Environment Canada Environnement Canada

Boot Island National Wildlife Area Management Plan

Canada

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Copies of this plan are available at the following addresses:

Environment Canada
Inquiry Centre
10 Wellington, 23rd Floor
Gatineau QC K1A 0H3
Toll Free: 1-800-668-6767 (in Canada only)
Email: enviroinfo@ec.gc.ca

Environment Canada – Canadian Wildlife Service
17 Waterfowl Lane, P.O. Box 6227
Sackville NB E4L 1G6
Telephone: 506-364-5044

Environment Canada Protected Areas website at:
www.ec.gc.ca/ap-pa

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Photos: © Colin MacKinnon (Great Black-backed Gulls and Great Black-backed Gull nest); and Diane Amirault (landscape)

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About Environment Canada Protected Areas and Management Plans

What are Environment Canada Protected Areas?

Environment Canada establishes marine and terrestrial National Wildlife Areas for the purposes of conservation, research and interpretation. National Wildlife Areas are established to protect migratory birds, species at risk, and other wildlife and their habitats. National Wildlife Areas are established under the authority of the *Canada Wildlife Act* and are, first and foremost, places for wildlife. Migratory Bird Sanctuaries are established under the authority of the *Migratory Birds Convention Act, 1994* and provide a refuge for migratory birds in the marine and terrestrial environment.

What is the size of the Environment Canada Protected Areas Network?

The current Protected Areas Network consists of 54 National Wildlife Areas and 92 Migratory Bird Sanctuaries comprising more than 12 million hectares across Canada.

What is a management plan?

A Management plan provides the framework in which management decisions are made. They are intended to be used by Environment Canada staff to guide decision making, notably with respect to permitting. Management is undertaken in order to maintain the ecological integrity of the protected area and to maintain the attributes for which the protected area was established. Environment Canada prepares a management plan for each protected area in consultation with First Nations and other stakeholders.

A management plan specifies activities that are allowed and identifies other activities that may be undertaken under the authority of a permit. It may also describe the necessary improvements needed in the habitat, and specify where and when these improvements should be made. A management plan identifies Aboriginal rights and allowable practices specified under land claims agreements. Further, measures carried out for the conservation of wildlife must not be inconsistent with any law respecting wildlife in the province in which the protected area is situated.

What is Protected Area Management?

Management includes monitoring wildlife, maintaining and improving wildlife habitat, periodic inspections of facilities, enforcement of regulations, as well as the maintenance of signs and infrastructure. Research is also an important activity in protected areas; hence, Environment Canada staff carries out or coordinates research in some sites.

The series

All of the National Wildlife Areas are to have a management plan. All of these management plans will be initially reviewed 5 years after the approval of the first plan, and every 10 years thereafter.

To learn more

To learn more about Environment Canada's protected areas, please visit our website at www.ec.gc.ca/ap-pa or contact the Canadian Wildlife Service.

Boot Island National Wildlife Area

Boot Island National Wildlife Area (NWA) supports significant populations of colonial nesting birds in a landscape shaped by a long history of human use, making it significant to both the biological diversity and uniqueness of this region. Boot Island NWA is located near the mouth of the Gaspereau River, near Wolfville in the province of Nova Scotia. The island is located in an area of extensive tidal mudflats that are important for foraging shorebirds.

Boot Island NWA was established in 1979 to protect an important staging and migration area for waterfowl and to a lesser extent a migration site for shorebirds. Among the 30 species of birds observed in the NWA, the island supports significant breeding colonies of Herring Gull, Greater Black-backed Gull, Great Blue Heron and Double-crested Cormorant. Due to significant concentrations of shorebirds in this area and in the larger area of the Southern Bight of the Minas Basin in which the island is situated, this basin was recognised as a Wetland of International Importance under the Ramsar Convention in 1987. In 1988, the area was also declared a Hemispheric Shorebird Reserve as part of the Western Hemisphere Shorebird Reserve Network.

Boot Island NWA is located at the eastern end of the Annapolis Valley, one of the prime agricultural areas in Nova Scotia. Boot Island has a 400-year history of human use and occupation by European immigrants. Boot Island was used by Acadian settlers in the 17th and 18th centuries, and it was during this time that extensive areas of salt marsh were converted to agricultural land.

Boot Island was connected to the mainland until the middle of the 19th century. The channel separating the island from the mainland is now nicknamed ‘‘The Guzzle’’, in reference to the loud noise of rushing water and the force associated with the changing tides. The name Boot Island is actually an anglicized version of the French name “le bout”–meaning “the end”, in reference to this area having been a point of land. The last farmers and settlers abandoned Boot Island in the 1930s, and the area has been subject to little human disturbance since that time.

The tidal forces that developed and sustained both the island and the productive mud flats are today eroding the island. Boot Island has been eroding at a rate of 0.7 to 1.3 metres per year from 1992 to 2008. Erosion is especially prevalent along the north shore of the island adjacent to the island’s forested area. Increasing sea levels, as a result of global warming and glacial isostatic adjustment subsidence, are expected to exacerbate erosion. Management action and physical structures to control erosion are logistically difficult and cost-prohibitive.

There are no roads, trails or buildings on Boot Island NWA, thus maintenance requirements are minimal. Inspection visits every two years are sufficient to survey and monitor the NWA. These visits include the repair and/or replacement of regulatory signage, monitoring of the colonial nesting bird colonies as well as measuring the rate of coastal erosion.

For greater certainty, nothing in this management plan shall be construed so as to abrogate or derogate from the protection provided for existing Aboriginal or treaty rights of the Aboriginal peoples of Canada by the recognition and affirmation of those rights in section 35 of the Constitution Act, 1982*.*

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1 DESCRIPTION OF THE PROTECTED AREA

Boot Island National Wildlife Area (NWA) is situated within the Minas Basin near the mouth of the Gaspereau River, 8 km northeast of Wolfville, Kings County, Nova Scotia (45° 08′ N, 64° 16′ W; Figure 1). The 107-hectare NWA consists of approximately 85% (90.7 ha) salt marsh and 15% (15.9 ha) uplands comprised of forests and abandoned clearings and hayfields (Figure 2).

The salt marsh around the island is an important area for staging and migrating waterfowl and to a lesser extent migrating shorebirds. The uplands support breeding colonies of Herring Gull (*Larus argentatus*), Greater Black-backed Gull (*Larus marinus*), Great Blue Heron (*Ardea herodias*) and Double-crested Cormorant (*Phalacrocorax auritus*). Boot Island is an International Union for Conservation of Nature Category IV Protected Area. The site is managed by Environment Canada, Canadian Wildlife Service.

Boot Island NWA was purchased from private interests by the Government of Canada in 1977. Boot Island was declared an NWA on November 8, 1979, and is administered under the *Wildlife Area Regulations* of the *Canada Wildlife Act*.

Table 1: Boot Island National Wildlife Area Summary Information

Protected Area Designation	National Wildlife Area
Province or Territory	Nova Scotia
Latitude and Longitude	45º 08’ N 64º 16’ W
Size	106.6 ha (263 acres)
Protected Area Designation Criteria (Protected Areas Manual)	Protecting an area with concentrations of birds and colonial nesting birds, namely, Double-crested Cormorant, Great Blue Heron, Great Black-backed Gull and Herring Gull
Protected Area Classification System	Species or Critical Habitat Conservation
International Union for Conservation of Nature (IUCN) Classification	IV – Habitat/Species Management Area
Order in Council Number	PC 1979-3017
Directory of Federal Real Property (DFRP) number	DFRP number 22844
Gazetted	8 November 1979
Additional Designations	Wetland of International Importance (Ramsar site) and part of the Western Hemisphere Shorebird Reserve Network’s Southern Bight Minas Basin Hemispheric Shorebird Reserve
Faunistic and Floristic Importance	Salt marsh supports spring and fall staging waterfowl. Uplands support a mixed seabird colony of Great Blue Heron, Double-crested Cormorant, Great Black-backed Gull and Herring Gull. In addition, the regionally rare salt marsh plant species, Big-leaf Marsh-elder and American Sea-blite, are found on the island.
Invasive Species	None identified as being a significant threat
Species at Risk	One Piping Plover record. Frequent use as a foraging area by Peregrine Falcon.
Management Agency	Environment Canada – Canadian Wildlife Service
Public Access and Use	Minimal – the site has limited access
Other Appropriate Information	Island is surrounded by a high-energy macro-tidal (10 m) environment.

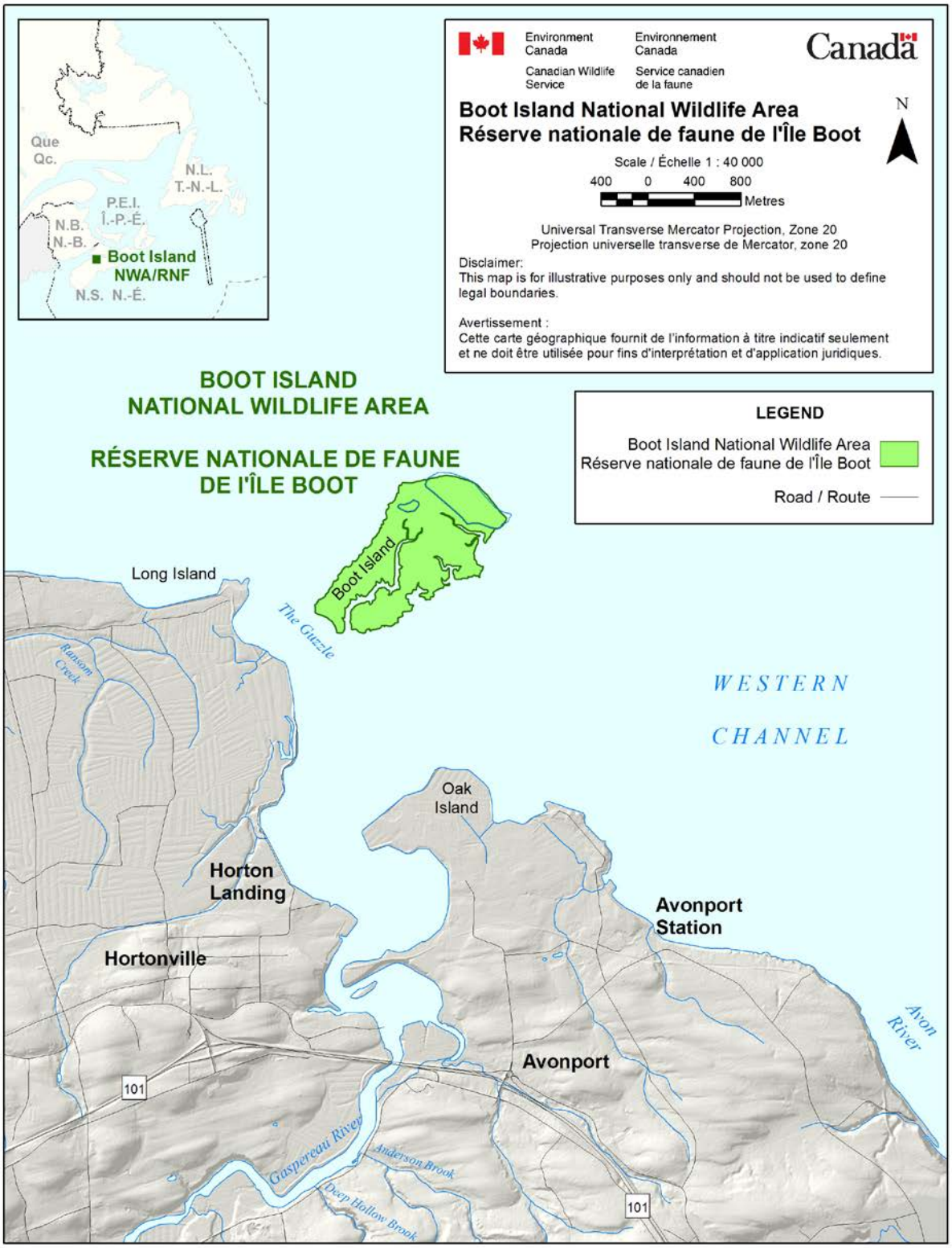

Figure 1: Boot Island National Wildlife Area

Figure 2: Aerial photograph of Boot Island, Nova Scotia, in 2003

1.1 REGIONAL CONTEXT

Boot Island is situated within the Southern Bight of the Minas Basin, Kings County, Nova Scotia. This basin is a southern arm of the Bay of Fundy bounded by Cape Blomidon to the north, Annapolis valley to the west, the Grand Pré dykelands to the south, and the mouths of the Gaspereau and Avon Rivers to the south and southeast respectively (Figure 3). The island lies just to the east of Evangeline Beach and is separated from the mainland by a narrow channel called ‘‘The Guzzle’’. Water levels in the Minas Basin can vary over 10 m between high and low water twice a day, making navigation not only difficult but also potentially dangerous.

