

Terrestrial Bird Survey, Minas Passage Tidal Demonstration Site— Shore Facilities and Cable Landfall

June–September 2009

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Submitted by

*Envirosphere Consultants Limited
Windsor, Nova Scotia*

EXECUTIVE SUMMARY

Surveys for terrestrial breeding birds, shorebirds and peregrine falcon in the Minas Passage, Black Rock area, which included possible sites for the shore facilities and cable route for the tidal power demonstration project, were made in early and mid June and late July to mid-August, and early September 2009 to assess the occurrence of breeding songbirds and coastal shorebirds respectively. The breeding status of 50 bird species observed in or near the study area over the course of the summer was surveyed and recorded, four of which were confirmed as breeding, 13 as probable breeding and 19 as possible breeding. Coastal surveys of the intertidal shore, brackish ponds and nearshore waters near the proposed shore facility site, indicated small numbers of shorebirds foraging during the key migration period, suggesting the site is not important for these species. The peregrine falcon, a species of concern, was not observed during the surveys; however, common loon, a provincially yellow-listed species was noted in waters along the shore during the August and September coastal surveys, but is not likely to be impacted by construction of the shore facilities or cable installation.

INTRODUCTION

Nova Scotia's Bay of Fundy has some of the highest tides in the world and some of the greatest potential for generation of electricity from the tides. In part to further its commitment to a sustainable future for Nova Scotians, the Province of Nova Scotia has undertaken to establish a Tidal Power demonstration research and test facility, and selected Minas Basin Pulp and Power Limited of Hantsport, Nova Scotia, to develop the necessary infrastructure and coordinate use of the site by interested companies and organizations which produce tidal energy use devices (tidal device providers) and which will partner in the project. The project to develop the test facility was inaugurated in January 2008 and includes engineering and environmental components, the latter to provide information on the physical conditions such as currents, relating to the supply of tidal energy as well as for adequate device design; seabed geology and geotechnical information for device installation; and background information on the oceanography, biology, fisheries, and socioeconomic environment, relating to the governmental and public environmental assessment/ regulatory processes under which the project must operate. The project includes berths for turbine installations located nearshore in Minas Passage, associated undersea cables to supply electricity and data to shore, as well as an interpretive facility and connections to the Nova Scotia power grid onshore. Installation of cables and construction and operation of the shore facilities will have the potential to impact breeding birds on shore, while activities associated with the installation of the electrical cable (e.g. trenching and cable laying) have the potential to impact breeding birds, shorebirds, and peregrine falcons foraging in the area from nearby nesting areas at Cape Sharp. The present study was undertaken to acquire biological information on site use and seasonality of breeding by terrestrial and coastal birds, as well as use of the site by peregrine falcon, an endangered raptor species which nests nearby on Cape Sharp.

METHODS

Breeding Bird Survey: A breeding bird survey was conducted on June 11-12 & 19; and incidental observations of terrestrial birds and coastal bird surveys (shorebirds, waterfowl, seabirds & raptors) were carried out on July 20, August 12-13 & September 4. An experienced bird watcher, Wayne Neily of Peregrine Heritage Services, Kingston, N.S., conducted a breeding bird survey in early and mid June (11-12 & 19) at the proposed shoreline installation site (see Appendix A)¹ to determine the occurrence of breeding bird species for each major vegetation community within the study area. Four hours were spent on site each time. An initial site reconnaissance was carried out during the first visit in late morning to early afternoon; the next day and on subsequent surveys, birds were located and mapped from 0500-0900 hrs, when singing was most intense. On each occasion, the area was traversed in two locations in each direction (roughly N-S & E-W), using existing cut-lines, trails, or openings, and the plant community map developed by EnviroSphere (Appendix E, Figure E-1) was used as a base map on which to record the location of singing birds and possible nesting sites.

Coastal Bird Survey: The bird observer was on site on July 20, August 12-13 and September 4 (see Appendices B-D) to conduct an incidental survey of terrestrial birds and a coastal bird survey. The full length of the beach from the Mill Brook mouth in the west to the base of Cape Sharp in the east was walked and scanned with a spotting scope near low tide to document any shorebirds, waterfowl, seabirds and raptors. Observations were also made of the coastal waters and of terrestrial habitats in the study area to look for further evidence of breeding terrestrial birds, and coastal bird activity.

¹ . The location of the shore facility was moved in late 2009 as shown in Figure . The surveys carried out in 2009 covered an area broad enough to include the new facility location.

RESULTS & DISCUSSION

Fifty bird species in total were observed in or near the study area over the course of the surveys, four were confirmed as breeding, 13 more showed evidence of probable breeding, and 19 were possibly breeding (presence in suitable habitat, song on one day but not twice a week or more apart) (Table 1). The 17 confirmed or probable breeders are presented in bold-face in Table 1. Another five were possibly breeding on the coastal islands, but not in the study area. The other 9 were migrants or visitants. None of the species identified were species of concern for the area (Table 2). The 50 species represented about a third of species previously observed to be breeding in the general area of the site (Table 3).

Table 1. Cumulative occurrence of breeding birds documented in major terrestrial ecological and vegetation communities at the study site, June-Sept. 2009. Confirmed or probable breeders are highlighted in bold.

<i>Species</i>	Coastal	Berm / Marsh	Shrub	Old Field	Residential	Forest
Common Eider	po					
Ruffed Grouse						po
Common Loon	ob					
Double-crested Cormorant	po					
Bald Eagle	ob	ob				ob
Northern Harrier		po				
Sharp-shinned Hawk			ob			ob
Red-tailed Hawk		ob	ob	ob		po
Semipalmated Plover	ob					
Spotted Sandpiper	ob					
Semipalmated Sandpiper	ob					
Herring Gull	po					
Great Black-backed Gull	po					
Black Guillemot	po					
Mourning Dove					po	
Belted Kingfisher	ob	ob				
Ruby-throated Hummingbird					pr	
Downy Woodpecker				po		
Hairy Woodpecker				ob		
Northern Flicker				Po		po
Yellow-bellied Flycatcher						po
Alder Flycatcher			pr	pr	pr	
Blue-headed Vireo						po
Red-eyed Vireo						po
Blue Jay					ob	
American Crow	ob		ob	ob	ob	co
Common Raven		ob				po
Swallow (sp.)	ob	ob				
Black-capped Chickadee					pr	
Winter Wren						po
Swainson's Thrush						pr
Hermit Thrush						po
American Robin				pr	po	co
Grey Catbird			co			
Cedar Waxwing				pr	ob	
Nashville Warbler			po			
Northern Parula				pr		po
Yellow Warbler			pr	pr		po

Table 1. Cumulative occurrence of breeding birds documented in major terrestrial ecological and vegetation communities at the study site, June-Sept. 2009. Confirmed or probable breeders are highlighted in bold.

Magnolia Warbler				pr		po
Yellow-rumped Warbler						po
Black-throated Green Warbler						pr
Palm Warbler				pr		
American Redstart				po		pr
Ovenbird						po
Common Yellowthroat			po	pr		po
Song Sparrow		co	co	po		
White-throated Sparrow						pr
Dark-eyed Junco						po
Purple Finch				po		
American Goldfinch				po		
Codes: ob = observed; po = possible breeding; pr = probable breeding; co = confirmed breeding (criteria as in Maritimes Breeding Bird Atlas)						

No shorebirds or species of concern were observed during the July 20th coastal bird survey, which included the saltmarsh and the area around the mouth of Mill Brook to the west. Some shorebirds were noted along the shore at the site in small numbers in the mid-August survey, including spotted sandpipers, semipalmated sandpipers, and semipalmated plovers (most abundant), occurring along the shore mostly on the east end of the beach area (see Appendix C & D). Only a single spotted sandpiper was observed along shore at high tide in the early September survey. Shorebirds clearly use the area for feeding during their migration, although the intensity of sampling was too small to determine overall frequency and abundance likely to occur at the site. The August sightings coincided with the normal migration period through the nearby Minas Basin (see Appendices C & D), and so this well-established time period should be avoided during coastal activities associated with the project, to avoid impacting shorebirds. No peregrine falcons were seen during any of the surveys, although individuals are likely to forage here. Absence in the surveys probably reflects the relatively low level of effort expended in observations. The coastal survey found Common Loon, a provincially yellow-listed species, which was present during the August & September surveys. Common loons may occur year-round, and, as well, other loon species migrate through the Bay of Fundy in the fall and early winter. The occurrence of an individual Common Loon represents a relatively low density, compared with other coastal environments where greater numbers congregate, suggesting that the tidal project site is not of particular importance to the species. Installation of subsea cables to turbine installations and associated activity, would likely not interfere with activity of Common Loons at the site.

