks. Based on the size of trees found in those areas, much of the agricultural land was abandoned several decades ago.

Similarly, the hardwood forest on a slope near Mulgrave consisted of trees of quite uniform size, indicating that the area also had been cut or otherwise disturbed several decades ago.

5.10.1.6 Wildlife Sightings

Observation of wildlife or signs of wildlife presence were noted during the habitat surveys with special interest given to raptor nests and SAR.

Birds were seen or heard everywhere in the study area. Additional information on birds and bird surveys is provided in Section 5.10.2.

There was no breeding habitat for wood turtles (*Glyptemis insculpta*), and no freshwater mussels were found at any of the stream crossings surveyed.

Moose (*Alces alces*) have been reported in the vicinity of the project area, and many times within the generalized area (NSDNR 2008).

Additional sightings are noted in Appendix 5.10-A.

5.10.1.7 Existing Habitat Summary

Eleven types of possible existing habitats were identified within the study area including various forested areas, urban areas, un-treed areas, riparian habitat, and wetlands. Three species of rare vascular plants, three species of rare lichens, and a lichen species of interest, were identified during the surveys.

Freshwater and marine wetlands are located within and adjacent to the study area including the proposed rail and transmission corridor (only freshwater wetlands identified in the area of the corridors). Although some vascular plant species of conservation concern were recorded in some of the freshwater wetlands, no plant species of conservation concern were found in the marine wetland areas. These areas also do not provide critical habitat to rare or endangered species (as defined by SARA).

No significant habitats are known to exist within in the proposed Project Site footprint, including the rail and transmission corridors. There are 56 significant habitats within 20 km of the Project Site; the majority within Cape Breton. Within mainland Nova Scotia, the closest significant habitats to the proposed Project Site include locations of species conservation concern. There is potential for DWAs between Mulgrave and Red Head which incorporates the proposed Logistics Park and the Marine Terminal.

Indications of previous disturbance are common within the Project Area.

There were numerous wildlife sightings during the surveys and there is the potential for faunal species of conservation concern to occur in the area.

5.10.2 Birds

Based on a background data search and observations during site visits, it is known that birds breed, migrate and over-winter within the study area.

The field program for the various bird surveys was developed and carried out according to the parameters set out in the CWS guidance document General Guidelines for Landbird Surveys for Environmental Assessment of Linear Right-of-Way Projects (R.Gautreau, CWS, personal communication, 2007).

Bird surveys were conducted during 2007, focusing primarily on breeding bird populations (Table 5.10-5). The survey schedule was developed in discussion with J. Chardine (CWS, 2007), and bird specialist C. Stevens. Further bird surveys are being conducted during the 2008 early and late summer season along the rail and transmission line corridor.

Table 5.10-5: Bird Survey Schedule

| Type of Survey | Date | Notes |
|----------------|---------------------------|-------------------------|
| Breeding Birds | June 20-July 1 | Includes morning chorus |
| Shorebirds | August and September 2007 | |

The following sections summarize the results of the survey results and data review. Data on species of conservation concern and sensitive bird species are presented in Section 5.10.5.2.

5.10.2.1 Seabird Colonies

Five seabird colonies are known to exist in the broad area surrounding Melford. Four of the colonies are on the Cape Breton side of the Straight of Canso and one colony is located southwest of the Project site in near Port Shoreham. The colonies are all a considerable distance from the proposed terminal site, with the closest colony approximately 10 kilometers away near Isle Madame, Cape Breton Island.

5.10.2.2 Breeding Birds

Data collected for breeding birds was completed as a three step process involving:

- Maritime Breeding Bird Atlas (MBBA) review from 2006/2007;
- MBBA review from 1990; and
- Field surveys.

Prior to surveys, information was gathered from the MBBA. The MBBA is a five-year Project, designed to determine the distribution and abundance of all bird species that breed in the Maritime Provinces.

Breeding bird surveys were conducted in the study area to collect data on species of landbirds, seabirds and shorebirds breeding in different habitats within the proposed footprint, including the area between the communities of Melford and Mulgrave in Guysborough County, NS. All surveys were carried out by an experienced birder (C. Stevens).

The specific scope of work for the breeding bird survey involved recording data for the following:

- Identification of breeding species observed within the study area;
- Identification of breeding status (established using the guidelines provided by the MBBA);
- Relative abundance;
- Identification of any of bird species of conservation concern (species listed by SARA, , COSEWIC, NSESA and NSDNR²), nests, or critical habitat (as defined by SARA) occurring within the study area;

² The General Status List created by NSDNR was used to determine up to date status of bird species (<http://www.gov.ns.ca/natr/wildlife/genstatus/ranks>) (NSDNR 2007c)

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- Identification of any bird colonies occurring in the study area; and
- Identification of any raptors including owls and nests occurring within the study area (protected under the *Nova Scotia Wildlife Act* (NSWA))

Surveys were conducted between June 20th and July 1st, 2007 within the Marine Terminal and Logistic Park footprint and throughout the study corridor (within 750 m along each side) corridor. Bird species were detected and identified by sight, songs and call notes. Point counts were carried out in all of the main habitat types identified in the Project area.

Results of the surveys are summarized below. Appendices 5.10-C and 5.10-D provide a field summary report and raw data with a summary of species observations for each habitat type, respectively.

A total of 113 point counts were conducted in nine (9) different habitat types identified for the study area, so that each habitat type was proportionally well represented. Point counts in habitats such as wetlands or marine flats were limited by the size and frequency of the habitat parcel.

A total of ninety-two (92) different species (4886 individuals) of birds overall were identified, including breeding status and relative abundance. Of the ninety-two (92) species detected, twenty-three (23) were confirmed to be breeding in the area, two (2) were probable breeders, and the remaining sixty-seven (67) species were observed with no evidence of breeding. It can be assumed that the number of species confirmed or probable to be breeding is larger than indicated in the survey results, as repeat visits to the same point count locations were not possible in most cases. Table 5.10-6 provides a summary of the breeding bird surveys by habitat type.

Table 5.10-6: Breeding Bird Survey Summary

| Habitat Type | Number of Point Counts | # of Species per Habitat Type | # of Individuals |
|------------------------|------------------------|-------------------------------|------------------|
| Mixed Forest | 25 | 60 | 1173 |
| Hardwood Forest | 15 | 49 | 410 |
| Softwood Forest | 12 | 38 | 503 |
| Regenerating Forest | 25 | 40 | 1689 |
| Wetland | 20 | 43 | 490 |
| Marine Flat | 6 | 11 | 150 |
| Urban | 7 | 31 | 442 |
| Riparian | 1 | 5 | 10 |
| Miscellaneous Un-treed | 2 | 6 | 19 |
| Totals: | 113 | -- | 4886 |

Taking into account the difference in number of point counts, Table 5.10-6 indicates that mixed wood forest has a larger diversity of birds than other types of forest, though abundance is higher in regenerating forest. Urban areas appear to have the highest diversity overall. It should be noted that the difference in the number of point counts distorts the results somewhat, as the number of species does not increase proportionally with the number of point counts in the same habitat.

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Fifteen (15) species of special status, as identified by COSEWIC, SARA, NSESA or NSDNR General Status and/or ACCDC ranks, were observed within the study area during the survey. Two (2) raptor species were among the confirmed breeding species and are discussed further in Section 5.10.5.2.

In addition, and prior to, the field surveys, 2006 and 2007 data were gathered from the MBBA. MBBA surveys are conducted in a designated 10 x 10 km square and the proposed Project Site, including the rail and transmission corridors, lies within the atlas squares 20PR34, 20PR24 and 20PR25 in regions 23 and 24 (MBBA 2007 a). For these surveys all observed birds are recorded as 'observed,' 'possible,' 'probable' or 'confirmed' breeders (MBBA 2007 b) with the following considerations:

Evidence for an '*observed*' species in the nesting season includes:

- Species observed with no evidence of breeding.

Evidence for a '*possible*' breeder observed in the nesting season includes:

- Species observed in breeding season.
- Singing males present or breeding calls heard.

Evidence for a '*probable*' breeder observed in the nesting season includes:

- Pair observed in suitable nesting habitat in nesting season.
- Courtship or display, including interaction between a male and female or two males, including courtship feeding or copulation.
- Visiting probable nest site.
- Brood patch on adult female or cloacal protuberance on male.
- Agitated behaviour or anxiety calls of an adult.
- Nest building or excavation of nest hole by wrens and woodpeckers.

Evidence of a '*confirmed*' breeder observed in the nesting season includes:

- Nest building or carrying nest materials (excluding wrens and woodpeckers).
- Distraction display or injury feigning.
- Used nest or egg shells found.
- Recently fledged or downy young, including incapable of sustained flight.
- Adult leaving/entering nest sites indicating occupied nest.
- Adult carrying fecal sac.
- Adult carrying food for young.
- Nest containing eggs.
- Nest with young seen or heard.

Since MBBA surveys cover 10 x 10 km squares, it is impossible to establish which species were seen within or near the Project Site footprint and associated rail and transmission corridors. However, the data summarized in Table 5.10-7 do give an indication as to overall numbers, behaviours, and which species can be expected within the general Project area. Overall, ninety-seven (97) different species were recorded. Complete raw data is provided in Appendix 5.10-E.

Table 5.10-7: Summary of MBBA 2006/2007 Breeding Bird Surveys in the Project Area

| MBBA Survey Sites | Confirmed Breeders | Probable Breeders | Possible Breeders | Observed |
|-------------------|--------------------|-------------------|-------------------|-----------|
| 20PR34 | 7 | 3 | 38 | 6 |
| 20PR24 | 38 | 19 | 18 | 3 |
| 20PR25 | 18 | 25 | 25 | 3 |
| Totals | 63 | 47 | 81 | 12 |

Note: If more than one observation of the same species was reported, the highest level of breeding evidence was used

All breeding bird species found during these MBBA surveys were compared with SARA, COSEWIC, NSDNR, and ACCDC databases. Seven (7) species at risk or of conservation concern, and six (6) species of raptors were identified (refer to Section 5.10.5.2).

Additional breeding bird data from 1990 was also reviewed. This data was summarized in the MBBA by Erskine (1992), and was provided by ACCDC for the same Atlas squares used in the 2006/2007 surveys (20PR34, 20PR24 and 20PR25) that cover the Strait of Canso region, including survey sites in Port Hawkesbury, Cape Breton. Although the data was not divided by atlas square, Table 5.10-8 provides an idea of the total numbers of breeding birds. Complete raw data is provided in Appendix 5.10-F. Overall, a total of eighty-five (85) different bird species were observed.

Table 5.10-8: Summary of MBBA 1990 Breeding Bird Surveys in the Project Area

| Confirmed Breeders | Probable Breeders | Possible Breeders | Observed |
|--------------------|-------------------|-------------------|----------|
| 43 | 18 | 24 | 0 |

Note: Data for the Cape Breton sites is not included.

Data were compared with SARA, COSEWIC, NSESA, NSDNR, and ACCDC databases and nine (9) species at risk or of conservation concern were found, as well as five (5) species of raptors (refer to Section 5.10.5.2).

5.10.2.3 Migrating Birds

Birds, including nests, eggs and young, are protected at all times (within Canada and when migrating) under the *Migratory Birds Convention Act (MBCA)*. This includes the species listed in the CWS Service Occasional Papers No.1, Birds Protected in Canada under the Migratory Birds Convention Act (EC, 2004).

After consultation with CWS, it was determined that fall and spring migration of passerines, waterfowl and raptors would not be necessary due to the nature of the Project. In addition, construction of the Project will not include any major aerial structures and therefore should not impact 'flying migration' of any avian group. Since most of the passerines breeding in Nova Scotia are migratory birds, breeding bird surveys of passerines provide sufficient migratory information for these species. It was, however, determined that a survey was needed to gather information on migrating shorebird species.

