Habitat Conservation Priority – Tidal Marshes

The following represents one of a series of summary documents that have been developed to aide in the dissemination of information presented in the *Southwest Nova Scotia Habitat Conservation Strategy*. For more detailed information, please see the final report, Farrow & Nussey 2015.

Tidal marshes are a common coastal feature in the Southwest Nova Scotia bioregion due to ample sediment supply from glacial deposits (McCullough *et al.* 2005). They are among the most biologically productive ecosystems in the world, providing important breeding, staging and wintering habitat for a wide variety of bird species, including rare and at risk species (e.g., Bobolink, Nelson's Sharp-tailed Sparrow, Short-eared Owl, and Willet), and as important nursery areas for juvenile fish and shellfish. Eastern Lilaeopsis is a small, semi-aquatic species of Atlantic Coastal Plain Flora that is found in the intertidal zone of five river estuaries located in the bioregion, usually where *Spartina alterniflora* dominates. The province's tidal marshes and intertidal flats are also believed to support the largest breeding concentration of Willet in Eastern Canada (NS EHJV). Conservation of tidal marsh habitat within the SWNS bioregion will contribute to the conservation of 48 priority species. Tidal marshes also serve important functions in flood protection, erosion control, supporting coastal and marine food webs, and removal of contaminants, nutrients and suspended sediments from the water column. GPI Atlantic (Genuine Progress Index for Atlantic Canada) estimates that the remaining tidal marshes in Nova Scotia provide over $400 million worth of ecosystem services to Nova Scotia communities each year (Government of Nova Scotia 2011).

Nested Conservation Priority Species

- Bobolink (TH)
- Short-eared Owl (SC)
- Red Knot (EN)
- Eastern Lilaeopsis (SC)
- Eastern Baccharis (TH)
- Willet
- Nelson's Sparrow

Landscape context assessment of tidal marshes: Fair

Tidal marshes are found primarily along the shorelines with the Atlantic Ocean and the Gulf of Maine, with significant occurrences located in the Yarmouth area and in Lobster Bay, including some of the largest intact tidal marshes in the province (T. Bowron, per. comm.; Figure 1). Historically, extensive tidal marshes were located at the mouth of the Annapolis River; however, these have been heavily impacted by agricultural practices over the past 300 years. Since European settlement of Nova Scotia in the early 1700's Nova Scotia has seen extensive loss of tidal marsh habitat, primarily to dyking for agriculture. Estimates of tidal marsh loss are as high as 65% of original tidal marshes province-wide, and 85% along the Bay of Fundy (Bowron *et al.* 2012; NAWCC 2012; NSE 2012b; Singh *et al.* 2007). Tidal marsh restoration efforts have been ongoing in Southwest Nova Scotia since 2002 (Bowron *et al.* 2012).

Development within the bioregion is concentrated along the coastlines; nonetheless approximately 80% of the land adjacent to the coast is classified as undeveloped (CBCL Ltd. 2009). A high percentage of the coastline is under private ownership however, so there is considerable potential for increased coastal development. The sensitivity of the bioregion to sea-level rise and coastal erosion is high to moderate along the Atlantic Coast (Shaw *et al.* 1998). Shoreline hardening and associated loss of sediment supply may further compound the impacts of sea-level rise by limiting the landward migration of tidal marshes. The additional protection of uplands adjacent to tidal marshes (suggested 275 m buffer; EC, OMNR, & OME 1998) will help to protect the ecological functions and integrity of the habitat priority, maintain nesting areas for wildlife (e.g., waterfowl), and allow for landward migration in the face of sea-level rise due to climate change. In 2011 the Province of Nova Scotia released the Nova Scotia Wetland Conservation Policy, which provides a direction and framework for the conservation and management of wetlands in the province, and identifies specific objectives intended to prevent the net loss of Nova Scotia's wetlands into the future (Government of Nova Scotia 2011). Under the policy, all tidal marshes are considered to be *Wetlands of Special Significance*. This policy should help to restrict any further loss of tidal marsh habitat in the province.

The average Landscape Context Index[1] for tidal marshes in the Southwest Nova Scotia bioregion is 27.51**,** which is

[1] *Landscape Context Index (LCI) is a measure that refers to the relative amount of development, agriculture, quarries, roads, and other fragmenting features directly surrounding ecosystem occurrences. It provides an estimate of isolation of occurrence as well as potential future encroachment on the occurrence. An LCI below 20 (30 for coastal ecosystems) indicates that the habitat conservation priority is surrounded primarily by natural cover with higher LCIs indicating increasing amounts of development directly surrounding ecosystem occurrences. An LCI above 50 is considered to be high, with individual occurrences usually rejected as critical (Anderson et al. 2006).*

considered to be an indication that, on average, the habitat conservation priority is surrounded primarily by natural cover and has good landscape context that will contribute toward the long term viability of the ecosystem type, although this value is approaching the upper bound of 30 for coastal ecosystems (calculated using NAAP data). In total 602 ha (7.7%) of tidal marshes in the bioregion are currently under protected or conservation status.

