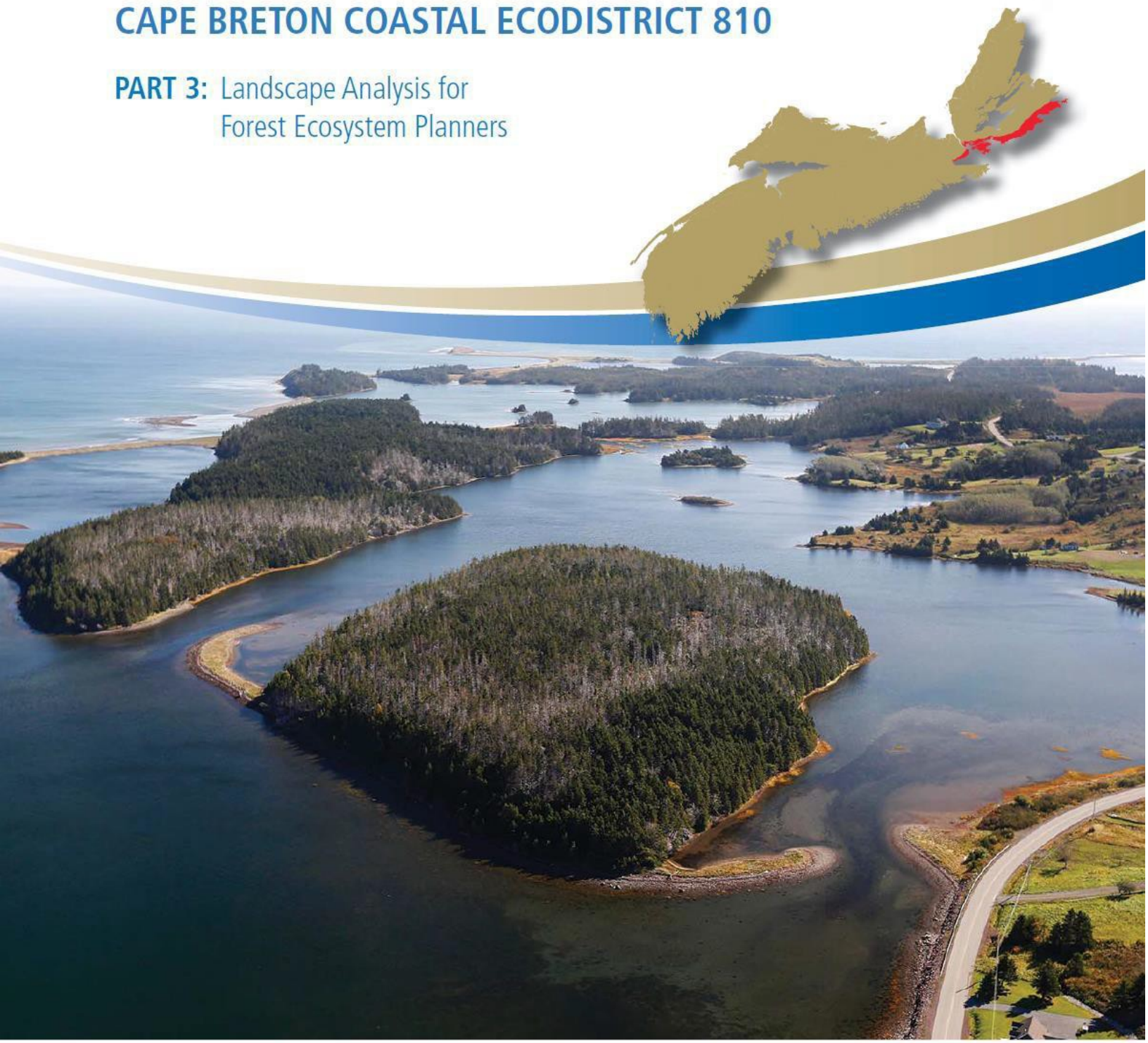
Department of Natural Resources

ECOLOGICAL LANDSCAPE ANALYSIS CAPE BRETON COASTAL ECODISTRICT 810

PART 3: Landscape Analysis for Forest Ecosystem Planners



ELA 2015-810

NOVA SCOTIA

Ecological Landscape Analysis, Ecodistrict 810: Cape Breton Coastal

Prepared by the Nova Scotia Department of Natural Resources
Authors: Eastern Region DNR staff

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This report, one of 38 for the province, provides descriptions, maps, analysis, photos and resources of the Cape Breton Coastal Ecodistrict.