Fall Migration – Shorebirds

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The proposed Project footprint includes almost a kilometer of shoreline along Melford Loop, which is the only major parcel of potential shorebird habitat. Shorebird surveys were conducted on August 10th and from September 9th – 12th, 2007 from just after high tide until low tide, during the peak of the fall migration period. The surveys were completed by an experienced birder (M. Cameron-MacMillan). Data was collected according to the Atlantic Canada Shorebird Survey protocol (designed by CWS). Bird species were identified by sight and call notes.

Few shorebird species were observed within the study area during the shorebird surveys. Rocky or stony shorelines are known to be less productive for shore birds (J. Chardine, personal communication, 2007). Since the shoreline surveyed is quite rocky, covered with cobble and pebbles, and consists of very little sand it is therefore considered to be poor shorebird habitat and therefore less productive overall for shore birds. Only two (2) shorebird species (sandpipers) were found to be present in the proposed Project footprint (Table 5.10-9).

Additional limited shorebird counts were conducted on September 9, 10 and 12, 2007 (Appendix Bird 5.10-G).

No species of conservation concern were found during the shorebird surveys (all species are considered Green status (not believed to be sensitive or at risk) under NSDNR General Status). Although the Nova Scotia breeding population of greater yellowlegs is considered rare (ACCDC 2007a), this species breeds in May to June (Tufts, 1986). The unidentified yellowlegs seen during the survey is therefore considered to be migratory. Additional information on shorebird species at risk is presented in Section 5.10.5.2.

Table 5.10-9 summarizes the survey results. Field reports are provided in Appendix 5.10-G.

Table 5.10-9: Shorebird Migration Survey Summary

| Common Name | Scientific Name | Comments |
|--------------------------------|--------------------------|----------------------|
| Spotted Sandpiper ¹ | <i>Actitis macularia</i> | Pair plus one single |
| Yellowlegs sp. | <i>Tringa sp.</i> | In flight, no call |
| Semipalmated Sandpiper | <i>Calidris pusilla</i> | 4 singles |
| Semipalmated Sandpiper | <i>Calidris pusilla</i> | 9 singles |
| Spotted Sandpiper | <i>Actitis macularia</i> | 3 singles |

Notes:

¹ Possibly the same birds that were heard during the breeding bird survey as this species does not leave its breeding area until August/September (Tufts, 1986).

Additional information could not be obtained from CWS as the Melford and Mulgrave areas are currently not surveyed for the Maritime Shorebird Survey (J. Pacquet, CWS, personal communication, 2007).

5.10.2.4 Over-Wintering Birds

This section contains information on avian species known to spend the winter season near the study area. Chedabucto Bay is an important area for wintering waterfowl (R. Gautreau, CWS, personal communication, 2007) however, waters with rapidly increasing depth do not provide good habitat (J. Chardine, personal communication, 2007). Furthermore, waters at and near the Project site are not known to produce large numbers of wintering waterfowl (Hicks pers. comm. 2007).

Wintering Waterfowl

Data was provided for surveys conducted in Coastal Block 230 which runs between the Canso Causeway and Cape Argus (about 8 km southwest of Melford) (CWS, 2007). Surveys were conducted in 1974, 1977, 1988, 1992-2000 and 2006, between mid-December and early March, with the exception of the 1974 survey which was conducted in mid April.

Results for the CWS historic surveys, including additional species also recorded during the surveys, are summarized in Table 5.10-10. The overall numbers confirm the low significance of the area to wintering waterfowl populations. No species of conservation concern were found during the data review (most species considered Green status (not believed to be sensitive or at risk) under NSDNR General Status). One sighting stated an “unidentified Goldeneye” and although the Common goldeneye is considered to be of Green status, it should be noted that the Barrow’s goldeneye (*Bucephala islandica*) is considered Yellow (sensitive to human activities and natural events). In addition, eleven (11) Long-tailed ducks were noted. This species is not listed under the NSDNR General Status lists but is considered a “species of least concern” by the International Union for the Conservation of Nature and Natural Resources (IUCN) Red List which defines this category as a “species that is not believed to approach the thresholds for the population decline criterion” (IUCN 2007; BirdLife International 2008). Under this category, taxa are considered to be widespread and abundant.

Table 5.10-10: Historical Wintering Waterfowl Survey Summary

| Common Name | Scientific Name | Total Number Observed | Years Observed |
|-------------------------|---------------------------------|-----------------------|--|
| American Black Duck | <i>Anas rubripes</i> | 52 | 1992, 1993, 1994, 1998, 2000, 2006 |
| Bufflehead | <i>Bucephala albeola</i> | 2 | 1999 |
| Common Goldeneye | <i>Bucephala clangula</i> | 32 | 2006 |
| Common Eider | <i>Somateria mollissima</i> | 6 | 1995 |
| Long-tailed Duck | <i>Clangula hyemalis</i> | 11 | 1974, 2000 |
| Great Cormorant | <i>Phalacrocorax carbo</i> | 7 | 1997 |
| White-winged Scoter | <i>Melanitta fusca</i> | 3 | 1998 |
| Unidentified Goldeneye | <i>Bucephala sp.</i> | 91 | 1977, 1988, 1992, 1993, 1994, 1995, 1996, 1998, 1999 |
| Unidentified Scoter | <i>Melanitta sp.</i> | 19 | 1988, 1995, 1998, 1999, 2006 |
| Unidentified Merganser | | 245 | 1977, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999 |
| Unidentified Duck | | 8 | 1996, 1998, 2000 |
| Other Species | | | |
| Great black-backed gull | <i>Larus marinus</i> | 4 | 1977 |
| Gull species (immature) | | 7 | 1977 |
| Herring gull | <i>Larus argentatus</i> | 76 | 1977 |
| Bald eagle | <i>Haliaeetus leucocephalus</i> | 3 | 1997 |

Source: CWS

Note: It should be noted that CWS Coastal Block survey data provide only a snapshot of the birds observed in coastal blocks during aerial surveys at a particular time of year and can be used to detect trends in bird use of coastal blocks

over time, or to identify areas of coastline that are of particular importance for birds. However, the data does not provide a total number of birds that occurred in the specific project area over the years.

Wintering Land Birds

The Audubon Christmas Bird Count (ACBC) is conducted during a single calendar day within two weeks of Christmas, and includes those birds that visit feeders (ACBC 2007). The Melford area count covers the highway route from approximately Sand Point to slightly North of Steep Creek and was most recently collected on December 28th, 2005, 2006, and 2007. Table 5.10-11 summarizes the information by bird groups observed by year. A complete list of species is provided in Appendix 5.10-H. Many of the species observed were common visitors to the area. One species of wintering waterfowl with special status was identified, the Barrow's goldeneye (*Bucephala islandica*) (NSDNR- Yellow, ACCDC - S1N, COSEWIC and SARA -Special Concern) during these surveys.

Table 5.10-11: Historical Wintering Land Bird Survey Summary

| Bird Group | Total Number Observed by Year | | |
|---------------------|-------------------------------|------------|------------|
| | 2005 | 2006 | 2007 |
| Waterfowl | 126 | 81 | 123 |
| Seabirds/Aerialists | 49 | 55 | 89 |
| Birds of Prey | 2 | 2 | 0 |
| Game Birds | 0 | 1 | 0 |
| Non-aligned species | 0 | 0 | 1 |
| Passerines | 43 | 68 | 176 |
| Totals | 220 | 207 | 389 |

Source: ACBC

Information on wintering bird species at risk is provided in Section 5.10.5.2. It is not possible to determine which of these species were detected within the Project Area.

5.10.2.5 Additional Avian Species

One species, the great horned owl (*Bubo virginianus*), was detected during the breeding bird surveys, and appropriate breeding habitat is found in the proposed Project site. Owls are raptors and as such protected under the NSWA.

5.10.2.6 Bird Summary

Bird species breed, migrate and over-winter within the Project/study area.

A total of 92 different species of breeding birds were identified during surveys. Fifteen (15) species of special status were observed within the study area and two (2) raptor species were among the confirmed breeding birds.

A review of past MBBA data revealed the following:

2006/2007

- 97 different breeding species observed;
- 7 species at risk or of conservation concern; and
- 6 species of raptors.

1990

- 85 different breeding bird species observed;
- 9 species at risk/conservation concern; and
- 5 species of raptors

Few migratory shorebird species were observed within the study area during surveys. This is likely due to the poor shorebird habitat. Overall, only two (2) shorebird species (sandpipers) were identified. There were no species of special concern identified in the study area and no species of special status were found during the shorebird surveys.

The waters in the study area are known as poor habitat for wintering waterfowl due to the rapidly increasing depth. Furthermore, waters at and near the Project site are not known to produce large numbers of wintering waterfowl. Overall numbers of historic survey data confirms the low significance of the area to wintering waterfowl populations.

Past surveys (2005-2007) of wintering land birds identified species considered to be common visitors to the area. Only one species of wintering waterfowl with special status was identified, Barrow's goldeneye (*Bucephala islandica*) (NSDNR- Yellow, ACCDC - S1N, COSEWIC and SARA -Special Concern) during the data review (recorded during ACBC survey).

Bird species of conservation concern are discussed in Section 5.10.5.2.

5.10.3 Mammals

There are 54 species of mammals native to Nova Scotia. Due to the variety of habitat conditions in the study area, it is reasonable to expect that a variety of mammals will use the habitat throughout the study area. These include herbivores (e.g. deer, rabbits, moose), insectivores (e.g. bats, shrews), carnivores (e.g. coyote, bobcat), and omnivores (e.g. bear, fox).

During the habitat and plant surveys, any signs or sightings of mammals were noted, with particular attention to species of conservation concern (Section 5.10.6.3.1) (Appendix 5.10-A). No mammal species of conservation concern, or signs thereof, were found within the study area.

Deer tracks were observed on the beach in the proposed marine terminal footprint and deer bones were found near the edge of the slope east of the residences at Melford Loop Road, about two meters above the beach. Coyote (*Canis latrans*) scat was also found within the footprint of the proposed Project Site. One female was observed near wetland #3 in the proposed terminal footprint. Wetland #4 may have been used by beavers (*Castor canadensis*) in the past, as indicated by the presence of slim woody stems bearing old tooth marks. One young rabbit was observed elsewhere in the study area, and rabbit droppings occurred at several locations. Moose sightings are not uncommon for the general vicinity and in 2008 were reported from the Hadleyville, and Goose Harbour Lake areas (NSDNR 2008).

5.10.4 Other Wildlife

Approximately 25 species of reptiles and amphibians are known to inhabit Nova Scotia. This includes various species of salamanders, frogs, turtles, and snakes. A large number of Odonates (dragon flies and damselflies), butterflies, beetles and other invertebrates are also known to occur in Nova Scotia, though these taxonomic groups are understudied, and the potential for additional “new “ species exists. Due to the variety of habitats, it is reasonable to expect that a number of these species will utilize habitat throughout the study area.

During the habitat surveys, signs or sightings of herpetiles were noted, with particular attention to species of conservation concern. No herpetile species of conservation concern were found. However, other species were noted (Appendix 5.10-A) and are listed in Table 5.10-12.