The predominant feature of the immediate terrestrial landscape, of which Boot Island is the eastern-most extremity, is the approximately 100-km-long Annapolis Valley. The relatively flat basin of the valley, as well as adjacent hills of North and South Mountain, are used extensively for the growing of fruit trees as well as hay and grain crops and make this one of the prime agricultural areas in Nova Scotia. The nearby Grand Pré dykelands were once salt marsh but have been converted to agricultural use by a series of dykes that date back to Acadian settlement over 300 years ago (Bleakney, 2004). The marshes on Boot Island were also once drained and converted to agricultural land through the use of dykes and aboiteaux. Remnants of this dyke complex can be seen on Boot Island to this day.

The waters surrounding Boot Island are turbid, with a high silt load in suspension caused by the underlying sedimentary rock formations and high water volumes being moved by the tides (Desplanque and Mossman, 2004). This sediment has been deposited along the bay, providing an abundance of mud-flat habitat that is critical foraging habitat for migrating shorebirds (Hicklin, 1987). A variety of shorebird species utilize these mudflats; predominantly the Semipalmated Sandpiper (*Calidris pusilla*), which number in excess of 100 000 at major shorebird roosts at nearby Evangeline Beach and Blue Beach to the south (Mawhinney et al., 1993). Due to these significant shorebird concentrations, the Southern Bight of the Minas Basin was declared a Wetland of International Importance under the Ramsar Convention in 1987, and one year later on August 10, 1988, the same area was declared a Hemispheric Shorebird Reserve as part of the Western Hemisphere Shorebird Reserve Network.

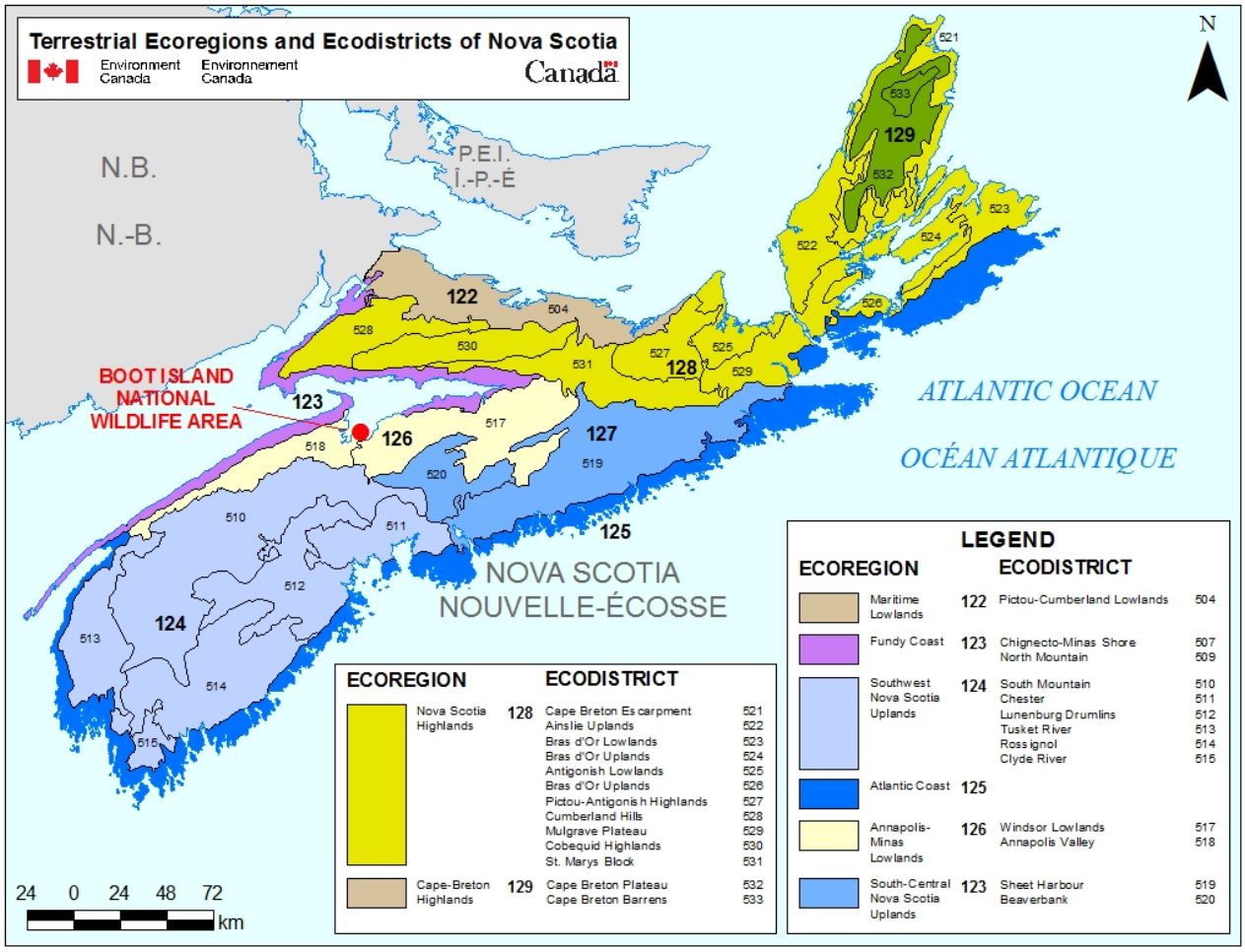

Figure 3: Terrestrial ecoregions and ecodistricts of Nova Scotia

Boot Island is in the Atlantic Maritime Ecozone, which includes all of New Brunswick, Prince Edward Island, Nova Scotia and Quebec's Gaspe Peninsula. Within this ecozone, Boot Island is situated within the Annapolis-Minas Lowlands Ecoregion and Annapolis Valley Ecodistrict (Webb and Marshall, 1999, P. 20–21) (Figure 3).

1.2 HISTORICAL BACKGROUND

Boot Island is believed to have received its name from early Acadian settlers who called the site "le bout" meaning the end. This presumably referred to the land mass that jutted out into the bay, the name ''le bout'' becoming anglicized to Boot (Mitcham, 1986). Boot Island was once connected to the mainland and was likely utilized by Acadian settlers in the late 17th and early 18th centuries. After the Acadian deportation in 1755, this area was settled by New England planters in the 1760s. The 1748 ''Morris'' map of the area clearly shows the island connected to present-day North Grand Pré by what appears to be salt marsh (Figure 4).

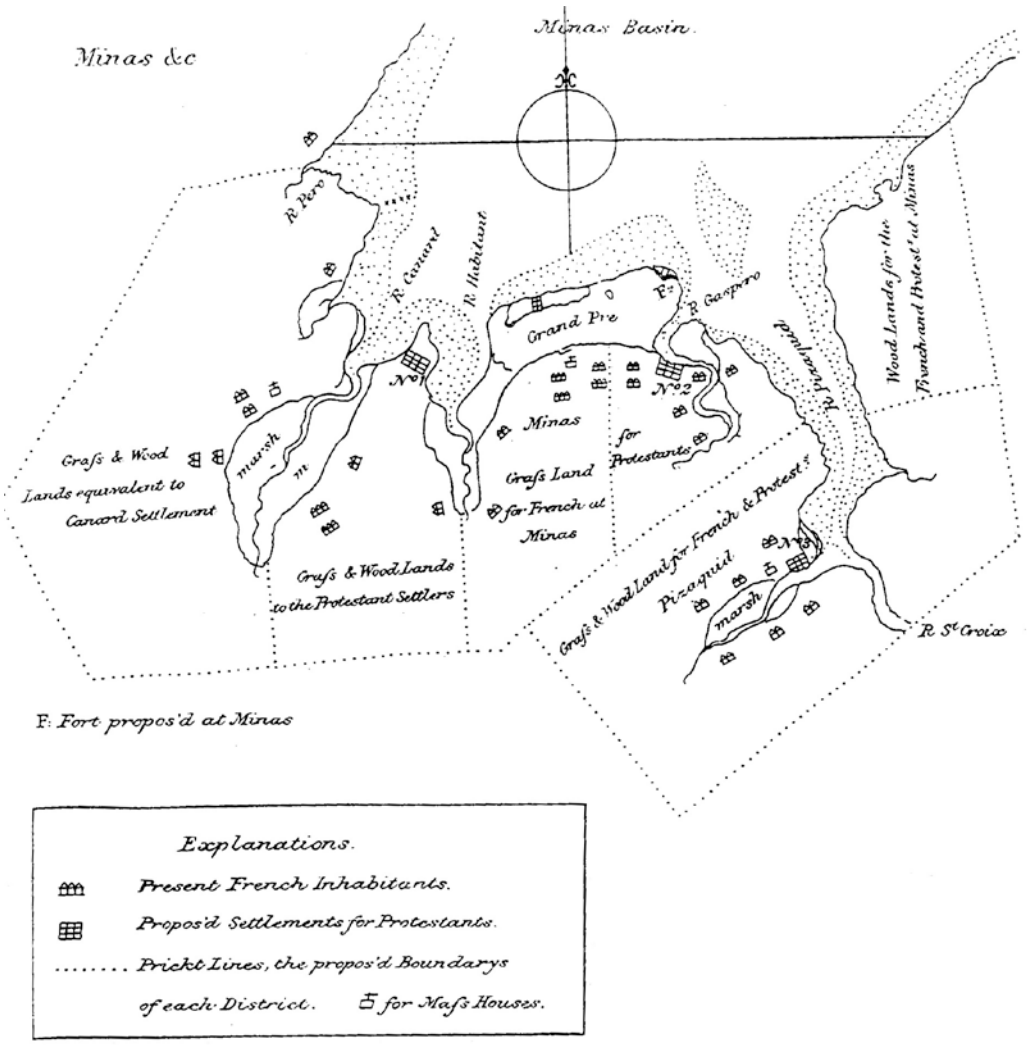

Figure 4: Map of Grand Pré and area, including Boot Island, by Charles Morris in 1748. Source: Canada. Sessional Papers, 3 George V, 1912, No. 29b, "Report of the Archives Branch for the Year 1912", Appendix H.

Although specific details are not known, earlier Aboriginal use would be expected, as one of the largest pre-historic settlement sites in Nova Scotia was situated at Melanson, just a few kilometres upriver from Boot Island (Nash and Stewart, 1990). By the mid-1800s, the island was mostly cut off from the mainland by erosion, as indicated on a map by A. F. Church (Figure 5 and 6); however, there was at least one house on the island at this time. On October 30, 1913, a severe storm destroyed many of the dykes on the Boot Island marsh. The damage caused by this storm ultimately resulted in the families' moving off the island in 1914 (Bleakney, 2004). However, two families (William Biggs and Fred Allen), who were new to the area, bought the island in 1915. The families moved to Boot Island and lived together in the substantial two-storey house located on the southeast side of Boot Island. They worked the land and rebuilt some of the dykes on the marsh, but hardships associated with living on an island forced them to move to the mainland (Mitcham, 1986).

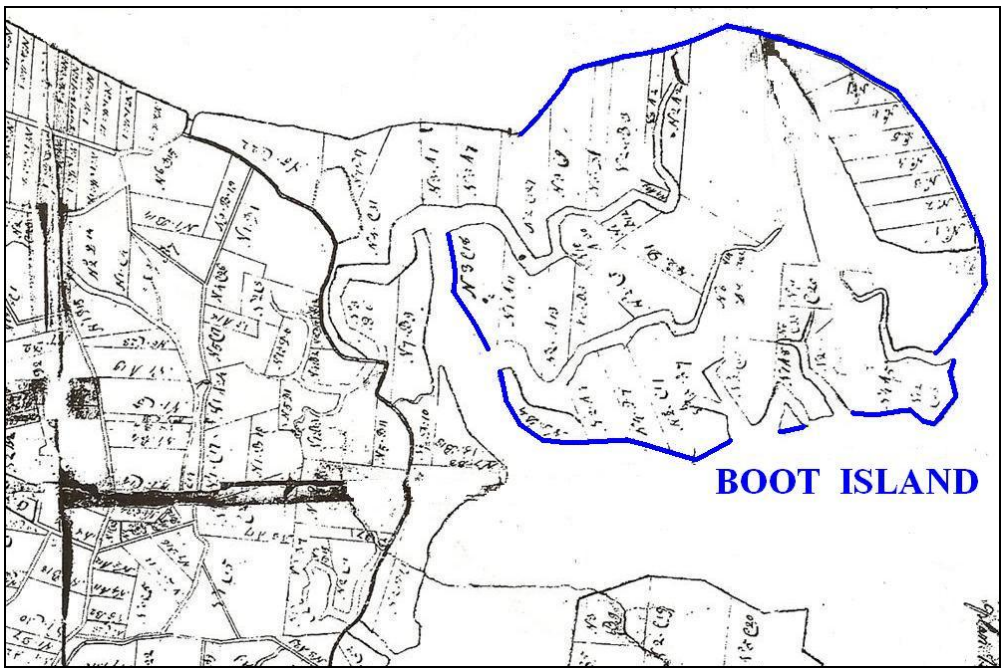

Figure 5: Survey plan of Boot Island and surroundings by John Harris in 1818. Note: At this time the "island" was connected to the mainland.