The Ecological Landscape Analyses (ELAs) were analyzed and written from 2005 – 2009. They provide baseline information for this period in a standardized format designed to support future data updates, forecasts and trends. The original documents are presented in three parts: Part 1 – *Learning About What Makes this Ecodistrict Distinctive* – and Part 2 – *How Woodland Owners Can Apply Landscape Concepts to Their Woodland.* Part 3 – *Landscape Analysis for Forest Planners* – will be available as a separate document.

Information sources and statistics (benchmark dates) include:

- Forest Inventory (1995 to 1997) – stand volume, species composition
- Crown Lands Forest Model landbase classification (2006) – provides forest inventory update for harvesting and silviculture from satellite photography (2005), silviculture treatment records (2006) and forest age increment (2006)
- Roads and Utility network – Service Nova Scotia and Municipal Relations (2006)
- Significant Habitat and Species Database (2007)
- Atlantic Canada Data Conservation Centre (2013)

Conventions

Where major changes have occurred since the original ELA report was written, the new information will be provided in *italics,* so that the reader can see how some conditions have changed since the benchmark date of the ELA.

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Part 3: Landscape Analysis of Cape Breton Coastal – *For Forest Ecosystem Planners*

This in-depth Ecological Landscape Analysis (ELA) report is a lightly edited version of the original ELA produced by Department of Natural Resources (DNR) as an internal document to assist with Crown land planning. The report provides information for planners, forest managers, ecologists, technicians, and woodland owners seeking detailed planning resources. In coming years the DNR will continue to develop landscape planning approaches and introduce additional tools to support sustainable management and biodiversity conservation. The Department is working with stakeholders to explore novel planning approaches using these methods.

The ELA provides tools to recognize and pursue common goals for sustaining ecosystem values across all ownerships within the province's diverse landscapes. The ELA is not a plan, but instead supports planning by providing a framework of ecosystem mapping, indicators, fine-scaled features, and landscape functions that help describe landscapes as ecological systems. The report comprises the four major sections outlined below, along with theme maps and appendices containing detailed data summaries:

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Understanding the Landscape as an Ecological System

(Appendices 1, 2a, 2b; Map 2)

Landscapes are large areas that function as ecological systems and respond to a variety of influences. Landscapes are composed of smaller ecosystems, known as elements, which were interpreted through analysis using the ecosection layer of the Ecological Land Classification (ELC) for Nova Scotia. Elements are described by their potential vegetation (e.g. climax forest type) and physical features (e.g. soil, landform). These characteristics help determine historical vegetation patterns and promote an understanding of present distributions and potential habitat

development. Across the province about three dozen elements were identified in the ELAs and mapped to show their distribution across ecodistricts and ecoregions.

Elements Within Landscapes (Map 2)

The landscape analysis identified and mapped six distinctive elements in the Cape Breton Coastal Ecodistrict – one matrix, four patches, and a corridor. A matrix is the dominant element. Patches are smaller yet still distinctive elements. Corridors are natural linear elements, such as river valleys, that extend across ecodistricts (see connectivity section for full discussion of matrix, patch and corridor concepts).

Coastal Spruce is the matrix element, representing 51% of the ecodistrict. The main species in this element are the softwoods black spruce, white spruce, and balsam fir. **Coastal Mixedwood Hills and Drumlins** is the largest patch element, representing 41% of the ecodistrict. In addition to the species in the matrix, this element also contains hardwood forests of red maple, yellow birch, and white birch. The other patch elements, in order of size, are **Wetlands**, **Coastal Beach**, and **Salt Marsh**. The two corridors in **Valley Corridors**, a linear element that usually follows major waterways, are the Mira River and the Grand River.

Flow – Element Interactions (Appendix 1; Map 2)

Flow phenomena are the features that move across and through landscapes. They can be energy or material, living or non-living. Diaz and Apostol (1992) suggest that the most relevant flows for landscape analysis may include water, wind, fire, animals, plants, and humans. The following flows were considered in the analysis of this ecodistrict and are described in Appendix 1: humans, water, deer, anadromous fish, aquatic furbearers, reptiles and amphibians, migratory birds and goshawks.

There is a natural percolation or movement throughout the ecodistrict but more specific locations of the flow phenomena are shown in Map 2.

One of the well-defined flows is seasonal movement of white-tailed deer in the St. Esprit area of Richmond County, with deer moving from the interior to the Atlantic coast in the late fall and then back to the interior for the summer months.

The relationships between flows and elements are presented in table form in Appendix 1.

The main purpose in describing flows, and their relationship to the elements, is to provide insight into the role of each element. This will inform understanding of each element's contribution to overall landscape function.

River corridors promote connectivity.