Table 5.10-12: Other Wildlife Survey Summary

| Common Name | Scientific Name | Location |
|-------------------------------|-----------------------------|--|
| Amphibians | | |
| Leopard frog | <i>Rana pipiens</i> | Throughout the study area |
| Wood frog | <i>Rana sylvatica</i> | |
| American toad | <i>Bufo americanus</i> | |
| Bull frog | <i>Rana catesbeiana</i> | Wetland #5 |
| Eastern red-backed salamander | <i>Plethodon cinereus</i> | Wetland #55 |
| Reptiles | | |
| Garter snake | <i>Thamnophis</i> sp | At bridge near the saline pond, northwest of the proposed terminal and throughout the study area |
| Lepidopterans | | |
| Swallowtail butterfly | <i>Papilio multicaudata</i> | Throughout the study area |
| Other butterflies | Numerous species | |
| Odonates | | |
| Odonates | Numerous species | Throughout the study area |

5.10.5 Species at Risk

The following section focuses on terrestrial and wetland fauna and flora species of conservation concern that are important as a result of the potential Project disturbances. Marine species are covered in Section 6.8 (Marine Environment).

Species of conservation concern include:

- species listed by COSEWIC or SARA as endangered, threatened or of special concern;
- species protected under the NSESA; and
- species listed in the NSDNR General Status Ranks of Wild Species in Nova Scotia as “Red” or “Yellow” (NSDNR 2007c);

However, additional species are assigned a special status in Nova Scotia. These include:

- wildlife protected under the NSWA; and
- species considered to be of conservation concern by species/resource experts such as the ACCDC (as S1, S2 and S3) and the NSMNH.

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Descriptions of the ranking systems used by COSEWIC, SARA, NSESA, the NSDNR General Status Ranks of Wild Species in Nova Scotia, and the ACCDC databases are provided in Appendix 5.10-I.

Wildlife species listed as species at risk in Nova Scotia by COSEWIC, SARA, NSESA, and/or in the NSDNR General Status Report are summarized by taxonomic group in a Priority Species List (NSEL, 2005).

In order to determine the potential for occurrence of these species in the study area, a two step evaluation process including habitat modeling was carried out (NSEL, 2005) as described below.

Evaluation Process – Step 1

Priority species were evaluated concerning their presence in the general area of the proposed Project using information on previously recorded sightings obtained from COSEWIC, NSDNR, NSMNH, ACCDC, and SigHab databases. Sources also included previously completed reports that summarized published and unpublished listings of occurrences of species of conservation concern and distribution maps from a variety of literary sources such as the MBBA, and Roland's Flora of Nova Scotia (Zinck, 1998). Data received from ACCDC for a 100km radius is provided in Appendix K (Tables K1-K4).

Data requests to the NSMNH resulted in no records for species of conservation concern, and six records of plant species of conservation concern in the area around Melford (see below) (NSMNH, 2007). ACCDC provided data for a 100 km radius around Melford and Mulgrave (ACCDC, 2007), containing hundreds of known occurrences of species of conservation concern and SAR in this area.

All data was then used to compile a Short List of Priority Species for this EIS that occur in the general geographical area of the Project, i.e. Eastern Nova Scotia (Appendix 5.10-J (Tables J1 and J2)). Those species that did not have distribution in the area were excluded from the short list.

Evaluation Process – Step 2

The species listed in the Short List of Priority Species were then reviewed regarding habitat requirements. Those species which exist in, or frequent habitats found within the study area, or immediate surrounding areas, were summarized by taxonomic group as "species with potential to be present at the Project site." Subsequently, suitable habitat was then scanned for indications of the presence of these priority species during field surveys.

It should be noted that it is possible that other species of concern exist within the area without previously recorded sightings. Therefore, the potential presence of other priority species with habitat requirements met by habitat available within the study area, were also considered during the field surveys.

Results are provided in the following sections.

5.10.5.1 Flora

Three hundred six (306) species, subspecies and varieties of vascular plants are considered to be at risk in Nova Scotia by NSDNR (2007a) and COSEWIC. In addition, 32 species of lichens are considered to be at risk.

A short-list of Priority Species was assembled based on known occurrences of Priority Species in the geographic region around the Project area, using data received from ACCDC and the NSMNH as well as the NSDNR Sig Hab database (NSDNR 2007 b) and distribution maps in Zinck (1998)³. A total of one hundred and sixty-two (162) vascular plant Priority Species, subspecies and varieties can occur in eastern Nova Scotia (Appendix 5.10-J (Table J1)). Data supplied by ACCDC contained records of plant species from PEI. Three (3) of the plant species within the 100 km radius that had records only on PEI are considered to be a Priority Species in NS. However, *Hudsonia ericoides*, *Empetrum eamesii* (and *E. eamesii* ssp. *atropurpureum*) and *Carex wiegandii*, were excluded from the short list due to their distribution in Nova Scotia (southwest Nova Scotia, exposed headlands in Northern Cape Breton and near Halifax, bogs in northern Cape Breton and Shelburne County, respectively) (Zinck, 1998).

ACCDC provided over 756 records of 226 (four on PEI) vascular plant species, subspecies and varieties considered to be at risk by NSDNR or of conservation concern by ACCDC, for a radius of 100 km around the Project site (ACCDC, 2007a; Appendix K (Tables K1 and K3)). ACCDC also had one record each for two lichens (*Erioderma pedicellatum*, NSDNR Red, COSEWIC/ SARA/ NSESA Endangered; and *Sclerophora peronella*, COSEWIC/ SARA Special Concern) and one moss (*Paludella squarrosa*, ACCDC S1) it considers to be of conservation concern (Appendix K).

The NSMNH provided records for seven (7) vascular plant species at risk for the area around Melford: Northern Arnica (*Arnica lonchophylla* (NSDNR Red), Fragrant Wood Fern (*Dryopteris fragans*, NSDNR, Yellow), Downy Willow Herb (*Epilobium strictum*, NSDNR Yellow), False Mermaid Weed (*Floerkea proserpinacoides*, NSDNR Yellow), Northern Comandra (*Geocaulon lividum*, NSDNR Yellow), Fountain Miners Lettuce (*Montia fontana*, NSDNR Red), and White Adder's Mouth (*Malaxis brachypoda*, NSDNR Red) (NSMNH, 2007). Northern Comandra was also reported in the general area by SOEP (1996). NSMNH points out that the small number of species is a reflection of the poor coverage of this area of the coast by botanical surveys, rather than an indication of low potential for Priority Species. The presence/ absence of these species would have to be determined by field surveys (NSMNH, 2007). All plant records provided by NSMNH were also provided by ACCDC, except for Northern Comandra (*Geocaulon lividum*).

In addition to known records received from ACCDC and NSMNH, fifteen (15) Priority species are retained in the shortlist of Priority species in eastern Nova Scotia based on distribution maps (Zinck, 1998). These species are marked with an asterisk in Table 5.10-13 below. A review of the SigHab database yielded 25 polygons indicating twenty (20) rare vascular plant species within a 50 km radius around the Study area (NSDNR, 2007 b). Eighteen (18) of these records were also provided by ACCDC and are included in the short list. *Poa alsodes* is not considered to be at risk or of conservation concern (NSDNR Green, ACCDC S4); hare figwort (*Scrophularia lanceolata*) (NSDNR undetermined, ACCDC S1) is not a Priority Species.

³ More than one database was utilized to compile information as the SigHab database is not comprehensive and may not be up to date for the Project area.

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Habitat modeling was applied in order to estimate the potential for the presence of the one hundred and sixty-two (162) Priority species in the Study area.

Habitat Modeling

Due to the large number of priority species known to occur in eastern Nova Scotia, not all plants can be discussed in detail. Habitat requirements, based on information in Zinck (1998) and Hinds (2000) are included in Appendix J (Table J1). Habitat is available for most of these priority species. Habitat requirements for Priority species recorded by ACCDC within 10 km radius around the study area, and Priority species listed by the NSMNH occurring around the Project Area (without distance) will be discussed below, as these species are closest to the Project Site and thus likely have high potential to occur in the Project Area (Table 5.10-13). However, many records are older than 40 years and thus may not be valid any more (M. Elderkin, personal communication, 2007).

Table 5.10-13: Priority Vascular Plant Species potentially present near the Project Site

| Scientific Name | Common Name | ACCDC Rank | NSDNR Status | Year |
|--|-----------------------------|------------|--------------|------------------|
| <i>Arnica lonchophylla</i> * | Northern Arnica | S1 | Red/ | ? |
| <i>Anemone Canadensis</i> | Canada Anemone | S2 | Yellow/ | ? |
| <i>Asplenium trichomanes</i> | Maidenhair Spleenwort | S2 | Yellow | 1941, 1905 |
| <i>Carex tenera</i> | Slender Sedge | S5 | Yellow | ? |
| <i>Cornus suecica</i> | Swedish Dwarf Dogwood | S1S2 | Yellow | 1938 |
| <i>Cypripedium parviflorum</i> <i>var. pubescens</i> | Large Yellow Lady's-Slipper | S2 | Yellow | ? |
| <i>Dryopteris fragrans</i> <i>var.</i> <i>remotiuscula</i> ** | Fragrant Fern | S2 | Yellow | ? |
| <i>Epilobium strictum</i> * | Downy Willow Herb | S3 | Yellow | ? |
| <i>Floerkea</i> <i>proserpinacoides</i> * | False Mermaid Weed | S2S3 | Yellow | ? |
| <i>Geocaulon lividum</i> * | Northern Comandra | S2S3 | Yellow | ?; SOEP: 1998 |
| <i>Malaxis brachypoda</i> ** | White Adder's-Mouth | S1 | Red | ? |
| <i>Montia fontana</i> ** | Fountain Miner's Lettuce | S1 | Red | 1951,1954 |
| <i>Senecio pseudoarnica</i> | Seabeach Groundsel | S2 | Yellow | 1938 |

Note: * Only supplied by the NSMNH for area around Project
 **Also supplied by the NSMNH

There is no suitable habitat for Northern Arnica, Maidenhair Spleenwort (*Asplenium trichomanes*), and Swedish Dwarf Dogwood (*Cornus suecica*). Northern Arnica growth requires calcareous gravel ledges and cliffs. While there is no such habitat in the study area, there may be appropriate habitat adjacent to the study area, as coastal areas near Mulgrave and Steep Creek are marked as limestone, gypsum or evaporates outcrops in SOEP (1998). Maidenhair fern is quite drought tolerant and may be found in rather dry and completely open, exposed cliffs and talus slopes (S. Blaney, 2007 a). The species is calciphile but has been found on basalt and sandstone as well as limestone (ibid.). If it occurred on granite, it likely would be in locations where seepage provides calcareous water (ibid.). There are no such cliffs or talus slopes in the study area. Swedish Dwarf Dogwood is found in sphagnous depressions in barrens, gravelly shores and dry exposed headlands. There is no such habitat in the study area.

There is suitable, although possibly infrequent, habitat for the following species:

- Canada Anemone (*Anemone Canadensis*) usually grows in damp thickets, meadows, gravelly shores on calcareous or alluvial soils. Such habitat is available in the Project Area, though most of the area is forested.