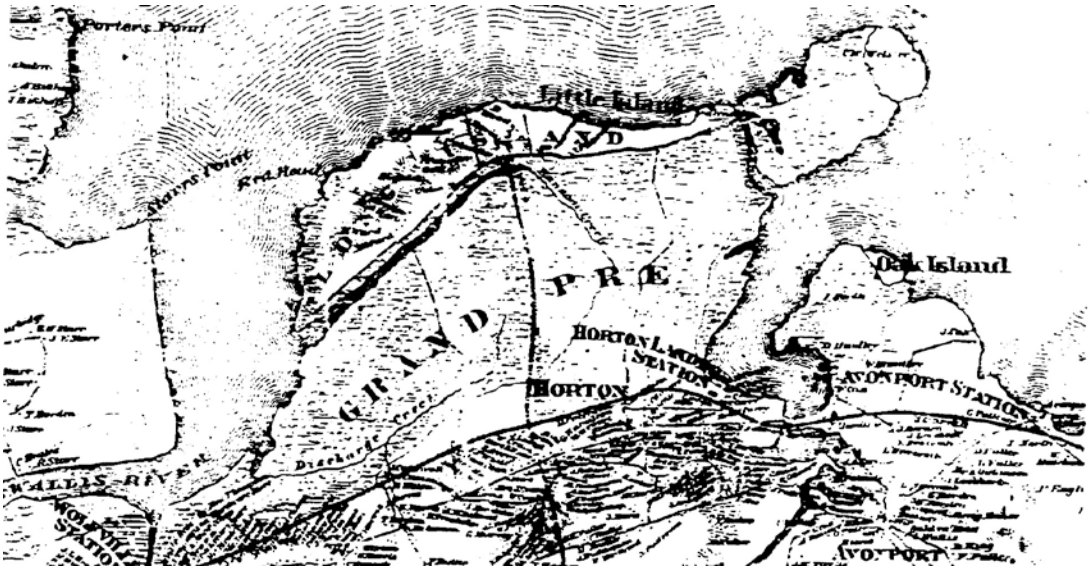

Figure 6: Grand Pré area and Boot Island in 1864. Source: A portion of a map of Kings County, Nova Scotia, by Ambrose F. Church, 1864.

The last family to reside on the island was that of Leon Card in the 1930s. Later owners of the island resided on the mainland. Even though the families had moved off Boot Island, the fields still provided valuable crop land, and farmers frequented the island to cut hay. It is believed that most agricultural use of Boot Island ended in the late 1930s. The old farm house was still standing in 1946 (Figure 7), and the fields have remained open. There has been some old field succession of mostly White Spruce (*Picea glauca*); however, the small forested area is quickly being diminished due to coastal erosion.

There are numerous accounts of the dangers encountered while travelling to and from the island by its residents and many visitors. Crossing at any time other than slack tide was, and continues to be, very dangerous, as the rising and falling tides rush in and out of the channel with great force. The channel, nicknamed ‘‘The Guzzle’’, reflects the loud noise of rushing water and the force associated with the changing tides.

Environment Canada’s Canadian Wildlife Service purchased the island from private interests in 1977 to manage it for wildlife. It was named the Boot Island National Wildlife Area under the *Wildlife Area Regulations* of the *Canada Wildlife Act* on November 8, 1979.

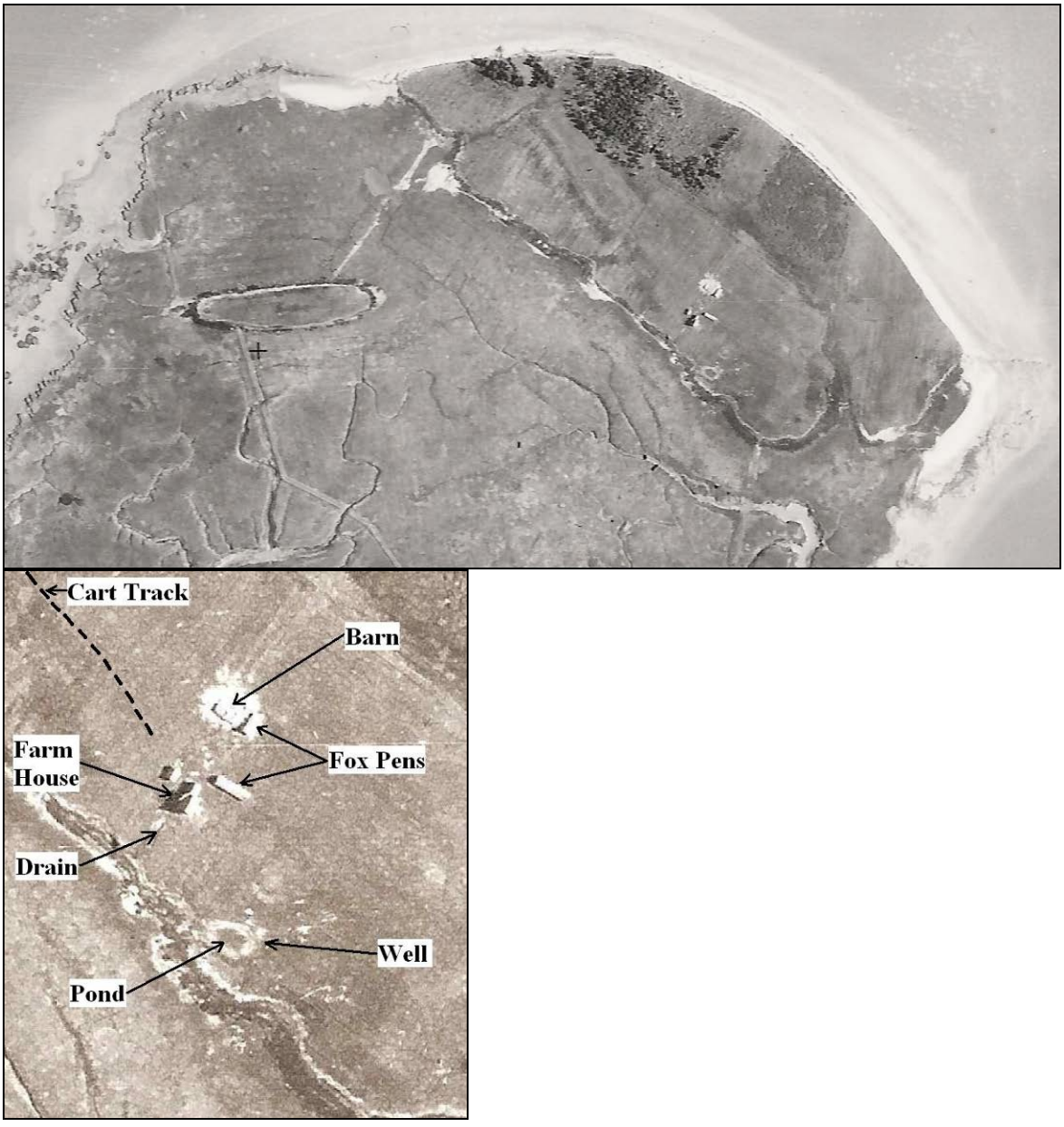

Figure 7: Aerial photograph of Boot Island, Nova Scotia, in 1946. For scale, use the fact that the small island (top photo) is about 190 m long. Photo: © Energy, Mines and Resources, Canada, A10178-5.

1.3 LAND OWNERSHIP

The entire upland and salt marsh portion of Boot Island NWA is owned and administered by the Government of Canada. The property boundary follows the mean ‘‘High Water’’ mark (Normal Tide) around the island. The federal government does not hold the sub-surface mineral rights for Boot Island NWA.

Regarding the adjacent area, Boot Island is completely surrounded by sub-tidal and intertidal waters that are un-deeded and thus held as provincial Crown land. The closest adjacent mainland (Grand Pré) is predominantly privately owned farms with a nearby heritage site (Grand Pré National Historic Site) administered by Parks Canada. The province of Nova Scotia also administers the Minas Basin (186 ha) and Dewey Creek (55 ha) Wildlife Management Areas protected under Schedules “A” and “B” of the *Lands and Forests Act* (1987).

1.4 FACILITIES AND INFRASTRUCTURE

There are no roads, trails or buildings on Boot Island NWA, thus the maintenance requirements are minimal. Visits every two years include site inspections and repairs and/or replacement of regulatory signage (boundary, public notice and 2’ x 4’ NWA identification sign).

Table 2. Facilities and infrastructure in Boot Island National Wildlife Area

Type of facility or infrastrucure	Size or quantity	Responsibility holder
Property boundary	4.75 km	Environment Canada – Canadian Wildlife Service
Boundary signs	10	Environment Canada – Canadian Wildlife Service
NWA entry signs	1	Environment Canada – Canadian Wildlife Service
Public Notice signs	2	Environment Canada – Canadian Wildlife Service
Erosion Monitoring Markers	8	Environment Canada – Canadian Wildlife Service

1.5 SOCIO-ECONOMIC ASSESSMENT

The island is not presently used for any commercial activity, and its isolated location discourages visitation. The waters around the island are used for sea kayaking. The area is also important for a baitworm and flounder fishery, and the Boot Island salt marsh is frequented by waterfowl hunters in the fall.

Although no specific socio-economic studies have been conducted regarding this protected area, more general surveys have highlighted the value placed by the Canadian public on habitat set aside for wildlife (Environment Canada, 1991).

2 ECOLOGICAL RESOURCES

2.1 TERRESTRIAL AND AQUATIC HABITATS

The upland section, on the basin side of Boot Island, is about 6 m above sea level (a.s.l.) and is former agricultural land. It is vegetated with a stand of dense White Spruce following the general line of the cliff face, with a shrub-grass cover protected behind this forested fringe. The salt marsh consists of fertile alluvial deposits, left by the receding silt-laden tidal waters of the Minas Basin (Roland, 1982). Typical salt marsh plant communities (Hanson, 2004) occur throughout the marsh, with Salt-Meadow Cordgrasses (*Spartina patens*) and Saltmarsh Cordgrass (*Spartina alterniflora*) being the dominant species. Twice daily, high tides fill the channel area at the mouth of the Gaspereau River as well as the numerous tidal streams that intersperse the marsh (Smith, 1967) (Figure 8). The ‘‘Boot’’ became an island when the salt marsh that once connected it to the mainland was cut through by the tides. This erosion process is continuing and is especially prevalent along the north shore of the island adjacent to the forest component. See Appendix I: Plant List for Boot Island National Wildlife Area 2010, 2010 for more information.

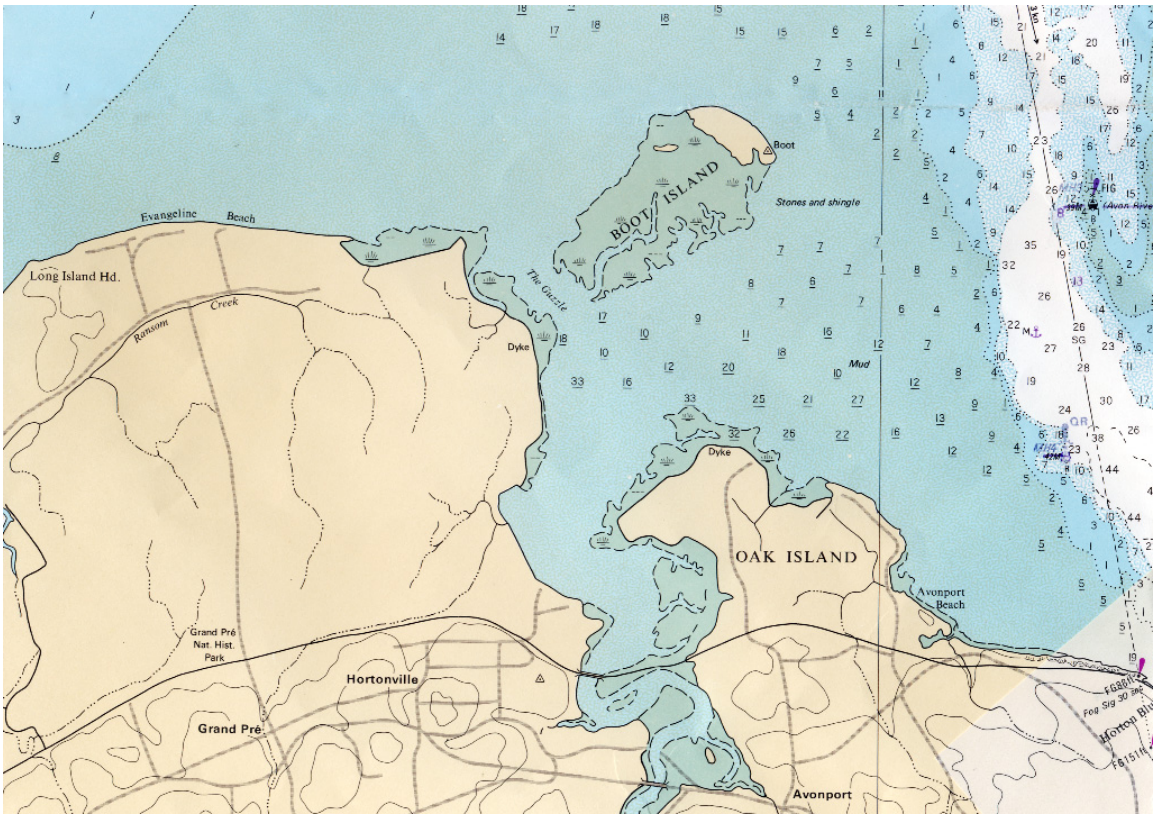

Figure 8: Nautical chart “Nova Scotia-Bay of Fundy, Avon River and Approaches No. 4140”, based on 1969 surveys, showing Boot Island and “The Guzzle”. Note: Soundings are in feet. Source: Canadian Hydrographic Service, 1982.