Landscape Connectivity (Appendices 2a, 2b; Map 2)

Connectivity refers to the ease or difficulty that resources, such as water, animals, or even events – such as fires – can move within an area. As a basic ecological requirement, the ability to move without excessive risk is of critical importance for maintaining biodiversity at all levels, including genetic, individual, species, population, community, and ecosystem.

Connectivity takes many forms and operates at a wide range of scales. Among the structural ecosystem components that support movement, three major systems can be identified:

Matrix Ecosystems – Matrix implies large areas of broadly similar habitat in which movement is not constrained to particular routes. The slow spreading and mixing of species through the dominant community characterizes the ecosystem matrix. This "percolation" is dependent on the large patch conditions, which may be vulnerable to fragmentation. Interior habitat is often an important feature of matrix ecosystems.

Patch Ecosystems – The movement of species among patches of suitable habitat is dictated by the arrangement and size of patches and by a number of species' specific measures. Patches of suitable habitat must occur at acceptable distances over time. Some patch habitats have critical functions and must be continuously sustained, such as wetlands for migrating birds, feeding areas for deer, and calving grounds for moose. Other patches may be dynamic, shifting about the landscape as ecosystems evolve. Edge and interior habitat conditions are important features of patch ecosystems, as well as natural isolation.

Linear Corridor Ecosystems – Flow along popular routes is dictated by enduring physical features, such as river valleys. Linear flow often requires continuous connection, such as rivers. Breaks in the connection serve as obstacles. It is a characteristic of continuous linear features that they often serve as connective corridors for some species and barriers for others.

Overall, the Cape Breton Coastal Ecodistrict is dominated by a forest that has a fairly natural structure and representation of forest communities. As such, the connective structure of the ecodistrict, and the movement it supports, are in relatively good shape to sustain most connective functions necessary for biodiversity.

The forest of the Grand River corridor has been altered to some extent by settlement and farming, but still exhibits many of the characteristics of the Coastal Spruce. Such alteration of the forest may be a barrier to the movement of some species. The transportation systems that follow this corridor, as well as the Mira River and Framboise River corridor, may form barriers to some species.

Opportunities for connective management strategies could include:

- Mitigating the potentially negative barrier effects of concentrated land use in the valley corridors by sustaining and restoring natural communities in key areas such as those identified during the landscape analysis.
- Enhancing connectivity among conservation areas by applying appropriate medium and

high biodiversity emphasis standards when managing areas with natural linkage potential
- Improving ecoregional connectivity by sustaining and restoring natural conditions at important linkage points among ecodistricts.

Links to Neighbouring Ecodistricts (Appendices 1, 2a; Map 2)

Many of the landscape flows identified (e.g. people, water, aquatic furbearers, and deer) are also linkages to adjacent areas or ecodistricts (Map 2).

The hydrological system provides the most obvious physical connection between the Cape Breton Coastal Ecodistrict and the Bras d'Or Lowlands Ecodistrict 510. River Inhabitants, Grand River, and the Mira River all provide linkages between these two ecodistricts.

The St. Francis Harbour River in Guysborough County provides a linkage between this ecodistrict and the Mulgrave Plateau Ecodistrict 360.

Many smaller streams as well connect Cape Breton Coastal with its neighbours. There are numerous lakes located along the edge of the boundaries that serve as links. Some of these lakes include Englands Lake in Guysborough County and Landrie Lake in Richmond County.

The main corridors in the ecodistrict are the Grand River and a river corridor from the headwaters of the Mira River south along the Framboise River to the Atlantic Ocean.

There is a strong tidal influence at the mouth of River Inhabitants, Grand River, and the Framboise River. Anadromous fish and, to a large extent aquatic furbearers including beaver, otter, mink and muskrat, are tied to river and lake drainages that generally flow south to the coast or empty into the Mira River.

Deer undertake seasonal migrations over traditional routes that are subject to some change from year to year but always flow from the interior of the ecodistrict to the Atlantic coast in late fall and winter. Less snow buildup on the coastline provides for a better opportunity for overwintering and more availability of winter food sources, including storm-cast seaweed, along the coast.

People provide links among neighbouring ecodistricts and Cape Breton Coastal through their activities (recreation, transportation, fishing, forest management, development, and settlements). These main links are in the River Inhabitants, Grand River, and Framboise and Mira River areas, where roads follow the river systems from the interior to the coastline.

Future management activities will recognize significant links to neighbouring ecodistricts and manage the forests in these areas to enhance and sustain connectivity.

