

**Southwest Nova Scotia Habitat Conservation Strategy  
Summary Report January 2017**

**Habitat Conservation Priority – Acadian Forest Mosaic**

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.

Nova Scotia falls within the Acadian Forest Region, which spans the Canadian Maritime provinces (Rowe 1972). The Acadian Forest is a rich and diverse temperate forest with a unique mixture of boreal species from the north and deciduous species from the south (Mosseler *et al.* 2003). The climax condition consists of mature forests dominated by shade-tolerant, long-lived tree species such as Red Spruce, Eastern Hemlock, Sugar Maple, and American Beech. Other long-lived although less shade-tolerant species can also fare well, such as Yellow Birch, Eastern White Pine, Northern Red Oak, and White Ash. Intermediate species such as Balsam Fir, Red Maple, and Black Spruce may also be considered edaphic climax species in some environments, such as bogs, fens, and coastal areas (Mosseler *et al.* 2003).

Since early European settlement the majority of Nova Scotia's forests have been logged extensively, simplifying forest structure and composition. Relatively recent industrial forestry practices, combined with a long history of human habitation and forest use, have resulted in an increase in relatively young, even-aged, early-successional forest types, while the abundance and age of shade-tolerant, late-successional forest types has declined (Loo & Ives 2003; Mosseler *et al.*, 2003). Old stand types are far less abundant than they were historically found in this region (Mosseler *et al.* 2003). The World Wildlife Fund has designated the Acadian Forest as critically endangered due to the long history of settlement and land clearing that has occurred here, with only approximately 5% of the forest remaining in pre-settlement condition.

Nonetheless, Nova Scotia's largest remaining intact forests are found in the SWNS bioregion, as identified in the NAAP (Anderson *et al.* 2006). These large areas of contiguous forest, with few permanent roads and mostly intact interior forest, allow for the maintenance of ecological processes and viable occurrences of forest communities, and are important as 'coarse filters' for the conservation of a wide range of plant and animal species, from soil invertebrates and little known fungi and lichens to forest interior birds, large herbivores, and wide ranging predators (Anderson *et al.* 2006). If protected and allowed to regain their natural condition, they would serve as critical source areas for associated species requiring interior forest conditions (Anderson *et al.* 2006). Conservation of forested ecosystems within the bioregion will contribute to the conservation of at least 113 priority species.

**Nested conservation priority species**

- Canada Warbler (TH)
- Olive-sided Flycatcher (TH)
- Boreal Felt Lichen (EN)
- Vole Ears Lichen (EN)
- Mainland NS Moose (EN NS)
- Northern Myotis Bat (EN)
- Tricoloured Bat (EN)
- Eastern White Cedar (VU NS)
- Black Ash (TH NS)

**Landscape context assessment of Acadian forest mosaic: Good**

According to the Nova Scotia Department of Natural Resources' Forest Resource Inventory 346,478 ha of late successional forest (i.e., development class mature or multi-aged with a seral score of 38-50) occur within the SWNS bioregion, making up 21.4% of the total area. Of this, a total 61,845 ha (17.8%) are currently under protected or conservation status. Recognizing the critical role of old-forest habitat in sustaining biodiversity, the Province introduced an *Interim Old Forest Policy for Crown land* in 1999, with the goal of protecting and restoring old-growth forest on a minimum of 8% of public land. Within the bioregion forest stands that exhibit old growth characteristics are located primarily within the network of protected areas, but small stands also exist on privately-owned and Crown land (Belliveau & Farrow 2010; Pesklevits 2006). Outside of protected areas, widespread clearcut harvesting has occurred, significantly impacting the bioregion's forests. Forest road density is also high, particularly in consideration of the low population density in the interior of the southwest region of Nova Scotia. While significant temporary landscape conversion has occurred within the bioregion's forests, there are large tracts of forest with minimal conversion to non-forest land-use, posing opportunity for ongoing and continued conservation efforts.