2.2 WILDLIFE SPECIES

2.2.1 Birds

The waters and tidal flats of the Minas Basin support a high diversity of migratory birds, especially shorebirds (Environment Canada and Nova Scotia Department of Natural Resources, 1994). Inspection reports document 30 species of birds on or around Boot Island (1984–2008) (Appendix II: Bird List for Boot Island National Wildlife Area). Four species of colonial birds have been noted as breeding on Boot Island, including Double-crested Cormorant, Great Blue Heron, Herring Gull and Great Black-backed Gull. The following is a summary of colonial bird nesting activity within the NWA.

1) **Double-crested Cormorant** – In 2008, 243 nests of Double-crested Cormorant were recorded on Boot Island. The colony has consistently been over 100 nests since 1984, with a peak of over 300 nests during 1996–2000. The nesting efforts of both this species and the Great Blue Heron have shortened the lifespan of many of the white spruce trees at the northern portion of the island due to feces (whitewash) on the vegetation (MacKinnon and Kennedy, 2006). At the rate the large trees are dying, the cormorants may at some point be forced to nest on the banks of the cliff, where they will be susceptible to mammalian predation (e.g. from coyotes and mink) (Figure 9 and Appendix IIIAppendix III: Summary of colonial nesting bird records (nest counts) for Boot Island National Wildlife Area, 1964 to 2008).

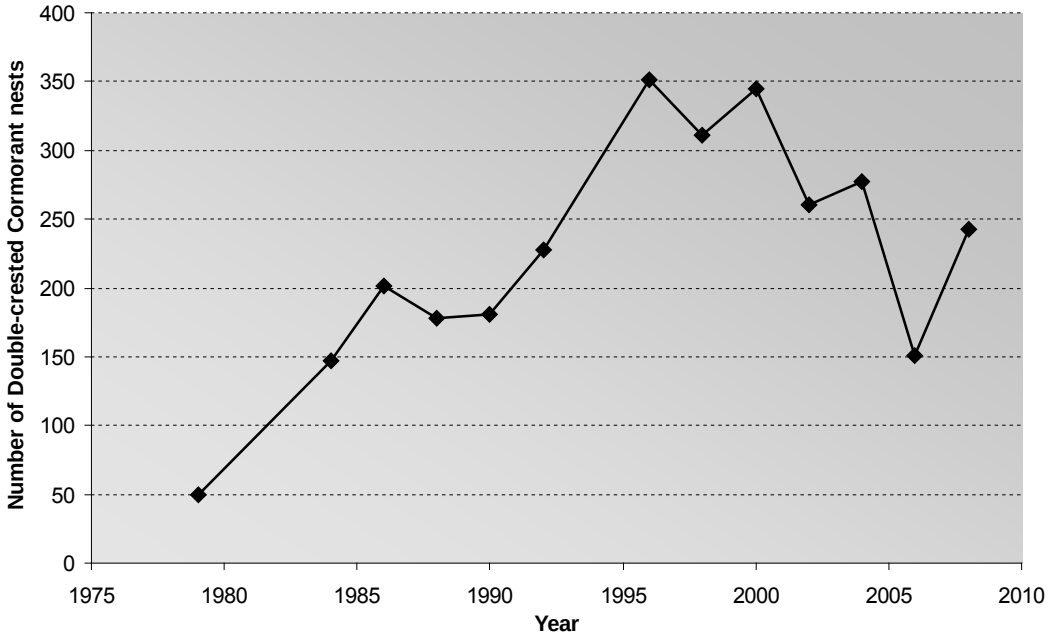

Figure 9: Number of Double-crested Cormorant nests in Boot Island National Wildlife Area

2) **Great Blue Heron** – In 2008, 52 nests of Great Blue Heron were recorded on Boot Island. Surveys have recorded close to 50 nests annually since 1984 (low of 44 nests in 1984 and high of 73 nests in 2002). As with the cormorants above, the rapid decline in the remaining trees on the island and the demand for nest sites will place additional pressures on these birds. Herons will nest on the ground (examples at Haley Lake Migratory Bird Sanctuary and Margaree Island NWA), but this is not generally a preferred site for nesting. The establishment of herons on Boot Island around 1964 was believed to have been from the desertion of a small mainland colony (no other details are known) (Figure 10 and Appendix II).

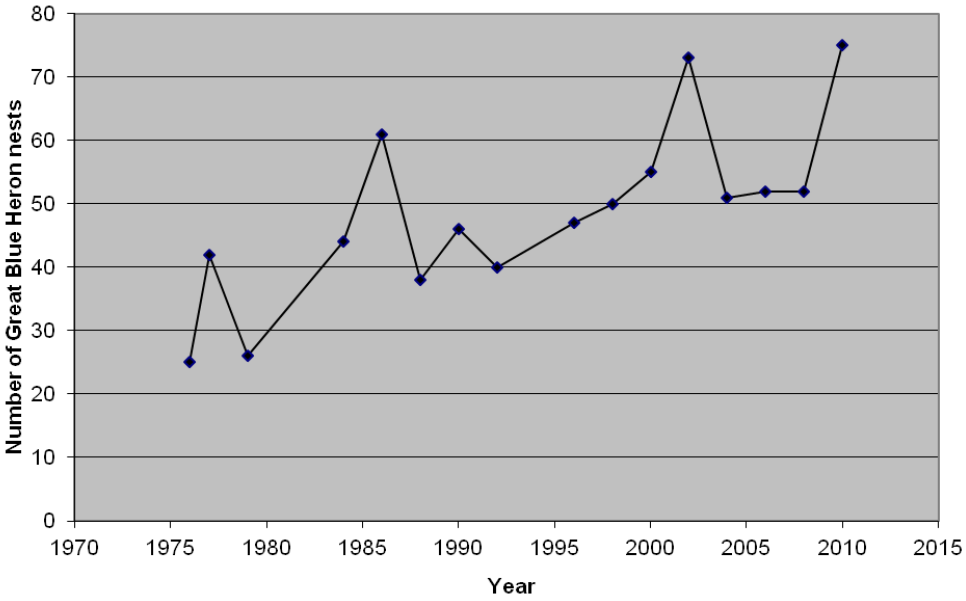

Figure 10: Number of Great Blue Heron nests in Boot Island National Wildlife Area

3) **Herring Gull** – The number of Herring Gull nests has declined from 600 nests in the mid-1980s to only 13 nests in 2008. Many factors may have contributed to this decline, including reduced food availability due to the closure of local open dumps, predation by coyote that frequent the island and pressures from the more aggressive Great Black-backed Gull that share the nesting space (Figure 11 and Appendix II).

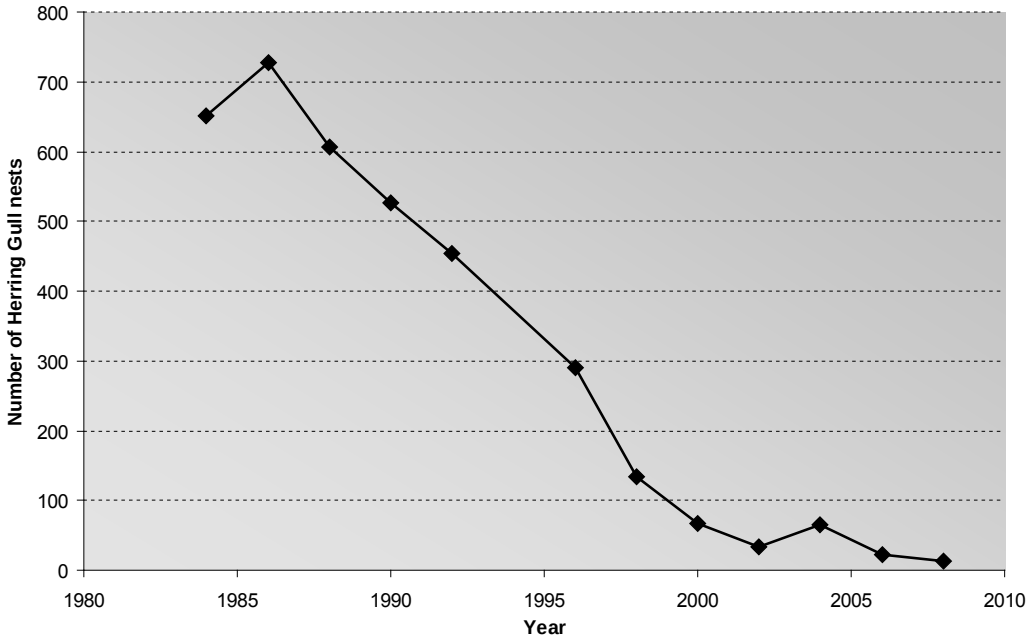

Figure 11: Number of Herring Gull nests in Boot Island National Wildlife Area

4) **Great Black-backed Gull** – The number of Great Black-backed Gull nests rose from 1005 in 1976 to around 1300 in 1984. Numbers then remained the same or slightly increased, to a peak of 1467 nests in 1992. Since 1998, nesting Great Black-backed Gull numbers have been in decline (though not nearly as drastically as that of the Herring Gull), with 998 nests recorded in 2008. Great Black-backed Gulls appear to be dominating much of the nesting habitat on Boot Island. This species nests in two separate colonies on Boot Island. One colony is spread throughout the main island. The other group is situated on a raised upland within the salt marsh, known as Cyril's Island (alternately "Little Boot Island") (Figure 12) (also see Appendix III: Summary of colonial nesting bird records (nest counts) for Boot Island National Wildlife Area, 1964 to 2008)**.**

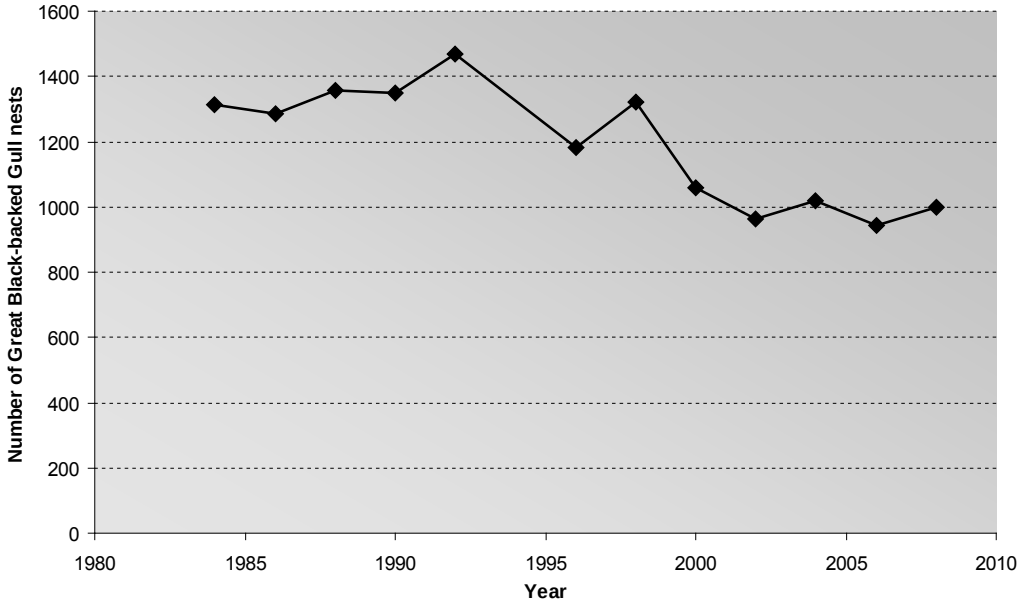

Figure 12: Number of Great Black-backed Gulls nests in Boot Island National Wildlife Area

Significant numbers of shorebirds frequent the Minas Basin in July and August every year as part of their southward migration (Elliot, 1977; Hicklin, 1981; Hicklin, 1984; Mawhinney, 1991; Gilliland, 1992; Mawhinney et al. 1993). One of the larger shorebird roosts is at Evangeline Beach, 3 km west of Boot Island. Although Boot Island is not immediately surrounded by extensive mudflats, large numbers of shorebirds utilize the island's intertidal creeks and salt marsh.