CONCLUSIONS AND RECOMMENDATIONS

The survey determined that the project shore facility site supports a normal range of species and activity of terrestrial birds, shorebirds and coastal birds; however no species of particular conservation significance were identified to be breeding or commonly occurring on the site. Project activities should be undertaken at times which will avoid critical periods of nesting for terrestrial birds including peregrine falcon (May-August period) and shorebirds (late-July to mid-August) periods.

Table 2. Records of bird species of concern within a 100 km radius of Cape Sharp, from Atlantic Canada Conservation Data Centre (ACCDC) Database, 2008.

Family/Scientific Name		Common Name	Rank		
			National	Provincial	Sub-National
Accipitridae	<i>Accipiter gentilis</i>	Northern Goshawk	NAR	Yellow	S3B
Alaudidae	<i>Eremophila alpestris</i>	Horned Lark		Green	S2B,S4N
Anatidae	<i>Anas strepera</i>	Gadwall		"	S2B
	<i>Anas clypeata</i>	Northern Shoveler		"	S2B
	<i>Aythya marila</i>	Greater Scaup		"	S3N
	<i>Branta bernicla</i>	Brant		Yellow	S2M
	<i>Bucephala clangula</i>	Common Goldeneye		Green	S2B,S4N
	<i>Bucephala islandica</i> (Eastern pop.)	Barrow's Goldeneye (Eastern population)	SC	Yellow	S1N
	<i>Mergus serrator</i>	Red-breasted Merganser		Green	S3B
Ardeidae	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron		Yellow	S2B
Caprimulgidae	<i>Caprimulgus vociferus</i>	Whip-Poor-Will		Green	S1?B
Cardinalidae	<i>Cardinalis cardinalis</i>	Northern Cardinal		"	S2B
	<i>Passerina cyanea</i>	Indigo Bunting		"	S2S3B
Charadriidae	<i>Charadrius melodus</i>	Piping Plover	E	Red	S1B
	<i>Charadrius semipalmatus</i>	Semipalmated Plover		Green	S2B,S5M
	<i>Pluvialis dominica</i>	American Golden-Plover		"	S3M
Cuculidae	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo		"	S3B
Emberizidae	<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	NAR	"	S3B
Falconidae	<i>Falco peregrinus anatum</i>	American Peregrine Falcon	SC	Red	S1B
Hirundinidae	<i>Progne subis</i>	Purple Martin		"	S1B
Icteridae	<i>Dolichonyx oryzivorus</i>	Bobolink		Yellow	S3B
	<i>Euphagus carolinus</i>	Rusty Blackbird	SC	"	S3B
	<i>Icterus galbula</i>	Baltimore Oriole		Green	S3B
Laridae	<i>Chlidonias niger</i>	Black Tern	NAR	"	S1B
	<i>Sterna dougallii</i>	Roseate Tern	E	Red	S1B
	<i>Sterna hirundo</i>	Common Tern	NAR	Yellow	S3B
	<i>Sterna paradisaea</i>	Arctic Tern		"	S3B
Mimidae	<i>Mimus polyglottos</i>	Northern Mockingbird		Green	S3B
Picidae	<i>Picoides dorsalis</i>	American Three-toed Woodpecker		"	S3
Rallidae	<i>Gallinula chloropus</i>	Common Moorhen		Green	S1B
	<i>Rallus limicola</i>	Virginia Rail		"	S2B
Scolopacidae	<i>Calidris bairdii</i>	Baird's Sandpiper		"	S2M
	<i>Calidris canutus rufa</i>	Red Knot (rufa subspecies)	E	Yellow	S3M

Table 2. Records of bird species of concern within a 100 km radius of Cape Sharp, from Atlantic Canada Conservation Data Centre (ACDC) Database, 2008.

Family/Scientific Name	Common Name	Rank			
		National	Provincial	Sub-National	
	<i>Calidris maritima</i>	Purple Sandpiper		“	S2N
	<i>Calidris minutilla</i>	Least Sandpiper		Green	S1B, S5M
	<i>Numenius borealis</i>	Eskimo Curlew	E	Undetermined	SXM
	<i>Numenius phaeopus</i>	Whimbrel		Green	S3M
	<i>Phalaropus fulicaria</i>	Red Phalarope		“	S3M
	<i>Phalaropus lobatus</i>	Red-necked Phalarope		“	S3M
Strigidae	<i>Asio flammeus</i>	Short-eared Owl	SC	Yellow	S1S2B
	<i>Asio otus</i>	Long-eared Owl		Green	S1S2
Thraupidae	<i>Piranga olivacea</i>	Scarlet Tanager		“	S2B
Troglodytidae	<i>Cistothorus palustris</i>	Marsh Wren		“	S2B
Turdidae	<i>Catharus bicknelli</i>	Bicknell's Thrush	SC	Yellow	S1S2B
	<i>Sialia sialis</i>	Eastern Bluebird	NAR	“	S2S3B
Tyrannidae	<i>Empidonax traillii</i>	Willow Flycatcher		Accidental	S1S2B
	<i>Myiarchus crinitus</i>	Great Crested Flycatcher		Green	S2S3B
Vireonidae	<i>Vireo gilvus</i>	Warbling Vireo		“	S1? B

- S1 Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.
- S2 Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
- S3 Uncommon throughout its range in the province, or found only in a restricted range, even if abundant in at some locations. (21 to 100 occurrences).
- S4 Usually widespread, fairly common throughout its range in the province, and apparently secure with many occurrences, but the Element is of long-term concern (e.g. watch list). (100+ occurrences).
- S5 Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions.
- S#S# Numeric range rank: A range between two consecutive numeric ranks. Denotes range of uncertainty about the exact rarity of the Element (e.g., S1S2).
- SH Historical: Element occurred historically throughout its range in the province (with expectation that it may be rediscovered), perhaps having not been verified in the past 20 - 70 years (depending on the species), and suspected to be still extant.
- SU Unrankable: Possibly in peril throughout its range in the province, but status uncertain; need more information.
- SX Extinct/Extirpated: Element is believed to be extirpated within the province.
- S? Unranked: Element is not yet ranked.
- SA Accidental: Accidental or casual in the province (i.e., infrequent and far outside usual range). Includes species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded.
- SE Exotic: An exotic established in the province (e.g., Purple Loosetrife or Coltsfoot); may be native in nearby regions.
- SE# Exotic numeric: An exotic established in the province that has been assigned a numeric rank.
- SP Potential: Potential that Element occurs in the province, but no occurrences reported.
- SR Reported: Element reported in the province but without persuasive documentation, which would provide a basis for either accepting or rejecting (e.g., misidentified specimen) the report.
- SRF Reported falsely: Element erroneously reported in the province and the error has persisted in the literature.
- SZ Zero occurrences: Not of practical conservation concern in the province, because there are no definable occurrences, although the species is native and appears regularly. An NZ rank will generally be used for long distance migrants whose occurrences during their migrations are too irregular (in terms of repeated visitation to the same locations) or transitory. In other words, the migrant regularly passes through the province, but enduring, mappable Element Occurrences cannot be defined.

Table 3. Checklist of 150 breeding bird species found on the Chignecto Peninsula, Nova Scotia as documented in the Maritimes Breeding Bird Atlas (Source: [www.mba aom.ca](http://www.mba.aom.ca)).