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- Slender Sedge (*Carex tenera*) grows in meadows, woodlands, moist or dry openings. Such habitat is frequent in the study area.
- Yellow Lady Slipper (*Cypripedium parviflorum*) usually grows on calcareous soils, near outcrops of gypsum or limestone, but is occasionally found in deciduous forests (Zink, 1998). *Cypripedium parviflorum* var. *pubescens* in New Brunswick grows in a wide range of moisture levels and therefore can be found anywhere on basic substrates, including cedar forests or rich hardwood forests, while *C. parviflorum* var. *makasin* is most often found on gypsum outcrops and calcareous cliffs (S. Blaney, personal communication, 2007 b).
- Fragrant Fern (*Dryopteris fragrans*) is found on dry overhanging cliffs, and in cliff crevices along streams or near waterfalls. There is little such habitat available in the study area. There are few areas that could potentially qualify as cliffs, all of them only a few meters high. There are no waterfalls in the study area, though there is a waterfall near the footprint of the Marine Terminal and Logistics Park, as well as on West Brook above Pirate Harbour (Appendix 5.10-A).
- Downy Willow Herb (*Epilobium strictum*) grows in boggy areas and meadows. Boggy areas occur frequently in the study area.
- False Mermaid Weed (*Floerkea proserpinacoides*) grows on deciduous ravine slopes, river margins and intervalle forests. Suitable habitat occurs infrequently in the study area. There is a ravine near Steep Creek and along West Brook above Pirate Harbour.
- Northern Comandra (*Geocaulon lividum*) is found on sterile soils and damp sands, in acid and peaty areas. Suitable habitat can be found infrequently in the study area. There is one suitable location within the proposed Terminal and Logistics park where habitat is classified as “miscellaneous untreed” (Figure 5.10-1).
- White Adder’s Mouth (*Malaxis brachypoda*) usually grows on moss cushions and wet, mossy cliff-edges, where there is little competition from other plant species. Suitable habitat occurs infrequently in the study area, as there are no larger cliffs (see above).
- Fountain Miner’s Lettuce (*Montia fontana*) has been found on springy and seepy slopes, wet shores and brackish spots. Suitable habitat is available in the footprint of the proposed Terminal and Logistics Park. Also, seepy slopes can be found infrequently throughout the study area.
- Seabeach groundsel (*Senecio pseudoarnica*) grows on gravelly shores. There is suitable habitat within the footprint of the proposed Marine Terminal.

While there is suitable habitat for a number of plant species at risk, few were found during the field surveys.

Flora Species of Special Status Found During Field Surveys with Known Occurrences in the Project Area

Field surveys of a variety of habitats in the Project Area were carried out in 2007 in order to identify species of conservation concern with early and late phenology (Appendix 5.10-A). Surveys were carried out in representative habitat polygons with an emphasis on habitats with a high potential for the presence of plant species of conservation concern, including freshwater wetlands and floodplains of streams and rivers, as well as marine wetlands. Forest habitats (except forests in flood plains), clear-cuts and regeneration areas are considered to have medium to low potential for plant species of conservation concern and received a lower level of effort, by exemplary surveys in a limited number of habitat polygons (Appendix 5.10-A).

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During the field surveys, three (3) vascular plant species at risk and three (3) vascular plant species of conservation concern (listed Green- secure by NSDNR), were found (Table 5.10-14). The locations of all sites visited during the surveys, including locations of plant species of conservation concern were found, is provided in Appendix 5.10-A. Figure 5.10-A-1 (Appendix 5.10-A) shows GPS locations of identified vascular plant species of conservation concern from the 2007 survey (Red rank, Yellow rank, and/or listed under SARA, COSEWIC, and/or NSESA). Further surveys are being conducted in 2008 for and will focus on wetlands and the rail and transmission corridor.

Table 5.10-14: Species of Conservation Concern Identified during Vascular Plant Field Surveys

| Species | Common Name | NSDNR Status | ACCDC Status | Habitat | Number |
|--------------------------------|------------------------|--------------|--------------|--|--------------------|
| <i>Cypripedium parviflorum</i> | Yellow Lady's-slipper | Yellow | S2S3 | Treed bog; and mixed woods, usually near streams | Frequent |
| <i>Fraxinus nigra</i> | Black Ash | Yellow | S3 | Treed bog | 2 |
| <i>Goodyera tessellata</i> | Rattlesnake-plantain | Green | S3 | Coniferous woods | 9 |
| <i>Listera convallarioides</i> | Broad-lipped Twayblade | Green | S3 | Mixed woods | Infrequent |
| <i>Platanthera orbiculata</i> | Large Roundleaf Orchid | Green | S3 | Mixed woods | 4 |
| <i>Viola nephrophylla</i> | Northern Bog Violet | Yellow | S2 | Stream edge | Several in a clump |

None of these species was included in the data provided by the NSMNH (NSMNH, 2007). ACCDC had records only of the Yellow Lady's Slipper in a 10 km radius around the Project Site, but all six species had been recorded previously within a 100 km radius around the Project Area (Appendix 5.10-K). Habitat similar to the locations where Yellow Lady's Slipper was found during the field surveys occurs more widespread in the study area. Therefore, there may be more plants than found during the surveys.

Results for the other species were as follows:

- Black Ash (*Fraxinus nigra*) usually grows on low ground, in damp woods and swamps. This type of habitat occurs frequently in the study area.
- Northern Bog Violet (*Viola nephrophylla*) grows in cool mossy bogs, on borders of streams and in damp woods. Such habitat occurs frequently in the study area, but plants were only found at one location.
- Three orchids, considered to be of conservation concern by ACCDC, were found during the field surveys: Rattlesnake Plantain (*Goodyera tessellata*) grows in moist, coniferous woods (Zinck, 1998). Broad-lipped Twayblade (*Listera convallarioides*) usually is found on rich deciduous slopes, climax forest and streamsides (ibid.). Large Round-leaved Orchid (*Platanthera orbiculata*) grows in damp woods in deep shade (ibid.). These types of habitat occur in the study area.

Lichens

During the field surveys, three lichen species at risk were found, as well as one lichen species of conservation concern or of interest due to the relationship with rare species (Table 5.10-15) (Appendix 5.10-A). None of these species had previously been recorded near the Project Area (NSMNH, 2007; ACCDC, 2007a).

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Table 5.10-15: Rare Lichen Species Identified during Field Surveys

| Species | NSDNR Status | Substrate and Habitat | Number |
|------------------------------|--------------|--|----------------------------|
| <i>Fuscopannaria ahlneri</i> | Red | <i>Acer rubrum</i> along brook | Frequent |
| <i>Leptogium laceroides</i> | Yellow | <i>Acer rubrum</i> along brook | Uncommon |
| <i>Placynthium nigrum</i> | Undetermined | shaded rock in ravine at base of large falls | several thalli on one rock |
| <i>Polychidium muscicola</i> | Yellow | on <i>Fagus grandifolia</i> in hardwoods | Uncommon |

Based on available habitat, there is potential that *Fuscopannaria ahlneri* and *Leptogium laceroides* occur at additional locations in the study area, as there are many streams in mixed and hardwood forests. *Polychidium muscicola* was found on hardwood. There are numerous hardwood stands in the Project area, as well as mixed wood stands. Also, these conditions can be found in the area surrounding the study area and across Nova Scotia. Depending on the amount of humidity required by *Placynthium nigrum*, the habitat may be uncommon in the study area. While there are many streams with rock and boulders, there are few waterfalls.

ACCDC records indicated that Boreal Felt lichen (*Erioderma pedicellatum*, NSDNR RED, COSEWIC/SARA Endangered) was found 97 km from Mulgrave, and Frosted Glass Whiskers (*Sclerophora peronella*) at 99 km. *Erioderma sp.* grows on bark of coniferous trees in cool, humid habitat (Appendix 5.10-J (Table J1)) therefore; wet coniferous forests on north-facing slopes are preferred. Habitat for boreal felt lichen in the study area is infrequent at best, and no boreal felt lichens were found during field surveys (Appendix 5.10-A).

Frosted Glass Whiskers grow on exposed heartwood of red maple (*Acer rubrum*) trees in mature/ old growth forest (Appendix 5.10-J (Table J1)). The potential for suitable trees in the study area is low. No Frosted Glass Whiskers were found during the field surveys (Appendix 5.10-A).

5.10.5.2 Birds

Thirty-one (31) species of birds are at risk in Nova Scotia and are listed in the Priority Species List. In addition, all raptors are protected under the NSWA. While a number of the priority species have not been recorded in Eastern Nova Scotia, there is a high potential that most of the priority species can be found in the Project area based on available habitat, either as breeding birds or during migratory species. The Short List of Priority Species for Eastern Nova Scotia (Appendix 5.10-J (Table J2)) is therefore essentially identical to the initial Priority Species List (NSDNR 2007c).

A selection of species with high potential to occur in the study area based on habitat requirements is provided in Table 5.10-16. The eskimo curlew (*Numenius borealis*) is not included in this list because this species does not breed in Nova Scotia and has not been observed during migration in the province for several decades.

Table 5.10-16: Bird Species at Risk with Potential to Occur at the Project Site Location

| Scientific Name | Common Name | COSEWIC* | NS General Status | NS Endangered Species Act |
|---------------------------|------------------|-----------------|-------------------|---------------------------|
| <i>Accipiter gentiles</i> | Northern Goshawk | Not at risk | Yellow | -- |
| <i>Alca torda</i> | Razorbill | -- | Yellow | -- |
| <i>Asio flammeus</i> | Short-Eared Owl | Special concern | Yellow | -- |
| <i>Branta bernicla</i> | Brant | -- | Yellow | -- |

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Table 5.10-16: Bird Species at Risk with Potential to Occur at the Project Site Location

| Scientific Name | Common Name | COSEWIC* | NS General Status | NS Endangered Species Act |
|--|---------------------------------------|-------------------------|-------------------|---------------------------|
| <i>Bucephala islandica</i> (eastern population) | Barrow's Goldeneye | Special Concern | Yellow | -- |
| <i>Calidris canutus</i> | Red Knot | Endangered | Yellow | Endangered ³ |
| <i>Calidris maritime</i> | Purple Sandpiper | -- | Yellow | -- |
| <i>Catharus minimus</i> (<i>C. bicknellii</i>) | Bicknell's Thrush | Special Concern | Yellow | Vulnerable ² |
| <i>Chaetura pelagica</i> | Chimney Swift | Threatened | Yellow | Endangered ³ |
| <i>Charadrius melodus</i> ssp.melodus | Piping Plover | Endangered | Red | Endangered ¹ |
| <i>Chordeiles minor</i> | Common Nighthawk | Threatened | Yellow | Threatened ³ |
| <i>Contopus borealis</i> | Olive-sided Flycatcher | Threatened ³ | Yellow | -- |
| <i>Dolichonyx oryzivorus</i> | Bobolink | -- | Yellow | -- |
| <i>Euphagus carolinus</i> | Rusty Blackbird | Special Concern | Yellow | -- |
| <i>Falco peregrinus</i> ssp.anatum | Peregrine Falcon | Special Concern | Red | Vulnerable ³ |
| <i>Fratercula arctica</i> | Atlantic Puffin | -- | Yellow | -- |
| <i>Gavia immer</i> | Common Loon | Not at Risk | Yellow | -- |
| <i>Hirundo rustica</i> | Barn Swallow | -- | Yellow | -- |
| <i>Histrionicus histrionicus</i> (eastern population) | Harlequin Duck | Special Concern | Yellow | Endangered ¹ |
| <i>Nycticorax nycticorax</i> | Black-crowned Night Heron | -- | Yellow | -- |
| <i>Parus hudsonicus</i> | Boreal Chickadee | -- | Yellow | -- |
| <i>Passerculus sandwichensis</i> ssp. <i>Princeps</i> | Ipswich Sparrow (Savannah Sparrow) | Special Concern | Yellow | -- |
| <i>Perisoreus Canadensis</i> | Gray Jay | -- | Yellow | -- |
| <i>Pooecetes gramineus</i> | Vesper Sparrow | -- | Yellow | -- |
| <i>Progne subis</i> | Purple Martin | -- | Red | -- |
| <i>Sialia sialis</i> | Eastern Bluebird | Not at Risk | Yellow | -- |
| <i>Sterna dougall</i> | Roseate Tern | Endangered | Red | Endangered ¹ |
| <i>Sterna hirundo</i> | Common Tern | Not at Risk | Yellow | -- |
| <i>Sterna paradisaea</i> | Arctic Tern | -- | Yellow | -- |
| <i>Wilsonia canadense</i> | Canada Warbler | Threatened | Yellow | -- |

Notes: 1 = listed in 2000
 2 = listed in 2002
 3 = listed in 2007
 * COSEWIC

Although habitat may be available to these species, many have no breeding or nesting habitat in the study area. The majority of species are non-breeders in the Melford and Mulgrave area, but may potentially migrate through or over-winter in the area. These species include the razorbill, brant, Barrow's goldeneye, red knot, purple sandpiper, Bicknell's thrush, chimney swift, piping plover, purple martin, peregrine falcon, Atlantic puffin, harlequin duck, black-crowned night heron, and ipswich sparrow. The common tern, arctic tern, and roseate tern have no available nesting habitat, but may be observed foraging near the Project Area during breeding season. The remaining 13 species are potential breeders in the area.