Bald Eagles are frequently observed on Boot Island, and in 2008 a newly active nest was discovered in the fringe of trees adjacent to the Great Blue Heron and Double-crested Cormorant colony.

The island is visited every two years to conduct site inspections. These inspections include a survey of colonial nesting birds (number of nests and adult birds). Rates of coastal erosion and other wildlife observations are also noted.

Other bird observations are summarised in Appendix II.

2.2.2 Mammals

Mammalian species on Boot Island include an abundance of the Meadow Vole (*Microtus pennsylvanica*) and a likely less-abundant and probably diminishing population of the Red-backed vole (*Clethrionomys gapperi*) as well as frequent foraging visits by Eastern Coyote (*Canis latrans*) and Mink (*Mustela vison*) during the summer months (MacKinnon et al., 2007). No other mammal species have been recorded.

2.2.3 Reptiles and Amphibians

No reptile or amphibian species have been documented at this site.

2.2.4 Fish

Numerous tidal creeks cut their way through the salt marsh portion of Boot Island. As well, tidal pools exist in the salt marsh at low tide. Typical salt marsh-tidal pool species expected to occur are Banded Killifish (*Fundulus majalis*) and Fourspine Stickleback (*Apeltes quadracus*).

2.3 SPECIES AT RISK

No species at risk breed on Boot Island, although the Peregrine Falcon (*Falco peregrinus*) is a spring and fall transient and there was one Piping Plover (*Charadrius melodus*) observation in May of 2006.

There are two species of plants worth noting: Big-leaf Marsh-elder (*Iva frutescens*) and American Sea-blite (*Suaeda calceoliformis*) (Newell et al., 2006) (Table 3). These species are uncommon in Canada but are frequently found in salt marshes in New England (Bertness, 2007).

Table 3: Rare plant species observed on Boot Island National Wildlife Area. Note: This table lists those species with an Atlantic Canada Conservation Data Centre (ACCDC) Sub-national (provincial) Rank of S3 or lower. Source: Newell et al., 2006.

Common and scientific names of the species	ACCDC Rank	Comments
Big-leaf Marsh-elder (*Iva frutescens*)	S2SE	A combination of two ranks indicates uncertainly about the exact rarity of the element. Here there seems to be uncertainty about whether this species is native or alien. If it is native, then it has a fairly significant rarity ranking. This species was found at two locations on Boot Island in the upper salt marsh.
American Sea-blite (*Suaeda calceoliformis*)	S2S3	This is a tentative identification. It is recommended that confirmation be obtained from a botanist with expertise in the Chenopodiaceae family (Goosefoot family). Plants believed to belong to this species were found on the sand beach near the east end of Boot Island.

3 MANAGEMENT CHALLENGES AND THREATS

A number of potential issues pertaining to the management of the Southern Bight Minas Basin Ramsar site have been outlined in the management plan for that site (Environment Canada and Nova Scotia Department of Natural Resources, 1994). As such, many of these factors have direct bearing on the successful management of Boot Island NWA. A summary of the more salient issues follow.

3.1 BAITWORM HARVESTING

The Bloodworm (*Glycera dibranchiate*) is a large polychaete worm that can reach a maximum length of 34 cm (Klawe and Dickie, 1957). This species is a favourite bait for saltwater sport fishing along the eastern coast of North America. The bloodworm is harvested by digging into the intertidal mudflats with a short-handled multi-pronged implement (a modified potato hack). The exposed bloodworm is then extracted. Using this method, many hectares of flats are turned over every year, and some bloodworm populations in the United States have been decimated this way. Currently harvest pressures appear to be at a manageable level, and the area around Boot Island is closed to baitworm harvesting (Environment Canada and Nova Scotia Department of Natural Resources, 1994; Shepherd, 1994; Westhead, 2005; DFO, 2009). In past years, Boot Island was used as a base camp for some baitworm harvesting.

3.2 TOURISM

Sea kayaking is a rapidly growing recreation activity. More and more, unique and previously inaccessible areas are being promoted for day adventure opportunities; either as guided tours or in tourism promotion material. The waters around Boot Island are promoted as an area for sea kayaking, although the frequency or duration of the activity near Boot Island is not presently known. Evidence of temporary picnicking and camping at the island's boat landing area suggests some use over the summer months. Given that the entire upland portion of the island is occupied by colonial nesting birds, any prolonged visits to the island or boating close to the cliffs adjacent to the heron colony is likely to cause significant disturbance to the birds. Great Blue Herons, for example, will readily desert not just their nests, but sometimes the entire colony due to such disturbances.

In addition, the undeveloped nature of Boot Island as a protected area provides the greatest benefit as habitat for colonial nesting birds.

3.3 TIDAL POWER

There is currently renewed interest in developing tidal power production in the Bay of Fundy. Research in the 1970s suggested concerns caused by this technology, as earlier plans included full tidal barriers (Smith and Hicklin, 1984). Current proposals are considered to have less potential

impact compared with earlier technologies, as they are in-flow devices; however, actual impacts on the mudflats or adjacent wetlands require additional study (Isaacman and Daborn, 2011).

3.4 COASTAL EROSION AND HABITAT LOSS

Boot Island was once connected to the mainland via a salt marsh to the east of North Grand Pré. A channel, now known as ‘‘The Guzzle’’, eventually eroded through this marsh, thus forming the island. Shoreline loss is still occurring at a considerable rate, as evident by comparing the 1946 and 2002 aerial photographs (Figure 13). The long, sinuous channel on the west side of the marsh in 1946 was completely gone by 2002. The area to the immediate north of Cyril’s Island has dramatically changed shape. Furthermore, the seaward side of the upland portion of the Main Island has also receded, although the general ‘‘crescent’’ shape remains unchanged.

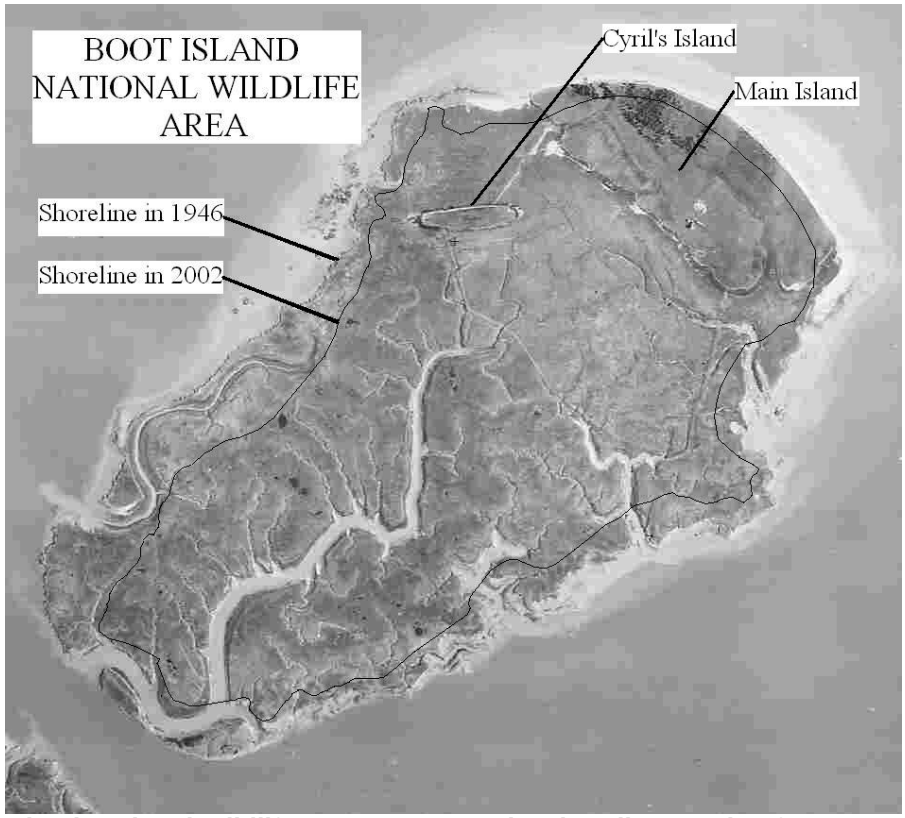

Figure 13: Boot Island National Wildlife Area, Nova Scotia, shoreline erosion from 1946 to 2002. Aerial photograph 1946, Energy, Mines and Resources, Canada, A10178-5.

As the herons and cormorants nest in the wooded area immediately adjacent to the eroding cliffs, this loss of land has also meant loss of habitat. The upland fields have shown little or no forest succession, such that the rate of woodland loss far exceeds the replacement rate. The erosion rates across the northern portion of the island vary annually and spatially (Table 4 and Figure 14). The western end of the island has experienced an average shoreline retreat of 1.0–1.3 m/year while, for the eastern portion it has been less at 0.7–1.0 m/year (1992–2008). The range of erosion rates may reflect the direction of prevailing winds and storm events, which have the greatest impact on the island (Figure 15).

Table 4: Measurements of coastal erosion at Boot Island National Wildlife Area, 1992–2008. Note: See Figure 14 for transect locations.

Survey marker		Distance from survey marker to cliff face (m)									
No.	**Name**	**1992**	**1996**	**1998**	**2000**	**2002**	**2004**	**2006**	**2008**	**Total change 1992 to 2008**	**Average change per year**
1	Field	26.9	22.4	21.1	19.4	18.4	17.9	16.5	15.3	11.6	0.7
2	Field Edge	31.1	27.1	25.5	24.7	22.3	22.1	20.1	20.1	11.0	0.7
3	Outhouse	30.1	24.5	23.3	19.2	19.1	16.7	14.9	12.8	17.3	1.1
4	Gap	38.1	33.4	31.6	29.6	29.1	25.3	NR	21.7	16.4	1.0
5	Forest	26.1	22.4	20.4	17.0	17.0	15.0	13.7	11.0	15.1	0.9
6	Old Chair (Blow-down)	26.7	20.3	17.5	15.0	12.8	9.8	8.3	6.7	20	1.3
7	Open Glade	23.5	16.4	13.4	11.9	9.5	7.6	6.6	4.2	19.3	1.2
8	End of Island	25.3	17.5	15.2	14.8	9.6	8.5	5.5	4.1	21.2	1.3

NR = not recorded

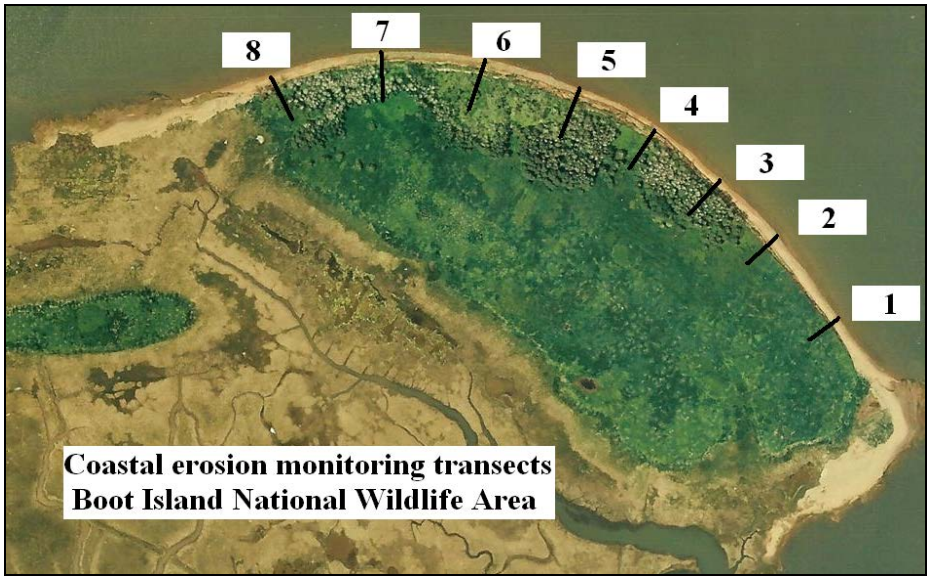

Figure 14: Location of control points 1 to 8, coastal erosion transects, Boot Island National Wildlife Area, Nova Scotia. Photo: 1992 Photo No. 92305-86, 21H/1, 92-06-18.

Figure 15: Erosion "terracing" on Boot Island National Wildlife Area, 2008. © Environment Canada, photo: C. MacKinnon.