Canada Goose	Northern Saw-whet Owl	Cedar Waxwing
Wood Duck	Common Nighthawk †	Tennessee Warbler
American Black Duck	Chimney Swift †	Nashville Warbler
Mallard ‡	Ruby-throated	Northern Parula
Blue-winged Teal ‡	Hummingbird	Yellow Warbler
Green-winged Teal	Belted Kingfisher	Chestnut-sided Warbler
Ring-necked Duck	Yellow-bellied Sapsucker	Magnolia Warbler
Common Eider §	Downy Woodpecker	Cape May Warbler
Common Goldeneye ‡	Hairy Woodpecker	Black-throated Blue Warbler
Hooded Merganser ‡	Black-backed Woodpecker	Yellow-rumped Warbler
Common Merganser	Northern Flicker	Black-throated Green Warbler
Red-breasted Merganser	Pileated Woodpecker	Blackburnian Warbler
Gray Partridge	Olive-sided Flycatcher †	Palm Warbler
Ring-necked Pheasant	Eastern Wood-Pewee	Bay-breasted Warbler
Ruffed Grouse	Yellow-bellied Flycatcher	Blackpoll Warbler
Spruce Grouse	Alder Flycatcher	Black-and-white Warbler
Common Loon	Willow Flycatcher †	American Redstart
Pied-billed Grebe ‡	Least Flycatcher	Ovenbird
Double-crested Cormorant §	Eastern Kingbird	Northern Waterthrush
Great Cormorant § ‡	Blue-headed Vireo	Mourning Warbler
American Bittern	Red-eyed Vireo	Common Yellowthroat
Great Blue Heron §	Gray Jay	Wilson's Warbler
Osprey	Blue Jay	Canada Warbler †
Bald Eagle ♂	American Crow	Scarlet Tanager †
Northern Harrier	Common Raven	Eastern Towhee †
Sharp-shinned Hawk	Horned Lark †	Chipping Sparrow
Northern Goshawk	Purple Martin ‡	Vesper Sparrow †
Broad-winged Hawk	Tree Swallow	Savannah Sparrow
Red-tailed Hawk	Bank Swallow §	Nelson's Sparrow
American Kestrel	Cliff Swallow §	Fox Sparrow
Merlin	Barn Swallow	Song Sparrow
Virginia Rail †	Black-capped Chickadee	Lincoln's Sparrow
Sora ‡	Boreal Chickadee	Swamp Sparrow
Semipalmated Plover †	Red-breasted Nuthatch	White-throated Sparrow
Killdeer	White-breasted Nuthatch	Dark-eyed Junco
Willet	Brown Creeper	Rose-breasted Grosbeak
Spotted Sandpiper	House Wren †	Bobolink
Wilson's Snipe	Winter Wren	Red-winged Blackbird
American Woodcock	Marsh Wren †	Rusty Blackbird †
Herring Gull §	Golden-crowned Kinglet	Common Grackle
Great Black-backed Gull §	Ruby-crowned Kinglet	Brown-headed Cowbird
Black Guillemot § ‡	Eastern Bluebird †	Baltimore Oriole
Rock Pigeon	Veery	Pine Grosbeak
Mourning Dove	Bicknell's Thrush †	Purple Finch
Black-billed Cuckoo	Swainson's Thrush	Red Crossbill †
Great Horned Owl	Hermit Thrush	White-winged Crossbill
Northern Hawk Owl †	American Robin	Pine Siskin
Barred Owl	Gray Catbird	American Goldfinch
Long-eared Owl †	Northern Mockingbird †	Evening Grosbeak
Short-eared Owl †	European Starling	House Sparrow
	Bohemian Waxwing †	

† and ♂ indicate rare species in Maritimes, ‡ a regionally rare species and § a colonial species. Please provide documentation for any sighting of rare species or confirmed colonial species.

APPENDIX A—
BREEDING BIRD SURVEY, JUNE 11, 12 & 19, 2009

Survey of Terrestrial Breeding Birds at proposed Shore Facilities Site Fundy Tidal Energy Research and Development Project

Prepared by Wayne Neily for EnviroSphere Consultants, June 2009

Introduction

As part of an assessment of potential environmental impacts of this project, baseline data were collected on the birds using the proposed shore facilities site during the breeding season. This site (see Figure 1) is on the north shore of the Minas Channel, just west of Cape Sharp, Cumberland Co., Nova Scotia, about seven km WSW of Parrsboro. The location, topography, and vegetation of the study are as described and illustrated by EnviroSphere Consultants, 2009 (1).

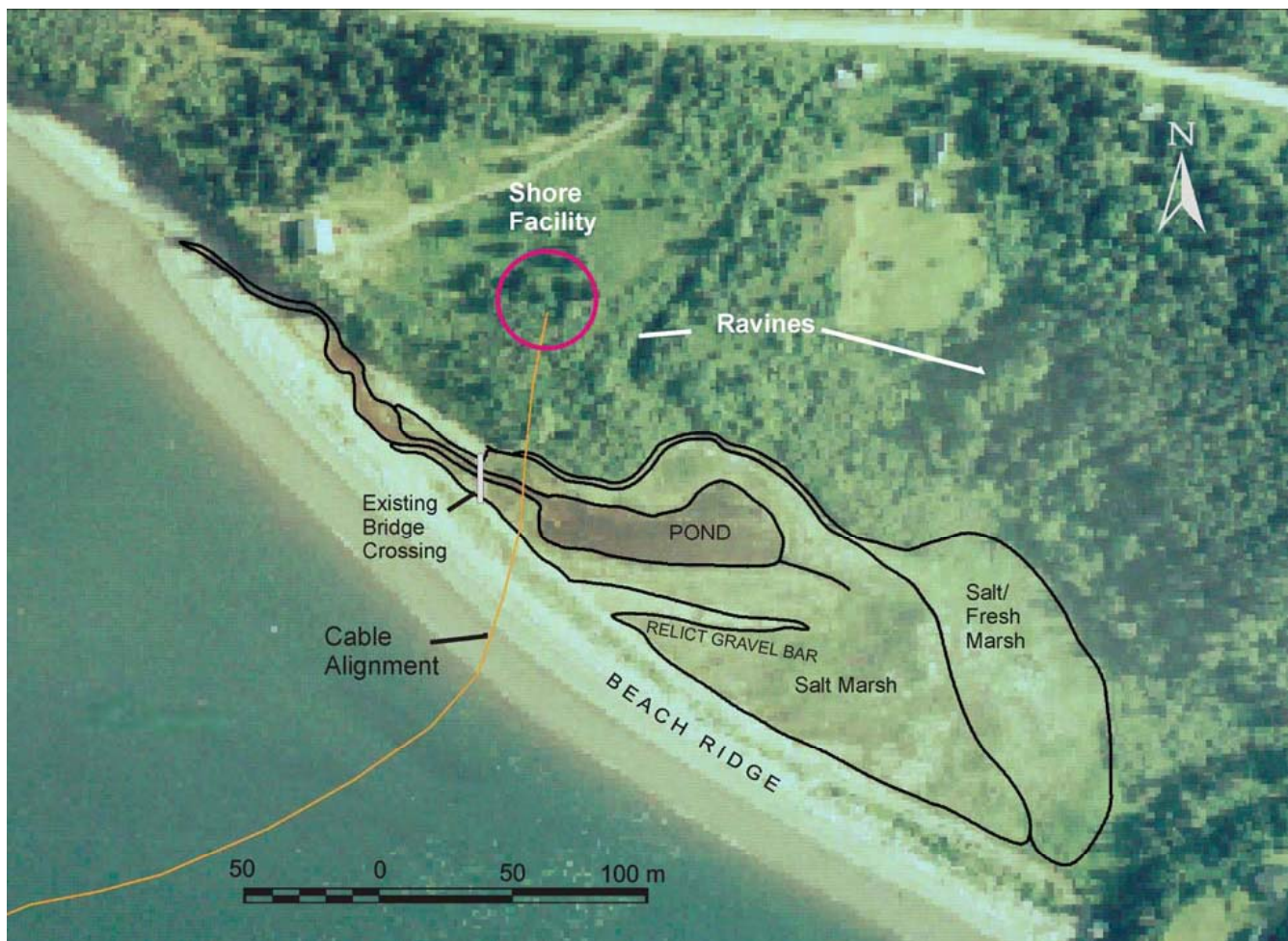


Figure 1. Study area at proposed site of shore facility and cable route. Image from EnviroSphere (2009).

Methods

Because of the small size of the affected area (about 200 X 100m), it would not have been practical to have more than one or two point count locations, since bird song commonly carries at least 50m, or over 100m in open areas. As we wanted to determine the most important breeding species for each of the ecological communities of the study area, it was decided to map all birds observed in the area, with indications of breeding as appropriate. Visits were made on three days in June, with four hours spent on site each time (11, 12, and 19 June). Mapping was done on two of these (12 & 19), when the visits were in early a.m. (0500-0900) to ensure that bird song was most active. On each occasion, the area was traversed in two locations in each direction (roughly N-S & E-W), using existing cut-lines, trails, or openings, and the plant community map developed by EnviroSphere (1) was used as a base map on which to record the location of singing birds. Although the adjacent forest areas are outside the area of direct impact, birds breeding in these areas may feed in the study area, so they were recorded as well. The results of these visits are shown in Figure 2. Code used for bird species names and criteria for assessing probability of breeding are as specified in the Maritime Breeding Bird Atlas Guide (2), except that “YEWA” is used for Yellow Warbler.