5.10.5.2.1 Bird Species of Special Status with Known Occurrences in the Project Area

All species of special status that were recorded in the general Project Area through data collected either from various sources (ACCDC, NSMNH, MBBA, ACBC, CWS Waterfowl Surveys) or from field surveys conducted on site in 2007 are listed below. The nesting habitat and potential of occurrence within the Project Area for each species is also described below. A limited number of birds are confirmed breeders (refer to Section 5.10.2.1).

Table 5.10-17: Bird Species of Special Status Known to Occur in the Project Area

| Scientific Name | Common Name | Listed By | Nesting Habitat | Potential Nesting Habitat in study area? | Recorded During: |
|---|------------------------|--|--|--|---|
| Waterfowl, Shorebirds and Seabirds | | | | | |
| <i>Bucephala clangula</i> | Common Goldeneye | ACCDC (S2BS4N) | Rivers, lakes bordered by forest. Breeds in Cape Breton | Potentially at Great Lake | ACBC |
| <i>Bucephala islandica</i> | Barrow's Goldeneye | NSDNR (Y) ACCDC (S1N) COSEWIC and SARA (Special Concern) | Cavity nester. Western North America from Alaska to Colorado. Northeastern Quebec and Labrador | No | ACBC |
| <i>Calidris maritimus</i> | Purple Sandpiper | NSNDR (Y) ACCDC (S2N) | Mossy tundra, barren flats | No, Arctic breeder | ACCDC |
| <i>Cephus grille</i> | Black Guillemot | ACCDC (S3) | Islands, cliffs | No | ACBC |
| <i>Gavia immer</i> | Common Loon | NSDNR (Y) | Clear lakes with deep and shallow water. Nest on islands, or shoreline | Potentially at Great Lake | Field Survey, MBBA (2007), MBBA (1990), ACBC |
| <i>Mergus serrator</i> | Red-breasted Merganser | ACCDC (S3B) | Near rivers, lakes, coastal areas | Yes | Field Survey, ACCDC, ACBC |
| <i>Sterna hirundo</i> | Common Tern | NSNDR (Y) ACCDC (S3B) | Rocky islands, stony shores of lakes or coastal areas | No | Field Survey, ACCDC, MBBA (2007), MBBA (1990) |
| <i>Sterna paradisaea</i> | Arctic Tern | NSNDR(Y) ACCDC (S3B) | Primarily offshore islands | No | Field Survey, ACCDC |
| <i>Tringa melanoleuca</i> | Greater Yellowlegs | ACCDC (S2BS5M) | Moss, peat wetlands. Breeds in Cape Breton | Yes | MBBA (2007) |
| Passerines and Non-aligned Birds | | | | | |
| <i>Chordeiles minor</i> | Common Nighthawk | NSDNR (Y) COSEWIC (Threatened) NESA (Threatened) | Grasslands or semi-open areas near coniferous forests | Yes | MBBA (1990) |
| <i>Contopus borealis</i> | Olive-sided Flycatcher | NSDNR (Y) COSEWIC (Threatened) | Edges of any forest type, particularly near bogs/aquatic habitats | Yes | Field Survey, MBBA (2007), MBBA (1990) |

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Table 5.10-17: Bird Species of Special Status Known to Occur in the Project Area

| Scientific Name | Common Name | Listed By | Nesting Habitat | Potential Nesting Habitat in study area? | Recorded During: |
|------------------------------|--------------------------|---|--|--|---|
| <i>Dolichonyx oryzivorus</i> | Bobolink | NSDNR (Y) ACCDC (S3B) | Grasslands or hayfields | Limited | ACCDC |
| <i>Euphagus carolinus</i> | Rusty Blackbird | NSDNR (Y) COSEWIC (Special Concern) ACCDC (SB3) | Forested areas near swamps, bogs or fens | Yes | MBBA (1990) |
| <i>Hirundo rustica</i> | Barn Swallow | NSDNR (Y) | Nest inside structures (barns) near agricultural areas | Limited | Field Survey |
| <i>Hylocichla mustelina</i> | Wood Thrush | ACCDC (S2B) | Edges/interior of hard/mixed wood forest near water | Yes | Field Survey |
| <i>Icterus galbula</i> | Baltimore Oriole | ACCDC (S3B) | Open woodland, hardwood forest edges | Yes | ACCDC |
| <i>Loxia curvirostra</i> | Red Crossbill | ACCDC (S3S4) | Mature coniferous and mixed wood forests | Yes | MBBA (2007) |
| <i>Mimus polyglottos</i> | Northern Mockingbird | ACCDC (S3B) | Dense shrubbery, various forest edges | Yes | ACCDC, MBBA (2007) |
| <i>Myiarchus crinitus</i> | Great Crested Flycatcher | ACCDC (S2S3B) | Hardwood forest/open deciduous woodlands | Yes | Field Survey |
| <i>Parus hudsonicus</i> | Boreal Chickadee | NSDNR (Y) | Softwood or mixed wood forests | Yes | Field Survey, ACCDC, MBBA (2007), MBBA (1990), ACBC |
| <i>Perisoreus canadensis</i> | Gray Jay | NSDNR (Y) | Softwood, mixed wood, bogs, open areas | Yes | Field Survey, MBBA (1990) |
| <i>Piranga olivacea</i> | Scarlet Tanager | ACCDC (S2B) | Mature mixed and hard wood forest | Yes | Field Survey |
| <i>Wilsonia canadensis</i> | Canada Warbler | NSDNR (Y) | Moist mixed forest with dense undergrowth | Yes | Field Survey |
| Raptors | | | | | |
| <i>Accipiter gentiles</i> | Northern Goshawk | NSDNR (Y) ACCDC (S3B) Raptor | Various mature forests | Yes | MBBA (1990) |
| <i>Accipiter striatus</i> | Sharp-shinned Hawk | Raptor | Softwood forest | Yes | Field Survey |
| <i>Aegolius acadicus</i> | Northern Saw-whet Owl | Raptor | Various mature forests | Yes | MBBA (2007) |
| <i>Bubo virginianus</i> | Great Horned Owl | Raptor | Various forest types | Yes | Field Survey |
| <i>Buteus platypterus</i> | Broad-winged Hawk | Raptor | Hardwood or mixed wood forests | Yes | Field Survey |
| <i>Circus cyaneus</i> | Northern Harrier | Raptor | Open habitats: bogs, meadows, marshes | Yes | MBBA (2007), MBBA (1990) |

Table 5.10-17: Bird Species of Special Status Known to Occur in the Project Area

| Scientific Name | Common Name | Listed By | Nesting Habitat | Potential Nesting Habitat in study area? | Recorded During: |
|---------------------------------|------------------|--------------------------|---|--|---------------------------------------|
| <i>Falco columbarius</i> | Merlin | Raptor | Various forest types | Yes | Field Survey, MBBA (2007) |
| <i>Falco sparverius</i> | American Kestrel | Raptor | Open/partially open habitats | Yes | MBBA (2007), MBBA (1990) |
| <i>Haliaeetus leucocephalus</i> | Bald Eagle | ACCDC (S5BS3N) Raptor | Various forest types near water, usually > 4km from coast | Yes | ACBC, ACCDC, MBBA (2007), MBBA (1990) |
| <i>Pandion haliaetus</i> | Osprey | Raptor | Near or above water, variety of habitats | Yes | MBBA (2007), MBBA (1990) |

B= Breeding Population

N = Non-breeding (wintering) population

S2= Rare, S3= Uncommon, S4= Usually widespread, fairly common; S5= Demonstrably widespread, abundant, and secure

Two sources provided information on records of bird species of conservation concern in the areas of Melford and Mulgrave. In a letter dated March 21, 2007, the NSMNH indicated they had no records of species of conservation concern within the immediate Project area. This does not necessarily indicate an absence of these species but may reflect the lack of data reported from the area. ACCDC also provided information on records of bird species of conservation concern in the Melford and Mulgrave area. Data were provided for a 100 km radius area (Appendix 5.10-J). In order to reflect the more immediate study area, the data were reduced to include only species recorded within a 10 km radius of the site, resulting in six bird species of special status (Table 5.10-16). The ACCDC indicated that it is reasonable to assume that many of the species identified within the buffer could also occur within the study area.

Based on available habitat, most species are likely to be seen within the Project Area at some time during the year. Nesting habitat requirements for all species of special status known to occur near the Project Area are described in Table 5.10-16. Appropriate nesting habitat is not available for arctic terns or common terns but both species may be observed foraging offshore. Purple sandpipers will not breed in the area, but may be seen during migration. Potential breeding habitat however, does exist for boreal chickadees, Baltimore orioles, northern mockingbirds, red-breasted mergansers and bald eagles. Breeding habitat for bobolinks is extremely limited. During migration, all species have potential of occurring within the Project Area.

5.10.5.2.2 Breeding Bird Species at Risk

Breeding Birds Known to Occur in the Project Area

Recent information on birds known to breed in the area was obtained from the MBBA (MBBA 2007a) (Section 5.10.2.1). All breeding bird species found within MBBA Atlas squares 20PR34, 20PR24 and 20PR25 were compared with the COSEWIC, NSDNR, and ACCDC databases and seven species of special status were identified, including four species at risk listed by NSDNR and three species of conservation concern listed by ACCDC. These species and rankings are listed in Table 5.10-16. Based on habitat requirements (Appendix 5.10-I), there is no suitable nesting habitat in the study area for common terns, though the species may be found foraging in the area. There is breeding habitat for the boreal chickadee, olive sided flycatcher, red crossbill, northern mockingbird, greater yellowlegs and limited habitat for the common loon.

The common loon and boreal chickadee were the only 'confirmed' breeders. Common tern and olive-sided flycatcher were 'possible' breeders in the area and the greater yellowlegs and red crossbill were 'observed.'

Six raptor species were also recorded within the atlas squares containing the Project Site. None of these are listed by NSDNR, NSESA or COSEWIC, but raptors are protected under the NSWA. The osprey was the only 'confirmed' breeder and the northern harrier was a 'probable' breeder. The bald eagle, merlin, American kestrel and northern saw-whet owl were 'possible' breeders. There is possible breeding habitat for all of these raptor species in the study area (Table 5.10-16).

5.10.5.2.3 Historical Breeding Bird Atlas Data

Breeding bird data from the MBBA (Erskine 1992), excluding survey sites in Cape Breton, resulted in nine species of special status. The species and their ranking are listed in Table 5.10-16.

Breeding habitat exists within the Project Area for most of the above mentioned species; however, there is no nesting habitat for the common tern, though they may be found foraging in coastal waters of the study area during the breeding season. Limited nesting habitat exists for the common loon and barn swallow.

The barn swallow and boreal chickadee were 'confirmed' breeders; common nighthawk, common loon, gray jay and olive-sided flycatcher were 'probable' breeders; and the common tern, and rusty blackbird were 'possible' breeders in the area.