The wooded interior of the island exhibits a high rate of change, mostly as a result of the guano and fish offal from the herons and cormorants, which kills the trees. The wooded area is also the most vulnerable to erosion. The forest stretches for about 450–500 m along the northernmost edge of the island adjacent to the cliffs. However, the width of the treed area only averages about 55 m (with wider portions up to 80 m) (Figure 16). Based on a ''worst case scenario'' (transect number 8, 1.4 m of erosion/year), the entire wooded area, which supports the herons and cormorants, could be gone in 40 to 60 years.

Figure 16: Boot Island uplands and nearby "Cyril's Island". Photo: 1977 Photo No. A-77301–61, 21H/1 W, 3-7-77.

3.5 PREDICTED CLIMATE CHANGE IMPACTS

The climate of Boot Island is classified in the Atlantic zone and is located in the Atlantic Maritime ecozone and the Annapolis-Minas Lowlands ecoregion. The climate within this ecoregion is strongly influenced by the Atlantic Ocean. High winds, high humidity and fog are characteristic of the summer and fall months. The region usually has cool, wet summers and mild, wet winters. Mean annual temperature is close to 6°C, with a mean summer temperature of 14.5°C and a mean winter temperature of -3°C. Mean annual precipitation amounts range from 1100 to 1400 mm. Tidal ranges of approximately 10 m occur in this portion of the Minas Basin. Recent analyses suggests that the regional climate will be shifting towards warmer winters and warmer summer nights, with mean annual temperature rising from 6ºC to 10ºC (Adam Fenech UPEI, unpubl. data).

Since 1992, the Canadian Wildlife Service has been monitoring the rate of erosion along the northwest and northeast face of the cliffs on Boot Island, with annual loss being about 1 m per year (Table 4). The rate of erosion appears to be more prevalent along the northwest side, where the island may be more exposed to storms and severe weather. However, a comparison of aerial photographs from 1946 to 2002 shows a significant reduction in the size of the island from all directions (Figure 13).

Most areas of the upper Bay of Fundy have experienced sea-level rise (combined with coastal subsidence) of approximately 13 m over the past 4000–5000 years (Shaw, 1998). A current estimate of crustal subsidence for the upper Bay of Fundy is 20 cm/100 yrs (Koohzare, 2005) with climate-induced changes of sea-level rise reported to be 90 cm/100 yrs based on current green-house gas emissions (Rahmstorf, 2007). As sea-level rise occurs, Boot Island is likely to experience increased erosion along the upland portion of the island.

4 GOALS AND OBJECTIVES

4.1 VISION

The long-term vision for Boot Island NWA is conservation through the maintenance of habitat for native wildlife and plants, with priority being given to the island's colonial nesting birds.

4.2 GOALS AND OBJECTIVES

Boot Island NWA was established to provide protection for the varied bird habitats within this coastal site. This goal is in accordance with A Wildlife Policy for Canada (Environment Canada, 1990). This policy states that the goal for a NWA is: "… to maintain and enhance the health and diversity of Canada's wildlife, for its own sake and for the benefit of present and future generations."

At the international level, Boot Island NWA is classified under the International Union for the Conservation of Nature criteria for protected areas as a Category IV Protected Area. The site is protected for the preservation of species and genetic diversity and scientific monitoring and research. It is not promoted as a tourism destination or for on-site public education. Public visitation, although not promoted, is not discouraged outside of the colonial bird nesting season, and some traditional activities are allowed.

Currently, the primary management goal for Boot Island NWA is to ensure that the colonial birds and other wildlife that nest or reside there are protected from outside disturbances, such that the potential for natural biological processes are maximized.

The specific goals and objectives are:

Goal 1. Habitat necessary to sustain populations of colonial nesting seabirds will be maintained.

a. Objective: Forest habitats will be maintained so that populations of migratory birds nesting in this habitat are sustained and/or residences and habitats are created, restored, or maintained through active management. Remediate forest habitat loss from coastal erosion by planting White Spruce so that nesting area for colonial birds does not decrease in extent. An additional two hectares of new forested habitat will be planted by 2025.

4.3 EVALUATION

Annual monitoring will be performed within the limits imposed by the availability of financial and human resources. The management plan will be reviewed 5 years after its initial approval, and reviewed and updated 10 years after that. The evaluation will take the form of an annual review of monitoring data obtained from the monitoring and research projects outlined below. This monitoring will be used to establish priorities for action and to allocate resources.

The management goal for Boot Island will be met and continuously evaluated through a long-term monitoring program, which incorporates field visits every two years. These data and

information collected will be incorporated into broader species conservation initiatives and will be incorporated into revisions of this management plan where and when appropriate or required. A major addition of new information may be appended to the document (as required), to assist in site management and decision making.

Table 5: Management approaches for Boot Island National Wildlife Area

Management challenges and Threats	Goals and objectives	Management approaches
Shoreline loss is occurring at a considerable rate, causing significant loss in marsh and forested habitats for nesting birds: • Forest loss due to nesting activities of Double Crested-Cormorants and Great Blue Herons is additional to erosion losses. The entire wooded area could be gone in 40 to 60 years. • Predicted climate change is anticipated to accelerate shoreline erosion.	1.1. a) retain a forested component on Boot Island NWA for colonial nesting birds (specifically Double-crested Cormorant and Great Blue Heron).	• Reforestation of 2 ha of early succession fields (abandoned farm land) in compensation for forest loss due to erosion. A small-scale tree planting of salt-tolerant White Spruce (*Picea glauca*) has been implemented downslope from the eroding cliff face (~300 trees per site inspection). Monitoring: • Coastal erosion monitoring stations have been established on Boot Island to measure the rate of loss. • Periodic aerial photography over the past 65 years allows for a comparison and evaluation of the rate of change, due to erosion, of Boot Island.

5 MANAGEMENT APPROACHES

This section and Table 5 contain a description of all of the possible approaches that could be used in the management of Boot Island NWA. However, management actions will be determined during the annual work planning process and implemented as human and financial resources allow.

The major threat, overall, to the island is sea-level rise and a subsequent increase of erosion rates. Any protection against this coastal erosion is cost-prohibitive as well as debatable in terms of its effectiveness. Hence, management activities will focus on elements that can be addressed efficiently with limited resources.

5.1 HABITAT MANAGEMENT

The recent decline in the forested area of the island, partly from erosion and partly due to trees being killed by nesting birds, is the most pressing threat. To partially remediate this loss, limited planting of salt-tolerant White Spruce (*Picea glauca*) seedlings has been implemented downslope from the eroding cliff face (~300 trees per site inspection). At present, planting of seedlings is having limited success, as the young trees are frequently being clipped and used as nest material by Great Black-backed Gull.

5.2 ALIEN AND INVASIVE PLANTS

Non-native plants on the island have been present since colonization and are generally not invasive, which is why these naturalized species are considered separate from more recent arrivals of ‘‘alien’’ and ‘‘invasive’’ plant species. On Boot Island NWA, there are no significant threats from alien or invasive plant species as of 2010. Monitoring activities are sufficient to detect the presence of alien and invasive plant species.

Additional information on plant community was gathered by Newell et al. (2006), who compared the relative number of native and non-native plant species in different habitats of Boot Island NWA. The various salt marsh habitats retained 100% of their composition as native plant species, while the uplands, especially cliff habitats, showed a greater composition of non-native plant species (Table6).

Table 6: Percentage of alien or non-native plant species occurring within each habitat type on Boot Island (Newell et al., 2006)

Sand beach	Wooded upland	Open upland (field)	“Island” upland	Bank (cliff) face	Upper salt marsh	Middle salt marsh	Lower salt marsh (intertidal)	Tidal pools and barachois pond
22.7%	27.3%	35.1%	28.6%	51.4%	4.5%	0%	0%	0%

5.3 WILDLIFE MANAGEMENT

5.3.1 Species at Risk

There are now a number of active nest sites for Peregrine Falcon in the upper Bay of Fundy following a successful re-introduction program in the 1980s. Important shorebird concentration areas, such as Boot Island, are frequently visited by foraging falcons. No specific management action is required.

5.4 MONITORING

Boot Island NWA will be visited every 2 years for monitoring purposes due to its remoteness and limited opportunities for safe access. Corresponding to the outlined goals and objectives above, these site inspections will include monitoring coastal erosion rates (objective 1.1) as well as biological monitoring (wildlife populations with a focus on the colonial birds). During the inspections, observations of other changes in habitat, such as changes in plant composition of the nesting habitat due to native, non-native, alien and invasive plant species will be recorded. Large changes to the island (size and vegetation loss) can be monitored remotely using aerial photography obtained by Service Nova Scotia every 10 years (sub-goal 1.1).

Boot Island has little public use/visitation, and visitation during the seabird nesting season is not encouraged. Furthermore, there are no facilities of any kind on the island, so any formal management requirements would be directed to curtailing unwanted or undesirable public use. The ongoing site inspection schedule, which includes placement or replacement of National Wildlife Area regulatory signage, is presently adequate to monitor the island.

5.5 RESEARCH

Research activities will be considered for permitting when the results obtained through research have the potential for the following:

1. Increasing knowledge with respect to forage resource available and influence on populations of colonial nesting seabirds;
2. Increasing knowledge of impacts of sea-level rise on coastal erosion rates and potential adaptation strategies.

To request a permit to conduct research in Boot Island NWA and to obtain more information, please contact:

National Wildlife Area – Permit Request
Environment Canada, Canadian Wildlife Service
17 Waterfowl Lane, P.O. Box 6227
Sackville NB E4L 1G6

Permit requests should be directed to Permi.Atl@ec.gc.ca.

5.6 PUBLIC INFORMATION AND OUTREACH

The unique character of Boot Island and its significance as a bird colony require public education and awareness ‘‘at a distance’’. The Canadian Wildlife Service Protected Areas website will provide written information on this NWA as well as visual representations of the ecological resources and physical character of the site.

6 AUTHORIZATIONS AND PROHIBITIONS

In the interest of wildlife and their environment, human activities are minimized and controlled in NWAs through the implementation of the *Wildlife Area Regulations*. These regulations set out activities that are prohibited (subsection 3(1)) in the wildlife area and provide mechanisms for the Minister of the Environment to authorize certain activities to take place in NWAs that are otherwise considered prohibited. The regulations also provide the authority for the Minister to prohibit entry into NWAs.

Activities within an NWA are authorized where notices have been posted at the entrance to or along the boundaries of the NWA or when notices have been published in local newspapers. All activities in an NWA are prohibited unless a notice has been posted or published authorizing the activity to take place. However, in addition to notices, certain activities may be authorized by obtaining a permit from the Minister of the Environment.

6.1 PROHIBITION OF ENTRY

Under the *Wildlife Area Regulations*, the Minister may issue a notice that will be published in a local newspaper or posted at the entrance of any wildlife area or on the boundary of any part thereof prohibiting entry to any wildlife area or part thereof. Such a notice can be issued when the Minister is of the opinion that entry is a public health and safety concern or may disturb wildlife and their habitats.

For Boot Island NWA, entry is allowed without a permit.

Note: If there is a discrepancy between the information presented in this document and the notice, the notice prevails, as it is the legal instrument prohibiting entry.

6.2 AUTHORIZED ACTIVITIES

For Boot Island NWA, the notice authorizing the following activities will be posted at the boat landing (eastern beach) in concert with an identification sign (2’ x 4’ NWA sign).

The following activities are authorized by notice for Boot Island NWA:

- hunting
- fishing
- trapping
- wildlife observation
- canoeing
- hiking
- skiing

- skating
- snowshoeing
- photography
- berry picking

Notes:

- Provincial and federal permits, limits, and ‘‘seasons’’ apply for hunting, fishing and trapping.
- If there is a discrepancy between the information presented in this document and the notice, the notice prevails, as it is the legal instrument authorizing the activity.

Applicable conditions for allowed activities correspond to the management vision for the Boot Island, i.e.: to maintain and enhance habitat for native wildlife and plants with priority being given to the island’s colonial nesting birds.

6.3 AUTHORIZATIONS

Permits and notices authorizing an activity may be issued only if the Minister is of the opinion that the activity is scientific research relating to wildlife or habitat conservation, or the activity benefits the wildlife and their habitats or will contribute to wildlife conservation, or the activity is not inconsistent with the most recent management plan. These conditions must be met before the Minister will consider authorizing a prohibited activity.

The Minister may also add terms and conditions to permits and authorizations in order to minimize the impact of an activity on wildlife and their habitat.

All requests for permits or authorizations must be made (in writing) to the following address:

Environment Canada – Canadian Wildlife Service
National Wildlife Area – Permit Request
17 Waterfowl Lane, P.O. Box 6227
Sackville NB E4L 1G6

For further information, please consult the Policy when Considering Permitting or Authorizing Prohibited Activities in Protected Areas Designated Under the *Canada Wildlife Act* and *Migratory Bird Convention Act, 1994* (December 2011). This Environment Canada policy document is available on the Protected Areas website at www.ec.gc.ca/ap-pa.