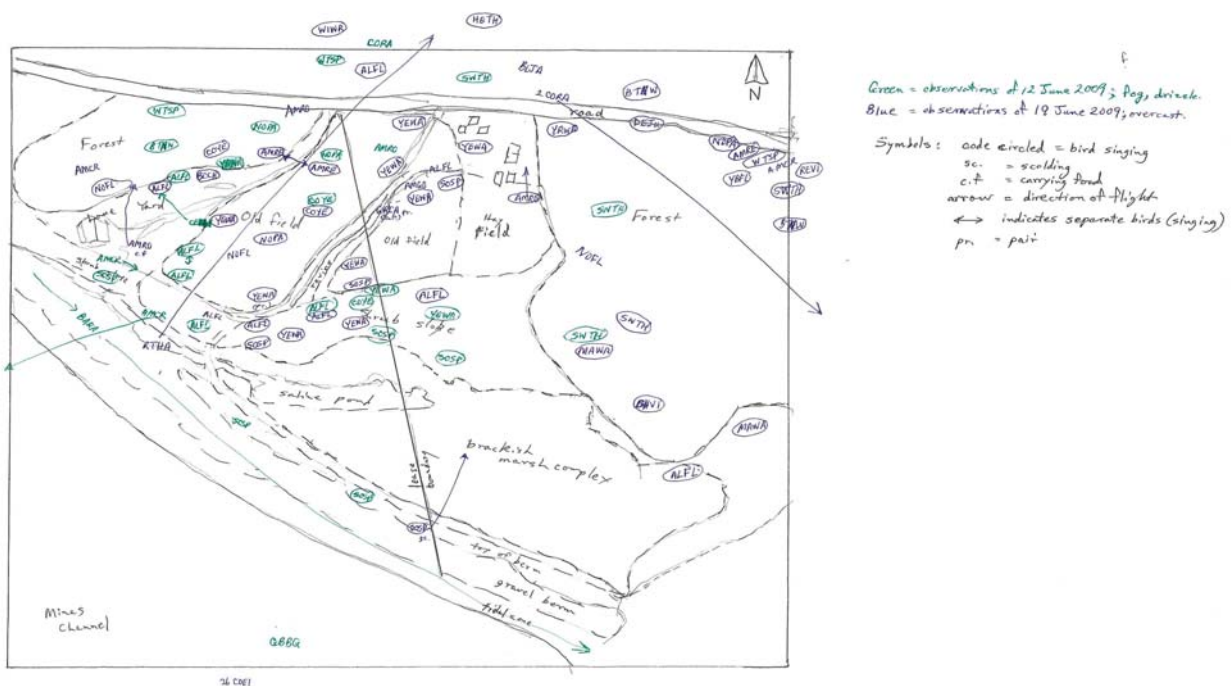


Figure 2. Mapping of territorial species from the two early a.m. surveys of the study area.

Results - General

As can be seen from figure 2, the greatest diversity of breeding birds was in the (coniferous) Forest community adjacent to the study area (18 species); next was the Old Field (9 species), followed by the Residential / Yard with 7, the Shrub Slope with 5, and the Saline Marsh and berm with only 2. The ravine was too small to hold separate territories, but one species (Grey Catbird) was found mainly there. Although diversity was highest in the forest, breeding density was highest in the Old Field and Shrub Slope units.

Observations from the three days were analyzed using the criteria of the Maritimes Breeding Bird Atlas (2) producing the results shown in Table 1. Of the total of 39 species observed in or near the study area, three were confirmed as breeding, nine more showed evidence of probable breeding, and 19 were possibly breeding (presence in suitable habitat, song on one day but not twice a week or more apart). The 12 confirmed or probable breeders are bold-faced in the table. Another five were possibly breeding on the coastal islands, but not in the study area.

Table 1. Breeding status of birds observed in or near the study area. Codes: ob = observed; po = possible breeding; pr = probable breeding; co = confirmed breeding (criteria as in Maritimes Breeding Bird Atlas)

<i>Species</i>	Coastal	Berm / Marsh	Shrub	Old Field	Residential	Forest
Common Eider	po					
Double-crested Cormorant	po					
Bald Eagle	ob	ob				
Red-tailed Hawk		ob	ob	ob		po
Herring Gull	po					
Great Black-backed Gull	po					
Black Guillemot	po					
Mourning Dove					po	
Ruby-throated Hummingbird					po	
Downy Woodpecker				po		
Northern Flicker				po		po
Yellow-bellied Flycatcher						po
Alder Flycatcher			pr	pr	pr	
Blue-headed Vireo						po
Red-eyed Vireo						po
Blue Jay					ob	
American Crow			ob	ob	ob	po
Common Raven		ob				po
Swallow (sp.)	ob	ob				
Black-capped Chickadee					pr	
Winter Wren						po
Swainson's Thrush						pr
Hermit Thrush						po
American Robin				pr	po	co
Grey Catbird			co			
Cedar Waxwing				ob	ob	
Nashville Warbler			po			
Northern Parula				pr		po
Yellow Warbler			pr	pr		po
Magnolia Warbler						po

<i>Species</i>	Coastal	Berm / Marsh	Shrub	Old Field	Residential	Forest
Yellow-rumped Warbler						po
Black-throated Green Warbler						pr
American Redstart				po		pr
Ovenbird						po
Common Yellowthroat			po	pr		po
Song Sparrow		co	co	po		
White-throated Sparrow						pr
Dark-eyed Junco						po
Purple Finch				po		
American Goldfinch				po		

Results – by Ecological Community

Coastal - On each visit the shore was scanned with binoculars and spotting scope to check for any migrant (or breeding) shorebirds. None were found, and the coarse stony beach does not seem suitable for feeding by the key migrants in the area, nor any breeders except possibly the Spotted Sandpiper along the drainage channel. On the nearby islands known as Black Rocks, a few coastal species were seen on 11 and 19 June (12th was too foggy), but none were close enough to confirm breeding. A flock of Common Eiders was resting around the base of the islands (20-30, mainly drakes), 2 Double-crested Cormorants were resting on top of the rocks (one an immature) on 11 June, but not there on 19th, and 2 Black Guillemots were seen flying from the cliffs of the island into the water on 11 June. Most likely as breeding species were the gulls, with more than 10 Great Black-backed Gulls on the grassy top of the largest island, and 8 Herring Gulls on ledges on the cliffs.

Vegetated Berm – The first plant community above the tidal zone was this sparsely vegetated ridge separating the salt marsh from the beach. It was walked in case there might have been some small patch of sand with a hardy Piping Plover, but there was no sign of them. The only birds with this ridge as part of their territory were a family of Song Sparrows.

Saltmarsh and Saline Pond – The silence and absence of birds in this zone was the most surprising result of this survey to me. Although I spent considerable time within sight or hearing of this habitat, no bird songs or calls were heard from it except one of the beach ridge Song Sparrows that sometimes used a stick in the marsh as a perch when hunting for food. A few others, including American Crow, Common Raven, and the two gulls occasionally flew over, but the only other species seen to land in the marsh was an adult Bald Eagle, that apparently found something to eat there on 11 June. It (or another) flew over low early the next morning parallel to the shore, probably scavenging.

Shrub Slope – This was the first zone from the shore to have a dense population of birds, of which four species appeared to be on territory. Most abundant was Alder Flycatcher, followed closely by Yellow Warbler, then Song Sparrow, and Common Yellowthroat. Fledgling Song Sparrows were noted there on 11 June. The zone was also visited twice by American Crows, apparently searching for food.

Old Field – This is a complex zone, with a mixture of shrubs, dense herbaceous cover, and scattered trees, mainly older spruces with good growths of the *Usnea* sp. favored by Northern Parulas for nest-building. At least five species had territories in this habitat: Yellow Warbler (commonest), Alder Flycatcher, Northern Parula, American Robin, and Common Yellowthroat, while American Redstart and Song Sparrow appeared to have parts of their territories here. The Northern Flicker here was likely feeding, but nesting in an adjacent forest area, while the American Goldfinch and Purple Finch might nest here later, but were not yet clearly territorial.

Residential Yard – This area of lawns, gardens, and scattered trees had few birds that appeared to be on territory (one Alder Flycatcher and one Black-capped Chickadee), and those probably had territories that extended into adjacent habitats. An American Robin carrying food was likely nesting in the nearby forest edge, and two American Crows foraging here were likely also nesting in wooded areas nearby (perhaps earlier). Small flocks of Cedar Waxwings feeding in the apple blossoms June 11 and 12 (figure 3) were not yet territorial, but might nest later. Bird feeders here and in nearby yards also attracted a Blue Jay and a Ruby-throated Hummingbird.



Figure 3. One of a flock of Cedar Waxwings in study area. Photo by J. Jotcham.

Forest – This habitat, mainly outside the study area, was not covered as thoroughly as those within it, but still had the greatest diversity, although numbers per species noted were low. Most frequent were Swainson's Thrush, Black-throated Green Warbler, and White-throated Sparrow, with 3, 2, and 2 territories respectively.