The osprey, bald eagle and American kestrel were 'probable' breeders; and the northern goshawk and northern harrier were 'possible' breeders. All five raptor species have potential to breed in the Project Area (Table 5.10-16).

5.10.5.2.4 Field Surveys for Breeding Birds of Special Status

All breeding bird species found during field surveys within the proposed Site were compared with SARA, COSEWIC, NSESA, NSDNR, and ACCDC databases for species of special status. Twelve species of special status, as identified by SARA, COSEWIC, NSESA, NSDNR General Status and/or ACCDC ranks, and four raptor species (NSWA) were observed within the Project Area (Table 5.10-16). The species and number of individuals are listed in Table 5.10-17.

Eight species at risk (NSDNR) and 4 species of conservation concern according to ACCDC were found inside the Project Area. Two raptor species were confirmed to be breeding in hardwood forest habitat along the proposed rail corridor. Another diurnal raptor and one owl species were observed as possible breeders in hardwood and mixed wood forests, respectively (Appendix 5.10-D).

Table 5.10-18 provides a list of species of conservation concern observed during the breeding bird surveys. It is important to note that sightings are not independent of one another. To provide an idea of abundance, the number of point counts completed in each of the nine (9) habitats is provided. A complete list and description of habitat types and a list of all birds noted during the breeding bird survey is provided in Appendix 5.10-C. Figure 5.10-C-1 (Appendix 5.10-C) provides the locations of the breeding bird survey points. Figure 5.10-C-2 (Appendix

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5.10-C) shows GPS locations of identified birds from the 2007 survey that are of conservation concern (Red rank, Yellow rank, and/or listed under SARA, COSEWIC, and/or NSESA). The results of additional surveys that are being conducted in 2008 will be made available in a technical report.

Table 5.10-18: Species of Conservation Concern Observed During Breeding Bird Surveys

| Scientific Name | Common Name | Status | # of Individuals | # of Point Counts |
|------------------------------|--------------------------|---|------------------|--|
| <i>Gavia immer</i> | Common Loon | Observed at one location 50 m offshore. | 1 | 6 |
| <i>Mergus serrator</i> | Red-breasted Merganser | Observed at one location 50 m offshore. | 4 | 6 |
| <i>Sterna hirundo</i> | Common Tern | Commonly observed offshore. | 29 | 6 |
| <i>Sterna paradisaea</i> | Arctic Tern | Uncommon offshore species. | 2 | 6 |
| <i>Hirundo rustica</i> | Barn Swallow | Observed in urban habitat. | 2 | 7 |
| <i>Perisoreus canadensis</i> | Gray Jay | Confirmed breeding in Project footprint. Widespread and commonly observed. | 28 | All habitats for a complete point count of 113 |
| <i>Parus hudsonicus</i> | Boreal Chickadee | Confirmed breeding in Project area. Widespread and commonly observed in softwood and mixed wood forests and wetlands. | 33 | Softwood – 12 Mixed- 25 Wetlands – 20 |
| <i>Contopus borealis</i> | Olive-sided Flycatcher | Widespread and commonly observed. | 16 | All habitats for a complete point count of 113 |
| <i>Myiarchus crinitus</i> | Great Crested Flycatcher | Probably breeding; pair observed in hardwood forest site. | 2 | 15 |
| <i>Hylocichla mustelina</i> | Wood Thrush | Single observation at hardwood forest site. | 1 | 15 |
| <i>Wilsonia canadensis</i> | Canada Warbler | Uncommonly observed in wetland, hardwood and mixed forest habitat. | 4 | Wetland – 20 Hardwood – 15 Mixed – 25 |
| <i>Piranga olivacea</i> | Scarlet Tanager | One individual observed in hardwood forest. | 1 | 15 |
| <i>Accipiter striatus</i> | Sharp-shinned Hawk | Confirmed breeder in hardwood forest. | 2 | 15 |
| <i>Falco columbarius</i> | Merlin | Confirmed breeder in hardwood forest. | 1 | 15 |
| <i>Buteus platypterus</i> | Broad-winged Hawk | Possible breeder in hardwood and mixed wood | 2 | Hardwood – 15 Mixed – 25 |
| <i>Bubo virginianus</i> | Great Horned Owl | Observed in mixed forest habitat | 1 | 25 |

Of the eight species listed by the NSDNR, boreal chickadees and gray jays were confirmed breeding. These two species, as well as the olive-sided flycatcher, were widespread and commonly observed in the Project Area. Boreal chickadees were confirmed breeding in a

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softwood habitat and were observed in mixed forest and wetland habitats, and gray jays were confirmed breeding in wetland habitat and were observed in mixed wood, softwood and hardwood habitats.

The olive-sided flycatcher was observed in mixed wood, softwood, hardwood, regenerating forest and wetland habitats. Canada warblers were widespread but uncommon in the Project area, although single birds were observed in two wetland point counts; one in hardwood forest, and one in mixed forest. Two barn swallows and a single common loon were observed during the surveys (Table 5.10-17).

While the two tern species were observed feeding along the coast offshore from the proposed terminal, indicating presence of breeding habitat there is no nesting habitat for either species at the Project Site.

Of the four species of conservation concern according to ACCDC, the red-breasted merganser was observed flying over or feeding along the coast offshore from the proposed Project footprint. This species is of concern in breeding habitats according to ACCDC; however, no nesting activity was observed in the immediate Project Area. A pair of great crested flycatchers are probable breeders at just one location within the 1500 m buffer along the proposed rail corridor.

Several types of terrestrial bird habitats are in decline in Nova Scotia, including mature hardwood, mature softwood and mature mixed forests (R. Gautreau, CWS, personal communication, 2007). Mature forest habitat that is likely decreasing in the study area due to logging. The rare scarlet tanager (S2B) breeds in mature forest habitats and is sensitive to loss or fragmentation of mature forest habitat (Cornell Lab of Ornithology 2003). The wood thrush (S2B) seems to be dependent on large tracts of mature forest in some parts of its range, but is tolerant of disturbance in other areas (Cornell Lab of Ornithology 2003). Only one wood thrush and one scarlet tanager were observed during the Breeding Bird Surveys in 2007 at one location each, with no evidence of breeding. Breeding habitats for both species occurs frequently within the Project Area.

No previous records for the scarlet tanager exist within 10 km of the study area (ACCDC 2007). Additionally, there are no previous MBBA records for the scarlet tanager or wood thrush for the area within or around the Project Site (Erskine 1992; MBBA 2006-2007). However, ACCDC (2007a) reported three scarlet tanager sightings between 40 and 100 km from the study area (Appendix 5.10-J). ACCDC (2007b) also has three records of wood thrush sightings; one 56 km from Melford, and two 41 and 95 km from Mulgrave.

The four raptor species are not of conservation concern. Nesting habitats occur frequently for these species in the study area (Table 5.10-16).

5.10.5.2.5 Shorebird Species of Special Status

No species of conservation concern were found during the shorebird survey or the additional shorebird counts made along the shore of the Project footprint. Few shorebird species were observed within the Project Area (Table 5.10-8).

However, one bird observed may potentially be of conservation concern (ACCDC). A single unidentified Yellowlegs species was seen flying past observers. As it flew by fairly quickly and

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did not call, it was not possible to determine whether this was a greater or lesser yellowlegs. Both are fairly common migrants in Nova Scotia during the month of August. NSDNR considers both species to be secure in Nova Scotia (NSDNR Green).

The breeding population of greater yellowlegs is considered rare in Nova Scotia according to ACCDC (S2B), but the unidentified Yellowlegs seen during the survey is considered to be migratory, thus not of conservation concern. ACCDC considers lesser yellowlegs (S5M) as secure, widespread and abundant by ACCDC (2007b).

5.10.5.2.6 Wintering Birds

Waterfowl Species of Special Concern

Only one species at risk as listed by SARA, COSEWIC, NSWESA, and NSDNR, was observed during the CWS waterfowl surveys. Barrow's goldeneye (*Bucephala islandica*) (NSDNR - Yellow, ACCDC - S1N, COSEWIC and SARA -Special Concern) was identified. However, the unknown goldeneye species observed may potentially be considered to be of conservation by ACCDC.

NSDNR General Status considers common goldeneye to be secure in Nova Scotia (Green). The ACCDC ranking for the common goldeneye is listed as S2BS4N, indicating the species is 'rare' during breeding season but fairly common in the non-breeding or winter season. Since the surveys took place in the non-breeding season, the presence of this species is not of significant conservation concern.

The unknown Goldeneye species are more likely to have been the common goldeneye. Barrow's goldeneye is ranked S1N (extremely rare in non-breeding season) by ACCDC and Yellow (sensitive) by NSDNR. Both goldeneye species are very similar in appearance and mixed flocks of the species are known to occur, suggesting that the rarer Barrow's goldeneye may occur more frequently in Nova Scotia than the records indicate (Tufts 1986).

Species of Special Status detected in ACBCs

Species identified during the 2005-2007 Melford area ACBC include terrestrial birds, waterfowl, seabirds, gulls and raptors. All bird species reported were compared with SARA, COSEWIC, NSESA, NSDNR and ACCDC databases for species of special status (Appendix 5.10-1).

A total of five species of conservation concern and one species at risk were found. Species and rankings are listed in Table 5.10-16. One Barrow's goldeneye was detected during the 2007 ACBC. A total of four bald eagles were found in the Melford area in 2005 and 2006. In addition, three adult bald eagles were observed during the CWS waterfowl surveys in 1997 (Section 5.10.2.4). All raptors are protected under the NSWA. None of the observed raptor species are listed by SARA, COSEWIC, NSESA or NSDNR.

5.10.5.3 Other Fauna Species at Risk

The list of fauna priority species was reviewed and a short-list of fauna priority species was assembled based on known occurrences of priority species in the geographic region around the Project Area. ACCDC provided hundreds of records for numerous fauna species of conservation concern including priority species, for a radius of 100 km around the Project site (ACCDC, 2007a; Appendix K). NSMNH did not have any records of rare fauna species for the

area around Melford, but points out that this is a reflection of the low degree of attention given to this area of the province rather than an indication of absence of priority species (NSMNH, 2007b).

Habitat modeling was applied in order to determine the potential for the presence of priority species in the study area and to develop a list of fauna priority species with potential to occur in the study area based on available habitat (Table 5.10-19). Details on the evaluation are provided in the following sections.