**Condition assessment of Acadian forest mosaic: Fair**

Since early European settlement the majority of Nova Scotia's forests have been logged extensively several times, simplifying the forest structure, composition, and age class. In 2000, it was estimated that 91% of Nova Scotia's forests consisted of even-aged stands less than 100 years old (NSDNR 2000; Stewart *et al.* 2003), though Lynds & LeDuc (1995) estimated that the percentage of Acadian Forest greater than 100 years old was less than 1%. Regenerating forest stands lack certain characteristics that are typical of old forest stands, even when they have reached their full height. These include large-diameter trees, large woody debris, and canopy openings with consequent understory regeneration, features

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that provide the necessary conditions for a variety of plant and animal species, such as cavities for nesting owls and colonies of Northern Myotis bats, food for ground beetles, and substrates for lichens and mosses (NBDNR 2013). Forestry practices remain the dominant threat to the region's forested ecosystems, with outbreaks of both native and invasive insects (e.g., Eastern Spruce Budworm, Pale-winged Gray Moth, Jack Pine Budworm) and disease also posing threats to the region's forests.

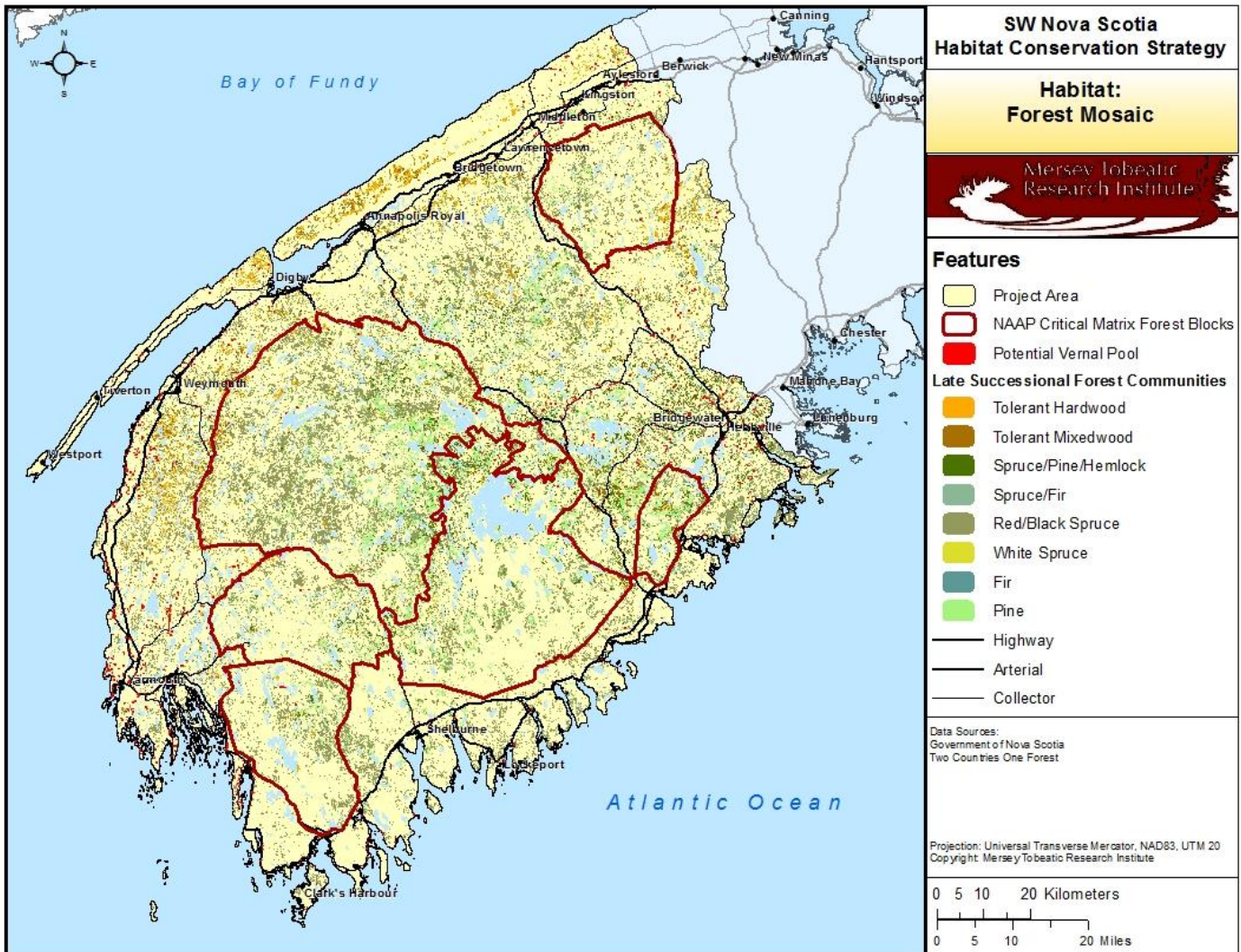


Figure 1. Acadian forest mosaic within the Southwest Nova Scotia bioregion.