Another 11 species occurred, apparently on territory, at least once in the adjacent forest areas (Northern Flicker, Magnolia Warbler, American Crow, Northern Parula, Yellow Warbler, Common Yellowthroat, American Redstart, Yellow-rumped Warbler, Blue-headed Vireo, Yellow-bellied Flycatcher, and Dark-eyed Junco). Three other species (Winter Wren, Hermit Thrush, and Red-eyed Vireo) were heard singing from woods just beyond the area of Figure 2.

Species of Special Concern

No endangered, threatened, or vulnerable species of birds were observed here. Peregrine Falcons are known to nest along this coast, and may occasionally hunt for food here, especially during the shorebird migration, but none were observed on these visits, and the topography here is not suitable for their breeding. Other species on the federal or provincial lists (see Appendix 1), may occur occasionally, especially in migration, but there is no indication that this spot is more suitable for them than any other comparable area of coastal habitat in the region. Of the terrestrial species observed here, only the Bald Eagle is noted as of special interest by the Atlas (3), and it was not nesting in the study area.

The first Maritimes Breeding Bird Atlas (Erskine, 1992) (2) found a few of these species of concern nesting in the 10km X 10 km square that includes the study area. Our site is at the extreme east edge of the Diligent River square (20LR82), which also includes a bit of Cape Split in its southwest corner. Northern Goshawk, Barn Swallow, and Eastern Bluebird were confirmed as breeding, while Boreal Chickadee and Canada Warbler were probable, and Grey (Canada) Jay was possibly breeding. In the square during the current atlas period (2006-2010), Peregrine Falcon was confirmed and Purple Martins were probably breeding in the square.

Summary

In the study area, there are about nine species confirmed as breeding or probable breeders, of which the commonest are Alder Flycatcher, Yellow Warbler, and Song Sparrow. Less numerous are Northern Parula, Common Yellowthroat, American Robin, Grey Catbird, American Redstart, and Black-capped Chickadee. Another seven (Mourning Dove, Ruby-throated Hummingbird, Downy Woodpecker, Northern Flicker, Nashville Warbler, Purple Finch, and American Goldfinch) are possibly breeding here, while in the adjacent forest areas three more species are probably breeding, and 12 possibly (see Table 1). All these are common and widely distributed in the region, as are the habitats to be disturbed. As long as disturbance to the land and vegetation is done outside the breeding season (mainly June - July), impact on bird populations should be minimal.

References Cited

- (1) EnviroSphere Consultants Ltd. 2009. *Terrestrial and Intertidal Biophysical Survey – Shore Facilities Fundy Tidal Energy Research & Development Project*. 42p.
- (2) Erskine, Anthony J. 1992. *Atlas of Breeding Birds of the Maritime Provinces*. Halifax, Nova Scotia Museum and Nimbus Publishing. 270p.
- (3) *Maritimes Breeding Bird Atlas Guide for Atlassers*. 2006. Sackville, N. B. 38p.

Appendix 1

A) Endangered, threatened, or vulnerable species

The following bird species that have occurred in the region or might be expected to occur are considered at risk or of special concern by either the federal or provincial governments. Lists from websites of Environment Canada and N. S. Dept of Natural Resources as of June 2009.

Species	Federal /SARA/COSEWIC status	NS ESA status	NS general status	
Piping Plover	<i>Charadrius melodus</i>	Endangered	Endangered	Red
Eskimo Curlew	<i>Numenius borealis</i>	Endangered	Undetermined	Grey
Roseate Tern	<i>Sterna dougallii</i>	Endangered	Endangered	Red
Red Knot	<i>Calidris canuta</i>	Endangered /S. C.*	Endangered	Yellow
Loggerhead Shrike	<i>Lanius ludovicianus migrans</i>	Endangered	Not listed	Pink
Harlequin Duck	<i>Histrionicus histrionicus</i>	Special Concern (eastern)	Endangered	Yellow
Purple Martin	<i>Progne subis</i>	Not listed	Not listed	Red
Chimney Swift	<i>Chaetura pelagica</i>	Threatened	Endangered	Yellow
Common Nighthawk	<i>Chordeiles minor</i>	Threatened	Threatened	Yellow
Peregrine Falcon	<i>Falco peregrinus</i>	Threatened**	Vulnerable	Red
Olive-s. Flycatcher	<i>Contopus cooperi</i>	Threatened	Not listed	Yellow
Canada Warbler	<i>Wilsonia canadensis</i>	Threatened	Not listed	Yellow
Least Bittern	<i>Ixobrychus exilis</i>	Threatened	Not listed	Green
Bicknell's Thrush	<i>Catharus bicknelli</i>	Special Concern	Vulnerable	Yellow
Barrow's Goldeneye	<i>Bucephala islandica</i>	Special Concern (eastern)	Not listed	Yellow
Short-eared Owl	<i>Asio flammeus</i>	Special Concern	Not listed	Yellow
"Ipswich" Sparrow	<i>Passerculus sandwichensis princeps</i>	Special Concern	Not listed	Yellow
Rusty Blackbird	<i>Euphagus carolinus</i>	Special Concern	Not listed	Yellow
Brant	<i>Branta bernicla</i>	Not listed	Not listed	Yellow
Northern Goshawk	<i>Accipiter gentilis</i>	Not listed	Not listed	Yellow
Bla.-cr. Night-Heron	<i>Nycticorax nycticorax</i>	Not listed	Not listed	Yellow
Purple Sandpiper	<i>Calidris maritima</i>	Not listed	Not listed	Yellow
Common Tern	<i>Sterna hirundo</i>	Not listed	Not listed	Yellow
Arctic Tern	<i>Sterna paradisaea</i>	Not listed	Not listed	Yellow
Razorbill	<i>Alca torda</i>	Not listed	Not listed	Yellow
Atlantic Puffin	<i>Fratercula arctica</i>	Not listed	Not listed	Yellow
Common Loon	<i>Gavia immer</i>	Not listed	Not listed	Yellow
Barn Swallow	<i>Hirundo rustica</i>	under review	Not listed	Yellow
Grey (Canada) Jay	<i>Perisoreus griseus</i>	Not listed	Not listed	Yellow
Boreal Chickadee	<i>Poecile hudsonica</i>	Not listed	Not listed	Yellow
Eastern Bluebird	<i>Sialia sialis</i>	Not listed	Not listed	Yellow
Vesper Sparrow	<i>Poocetes gramineus</i>	Not listed	Not listed	Yellow
Bobolink	<i>Dolichonyx oryzivorus</i>	under review	Not listed	Yellow

Acronyms used are: SARA = Species At Risk Act (Canada); COSEWIC = Committee On the Status of Endangered Species In Canada; NS ESA = Nova Scotia Endangered Species Act.

N. S. general status colours: red indicates endangered or threatened; yellow indicates vulnerable or sensitive to disturbance; green indicates populations stable; pink is accidental or vagrant; grey indicates undetermined status. These are assessments of status, but do not necessarily have designation under legislation.

* Subspecies *Calidris canuta rufa* is considered Endangered, *C. c. roselaari* is Threatened, and *C. c. islandica* is of Special Concern.

** Subspecies *Falco peregrinus anatum* is considered Threatened, *F. p. tundrius* is of Special Concern by COSEWIC

APPENDIX B—
TERRESTRIAL & COASTAL BIRD SURVEY, JULY 20, 2009

Survey of Early Migrants and Late Terrestrial Breeding Birds at Proposed Shore Facilities Site Fundy Tidal Energy Research and Development Project

Prepared by Wayne Neily for EnviroSphere Consultants, July 2009

Introduction

In relation to an assessment of potential environmental impacts of this project (AECOM 2009) (1), baseline data were collected on the birds using the proposed shore facilities site during July 2009. This site is on the north shore of the Minas Channel, just west of Cape Sharp, Cumberland Co., Nova Scotia, about seven km WSW of Parrsboro. The location, topography, and vegetation of the study are as described and illustrated by EnviroSphere Consultants, 2009 (2).

Because parts of the Bay of Fundy and Minas Basin (notably Shepody Bay and Evangeline Beach) are recognized as being of hemispheric importance for shorebird migration and staging (Hicklin 1987) (Morrison *et al.*, 1994), special efforts are being made to check for their presence here, even though, as noted in the original assessment (2), the shingle / gravel beach is not suited for feeding by most shorebirds.