Table 5.10-19: Other Fauna Priority Species with potential to be present near the Project Site

| Scientific Name | Common Name | NSDNR General Status | ACDC | NSESA/ SARA/ COSEWIC |
|-----------------------------------|--|------------------------|------|----------------------|
| Mammals | | | | |
| <i>Alces alces</i> | Mainland moose | Yellow | -- | Endangered |
| <i>Myotis lucifugus</i> | Little Brown Bat | Yellow | -- | -- |
| <i>Myotis septentrionalis</i> | Northern Long-eared Bat | Yellow | -- | -- |
| Mollusca | | | | |
| <i>Alasmidonta undulata</i> | Triangle Floater | Yellow | S1S3 | -- |
| <i>Alasmidonta varicosa</i> | Brook Floater | Yellow | S1S2 | -- |
| <i>Lampsilis ochraceae</i> | Delicate Lamp Mussel (Tidewater Mucket) | Red | S1 | -- |
| Lepidoptera | | | | |
| <i>Boloria plexipus</i> | Arctic (Titania) Fritillary | Yellow | S2 | -- |
| Odonata | | | | |
| <i>Coenagrion resolutum</i> | Taiga Bluet* | Red | S1 | -- |
| <i>Enallagma minusculum</i> | Little Bluet* | Yellow | S2 | -- |
| <i>Epitheca princeps</i> | Prince Baskettail* | Yellow | S2 | -- |
| <i>Gomphaeschna furcillata</i> | Harlequin Darner | Yellow | S1 | -- |
| <i>Lanthus parvulus</i> | Zorro Clubtail (Northern Pygmy Clubtail) | Yellow | S2 | -- |
| <i>Ophiogomphus aspersus</i> | Brook Snaketail | Red | S1 | -- |
| <i>Ophiogomphus rupinsulensis</i> | Rusty Snaketail * | Red | S1 | -- |
| <i>Somatochlora tenebrosa</i> | Clamptipped Emerald | Yellow | S2 | -- |
| <i>Somatochlora williamsoni</i> | Williamson's Emerald | Red | S1 | -- |
| <i>Stylurus scudderi</i> | Zebra Clubtail* | Undetermined (was Red) | S1 | -- |
| <i>Williamsonia fletcheri</i> | Ebony Boghaunter* | Red | S1 | -- |

* P. Brunelle personal communication

5.10.5.3.1 Mammal Species at Risk

Thirteen (13) terrestrial mammalian species at risk are listed by SARA, COSEWIC, NSESA, and NSDNR in Nova Scotia (COSEWIC 2007, NSDNR 2007c, NSESA 2007, SARA 2007). Based on distribution maps and known sightings, the shortlist of priority species occurring in eastern Nova Scotia contains six (6) species (Appendix 5.10-J (Table J2)).

ACDC (2007a) did have records of the American marten, lynx, Gaspé shrew and moose occurring within 100 km of the Project area (Appendix 5.10-J (Table J2)). No data exists on confirmed sightings of bats in Eastern Nova Scotia (ACDC, 2007a; NSMNH, 2007a). However, little brown bat and northern long-eared bat are likely to occur in Guysborough County (H. Broders, personal communication, 2005). Since the presence of both species and populations of concern in the Project area cannot be excluded outright, both species are retained in the

short list. Field studies have found no evidence of eastern pipistrelle occurring in Guysborough County (Broders, H. G. 2004) and the species may be at its northern limits in Nova Scotia, though records are comparatively more frequent than for tree bats (Broders et al., 2003). The most northerly record of eastern pipistrelle is from a hibernation site in Halifax County. It is possible for the species to exist further north, but current summertime records are restricted to southwestern Nova Scotia (A. Hebda, personal communication, 2005). Eastern pipistrelle therefore is not likely to occur in the Project Area and is not included in the short list.

A small population of American marten is known to exist in Cape Breton and few have been recently reported in Southwestern Nova Scotia following the reintroduction of the species in Kejimikujik National Park (NSES 2007). The Nova Scotia populations of lynx and Gaspe shrew are found only in Cape Breton. Therefore, the American marten, lynx and Gaspe shrew are highly unlikely to occur in the Project area, and are therefore not included in the following assessment of habitat requirements.

Moose were retained on the shortlist. NSDNR (2008) has received several moose sightings over the past 12 years for this area. The moose recorded within the 100 km radius may have been from the Cape Breton population (Parker 2003) or may have been from one of the mainland (endangered) core populations (Figure 5.10-6).

Therefore, only three (3) of the six (6) mammalian species at risk in the Nova Scotia Short-List have the potential of occurring in the general Project area, and thus their habitat requirements are reviewed.

Habitat Requirements

The little brown bat forages primarily in forested hardwood and mixed wood areas near watercourses, but also in orchards, old fields and grasslands/herbaceous lands. The species may be found over bogs or fens, and in forested wetlands (Dilworth, 1984; NatureServe 2007) and was found foraging at ground level over forest trails, rivers and stillwaters (Broders et al., 2003).

Northern long-eared bats are a forest interior species found in woodland and forests of any composition (Broders et al., 2003). The species forages among the canopy, along clearings and occasionally over water (NatureServe, 2007), but were also found foraging at ground level over forest trails. Caves, mines, and quarries are utilized for hibernation and nighttime roosting, while crevices, hollows, under bark, and buildings, are used for daytime roosting (NatureServe, 2005). While there may be potential daytime roosting areas for this species, the night time roosting or hibernation habitat is not present at the proposed site.

There appears to be potential summertime and foraging habitat for both bat priority species on the shortlist, although there is limited hibernation and nighttime roosting habitat available. All bat species live in habitat that has standing snag/hollow trees as a special feature (NatureServe 2007). Such features are likely still available despite the clear-cutting. Thus, both bat species may occur in the study area during the summer and are included in the list of priority species with potential to occur in the Project area (Table 5.10-19).

The native population of moose in Nova Scotia is limited to approximately 1000 individuals in isolated sub-populations across the mainland (Beazley et al. 2006, NSMNH 2007b, CPAWS 2008). In 2003, this species, for mainland Nova Scotia, was declared an endangered species

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under the NSESA (Beazley et al. 2006). Moose require a diversity of habitats (CPAWS 2008) and inhabit second-growth forests, openings, swamps, lakes and wetlands where they consume herbaceous vegetation in summer and switch to woody browse in winter (NatureServe 2007, NSMNH 2007b). Moose also eat aquatic plants, although these are not an indispensable item in their diet (NSMNH 2007b). Although suitable moose habitat occurs within the Project area, the closest mainland core population is located in Pictou/Antigonish (Figure 5.10-6) (Beazley et al., 2005). However, only low numbers of moose are known to occur in Eastern mainland Nova Scotia (Parker 2003) and no indications of moose were observed during the field studies. Therefore, this species is considered to have a small potential for presence within the Project Site.

The NSMNH does not have any records of mammal species of concern in the general Project Area (NSMNH, 2007b). Data provided by ACCDC (2007a) showed no records of mammal species at risk or species of conservation concern occurring within a 10 km radius of the Project Site including the associated rail and transmission corridors.

Based on the above, there is potential for presence of both bat species, and mainland moose to be present in the study area (Table 5.10-19)

5.10.5.3.2 Reptile and Amphibian Species at Risk

Three species of reptiles and amphibians at risk are listed by SARA, COSEWIC, NSESA or NSDNR in Nova Scotia (COSEWIC 2007, NSDNR 2007c, NSESA 2007, SARA 2007). Of the three (3) herpetile priority species in Nova Scotia, only the wood turtle has potential of occurring in the Melford and Mulgrave area and is included in the Shortlist of Priority Species (Appendix 5.10-J (Table J2)). The Blanding's turtle and northern ribbonsnake are restricted to southwestern Nova Scotia, in the general area of Kejimikujik National Park in Queens and Lunenburg Counties (Gilhen, 1984; NS Species at Risk, 2007).

According to data provided by ACCDC (2007a), the wood turtle (NSESA Vulnerable, NSDNR Yellow, COSEWIC Threatened⁴, ACCDC S3), has been recorded within a 10 km radius of the proposed terminal footprint and associated rail and transmission corridors, as well as at greater distances (Appendix 5.10-K).

The NSMNH does not have any records of species of concern in the general Project Area (NSMNH, 2007b), however NSDNR (2008) has had at least one report of a wood turtle sighting in the Mulgrave area.

Habitat Requirements

For most of the year, wood turtles live along permanent streams, but in summer months they roam widely over a large variety of terrestrial habitats adjacent to streams, including deciduous forest, fields, woodland bogs and marshy pastures. For nesting, wood turtles require fairly moist but well-drained, un-shaded, vegetation-free sites with loose substrate, such as sandy or gravelly stream banks or sand-gravel bars in streams (NatureServe, 2007). They also use such banks for basking and will utilize clearings created by humans for basking or breeding (NatureServe, 2007). The species prefers deep, slow moving waters and overwinters at the bottom of streams.

⁴ It should be noted that COSEWIC has uplisted wood turtles from Special Concern to Threatened, as of 2007.

Although the banks of all streams found within the Project area are vegetated and therefore may not necessarily meet the species' nesting habitat requirements, it is important to note that this species regularly moves limited distances from aquatic environments to nesting areas away from streams, and is not limited to immediate riparian borders (NSDNR 2008). Wood turtles may be able to overwinter in some of the streams in the study area. Although there is potential foraging habitat in the Project Area during summer months, wood turtles are highly unlikely to nest within the proposed Site. Therefore, it is not likely to be present in the study area, and is not included in Table 5.10-19.

5.10.5.3.3 Freshwater Molluscs

Five (5) species of molluscs are listed as 'at risk' in Nova Scotia by SARA, COSEWIC, NSESA, and NSDNR in Nova Scotia (COSEWIC 2007, NSDNR 2007c, NSESA 2007, SARA 2007).

Four of the five (5) priority species are included in the Shortlist of Priority Species based on known occurrences (Appendix 5.10-J (Table J2)). ACCDC (2007a) listed species of concern within a 100km radius from the Project Area (all data are recent), and reported presence of the yellow lamp mussel (Appendix 5.10-K). However, the only Nova Scotia occurrence for this species is found in Sydney River, Cape Breton. Therefore, this species is not expected to be present within the Project Area, and is not included in the habitat evaluation. Distribution maps however show that the triangle floater, brook floater and delicate lamp mussel have occurrences in Guysborough County (Clarke, 1981). All three species parasitize on fish during certain stages of development, so only aquatic habitats with fish present have potential to contain these mussels. Potential habitats are as follows:

- The triangle floater (*Alasmidonta undulata*, NSDNR Yellow) is found in rivers and lakes with sand or gravel bottoms. Several streams, as well as lakes such as Wheaton Lake could potentially provide habitat for this species.
- The brook floater (*Alasmidonta varicosa*, NSDNR Yellow) is found in riffles of small rivers or streams with rocky substrate. Several streams of the appropriate size and substrate, with fish present, occur within the Project Area.
- The delicate lamp mussel (*Lampsilis ochraceae*, NSDNR Red) occurs only near the seacoast in quiet waters, such as slow moving river sections or ponds, with sand or mud bottoms. Most streams in the study area are fast flowing. Few streams could potentially provide suitable habitat, though it is not clear if stream flow is slow enough. Several slow flowing streams also contain fish. The streams are located mostly in the Melford area within or near the proposed Logistics Park and Marine Terminal. Habitat potentially also exists for this species in ponds associated with some of the wetlands. It is not known whether there are fish in these ponds.

ACCDC (2007a) has no records of the three priority mussel species within a 10 km radius of the proposed Project Site footprint nor, does the NSMNH (NSMNH, 2007b). Although potential habitat is present, no mussel shells were observed in streams during field surveys. Therefore the potential for the presence of these species within the proposed study area is low.

5.10.5.3.4 Lepidoptera

Nine (9) butterfly species are listed as 'at risk' in Nova Scotia by SARA, COSEWIC, NSESA, and NSDNR in Nova Scotia (COSEWIC 2007, NSDNR 2007c, NSESA 2007, SARA 2007). Five

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(5) priority species have known occurrences within 100 km of the study area (ACCDC, 2007 a). However, hoary comma (*Polygonia gracilis*) was only recorded once in 1921; northern cloudywing (*Thorybes pylades*) was recorded in 1944 and 1955; and short-tail swallowtail (*Papilio brevicauda*) was noted once in 1950, 76 km from Mulgrave. Data older than about 40 years should not be used (M. Elderkin, personal communication, Nov.1, 2007). Therefore, these species are not included in the Short List of Priority Species. While the single ACCDC record for monarch (*Danaus plexippus*) in the 100 km radius is over 100 years old, this species has since been seen elsewhere in Nova Scotia and is therefore retained on the shortlist (Appendix J (Table J2)).

ACCDC (2007a) does not have records of the two (2) butterfly priority species within a 10 km radius of the study area, nor does the NSMNH (NSMNH, 2007b).