### Size assessment of Acadian forest mosaic: Fair

Though Nova Scotia's largest remaining intact forests are found in the bioregion, stands of late-successional forest types are imbedded among a matrix of relatively young, even-aged, early-successional forest types (Figure 1). For each of the identified late-successional forest community types, minimum patch size criteria were identified to maintain the overall integrity of forest stands and provide sufficient habitat to maintain viable populations of old forest dependent vertebrate species<sup>1</sup> (see Farrow & Nussey 2015 for methodology and minimum size criteria). The area and average size of each of the dominant late-successional forest types within the bioregion is presented in Table 1, and in all cases the average size of current forest stands is significantly less than the minimum size criteria, which ranged from 15 ha for late-successional stands of White Pine to 60 ha for late-successional mixedwood forest stands.

<sup>1</sup> Adapted from the New Brunswick Department of Natural Resources' Old Forest Community and Old-Forest Wildlife Habitat Definitions for New Brunswick (2013) and the Coast Forest Conservation Initiative's Maintaining the Integrity of Northern Goshawk Nesting and Post-fledging Areas in the Ecosystem Based Management Plan Area of Coastal British Columbia: Guidance for Forest Professionals (2012).

**Table 1. Total area and average size of occurrences of late-successional forest types in the bioregion.**

Late-successional Forest Type		Total Area (ha)	Average Size (ha)	Minimum Size (ha) <sup>1</sup>
Shade-tolerant hardwood	Inland	24,354	6.9	40
	Coastal	5,789	13.6	40
Shade-tolerant mixedwood	Inland	18,969	5.7	60
	Coastal	2,275	9.1	60
Shade-tolerant softwood	Inland	278,677	7.9	50 (15 ha for WP)
	Coastal	16,414	8.0	50
<b>All late-successional forest types</b>		<b>346,478</b>	<b>8.6</b>	

**Current threats to Acadian forest mosaic**

- 2.2 Wood and pulp plantations
- 3.2 Mining and quarrying
- 4.1 Roads & railroads
- 5.3 Forest harvesting practices
- 6.1 Off-highway vehicle use
- 8.1 Invasive plants
- 8.4 Invasive pathogens
- 9.3 Agricultural and forestry effluents
- 9.5 Air pollution and acid precipitation

**Emerging threats to Acadian forest mosaic**

- 11.1 Habitat shifting and alteration (Climate Change)

**Overall assessment of Acadia forest mosaic in the Southwest Nova Scotia bioregion: Fair****References**

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**Table 1. Conservation actions related to Acadian forest mosaic for conservation partners in the Southwest Nova Scotia bioregion.**

<b>Conservation Actions<sup>1</sup></b> <b>Description of related action (specific and measurable if possible)</b>	<b>Collaborators</b>	<b>Importance<sup>2</sup></b>	<b>Date for Completion</b>	<b>Priority Habitat(s)<sup>3</sup></b>	<b>Primary Related Threat(s)</b>
<b>1. Land/Water Protection</b>					
<b>1.1 Site/Area Protection</b> 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	
<b>1.1 Site/Area Protection</b> Complete a gap analysis for the system of protected areas in Nova Scotia.	Province of NS	Beneficial		All	
<b>1.1 Site/Area Protection</b> Secure 2500 ha of priority 1 and priority 2 forest habitat to protect them from harvesting.	NCC	Necessary	2025	Acadian Forest Mosaic	5.3 Forest harvesting practices
<b>1.1 Site/Area Protection</b> Secure 500 ha of priority 1 and priority 2 habitat for species at risk to protect them from development.	NCC	Necessary	2025		
<b>2. Land/Water Management</b>					
<b>2.1 Site/Area Management</b> 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	
<b>2.1 Site/Area Management</b> 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	
<b>2.1 Site/Area Management</b> Continue ecological integrity monitoring to assess the state of forest, freshwater, wetland, and coastal ecosystem health in Kejimikujik National Park through the monitoring, analysis, and reporting of approximately 30 measures (e.g., forest birds, salamanders, water quality, Eelgrass) and by summarizing these findings in the <i>State of the Park Report</i> .	Parks Canada through collaboration with many partners	Necessary	Ongoing	All	
<b>2.1 Site/Area Management</b> Conduct wildlife connectivity analyses to identify optimal connectivity	NCC	Necessary	2018	All	