6.4 EXCEPTIONS

The following activities will be exempt from the requirements for permitting and authorizations:

- Activities related to public safety, health or national security, that are authorized by or under another Act of Parliament or activities that are authorized under the *Health of Animals Act* and the *Plant Protection Act* to protect the health of animals and plants;
- Activities related to routine maintenance of NWAs, to the implementation of management plans, and enforcement activities conducted by an officer or employee of Environment Canada.

6.5 OTHER FEDERAL AND PROVINCIAL AUTHORIZATIONS

Depending on the type of activity, other federal or provincial permits may be required to undertake an activity in the Boot Island NWA. Contact your regional federal and provincial permitting office for more information.

National Wildlife Area – Permit Request
Environment Canada, Canadian Wildlife Service
17 Waterfowl Lane, P.O. Box 6227
Sackville, NB E4L 1G6

Province of Nova Scotia
Department of Natural Resources
Fish and Wildlife Division
136 Exhibition Street
Kentville NS B4N 4E5

7 HEALTH AND SAFETY

Any environmental emergency pertaining to Boot Island NWA should be reported to:

Maritimes Regional Office
Canadian Coast Guard
Fisheries and Oceans Canada
Telephone: 902-426-6030 or 1-800-565-1633

Non-emergency issues related to security or health and safety issues for Boot Island NWA should be reported to:

Environment Canada, Canadian Wildlife Service
17 Waterfowl Lane, P.O. Box 6227
Sackville NB E4L 1G6
Telephone: 506-364-5044

All reasonable efforts will be made to protect the health and safety of the public, including adequately informing visitors of any known or anticipated hazards or risks. Further, Environment Canada staff will take all reasonable and necessary precautions to protect their own health and assure safety as well as that of their co-workers. However, visitors (including researchers and contractors) must make all reasonable efforts to inform themselves of risks and hazards and must be prepared and self-sufficient. Natural areas contain some inherent dangers, and proper precautions must be taken by visitors, recognizing that Environment Canada staff neither regularly patrol nor offer services for visitor safety in NWAs.

Offshore islands, and activities along the seacoast in general, present issues of safety. In general, the public must seek and heed expertise to operate in these environments and obtain specialized training and certification, where required.

Boot Island NWA has no point of designated public access. Boot Island is remote, with no permanent staff. Any emergency should be reported immediately to the appropriate responding authorities. The report should include date, time and nature of the incident/accident, who is reporting, contact information of the reporting party (for follow-up information), and all relevant details. Multiple authorities should be advised, if the situation warrants, as soon as possible (Table 7).

Table 7: Emergency contact information for Boot Island National Wildlife Area

Emergency contacts for Boot Island NWA, Nova Scotia	
Any life-threatening emergency	911
Police-Fire-Ambulance	911
Royal Canadian Mounted Police (RCMP), Wolfville detachment	1-902-542-3817
Rescue Coordination Centre to report air and marine emergencies	1-800-565-1582
Environmental emergencies (oil, pesticide, chemical spills)	1-800-565-1633
Environment Canada – Wildlife Enforcement Division	1-506-364-5036
Environment Canada – Canadian Wildlife Service	1-506-364-5044
Nova Scotia Department of Natural Resources	1-800-565-2224

8 ENFORCEMENT

To promote compliance with the *Canada Wildlife Act* and *Wildlife Area Regulations*, Environment Canada, Canadian Wildlife Service posts signs along the NWA boundaries and at main access points that identify what activities are authorized within each NWA and any conditions on those activities.

Environment Canada's Wildlife Enforcement Division (EC-WED) is responsible for enforcement of federal and provincial wildlife laws, and will perform on-site inspections and investigations, patrol the NWA to promote compliance, and prevent prohibited uses within the NWA.

EC-WED officers monitor compliance with the *Canada Wildlife Act, Wildlife Area Regulations,* the *Migratory Birds Convention Act, 1994,* the *Species at Risk Act,* and the provincial *Wildlife Act, 1989* on an ongoing basis and will initiate investigations when required. EC-WED officers will respond to violations and take appropriate enforcement actions. CWS Atlantic staff provides details from site inspections that may require investigation.

9 PLAN IMPLEMENTATION

The management plan will be implemented over a 10-year period. Annual work plans will be developed in accordance with priorities and budgets, and the details of management plan implementation will be developed through Environment Canada's annual work planning process and will be implemented as human and financial resources allow. An adaptive management approach will be favoured for the implementation of the management plan. The implementation of the plan will be evaluated 5 years after its publication, on the basis of the actions identified in Table 5.

9.1 MANAGEMENT AUTHORITY AND MANDATE

Environment Canada, Canadian Wildlife Service – Atlantic is responsible for site management of Boot Island NWA.

9.2 MANAGEMENT PLAN REVIEW

Evaluation will take the form of a review of data obtained from the monitoring, surveys, and research projects and collaborative agreements outlined below. Monitoring and surveys at Boot Island NWA will be performed every two years within the limits imposed by financial and human resources. The data collected will be reviewed and be used to inform future management at the NWA. Furthermore, these data will be used to evaluate federal contributions towards accomplishing the mandates specific to Environment Canada for which the protected area was established.

This management plan will be reviewed 5 years after its formal approval by Environment Canada, Canadian Wildlife Service and every 10 years thereafter.

Additions of new information may be appended to the document as required to aid in site management and decision-making.

Table 8: Implementation Strategy 2014–2023 for Boot Island National Wildlife Area

	Year									
Activity	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Site inspection		x		x		x		x		x
Colonial bird census		x		x		x		x		x
Coastal erosion monitoring		x		x		x		x		x
Tree planting		x		x		x		x		x

10 COLLABORATORS

There are no formal arrangements with collaborators or partners pertaining to the management or administration of Boot Island NWA. There are other government agencies and organizations that have interests and mandates consistent with the management vision and objectives for Boot Island NWA.

The Grand Pré dykelands and surrounding area, centred on the Parks Canada site at Grand Pré, are being proposed as a World Heritage Cultural Landscape under UNESCO (UNESCO, 2009). As such, Boot Island may be included within this jurisdiction and indirectly subject to visitation and/or tourism pressures. Parks Canada has been advised of the protected status of Boot Island as well as the wildlife resources protected there.

Close working relationships are also maintained with the Nova Scotia Department of Natural Resources – Wildlife Division with frequent data and information sharing as it pertains to Boot Island.

The Blomidon Naturalist Club has frequently expressed the desire of its members to be kept advised of the status of bird numbers on Boot Island, and this information is readily provided by Environment Canada, Canadian Wildlife Service on the completion of each inspection visit.

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APPENDIX I: PLANT LIST FOR BOOT ISLAND NATIONAL WILDLIFE AREA 2010

Source: Scientific and English common names from Roland and Smith, 1969; French common names from Marie-Victorin, 1964.

Table 9: Plant List for Boot Island National Wildlife Area, 2010

Scientific names	Common English	Common French	Atlantic Canada – Conservation Data Centre – Provincial Status Rank
Aanaphalis margaritacea	Pearly Everlasting	Immortelle	S5
Abies balsamea	Balsam Fir	Sapin baumier	S5
Acer rubrum	Red Maple	Érable rouge	S5
Agrostis alba	Red – top	Agrostis géant	
Agrostis scabra	Ticklegrass or Hairgrass	Foin fou	
Agrostis stolonifera	Spreading Bentgrass	Agrostide stolonifère	S5SE
Agrostis capillaris	Colonial Bentgrass	Agrostide ténue	SE
Achilea millefolium	Common Yarrow	Herb à dindes	
Alopecurus pratensis	Meadow Foxtail	Vulpin des prés	SE
Amaranthus retroflexus	Red-root Amaranth	Amarante réfléchie	SE
Ambrosia artemislifolia	Annual Ragweed	Ambroisie annuelle	S5
Ammophila breviligulata	American Beachgrass	Gourbet	S5
Anthemis cotula	Mayweed	Camomille puante	SE
Anthoxanthum odoratum	Sweet Vernalgrass	Flouve odorante	SE
Arctium minus	Lesser Burdock	Petite bardane	SE
Arenaria lateriflora	Blunt-leaved sandwort	Sabline latériflore	
Argentina egedii (*Potentilla egedii*)	Egede Cinquefoil	Argentine egede	S4S5
Aster acuminatus (*Oclemena acuminata*)	Whorled Aster	Aster acuminé	S5
Aster lateriflorus	Calico Aster	Aster lateriflore	
Aster novi – belgii (Symphyotrichum novi-belgii)	New Belgium Aster New York Aster	Aster de la Nouvelle Belgique	S5
Atriplex patula	Halberd-Leaf Saltbush	Arroche étalée	SE
Atriplex prostrata	Creeping Saltbush	Arroche hastée	S5
Betula papyrifera	White/Canoe/Paper Birch	Bouleau blanc	S5

Scientific names	Common English	Common French	Atlantic Canada – Conservation Data Centre – Provincial Status Rank
Cakile edentula	Sea-Kale	Caquillier édentulé	S5
Calamagrostis canadensis	Blue-joint	Foin bleu	S5
Carex nigra	Black Sedge	Teigne	S5
Carex paleacea	Chaffy Sedge	Carex paléacé	S5
Carex scoparia	Pointed Broom Sedge	Carex à balais	S5
Carex silicea	Sea-Beach Sedge	Carex silicicole	S4S5
Carum carvi	Common Caraway	Anis canadien	SE
Ceratodon purpureus	Fire Moss		
Cerastium vulgatum	Common Mouse-ear Chickweed	Mouron à oreille de souris	SE
Cetraria glauca			
Chenopodium album	White Goosefoot		S5
Chrysthanthemum leucanthemum	Ox-Eye-Daisy	Margeurite	SE
Cirsium arvense	Canada Thistle	Chardon des champs	SE
Cirsium muticum	Swamp Thistle	Chardon mutique	S5
Cirsium vulgare	Bull Thistle	Piqeux	SE
Cladonia rangiferina	Reindeer moss		
Corallorhiza trifida	Early Coralroot	Corallorhize trifide	S3
Cornus canadensis	Bunchberry	Cornouiller du Canada	S5
Crataegus	A Hawthorn		
Descampsia flexuosa	Wavy Hair-grass	Cauche	
Dicranum scoparium	Moss		
Distichlis spicata	Seashore Saltgrass	Distichlis a epis	S4
Dryopteris carthusiana	Spinulose Shield Fern	Dryoptère spinuleuse	S5
Echinochloa crusgalli	Barnyard Grass	Pied-de-coq	SE
Echinocystis lobata	Wild Cucumber	Éhinocystis lobé	SE
Elymus pungens	Coast Wheatgrass		
Elymus repens	Quackgrass	Chiendent rampant	SE
Empetrum atropurpureum	Red Crowberry		
Empetrum nigrum	Black Crowberry	Graines noires	SU
Epilobium angustifolium	Fireweed/Large Willow Herb	Bouquets rouges	S5
Epilobium ciliatum	Hairy Willow-herb	Épilobe hispide	S5

Scientific names	Common English	Common French	Atlantic Canada – Conservation Data Centre – Provincial Status Rank
Epipactis helleborine	Eastern Helleborine	Épipactis petit-hellébore	SE
Equisetum arvense	Field Horsetail	Queue de renard	S5
Euphrasia canadensis	Canadian Eyebright	Euphraise du Canada	
Euthamia graminifolia	Flat-top Fragrant-goldenrod	Verge d'or graminifoliée	S5
Festuca rubra	Red Fescue	Fétuque rouge	S5
Fragaria virginiana	Wild Strawberry	Fraisier des champs	S5
Galeopsis tetrahit	Brittle-stem Hempnettle	Ortie royale	SE
Galium aparine	Catchweed Bedstraw	Gaillet gratteron	SE
Galium tinctorium	Stiff Marsh Bedstraw	Gaillet des teinturiers	S5
Glaux maritima	Sea Milkwort	Glaux maritime	S5
Gnaphalium uliginosum	Low Cudweed	Gnaphale des vases	SE
Hieracium florentinum	King Devil		
Hieracium pilosella	Mouse - ear Hawkweed	Oreille de piloselle	SE
Hordeum jubatum	Fox-tail Barley	Queue d'écureuil	S5
Hylocomium splendens	Moss		
Ilex verticillata	Black Holly	Apalanche houx verticillé	S5
Impatiens capensis	Spotted Jewelweed	Chou sauvage	S5
Iris versicolor	Blueflag	Clajeux	S5
Iva frutescens	Big-leaf Marsh-elder		S2SE
Juncus canadensis	Canada Rush	Jonc du Canada	S5
Juncus gerardii	Black-grass Rush	Jonc de Gérard	S5
Juncus tenuis	Slender Rush	Jonc ténu	S5
Juniper communis	Common Juniper	Genièvre	S5
Juniper horizontalis	Creeping Juniper	Savinier	S4
Kalimia angustifolia	Sheep Laurel or Lambkill	Crevard de moutons	
Lactuca canadensis	Wild (Canada) Lettuce	Chicorée blanche	S5
Lactuca serriola	Prickly Lettuce	Laitue épineuse	SE
Larix laricina	American Larch	Mélèze laricin	S5
Lemna minor	Lesser Duckweed	Lentille d'eau	S5
Leontodon autumnalis	Fall Dandelion or August-Flower	Pissenlit	
Limonium	Sea-lavender	Lavande de mer	S5