Methods

The principal southward migration of shorebirds through our region occurs from mid-July to mid-September with some species occurring a little earlier and later. The most abundant – Semipalmated Sandpipers – nest in the Arctic and winter in South America, and use this region as their staging area to refuel for a week or so between the two long flights. Although they probably do not feed in the study area, we want to check it periodically to see if they use it for resting during non-feeding periods (mainly at high tide). To this end, one visit was undertaken on 20 July, when the full length of the beach from the Mill Brook mouth in the west to the base of Cape Sharp in the east was walked near high tide (12:00) and was also scanned with a spotting scope near low tide. Observations were also made of the coastal waters and in the various terrestrial habitats of the study area to collect any further evidence of breeding.

Results - General

No shorebirds were observed in this survey; indeed, the only bird in the intertidal zone of the study area was an American Crow that stopped there briefly. No shorebirds or other migrants were found in the brackish marsh area either, nor in the area around the mouth of Mill Brook to the west, although, as noted in the EIA (1) (p. 174), that does appear to be a better feeding area for some sandpipers. There was no evidence of any new coastal or terrestrial migrants having yet arrived from the north either, but some of the common breeding species here in June had already left – notably the Alder Flycatchers. Other terrestrial species were mostly silent, and some warblers had likely left already, but others were still present with fledged young.

The absence of shorebirds here was not unexpected, not only because of the marginal habitat, but because the migration is later than usual this year, perhaps because of a late spring in the Arctic. A visit to Evangeline Beach on 18 July revealed that they had not arrived there yet, and were already two weeks behind last year according to local residents who keep records. Similarly, a report on-line from southern James Bay showed that no significant numbers of Semipalmated Sandpipers had arrived there by that weekend. These Ontario Ministry of Natural Resources reports have since found the arrivals of the first major flocks there (July 19), although noting that numbers have declined seriously in recent years. Here the flocks began to arrive at Evangeline Beach and the NE end of the Bay of Fundy on July 25, according to reports on the e-mail lists NatureNS and NBNature. The landowner Lea Pelletier, whose home overlooks the study area's beach, noted that she has never seen shorebirds here in the 15 years that she has lived here. Although she is not a trained observer, and would not have been observing at all times, that certainly supports the idea that this site is not used extensively by shorebirds in migration.

Nineteen species were observed, of which two, Northern Harrier and Palm Warbler, were new for the year's surveys here. These bring the cumulative total to 41 (see Appendix 1).

The Palm Warblers were not a complete surprise, as a possible song of one had been heard once on 12 June, but I had been unable to confirm it. This time, a juvenile was seen with an agitated adult female in the same area, toward the north part of the old-field area, adding it to the "probable" breeder group. The Northern Harrier was an adult female seen only once, flying low over the salt marsh area. It was thus a "possible" breeder, although, like the Bald Eagle, this was likely only a small part of its territory, with the lack of sightings suggesting that the nest was elsewhere.

Observations on this date also enabled us to upgrade the breeding status of four other species: American Crow to confirmed; Ruby-throated Hummingbird and Magnolia Warbler to probable; and Cedar Waxwing to possible, as indicated in Appendix 1. The crow was confirmed by a young begging from an adult on the peninsula tip formed by the mouth of Mill Brook, just west of the study area. A pair of hummingbirds were interacting around the Pelletiers' flowers, and a Magnolia Warbler female was scolding at the edge of small conifers in the old field area. The waxwing flocks had broken up and only one was observed here at this time, as would be expected for one on territory.

Results – by Ecological Community

Coastal - Eiders, Black Guillemots, and both gull species were seen again on and around Black Rocks, but no juveniles or other evidence of breeding could be seen from shore.

Vegetated Berm – Again the only birds with this ridge clearly as part of their territory were Song Sparrows. One American Robin flew out onto it briefly from the east end, probably foraging.

Saltmarsh and Saline Pond – Again I spent considerable time within sight or hearing of this habitat, but no bird songs or calls were heard from it. As some marsh species, such as Nelson's Sparrow, that might be expected here, call mainly at night, one hour was spent after sunset, but with the same result. The Northern Harrier hunting over the area was the only species seen here. Ms Pelletier noted the ducks have sometimes nested here, but did not do so this spring. Although at normal high tide there was still water flowing out across the berm from this stream, there had been at least two major storm surges this spring and summer (one since the last visit) that took out the footbridge and would have flooded the pond with salt water. Perhaps this made it too saline for species such as the American Black Duck and some of the rails that might be expected to nest there, and wiped out nests of birds that might have attempted to nest.

Shrub Slope – Song Sparrows were still active here; these seed-eaters were working on second broods, and were the only birds still conspicuously singing on territory. The flycatchers and Common Yellowthroats, both insectivores and Neotropical migrants, had left already, although some Yellow Warblers were still present with flying young.

Old Field – This and the adjacent forest edges were the most active areas for birds (and insects?). The Grey Catbird family had moved out here from the ravine, and the other insectivores remaining– Magnolia, Palm, and more Yellow Warblers, and American Redstarts – were mainly in this zone. The flycatchers and Northern Parulas had already left. White-throated Sparrows with flying young were also present.

Residential Yard – Ruby-throated Hummingbirds were more active here, feeding at the flowers and feeders. The increased numbers probably included flying young, but interactions and mutual tolerance by one pair of this usually aggressive species provided better evidence of probable breeding. The Cedar Waxwing was also heard in this habitat.

Forest – With most bird song over for the year, detecting species from the adjacent forest becomes difficult. One Swainson's Thrush and one White-throated Sparrow were the only birds even making feeble attempts at song here, and no evidence of additional species was found here.

Species of Special Concern

No species of birds of special concern were observed here on this visit.

Summary

The most important result of this survey was the complete absence of shorebirds. Two new bird species were added to the site list, bringing the cumulative total to 41, and the breeding status of four others was upgraded. No new concerns were found that are likely to affect the project, but additional checks for migrants should be made during the peak migration periods.

References Cited

- (1) AECOM. 2009. *Environmental Assessment Registration Document – Fundy Tidal Energy Demonstration Project. Volume 1: Environmental Assessment*. Halifax, N. S.
- (2) Envirosphere Consultants Ltd. 2009. *Terrestrial and Intertidal Biophysical Survey – Shore Facilities Fundy Tidal Energy Research & Development Project*. 42p.
- (3) Hicklin, Peter W. 1987. "The Migration of Shorebirds in the Bay of Fundy", *Wilson Bulletin* 99: 540-569.
- (4) Morrison, R. I. Guy, C. Downes, and B. Collins. 1984. "Population Trends of Shorebirds on Fall Migration in Eastern Canada 1974-1991", *Wilson Bulletin* 106 431-447.

Appendix 1

Breeding status of birds observed in or near the study area. Cumulative Results.

Of the total of 41 species observed in or near the study area, four were confirmed as breeding, 12 more showed evidence of probable breeding, and 19 were possibly breeding (presence in suitable habitat, song on one day but not twice a week or more apart). The 16 confirmed or probable breeders are bold-faced in the table. Another five were possibly breeding on the coastal islands, but not in the study area.

Codes: ob = observed; po = possible breeding; pr = probable breeding; co = confirmed breeding (criteria as in Maritimes Breeding Bird Atlas)

<i>Species</i>	Coastal	Berm / Marsh	Shrub	Old Field	Residential	Forest
Common Eider	po					
Double-crested Cormorant	po					
Bald Eagle	ob	ob				
Northern Harrier		po				
Red-tailed Hawk		ob	ob	ob		po
Herring Gull	po					
Great Black-backed Gull	po					
Black Guillemot	po					
Mourning Dove					po	
Ruby-throated Hummingbird					pr	
Downy Woodpecker				po		
Northern Flicker				po		po
Yellow-bellied Flycatcher						po
Alder Flycatcher			pr	pr	pr	
Blue-headed Vireo						po
Red-eyed Vireo						po
Blue Jay					ob	
American Crow	ob		ob	ob	ob	co
Common Raven		ob				po
Swallow (sp.)	ob	ob				
Black-capped Chickadee					pr	
Winter Wren						po
Swainson's Thrush						pr
Hermit Thrush						po

<i>Species</i>	Coastal	Berm / Marsh	Shrub	Old Field	Residential	Forest
American Robin				pr	po	co
Grey Catbird			co			
Cedar Waxwing				po	ob	
Nashville Warbler			po			
Northern Parula				pr		po
Yellow Warbler			pr	pr		po
Magnolia Warbler				pr		po
Yellow-rumped Warbler						po
Black-throated Green Warbler						pr
Palm Warbler				pr		
American Redstart				po		pr
Ovenbird						po
Common Yellowthroat			po	pr		po
Song Sparrow		co	co	po		
White-throated Sparrow						pr
Dark-eyed Junco						Po
Purple Finch				po		
American Goldfinch				po		

APPENDIX C—
COASTAL BIRD SURVEY, AUGUST 12-13, 2009

Survey of Shorebirds and other Migrants at Proposed Shore Facilities Site Fundy Tidal Energy Research and Development Project

Prepared by Wayne Neily for EnviroSphere Consultants, August 2009

Introduction

In relation to an assessment of potential environmental impacts of this project (AECOM 2009) (1), baseline data were collected on the birds using the proposed shore facilities site during August 2009. This site is on the north shore of the Minas Channel, just west of Cape Sharp, Cumberland Co., Nova Scotia, about seven km WSW of Parrsboro. The location, topography, and vegetation of the study are as described and illustrated by EnviroSphere Consultants, 2009 (2).