Habitat Requirements

A review of habitat requirements for the two (2) butterfly species on the short list includes the consideration of larval food-plants. Butterflies depend on plants as a food source for the juvenile stage, the caterpillar. Many species are very specialized on one or a few plant species. Adults are mobile and are expected to be able to search for nectar producing plants in larger, though somewhat limited areas, thus avoiding areas unsuitable due to Project activities. However, presence or absence of larval food-plants ultimately determines the potential for presence of these species in the study area, as well as the possibility of negative impacts caused by Project activities.

During the breeding season, monarch butterflies (*Danaus plexippus*, NSDNR Yellow, SARA and COSEWIC Special Concern, ACCDC S2B) utilize habitats such as meadows, weedy fields and watercourses, where milkweed, the larval foodplant, is present. Monarchs can occur almost anywhere in NS during spring migration, and in the breeding season near the food plants. Monarchs are common to abundant during the fall migration, notably along the Atlantic coast, however, these fall migrants are thought to originate from outside the province. Small numbers are resident. During the field surveys in 2007, no milkweed plants were found. Therefore, breeding monarchs are unlikely to be present.

The arctic (titania) fritillary (*Boloria chariclea*) adult (NSDNR Yellow, ACCDC S2) is typically found in June and July. This species occurs in boreal woodlands and black spruce sphagnum bogs (Pyle, 1994). A cotton grass (*Eriophorum spissum*) may be the food plant of the arctic fritillary larvae as well as violets (*Viola* sp.), scrub willows (*Salix* sp.) and possibly blueberries (*Vaccinium* sp.) (Opler, 2006). Another source lists the food plants as mountain avens (*Geum peckii*) and possibly violets, and the flying time as August (The Butterflies of Nova Scotia, 2007). Information obtained from NSDNR (M. Elderkin, Species at Risk Biologist, personal communication, 2005), showed that very little information and no recent sightings are available. The previous sightings were ephemeral (i.e. the butterflies only stayed for very few years). This suggests that presence was “accidental.” There is no boreal forest in the study area, and only few, small sphagnum bogs. In addition, potential food plants are sparse. Only violets (*Viola* sp.) and blueberries (*Vaccinium* sp.) were found at several locations. Therefore, there is a small potential for this species to be present in the study area (Table 5.10-19).

5.10.5.3.5 Odonata

There are seventeen (17) species of dragonflies and damselflies (Odonates) listed as Red or Yellow in the General Status of Wildlife in Nova Scotia Report (NSDNR 2007c). No odonate species are listed under SARA, COSEWIC or the NDESA. Little information is available on the distribution of odonates in Nova Scotia, and Guysborough County is the least studied county in Nova Scotia (P. Brunelle, personal communication, 2007).

Fifteen (15) species of Odonates with potential to occur in eastern Nova Scotia are included in the Shortlist of Priority Species (Appendix 5.10-J (Table J2)). Nine (9) odonate priority species are known to occur within a 100 km radius around the study area (ACCDC, 2007 a) (Appendix 5.10-K). Six (6) additional priority species are likely to occur in Guysborough County (P. Brunelle, personal communication, 2007):

- Little Bluet;
- Prince Baskettail;
- Seaside Dragonlet;
- Rusty Snaketail;
- Zebra Clubtail; and
- Ebony Haunter.

These species are included in the shortlist (Appendix 5.10-J (Table J2)).

Of the fifteen (15) species, muskeg emerald (*Somatochlora septentrionalis*; NSDNR Yellow, ACCDC S1) is restricted to the Cape Breton highlands and is not likely to occur in Guysborough County. This species was not included in the habitat evaluation. Harpoon clubtail (*Gomphus desertus*, NSDNR Yellow, ACCDC S2) and twinhorn snaketail (*Ophiogomphus mainenesis*, NSDNR Red, ACCDC S1) are also not likely to occur in Guysborough County (P. Brunelle, personal communication, 2007).

According to ACCDC (2007a) thirty-six (36) species of conservation concern are known to occur within 10 km of the study area (Appendix 5.10-K). However, only two of these are priority species listed by NSDNR: harlequin darner (*Gomphaeschna furcillata*, ACCDC S1, NSDNR Yellow), and brook snaketail (*Ophiogomphus aspersus*, ACCDC S1, NSDNR Red). The NSMNH does not have any records of fauna species of concern in the general Project Area (NSMNH, 2007).

Odonate observations were made on an opportunistic basis by field personnel. During habitat surveys, larval castings of an Odonate species were found at one forest stream. The castings were likely from a damselfly, but the species is unknown. Adult Odonates were seen basking or hunting throughout the study area.

Habitat requirements

Due to the Odonate lifecycle, the biggest impact on these insects would be from destruction or alteration of their aquatic breeding habitat. As adults, they are agile fliers and are able to roam over larger areas. Information on breeding habitat requirements was obtained from P. Brunelle (personal communication, 2005 and 2007 and Natureserve, 2007). Based on habitat requirements (Appendix K (Table K4)), potential breeding habitat exists for most Odonate Priority Species short-listed, as well as ACCDC species of conservation concern (Appendix K). The study area contains several types of aquatic habitats which are potential breeding sites for

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odonates: fast or slow moving streams, gravel or sand bottomed streams, bogs, ponds or wetlands.

There are 26 streams within the overall Project area which range in size from large watercourses (10 m width) to dry channels. There are slow moving streams, located mostly in the Melford area within or near the proposed Logistics Park and Marine Terminal, but also along the rail and transmission corridors and at the Mulgrave end of the corridor. Fast moving streams are located on the downward sloping gradient along the rail and transmission corridors, including the Melford end of the corridor. Substrate of the streams varies from sand to gravel to large boulders that encompass habitat requirements for stream breeding Odonate species. Numerous watercourses flow through forested areas, and therefore may provide breeding habitat for *Somatochlora tenebrosa* and *S. willamsonii*. The proposed marine terminal site and rail and transmission corridors also include numerous wetlands, including fens, swamps, marshes and bogs. This is potential habitat for the lentic, or still water, breeding Odonate species listed above.

However, seaside dragonlet (*Erythrodiplax berenice*, NSDNR Yellow, ACCDC S2) breeds in saltmarshes. These are located near, but not within, the study area. Therefore, this species is not likely to occur in the immediate Project Area. Also, breeding habitat for the following four (4) species is in limited supply and potentially absent:

- Harpoon Clubtail (*Gomphus desertus*, NSDNR Yellow, ACCDC S2);
- Little Bluet (*Enallagma minusculum*, NSDNR Yellow, ACCDC S2);
- Twinhorn Snaketail (*Ophiogomphus mainensis*, NSDNR Red, ACCDC S1); and
- Rusty Snaketail (*Ophiogomphus rupinsulensis*, NSDNR Red, ACCDC S1)

As both harpoon clubtail and twinhorn snaketail are also unlikely to occur in Guysborough County (P. Brunelle, personal communication, 2007), these two (2) species are not thought to have potential to occur in the study area. Breeding habitat for the remaining nine (9) species occurs frequently in the study area (Appendix 5.10-J (Table J2)).

Therefore, eleven (11) priority species have potential to be present in the study area and are included in Table 5.10-19, though two (2) species have little potential to occur.

Appendix L provides a list of the names and credentials of the various experts involved in the collection of data for this section.

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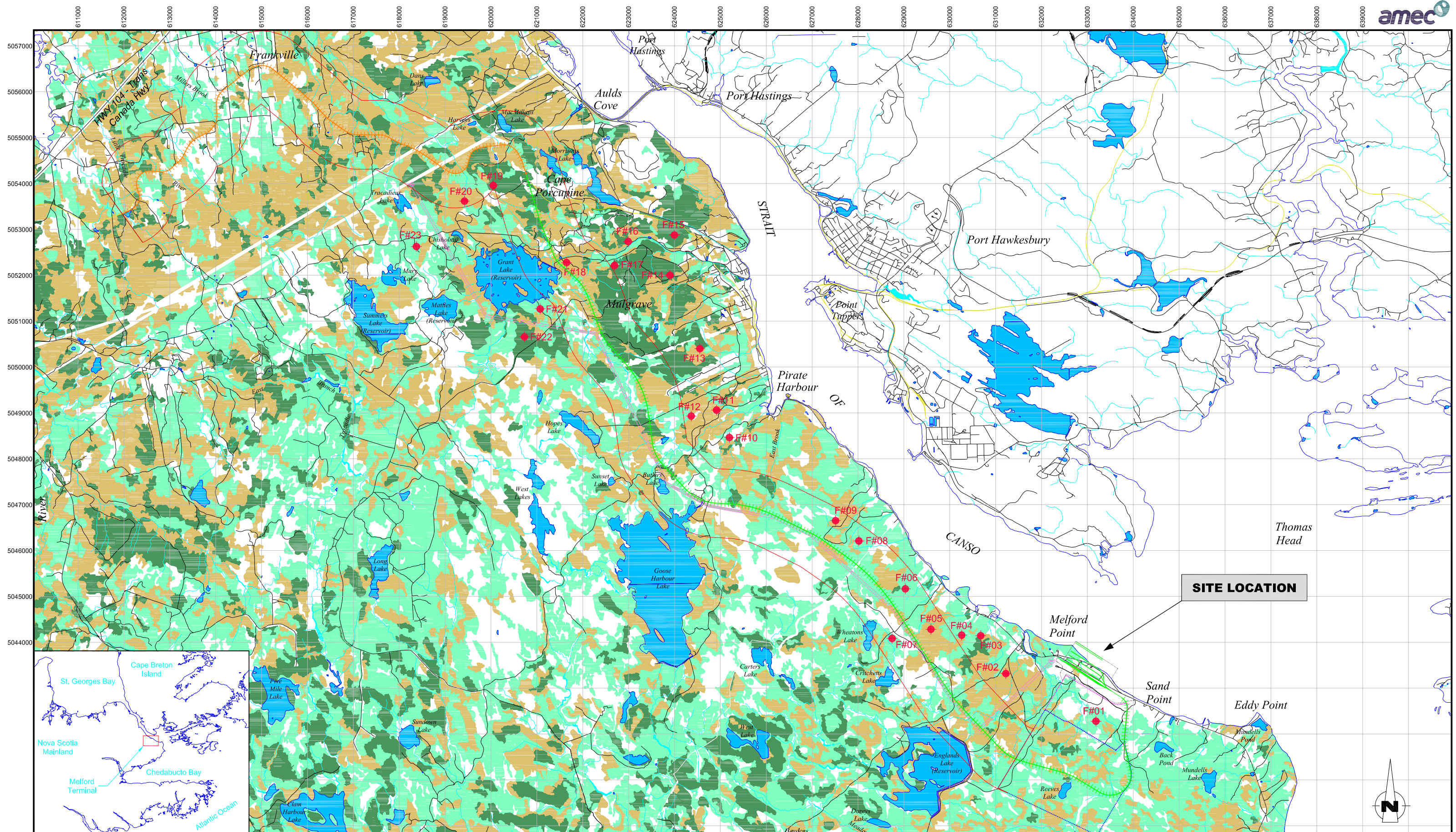
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LEGEND:

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|--|---|---------------|
| Proposed Melford Rail Track | Proposed Melford International Terminal | Softwood |
| Proposed Melford Rail Track (On Existing Rail Bed) | Environmental Baseline Study Corridor | Mixedwood |
| Existing Route 344 | Initial Logistics Park | Hardwood |
| Road Network | Future Logistics Park Expansion | GPS Locations |
| Railroad Network | Proposed NSPI Easement | |

Figure 5.10-1
Forestry Map
Melford International Terminal
Environmental Assessment Services
July 2008