Scientific names	Common English	Common French	Atlantic Canada – Conservation Data Centre – Provincial Status Rank
carolinianum			
Linaria vulgaris	Butter-and-eggs	Linaire vulgaire	SE
Lobelia inflata	Indian-tobacco	Lobélie enflée	S5
Lonicera spp.	Honeysuckle species	Chèvrefeuille	
Luzula multiflora	Common Woodrush	Luzule multiflore	S5
Maianthemum canadense	Wild Lily-of-the-valley	Maïanthème du Canada	S5
Matricaria discoidea	Pineapple-weed	Matricaire suave	SE
Myrica pensylvanica (Morella pensylvanica)	Bayberry	Myrique de Pennsylvanie	S5
Oenothera biennis	Evening-primrose	Onagre bisannuelle	S5
Oenothera parviflora	Small - flowered Evening - primrose	Onagre parviflore	S4?
Dichanthelium acuminatum	Panic-grass	Panic	S5
Parmelia physides			
Phalaris arundinacea	Reed Canary Grass	Phalaride vivace	S5
Phleum pratense	Timothy	Phléole des prés	
Picea glauca	White Spruce	Épinette blanche	S5
Picea rubens	Red Spruce	Épinette rouge	S5
Plantago lanceolata	English Plantain	Plantain lancéolé	SE
Plantago major	Common Plantain	Grand plantain	SE
Plantago maritima	Seaside Plantain	Plantain juncoïde	S5
Poa palustris	Fowl Bluegrass	Pâturin des marais	S5
Poa pratensis	Kentucky Bluegrass	Pâturin des prés	S5
Polygonum convolvulus	Black Bindweed	Renouée liseron ou chevrier	SE
Polygonum hydropiper	Marshpepper Smartweed	Curage	SE
Polygonum persicaria	Lady's thumb	Fer à cheval	SE
Polygonum sagittatum	Arrow-leaved Tearthumb	Gratte-cul	S5
Populus tremuloides	Trembling Aspen	Tremble	S5
Sibbaldiopsis tridentata	Three-toothed Cinquefoil	Potentille tridentée	S5
Prunella vulgaris	Heal-all	Herbe au charpentier	S5
Prunus virginiana	Choke-cherry	Cerisier à grappes	S5
Pteridium aquilinium	Bracken	Grand fougère	S5

Scientific names	Common English	Common French	Atlantic Canada – Conservation Data Centre – Provincial Status Rank
Puccinellia Americana (P. maritime)	American Alkali Grass	Puccinellie américaine	S4S5
Pyrus malus (Malus pumila)	Apple	Pommier sauvage	SE
Ranunculus acris	Common Buttercup	Bouton d'or	SE
Ranunculus repens	Creeping Buttercup	Bassinet	SE
Raphanus raphanistrum	Wild Radish	Radis sauvage	SE
Rhinanthus Crista	Yellow-rattle	Claquette, Cocrête	S5
Toxicodendron radicans ssp. *radicans*	Poison Ivy	Herbe à la puce	S4
Rhytidiadelphus triquetrus	Moss		
Ribes glandulosum	Skunk Current	Gadellier glanduleux	S5
Rosa virginiana	Virginia Rose	Rosier de virginie	S5
Rubus recurvicaulis	Blackberry		
Rubus idaeus	Wild Raspberry	Framboisier	S5
Rumex acetosella	Sheep Sorrel	Oseille ou surette	SE
Rumex crispus	Curly Dock	Patience crépue	SE
Ruppia maritima	Ditch-grass	Ruppie maritime	S5
Salicornia maritima	Jointed Glasswort	Salicorne maritime	S5
Salix bebbiana	Bebb's Willow	Chaton ou petit minou	S5
Sambucus canadensis	Common elderberry	Sureau de Canada	S5
Sambucus racemosa	Red Elderberry	Sureau rouge	S5
Schoenoplectus maritimus	Saltmarsh bulrush	Scirpe maritime	S4S5
Schoenoplectus tabernaemontani	Soft-stem Bulrush	Scirpe vigoureux	S5
Scutellaria galericulata	Hooded Skullcap	Toque	S5
Senecio jacobaea	Ragwort or Stinking-Willie	Séneçon jacobée	SE
Sisymbrium officinale	Hairy-pod Hedge Mustard	Herbe au chantre	SE
Sisyrinchium montanum	Blue-eyed Grass	Bermudienne montagnarde	S5
Solanum dulcamara	Climbing Nightshade	Morelle douce-amère	SE
Solidago canadensis	Canada Goldenrod	Verge d'or du Canada	S5
Solidago rugosa	Rough Goldenrod	Verge d'or rugueuse	S5

Scientific names	Common English	Common French	Atlantic Canada – Conservation Data Centre – Provincial Status Rank
Solidago sempervirens	Seaside Goldenrod	Verge d'or	S5
Sonchus arvensis	Field Sowthistle	Laiteron des champs	SE
Sonchus asper	Spiny-leaf Sowthistle	Laiteron épineux	SE
Spartina alterniflora	Saltwater Cordgrass	Herbe salée	S5
Spartina patens	Salt-meadow Cordgrass	Musotte	S5
Spartina pectinata	Freshwater Cordgrass	Chaume	S5
Spergularia canadensis	Canada Sand-spurrey	Spergulaire du Canada	S4
Spergularia marina (S. salina)	Purple Sand-spurrey		S5
Stellaria graminea	Common Stitchwort	Mouron des champs	SE
Stellaria media	Common Starwort		SE
Suaeda calceoliformis	American Sea-bite	Suéda couchée	S2S3
Suaeda maritima	Maritime Sea-bite	Suéda maritime	S5SE
Taraxacum officinale	Common Dandelion	Pisenlit	SE
Taxus canadensis	Canada Yew	Buis de sapin	S5
Teloschistes parietina	Yellow Wall-lichen		
Trientalis borealis	Star-flower	Trientale boréale	S5
Trifolium pratense	Red Clover	Trèfle rouge	
Trifolium repens	White Clover	Trèfle blanc	SE
Triglochin maritima	Common Bog Arrow-grass	Troscart maritime	S5
Tussilago farfara	Colt's-foot	Pas-d'âne	SE
Typha latifolia	Broad-leaf Cattail	Typha à feuilles large; Grande massette	S5
Urtica dioica ssp.	Stinging Nettle	Grande ortie	S4
Vaccinium angustifolium	Late Lowbush Blueberry	Bleuets	S5
Viburnum cassinoides	Witherod or Viburnum Alisier	Bourdaine	
Vicia cracca	Tufted Vetch	Jargeau	SE
Vicia sp.	Vetch		SE
Viola Selkirkii	Great-spurred Violet	Violette de Selkirk	S4
Viola septentrionalis	Northern Blue Violet	Violette septentrionale	S5?

APPENDIX II: BIRD LIST FOR BOOT ISLAND NATIONAL WILDLIFE AREA

Source: Scientific names follow that of Godfrey, 1986; sequencing of families follows the American Ornithologists' Union's Check-list of North American Birds (1998 and 42nd supplement 2000).

Table 10: Bird List for Boot Island National Wildlife Area, 2010

Family	Common English	Scientific names	Status*	Comments
Cormorants				
	Double-crested Cormorant	*Phalacrocorax auritus*	Breeding Common	
Herons, Egrets and Bitterns				
	Great Blue Heron	*Ardea herodias*	Breeding Common	
Ducks, Geese and Swans				
	American Black Duck	*Anas rubripes*	Breeding Common	
	Atlantic Brant	*Branta bernicla*	Transient	
	Black Scoter	*Melanitta nigra*	Transient	
	Common Eider	*Someteria mollissima*	Transient	
Hawks, Eagles and Kites				
	Bald Eagle	*Haliaeetus leucocephalus*	Breeding	
	Red-tailed Hawk	*Buteo jamaicensis*	Transient	
	Peregrine Falcon	*Falco peregrinus*	Transient	
Pheasants and Partridges				
	Ring-necked Pheasant	*Phasianus colchicus*	Common Breeding?	
Plovers and Lapwings				
	Piping Plover	*Charadrius melodus*	Transient	One record
	Semipalmated Plover	*Charadrius semipalmatus*	Transient	
Sandpipers				
	Yellowlegs sp	*Tringa sp*	Transient	
	Semipalmated Sandpiper	*Calidris pusilla*	Transient	
	Dunlin	*Calidris alpina*	Transient	
	Purple Sandpiper	*Calidris maritima*	Transient	
Gulls				
	Greater Black-backed Gull	*Larus marinus*	Breeding Common	
	Herring Gull	*Larus argentatus*	Breeding Common	
Owls				
	Long-eared Owl	*Asio otus*	Transient	
Hummingbirds				
	Ruby-throated Hummingbird	*Archilochus colubris*	Transient	
Vireos				
	Solitary Vireo	*Vireo solitarius*	Common	
Crows, Jays and Magpies				
	American Crow	*Corvus brachyrhynchos*	Breeding Common	
	Common Raven	*Corvus corax*		

Family	Common English	Scientific names	Status*	Comments
Swallows				
	Bank Swallow	*Riparia riparia*	Breeding Common	
Chickadees and Tits				
	Black-capped Chickadee	*Parus atricapillus*	Common Breeding?	
Starlings				
	European Starling	*Sturnus vulgaris*	Common Breeding?	
Warblers				
	Yellow Warbler	*Dendroica petechia*	Common Breeding?	
	Black-throated Green Warbler	*Dendroica virens*		
Sparrows				
	Song Sparrow	*Melospiza melodia*	Common Breeding	
Blackbirds, Orioles and Allies				
	Red-winged Blackbird	*Agelaius phoeniceus*	Common	
	Common Grackle	*Quiscalus quiscula*	Common	
Finches and Allies				
	American Goldfinch	*Carduelis tristis*	Common Breeding	

***Status Categories**
Breeding: Birds that nest or have nested on Boot Island
Common (Summer/Winter): Birds common only throughout certain seasons
Resident: Birds present on Island year-round (largely non-migratory)
Transient: Birds that are seen while travelling by Boot Island or during migration in the spring and fall

Status categories follow the justification of the Nova Scotia Bird List (The Nova Scotia Museum of Natural History, 1998).

APPENDIX III: SUMMARY OF COLONIAL NESTING BIRD RECORDS (NEST COUNTS) FOR BOOT ISLAND NATIONAL WILDLIFE AREA, 1964 TO 2008

Table 11: Summary of colonial nesting bird records (nest counts) for Boot Island National Wildlife Area, 1964 to 2008

Year of survey	Species and number of breeding pairs based on nest counts				Survey/Source
	DCCO[1]	GBHE[2]	GBBG[3]	HERG[4]	
1964	NR*	1	NR	NR	C.K. Coldwell
1965	NR	6	NR	NR	C.K. Coldwell
1966	NR	5	NR	NR	C.K. Coldwell
1967	5	NR	NR	NR	NWA acquisition proposal
1968	NR	20	NR	NR	C.K. Coldwell
1969	NR	30	NR	NR	C.K. Coldwell
1970	NR	50+	NR	NR	C.K. Coldwell
1971	NR	40+	NR	NR	C.K. Coldwell
1973	NR	50+	NR	NR	C.K. Coldwell
1976	93	25	1005	712	CWS
1977	NR	42	NR	NR	Quinney and Smith, 1980
1978	NR	26	NR	NR	Quinney and Smith, 1980
1980	NR	30	NR	NR	R. Milton NSL&F
1981	NR	18	NR	NR	Forsythe
1984	147	44	1314	661	CWS Inspection Reports
1986	201	61	1284	727	CWS Inspection Reports
1988	178	38	1358	606	CWS Inspection Reports
1990	181	46	1351	527	CWS Inspection Reports
1992	228	40	1467	454	CWS Inspection Reports
1996	351	47	1184	291	CWS Inspection Reports
1998	311	50	1322	134	CWS Inspection Reports
2000	345	55	1080	67	CWS Inspection Reports
2002	260	73	964	33	CWS Inspection Reports
2004	277	51	1018	65	CWS Inspection Reports
2006	151	52	943	22	CWS Inspection Reports
2008	243	52	998	13	CWS Inspection Reports

*NR = not recorded

[1] **DCCO – Double-crested Cormorant**

[2] **GBHE – Great Blue Heron**

[3] **GBBG – Great Black-backed Gull**

[4] **HERG – Herring Gull**