Because parts of the Bay of Fundy and Minas Basin (notably Shepody Bay and Evangeline Beach) are recognized as being of hemispheric importance for shorebird migration and staging (Hicklin 1987) (Morrison *et al.*, 1994), special efforts are being made to check for their presence here, even though, as noted in the original assessment (2), the shingle / gravel beach is not suited for feeding by most shorebirds.

Methods

The principal southward migration of shorebirds through our region occurs from mid-July to mid-September with some species occurring a little earlier and later. The most abundant – Semipalmated Sandpipers – nest in the Arctic and winter in South America, and use this region as their staging area to refuel for a week or so between the two long flights. Although they probably do not feed in the study area, we want to check it periodically to see if they use it for resting during non-feeding periods (mainly at high tide). To this end, a visit was undertaken on 12-13 August, when the full length of the beach from the Mill Brook mouth in the west to the west base of Cape Sharp in the east was walked near high tide (17:00 – 19:00 on 12th) and was also scanned with a spotting scope and walked as the tide was retreating (08:15 – 10:15 on 13th). Observations were also made of the coastal waters and in the various terrestrial habitats of the study area to note any significant changes in bird populations.

Results - General

A few shorebirds were observed in this survey in the intertidal zone of the study area although none of the large flocks for which the Upper Bay of Fundy is famous. Somewhat surprisingly, no shorebirds or other migrants were found in the brackish marsh area, nor in the area around the mouth of Mill Brook to the west, although, as noted in the EIA (1) (p. 174), that does appear to be a better feeding area for some sandpipers.

On 12 August, near high tide, two Spotted Sandpipers and four Semipalmated Sandpipers were feeding right at the edge of the water. They remained there for the next hour, but were not joined by any others. The next a.m., about 2 hours after high tide (8:30), four Semipalmated Sandpipers were also seen (perhaps the same), and 10 adult

Semipalmated Plovers. As the tide receded, these were joined by another 22 of the same plovers that came in to rest and feed along the water's edge. They appeared to arrive from the direction of Black Rocks, but this could not be confirmed. This flock remained in the part of the beach just east of the study area, where drainage comes through the berm, apparently from the marsh, at the mid-tide level. This remains wet long after the rest of the beach at that level has dried, and the plovers seemed to favour it. Although I watched for another two hours, until the tide reached a fairly low level, no more shorebirds were seen.

The flocks at Evangeline Beach and the NE end of the Bay of Fundy were then near their peaks, according to reports on the e-mail lists NatureNS and NatureNB. On the New Brunswick side at Mary's Point, up to 75 000 shorebirds were observed from 11-13 August, with the peak on the 13th. At Evangeline Beach in the Minas Basin, 10 000 - 20 000 were estimated on 10 August, and "over 100 000" on 13 August.

Although most of the effort this trip went into the shorebird survey, the water was also scanned and the land area briefly surveyed. Near and on the Black Rocks on the evening of 12 August were 11 adult and 7 juvenile Herring Gulls, one Ring-billed Gull and a few Double-crested Cormorants and Common Eiders. One Common Loon in non-breeding plumage was in the water between the shore and Black Rocks, but the guillemots and Great Black-backed Gulls appeared to have left. On the next morning, the Herring Gulls were also gone, except for two seen flying over. This may represent movement related to feeding rather than dispersal.

Terrestrial species were mostly silent, and staying hidden as they fed in the dense vegetation. Most warblers had likely left already, but some early migrants had arrived from farther north, notably Yellow-rumped Warbler, of which a small wave was noted on the morning of 13 August. Numbers and species change daily at this time of year, except for residents such as crows, ravens, and chickadees, but migrants were still in low numbers. Two species that had disappeared in late July, Alder Flycatcher and Common Yellowthroat, were back in small numbers as ones had moved in from farther north. Other terrestrial species observed included hummingbirds, Magnolia Warbler, Song Sparrows, White-throated Sparrows, and American Goldfinch.

A total of twenty species were observed at the site, of which only the three shorebirds were new for the year's surveys here. These bring the cumulative total to 44 (see Appendix 1).

Species of Special Concern

The Common Loon was the only species of special concern were observed here on this visit. It is yellow-listed by the Province, and may use the channel here for feeding in the non-breeding season.

Summary

The most important finding of this survey was that some shorebirds do use the site, but, even when present in the tens of thousands elsewhere in the region, only small numbers are found here. Even those found here were mainly to the east of the proposed construction site, and so should not be impacted seriously. No new concerns were found that are likely to affect the project, but an additional check for migrants should be made during the peak migration period.

References Cited

- (1) AECOM. 2009. *Environmental Assessment Registration Document – Fundy Tidal Energy Demonstration Project. Volume 1: Environmental Assessment*. Halifax, N. S.
- (2) EnviroSphere Consultants Ltd. 2009. *Terrestrial and Intertidal Biophysical Survey – Shore Facilities Fundy Tidal Energy Research & Development Project*. 42p.
- (3) Hicklin, Peter W. 1987. "The Migration of Shorebirds in the Bay of Fundy", *Wilson Bulletin* 99: 540-569.
- (4) Morrison, R. I. Guy, C. Downes, and B. Collins. 1984. "Population Trends of Shorebirds on Fall Migration in Eastern Canada 1974-1991", *Wilson Bulletin* 106 431-447.

Appendix 1

Breeding status of birds observed in or near the study area. Cumulative Results.

Of the total of 44 species observed in or near the study area, four were confirmed as breeding, 12 more showed evidence of probable breeding, and 19 were possibly breeding (presence in suitable habitat, song on one day but not twice a week or more apart). The 16 confirmed or probable breeders are bold-faced in the table. Another five were possibly breeding on the coastal islands, but not in the study area.

Codes: ob = observed; po = possible breeding; pr = probable breeding; co = confirmed breeding (criteria as in *Maritimes Breeding Bird Atlas*)

<i>Species</i>	Coastal	Berm / Marsh	Shrub	Old Field	Residential	Forest
Common Eider	po					
Double-crested Cormorant	po					
Bald Eagle	ob	ob				
Northern Harrier		po				
Red-tailed Hawk		ob	ob	ob		po
Semipalmated Plover	ob					
Spotted Sandpiper	ob					
Semipalmated Sandpiper	ob					
Herring Gull	po					
Great Black-backed Gull	po					
Black Guillemot	po					
Mourning Dove					po	
Ruby-throated Hummingbird					pr	
Downy Woodpecker				po		
Northern Flicker				po		po
Yellow-bellied Flycatcher						po
Alder Flycatcher			pr	pr	pr	
Blue-headed Vireo						po
Red-eyed Vireo						po
Blue Jay					ob	

<i>Species</i>	Coastal	Berm / Marsh	Shrub	Old Field	Residential	Forest
American Crow	ob		ob	ob	ob	co
Common Raven		ob				po
Swallow (sp.)	ob	ob				
Black-capped Chickadee					pr	
Winter Wren						po
Swainson's Thrush						pr
Hermit Thrush						po
American Robin				pr	po	co
Grey Catbird			co			
Cedar Waxwing				po	ob	
Nashville Warbler			po			
Northern Parula				pr		po
Yellow Warbler			pr	pr		po
Magnolia Warbler				pr		po
Yellow-rumped Warbler						po
Black-throated Green Warbler						pr
Palm Warbler				pr		
American Redstart				po		pr
Ovenbird						po
Common Yellowthroat			po	pr		po
Song Sparrow		co	co	po		
White-throated Sparrow						pr
Dark-eyed Junco						po
Purple Finch				po		
American Goldfinch				po		

APPENDIX D—
COASTAL BIRD SURVEY, SEPTEMBER 4, 2009

Survey of Shorebirds and other Migrants at Proposed Shore Facilities Site Fundy Tidal Energy Research and Development Project – Part 3

Prepared by Wayne Neily for EnviroSphere Consultants, September 2009

Introduction

In relation to an assessment of potential environmental impacts of this project (AECOM 2009) (1), baseline data were collected on the birds using the proposed shore facilities site during early September 2009. This site is on the north shore of the Minas Channel, just west of Cape Sharp, Cumberland Co., Nova Scotia, about seven km WSW of Parrsboro. The location, topography, and vegetation of the study are as described and illustrated by EnviroSphere Consultants, 2009 (2).