Condition assessment of tidal marshes: Fair

Numerous tidal marshes within the bioregion have restricted tidal flow due to the installation of historic infrastructure, such as the extensive areas of dykes and aboiteaux on the Annapolis River, or undersized and poorly constructed culverts, causeways and roadways. Tidal flow restrictions can result in decreased soil accretion, and changes in vegetation, which can severely impact the health and integrity of tidal marsh habitat (Roman *et al.* 1984; Sullivan 2005). At least three non-indigenous invasive plant species have been documented in tidal wetlands in eastern Canada, the Common Reed, Purple Loosestrife, and Reed Canary Grass (T. Bowron, K. Porter, per. comm.). The Common Reed is an aggressive invasive species that inhabits freshwater or brackish shores and wetlands and is of particular concern in the bioregion, including an extensive colony in Annapolis Royal. It spreads quickly to form large, dense stands that exclude native species and can alter the structure and function of native marsh ecosystems (Mal & Narine 2004; MTRI 2012).

Size assessment of tidal marshes: Good

In total there are 7843 ha of tidal marsh, which makes up 0.5% of the total area of the bioregion. Of this area, 7087 ha were identified as critical in the NAAP, representing 42% of the critical occurrences of tidal marshes in Nova Scotia (note that the bioregion contains 29.3% of the total area of the province). A 275 metre buffer was included around tidal marshes to protect the ecological functions and integrity of this priority habitat and allow for landward migration in the face of sea-level rise due to climate change. The average size of tidal marsh occurrences in the bioregion is 9 ha, which is significantly less than the NAAP minimum size criteria for critical occurrences of tidal marshes (24 ha), however, there is further criteria that occurrences below the minimum criteria may be considered critical if they are part of a coastal complex of unified marsh, tidal flat, beach, and salt ponds over 40 ha (Anderson *et al.* 2006). Many of the tidal marshes located within the bioregion are associated with extensive areas of tidal flats, and consequently still meet the criteria for critical occurrences.

Current threats to tidal marshes

- 1.1 Cottage and residential development
- 2.1 Agricultural practices – annual and perennial non-timber crops
- 2.3 Livestock farming and ranching
- 2.4 Marine shellfish and finfish aquaculture
- 4.1 Roads and railroads
- 4.3 Shipping activity oil spills and discharges
- 7.2 Dams and other aquatic barriers
- 8.1 Invasive European Green Crab
- 8.1 Invasive plants
- 9.1 Household sewage and urban waste water
- 9.3 Agricultural and forestry effluents

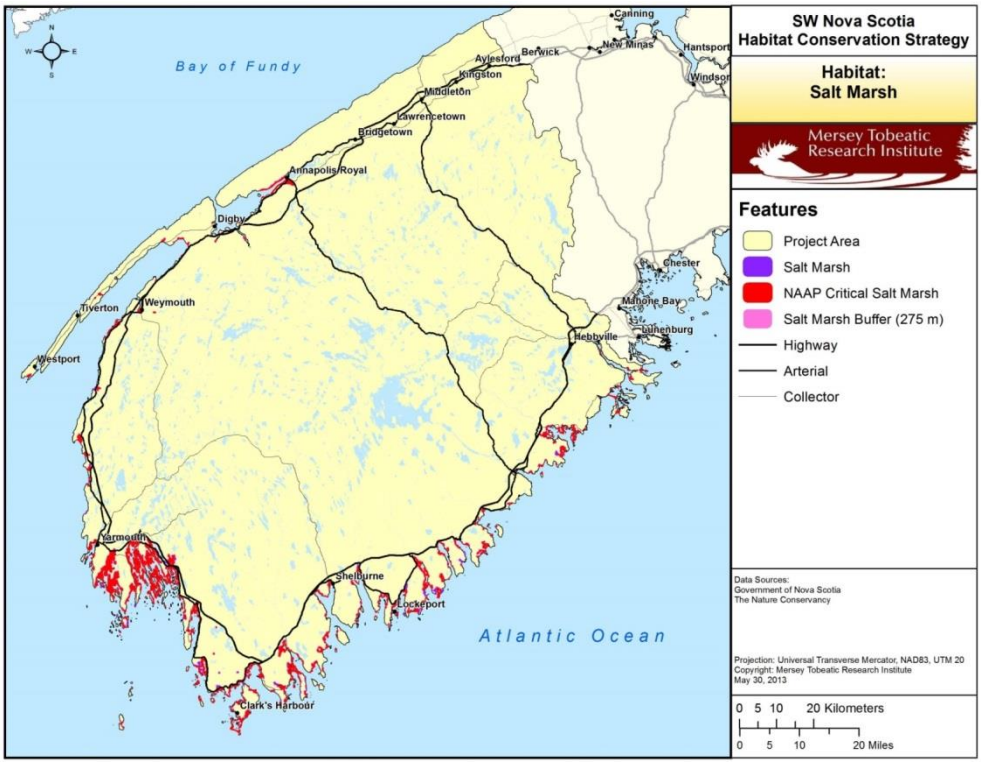

Figure 1. Tidal marsh habitat within the Southwest Nova Scotia bioregion.