<sup>1</sup> Categories based on IUCN – CMP Unified Classification of Conservation Actions Needed (Version 2.0). Actions are meant to be specific and measurable if possible, and are not listed in order of importance.

<sup>2</sup> 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.

<sup>3</sup> Priority Habitats: Beaches and dunes, tidal marshes, tidal flats, coastal islands, freshwater wetlands, Acadian forest, riparian/floodplain systems, grasslands/agro-ecosystems, barrens.

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Conservation Actions <sup>1</sup> Description of related action (specific and measurable if possible)	Collaborators	Importance <sup>2</sup>	Date for Completion	Priority Habitat(s) <sup>3</sup>	Primary Related Threat(s)
corridors between core protected areas/natural habitats.					
<b>2.1 Site/Area Management</b> Continue to locate, map, and assess potential old growth stands on private and public lands using adaptations of the NSDNR's old forest scoring methods to refine parcel prioritization, inform conservation efforts, and help maintain old forests and associated biodiversity for landscape connectivity according to Nova Scotia's <i>Old Forest Policy</i> .	MTRI, NSDNR, NCC	Necessary	Ongoing	Acadian Forest Mosaic	5.3 Forest harvesting practices
<b>2.1 Site/Area Management</b> Assess air quality and climate change using lichens within permanent sample plots.	Province of NS	Beneficial	Ongoing	Acadian Forest Mosaic	9.5 Air pollution & acid precip. 11 Climate Change
<b>2.1 Site/Area Management</b> Conduct botanical surveys of rare and uncommon cyanolichens to refine parcel prioritization.	MTRI, NCC	Necessary	Ongoing	Acadian Forest Mosaic, Riparian and Floodplain Systems	
<b>2.2 Invasive/Problematic Species Control</b> 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
<b>2.2 Invasive/Problematic Species Control</b> 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
<b>2.2 Invasive/Problematic Species Control</b> Continue to monitor and eradicate all mature, seed-producing Glossy Buckthorn plants within Kejimikujik National Park and National Historic Site as locations become known, and educate and engage the public on the ecological impacts of this species, its identification, and how to employ the most effective means of control.	PC, MTRI	Necessary	Ongoing	Acadian Forest Mosaic, Riparian and Floodplain Systems	8.1 Invasive non-native/ alien species/ diseases
<b>3. Species Management</b>					
<b>3.1 Species Management</b> Continue to systematically monitor population levels of Chimney Swift at known roost sites through a citizen-science monitoring and conservation program that brings together volunteers and community groups to act as stewards for Chimney Swift and their habitat, to advance knowledge of nesting ecology, and to increase awareness of this species at risk in the Maritimes. Continue to solicit the public for sightings of Chimney Swift and Chimney Swift nest locations.	MTRI, BSC, EC	Necessary	Ongoing		
<b>3.1 Species Management</b> Continue research to increase knowledge of Boreal Felt Lichen habitat requirements and contributing factors to survivorship. Improve the predictive ability of a GIS habitat algorithm to locate BFL occurrences.	MTRI, Port Hawksbury Paper, NSDOE, NSDNR, Northern Pulp	Necessary	Ongoing	Acadian Forest Mosaic	5.3 Forest Harvesting Practices