Because parts of the Bay of Fundy and Minas Basin (notably Shepody Bay and Evangeline Beach) are recognized as being of hemispheric importance for shorebird migration and staging (Hicklin 1987) (Morrison *et al.*, 1994), special efforts are being made to check for their presence here, even though, as noted in the original assessment (2), the shingle / gravel beach is not suited for feeding by most shorebirds.

Methods

The principal southward migration of shorebirds through our region occurs from mid-July to mid-September with some species occurring a little earlier and later. The most abundant – Semipalmated Sandpipers – nest in the Arctic and winter in South America, and use this region as their staging area to refuel for a week or so between the two long flights. Although they probably do not feed in the study area, we want to check it periodically to see if they use it for resting during non-feeding periods (mainly at high tide). To this end, a third visit was undertaken on 4 September, when the full length of the beach from the Mill Brook mouth in the west to the west base of the cape to the east was walked near high tide (13:00 – 14:00) and was also scanned with a spotting scope and walked as the tide was retreating (14:00 – 16:00). Observations were also made of the coastal waters and in the various terrestrial habitats of the study area to note any significant changes in bird populations.

Results - General

Only one shorebird, a Spotted Sandpiper, was observed in this survey, along the water's edge at high tide. No shorebirds or other migrants were found in the brackish marsh area, nor in the area around the mouth of Mill Brook to the west.

The flocks at Evangeline Beach and the NE end of the Bay of Fundy were then just past their peaks. On 2 September, I visited Evangeline Beach and noted that the number of shorebirds there was down to about 1 000 at high tide, more than half of them Semipalmated Plovers. On the New Brunswick side at Mary's Point, about 2 000 shorebirds were observed on the same date (NatureNB).

Although much of the focus of this trip was on the shorebird survey, the water was also scanned and the land area also surveyed. The only birds observed on the Black Rocks this time were three Double-crested Cormorants. There was again one Common Loon in non-breeding plumage in the water between the shore and Black Rocks, but the other species appeared to have left. Only one or two Herring Gulls were seen flying over.

Terrestrial species were mostly silent, but actively feeding in the dense vegetation. A few of the larger species had noticeable migration movements on this date, notably Northern Flickers and Belted Kingfishers. A male kingfisher was fishing along the stream that drains the marsh of the study area, and at least two flickers were moving through the old-field area. Raptors were also present in greater than usual numbers, suggesting migration. An adult and a juvenile Bald Eagle that flew out from the east over the woods of the study area (separately) were likely part of the local family that the landowner (L. Pelletier) had indicated nest farther up the coast (probably near Cape Sharp). An adult Red-tailed Hawk and two Sharp-shinned Hawks, probably migrants, were also flying low over the woods and could have been of local origin, although the latter had not been seen before.

A Ruffed Grouse emerged from the woods at the edge of the road, and was likely a local breeder, missed earlier because its territorial drumming was over by the time our survey started. Because they tend to be sedentary, remaining in the same area year-round, it has been added to the cumulative list (Appendix 1) as a possible breeder, although the MBBA criteria for that status have not strictly been met. Family groups of Cedar Waxwings were also moving around in the old-field habitat, feeding on berries, so this late nester has been upgraded to "probable" breeder for the study area.

A feeding flock of migrant passerines was noted in and around the ravine area. Numbers and species change daily at this time of year, but Yellow-rumped, Palm, Yellow, and Magnolia Warblers were noted, as well as Common Yellowthroat. Other terrestrial species observed may have been residents or migrants, including Hairy Woodpecker, American Crow, Common Raven, Black-capped Chickadee, American Robin, Grey Catbird, Song Sparrow, Dark-eyed Junco, and American Goldfinch, bringing the total for this date to 24 species.

The Ruffed Grouse, Sharp-shinned Hawk, Belted Kingfisher, and Hairy Woodpecker were new for the year's surveys here, bringing the cumulative total to 50 species (see Appendix 1).

Species of Special Concern

The Common Loon was again the only species of special concern observed here on this visit. It is yellow-listed by the Province, and may use the channel here for feeding in the non-breeding season. Its presence on both the August and September surveys, along with the presence of cormorants on all survey dates, suggests that these piscivorous birds are here at all seasons, and are likely joined in winter by the Arctic-nesting Red-throated Loon, that winters commonly in the Bay of Fundy. These birds catch fish by pursuing them underwater, and so their presence should be of particular concern to designers of the tidal power turbines.

Summary

The most important finding of these migration surveys is that a few shorebirds do use the site, but, even when present in the tens of thousands elsewhere in the region, only small numbers are found here. Even those found here

were mainly to the east of the proposed construction site, and so should not be impacted seriously. The only new concern found that might affect the project was the continued presence of Common Loon in the non-breeding seasons.

References Cited

- (1) AECOM. 2009. *Environmental Assessment Registration Document – Fundy Tidal Energy Demonstration Project. Volume 1: Environmental Assessment*. Halifax, N. S.
- (2) EnviroSphere Consultants Ltd. 2009. *Terrestrial and Intertidal Biophysical Survey – Shore Facilities Fundy Tidal Energy Research & Development Project*. 42p.
- (3) Hicklin, Peter W. 1987. "The Migration of Shorebirds in the Bay of Fundy", *Wilson Bulletin* 99: 540-569.
- (4) Morrison, R. I. Guy, C. Downes, and B. Collins. 1984. "Population Trends of Shorebirds on Fall Migration in Eastern Canada 1974-1991", *Wilson Bulletin* 106 431-447.

Appendix 1. Breeding status of birds observed in or near the study area. Cumulative Results.

Of the total of 50 species observed in or near the study area, four were confirmed as breeding, 13 more showed evidence of probable breeding, and 19 were possibly breeding (presence in suitable habitat, song on one day but not twice a week or more apart). The 17 confirmed or probable breeders are bold-faced in the table. Another five were possibly breeding on the coastal islands, but not in the study area. The other 9 were migrants or visitants.

Codes: ob = observed; po = possible breeding; pr = probable breeding; co = confirmed breeding (criteria as in Maritimes Breeding Bird Atlas)

<i>Species</i>	Coastal	Berm / Marsh	Shrub	Old Field	Residential	Forest
Common Eider	po					
Ruffed Grouse						po
Common Loon	ob					
Double-crested Cormorant	po					
Bald Eagle	ob	ob				ob
Northern Harrier		po				
Sharp-shinned Hawk			ob			ob
Red-tailed Hawk		ob	ob	ob		po
Semipalmated Plover	ob					
Spotted Sandpiper	ob					
Semipalmated Sandpiper	ob					
Herring Gull	po					
Great Black-backed Gull	po					
Black Guillemot	po					
Mourning Dove					po	
Belted Kingfisher	ob	ob				
Ruby-throated Hummingbird					pr	
Downy Woodpecker				po		
Hairy Woodpecker				ob		
Northern Flicker				po		po
Yellow-bellied Flycatcher						po
Alder Flycatcher			pr	pr	pr	
Blue-headed Vireo						po
Red-eyed Vireo						po
Blue Jay					ob	
American Crow	ob		ob	ob	ob	co
Common Raven		ob				po
Swallow (sp.)	ob	ob				
Black-capped Chickadee					pr	
Winter Wren						po
Swainson's Thrush						pr
Hermit Thrush						po
American Robin				pr	po	co
Grey Catbird			co			
Cedar Waxwing				pr	ob	
Nashville Warbler			po			
Northern Parula				pr		po
Yellow Warbler			pr	pr		po
Magnolia Warbler				pr		po
Yellow-rumped Warbler						po
Black-throated Green Warbler						pr
Palm Warbler				pr		

<i>Species</i>	Coastal	Berm / Marsh	Shrub	Old Field	Residential	Forest
American Redstart				po		pr
Ovenbird						po
Common Yellowthroat			po	pr		po
Song Sparrow		co	co	po		
White-throated Sparrow						pr
Dark-eyed Junco						po
Purple Finch				po		
American Goldfinch				po		

APPENDIX E—
TERRESTRIAL HABITAT TYPES AT STUDY SITE



Figure E1. Terrestrial habitat types, Fundy Tidal Demonstration Project, Shore Facilities, 2009.