Emerging threats to tidal marshes

- 11.1 Sea-level rise and coastal erosion
- 11.5 Storm-induced coastal erosion (Threat status: High)

Overall assessment of tidal marshes in the Southwest Nova Scotia bioregion: Fair

Table 1. Conservation actions related to tidal marshes for conservation partners in the Southwest Nova Scotia bioregion.

Conservation Actions[2] Description of related action (specific and measurable if possible)	Collaborators	Importance[3]	Date for Completion	Priority Habitat(s)[4]	Primary Related Threat(s)
1. Land/Water Protection					
1.1 Site/Area Protection Contribute to Marine Protected Area planning within the Scotian Shelf marine bioregion, and the identification and description of Ecologically and Biologically Significant Areas and other habitat classification schemes that contribute towards the protection of 10% of coastal and marine areas by 2020.	DFO, EC, PC	Necessary	2020	Beaches and Dunes, Tidal Marshes, Tidal Flats, Coastal Islands	
1.1 Site/Area Protection Province of Nova Scotia to designate 68 000 ha of new protected areas under the 14% Protected Areas Initiative.	Province of NS	Necessary	2025	All	
1.1 Site/Area Protection Secure 500 ha of priority 1 and priority 2 coastal habitat to protect them from development.	NCC	Necessary	2025	Beaches and Dunes, Tidal Marshes, Tidal Flats, Coastal Islands	1.1 Cottage and residential development
1.1 Site/Area Protection Acquire priority coastal habitat and priority habitat for ACPF as opportunities arise.	NSNT	Necessary	2025	Beaches and Dunes, Tidal Marshes, Tidal Flats, Coastal Islands	
2. Land/Water Management					
2.1 Site/Area Management Inform and implement the North American Waterfowl Management Plan (NAWMP) and conduct waterfowl surveys as required by the plan.	EC, EHJV, USFWS, USGS	Necessary	Ongoing	Tidal Marshes, Tidal Flats, Freshwater Wetlands, Riparian and Floodplain Systems, Grasslands	
2.1 Site/Area Management Implement management plans for Sand Pond National Wildlife Area and Sable River, Port Joli, Haley Lake, and Port Hebert Migratory Bird Sanctuaries.	EC	Necessary	Ongoing	All	
2.1 Site/Area Management Complete ecological risk assessments to assess threats to species and ecosystems within existing and proposed protected areas. Create a spatial layer of sensitive habitats and ecosystems to aid in planning and an action plan for protected area managers.	Province of NS	Beneficial		All	

[2] Categories based on IUCN – CMP Unified Classification of Conservation Actions Needed (Version 2.0). Actions are meant to be specific and measureable if possible, and are not listed in order of importance.

[3] CRITICAL: Conservation actions that, without implementation, would clearly result in the reduction of viability of a biodiversity target or the increase in magnitude of a critical threat within the next 5-10 years. Also includes research information that is needed before key decisions can be made on the management of biodiversity targets. NECESSARY: Conservation actions that are needed to maintain or enhance the viability of biodiversity targets or reduce critical threats. Also includes research that will assist in decisions on management of biodiversity targets. BENEFICIAL: Conservation actions that will assist in maintaining or enhancing viability of biodiversity targets and reducing threats.

[4] Priority Habitats: Beaches and dunes, tidal marshes, tidal flats, coastal islands, freshwater wetlands, Acadian forest, riparian/floodplain systems, grasslands/agro-ecosystems, barrens.