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Conservation Actions <sup>1</sup> Description of related action (specific and measurable if possible)	Collaborators	Importance <sup>2</sup>	Date for Completion	Priority Habitat(s) <sup>3</sup>	Primary Related Threat(s)
Maintain a database and monitor known occurrences. Protect newly found occurrences of BFL and other at risk lichens through work with forestry companies. Search for occurrences in potential habitat prior to planned harvests.					
<b>3.2 Species Recovery</b> 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	
<b>4. Education and Awareness</b>					
<b>4.2 Training</b> Continue to facilitate opportunities for volunteers to engage in regional SAR 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 <i>Species at Risk in NS</i> , <i>Atlantic Coastal Plain Flora in NS</i> , <i>Healthy Lakes and Wetlands for Tomorrow</i> , and <i>Invasive Alien Species in NS</i> .	PC, Friends of Keji, MTRI, BSC, Acadia University	Beneficial	Ongoing	All	
<b>4.3 Awareness and Communications</b> Address habitat threats through the education and engagement of stakeholders, landowners, and landusers.	NSNT	Beneficial	Ongoing		
<b>5. Law and Policy</b>					
<b>5.1.2 Legislation (National level)</b> <i>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.</i>	EC, DFO	Necessary	Ongoing		
<b>5.1.3 Legislation (Sub-national level)</b> Participate in the review and update of the <i>Nova Scotia Mineral Resources Act</i> and seek appropriate mechanisms for resolution of conflicts between private conservation lands and sub-surface rights.	NCC, NSNT	Beneficial	2016		3.2 Mining and quarrying
<b>5.2 Policies and Regulations</b> Collaborate with the Province of Nova Scotia and other stakeholders regarding changes to the <i>Code of Forest Practice for Crown Land</i> .	MTRI	Beneficial	Ongoing	Acadian Forests, Freshwater Wetlands, Floodplain Systems	5.3 Forest harvesting practices
<b>5.4 Compliance and Enforcement</b> 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	

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Conservation Actions <sup>1</sup> Description of related action (specific and measurable if possible)	Collaborators	Importance <sup>2</sup>	Date for Completion	Priority Habitat(s) <sup>3</sup>	Primary Related Threat(s)
<b>6. Livelihood, Economic, and Other Incentives</b>					
<b>6.1 Linked Enterprises &amp; Livelihood Alternatives</b> Demonstrate strong environmental stewardship and woodland management through the development of the Medway Community Forest Cooperative, a locally governed, long-term, ecologically-based stewardship plan that allows multiple uses of a working community forest, while nurturing new and innovative forest-based businesses that support the local economy.	MTRI, Wind Horse Woods, North Queens Board of Trade, FNSWO, NSWOOA, NS Co-operative Council, EAC, forestry contractors, mills	Beneficial	Ongoing	Acadian Forest Mosaic, Freshwater Wetlands, Riparian and Floodplain Systems	5.3 Forest harvesting practices
<b>6.3 Market Forces</b> Continue to assist small woodland owners in SWNS to certify their woodlands under one collective Forest Stewardship Council (FSC) group certification and provide training and education opportunities as a tool for woodlot owner engagement and to support sustainable woodland management. Continue research to explore awareness and attitudes of forest product consumers, and to investigate marketing strategies to support locally produced certified forest products.	MTRI, FNSWO	Beneficial	Ongoing	Acadian Forest Mosaic	5.3 Forest harvesting practices
<b>6.4 Conservation Payments</b> Implement and encourage the use of EC Ecological Gifts program.	EC, NCC, NSNT	Necessary	Ongoing	All	
<b>6.5 Non-monetary Values</b> Explore the opportunity to develop an incentive program that provides recognition for woodlot owners that promotes sustainable harvesting and protection of biodiversity on woodlots.	NCC	Beneficial	2018	Acadian Forest Mosaic	5.3 Forest harvesting practices
<b>7. External Capacity Building</b>					
<b>7.2 Alliance and Partnership Development</b> Provide EC-CWS input into: Staying Connected Initiative, Western Hemispheric Shorebird Reserve Network, and Important Bird Areas.	EC through collaboration with many partners	Beneficial	Ongoing	All	
<b>7.3 Conservation Finance</b> Communicate, inform, and increase awareness related to funding opportunities for conservation: <i>North American Wetland Conservation Act</i> /Eastern Habitat Joint Venture, North Atlantic Landscape Conservation Cooperative; National Conservation Plan: Atlantic Ecosystems Initiative, Habitat Stewardship Program, Aboriginal Fund for Species at Risk, National Wetland Conservation Fund.	EC, US Federal and State partners	Necessary	Ongoing	All	
<b>7.3 Conservation Finance</b> Continue to engage longstanding/key funding partners to support conservation work in the SWNS bioregion.	NCC, MTRI, NSNT, ENGOS	Necessary	Ongoing	All	