Conservation Actions[2] Description of related action (specific and measurable if possible)	Collaborators	Importance[3]	Date for Completion	Priority Habitat(s)[4]	Primary Related Threat(s)
2.1 Site/Area Management Continue ecological integrity monitoring to assess the state of forest, freshwater, wetland, and coastal ecosystem health in Kejimkujik National Park through the monitoring, analysis, and reporting of approximately 30 measures (e.g., forest birds, salamanders, water quality, soft-shell clams, Eelgrass) and by summarizing these finding in the *State of the Park Report*.	Parks Canada through collaboration with many partners	Necessary	Ongoing	All	
2.1 Site/Area Management Conduct botanical surveys of potential ACPF habitat between Tusket watershed and Queens County	ACCDC	Necessary	2020	Tidal Marshes, Freshwater Wetlands, Riparian and Floodplain Systems	
2.1 Site/Area Management Conduct insect biodiversity surveys in southwestern Nova Scotia, focusing on the discovery of disjunct species associated with the Atlantic Coastal Plain, including targeted efforts to find species dependent on rare ACPF, such as Sweet Pepperbush and Eastern Baccharis.	ACCDC	Beneficial	2020	Tidal Marshes, Freshwater Wetlands, Riparian and Floodplain Systems	
2.2 Invasive/Problematic Species Control Establish a structure to facilitate collaboration and strategic decision making regarding invasive species control techniques.	NCC, MTRI	Beneficial	2020	All	8.1 Invasive/ alien species/ diseases
2.2 Invasive/Problematic Species Control Raise awareness of invasive species in Nova Scotia and the role they play in ecosystems through the Backyard Biodiversity project.	PC, MTRI	Beneficial	Ongoing	All	8.1 Invasive / alien species/ diseases
2.2 Invasive/Problematic Species Control Continue research to investigate population dynamics of invasive European Green Crab, assess their ecological impacts on coastal ecosystems, and determine if physical removal (i.e., trapping) can effectively and sustainably control invasive green crab in Kejimkujik National Park Seaside Adjunct estuaries. Continue to work with local interests and other government departments to develop a positive use for removed crabs (e.g., lobster bait, fertilizer, compost).	PC	Critical	Ongoing	Tidal Marshes, Tidal Flats	8.1 Invasive non-native/ alien species/ diseases
3. Species Management					
3.2 Species Recovery Engage and consult with all partners in the development of SAR recovery documents, and support the activities described within recovery documents for the schedule of studies for SAR and the identification of their critical habitat within the SWNS bioregion.	EC, NSDNR, Academic Institutions, NSNT, NCC, MTRI	Necessary	Ongoing	All	
4. Education and Awareness					
4.2 Training Continue to facilitate opportunities for volunteers to engage in regional SAR	PC, Friends of Keji, MTRI,	Beneficial	Ongoing	All	

Conservation Actions[2] Description of related action (specific and measurable if possible)	Collaborators	Importance[3]	Date for Completion	Priority Habitat(s)[4]	Primary Related Threat(s)
and conservation programs in the Southwest Nova Biosphere Reserve through the Kejimkujik Southwest Nova Volunteer Program. Stewardship tools and guides will be developed and distributed, including *Species at Risk in NS, Atlantic Coastal Plain Flora in NS*, and *Invasive Alien Species in NS*.	BSC, Acadia University				
4.3 Awareness and Communications Address habitat threats through the education and engagement of stakeholders, landowners, and landusers.	NSNT	Beneficial	Ongoing		
5. Law and Policy					
5.1.2 Legislation (National level) *Implement the Migratory Bird Convention Act*, *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act*, *Species at Risk Act*, *Canadian Environmental Protection Act*, *Canada Wildlife Act*, *Environmental Enforcement Act*, *Canadian Environmental Assessment Act*, *Fisheries Act*.	EC, DFO	Necessary	Ongoing		
5.2 Policies and Regulations Implement the federal policy on wetland conservation.	EC	Necessary	Ongoing	Tidal Marshes, Tidal Flats, Freshwater Wetlands, Riparian and Floodplain Systems	
5.4 Compliance and Enforcement Undertake wildlife and environmental enforcement activities (EC Wildlife Enforcement, Environmental Enforcement); address illegal hunting and disturbance, illegal activities and habitat destruction	EC, Province of NS	Necessary	Ongoing	All	
6. Livelihood, Economic, and Other Incentives					
6.4 Conservation Payments Implement and encourage the use of EC Ecological Gifts (Ecogifts) program.	EC, NCC, NSNT	Necessary	Ongoing	All	
7. External Capacity Building					
7.3 Conservation Finance Communicate, inform, and increase awareness related to funding opportunities for conservation: *North American Wetland Conservation Act* (NAWCA)/Eastern Habitat Joint Venture (EHJV), North Atlantic Landscape Conservation Cooperative (NALCC); National Conservation Plan (NCP): Atlantic Ecosystems Initiative (AEI), Habitat Stewardship Program (HSP), Aboriginal Fund for Species at Risk (AFSAR), National Wetland Conservation Fund (NWCF).	EC, US Federal and State partners	Necessary	Ongoing	All	
7.3 Conservation Finance Continue to engage longstanding/key funding partners to support conservation work in the SWNS bioregion.	NCC, MTRI, NSNT, ENGOs	Necessary	Ongoing	All	

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