Landscape Indicators (Appendices 3, 6, 7, 8, 9, 10, 11; Maps 3, 4, 5, 9, 10)

Indicators provide standard measures for assessing landscape conditions. Indicators can be used to develop goals, identify priority actions, assess trends, and support the evaluation of scenarios.

Forest Composition Indicators (Appendices 8, 10; Maps 4, 9, 10)

Managing landscapes for biodiversity requires a variety of planning approaches and tools. Sustaining forest composition diversity by reflecting natural patterns of disturbance and succession is one approach that DNR is employing to try and realize this objective. A number of additional approaches and planning tools are being developed which will be integrated with objectives defined in the ELA protocol.

Human activities, such as forest harvesting, can shape the structure and composition of the forested landscape and should be planned to help support landscape composition goals.

At a landscape planning scale, the variety of habitats can be broadly described in terms of the composition of development classes, seral stages, and covertypes.

Development class indicators describe changes in structure and process as forests age and trees grow larger. For landscape management purposes, four development classes are recognized:

- forest establishment (0 to 6 m height)
- young competing forest (7 to 11 m height)
- mature forest (> 11 m height; including multi-aged and old forest)
- multi-aged / old forest (multiple layered / Old Forest Policy)

Seral stage indicators describe changes in species composition of forest communities as succession progresses from domination of early seral "pioneer" species following disturbance, toward late seral communities dominated by long-lived, shade-tolerant "climax" species. Seral stage is dependent on the composition of tree species of a forest, irrespective of age. For landscape management purposes, three seral stages are recognized:

- early (seral score 10 to 23)
- mid (seral score 24 to 37)
- late (seral score 38 to 50)

A look-up table (see Appendix 8) assigns each species in the forest inventory a value from one to five representing its position on the successional scale. These values are applied to the species composition data in the forest inventory to calculate a seral score, which may range from 10 to 50.

Covertype indicators further refine landscape composition by distinguishing forests of different community conditions. Management generally recognizes three forest covertypes:

- softwood (overstory cover of softwood species is 75% or more)
- hardwood (overstory cover of hardwood species is 75% or more)
- mixedwood (overstory cover of either softwood or hardwood is between 25% and 75%)

Target Ranges for Composition Indicators

Table 7 provides target ranges for development class and seral stage composition appropriate for different disturbance regimes. These ranges have been derived from the professional judgment of DNR forest ecologists to guide composition objectives for large landscape areas. This guidance can be used to assess how land holdings contribute to the overall ecodistrict structure by referring to the element analysis section which summarizes the levels of these indicators.

A full description of definitions and mapping of Nova Scotia's disturbance regimes is contained in the report "Mapping Nova Scotia's Natural Disturbance Regimes" available from the DNR website (http://novascotia.ca/natr/library/forestry/reports/NDRreport3.pdf).

Table 7 - Landscape Composition Target Ranges (by Development Class / Disturbance Regime)

Natural Disturbance Regime	Development Class			
	Forest Establishment	Young Competing Forest	Mature Forest (including multi-aged and old forest)	Multi-aged and Old Forest
Frequent Stand Initiating	5 - 30%	5 - 30%	>40% early, mid, and late seral representation	>8%
Infrequent Stand Initiating	5 - 20%	5 - 20%	>60% most in mid and late seral stages	>16%
Gap Replacement	0 - 15%	0 - 15%	>70% most in late seral stage	>24%

Forest Vegetation Types for Seral Stages in Each Element

Each element contains a number of forest stands that can be classified by vegetation, soil, and ecosites. The DNR publication ***Forest Ecosystem Classification for Nova Scotia, Part I: Vegetation Types (2010)*** (http://novascotia.ca/natr/forestry/veg-types/veg-navigation.asp) is helpful in identifying forest plant communities. Table 8 presents a description of the vegetation types likely to be found within elements, along with the current percentage of each seral stage.

Table 8 – Forest Vegetation Types[1] Within Elements in Cape Breton Coastal

Element	Seral Stage					
	Early	% *	Middle	%	Late	%
Coastal Mixedwood Hills and Drumlins	OF1, OF2, OF4	7.0	CO5	18.0	**CO4, CO6**	64.0
Coastal Spruce	OW1, OW2, CO5, SP1, SP6			30.0	**CO1, CO2, CO4,** SP4, SP5	57.0
Salt Marsh	Grasslands of *Spartina spp.*					
Coastal Beach	CO7, Beach grass, Bayberry, Rose spp., White spruce					
Wetlands	WC1, WC2, WC3, WC6, WC7, WD2, WD3, WD4, WD6, SP7					

View forest groups and vegetation types at
http://novascotia.ca/natr/forestry/veg-types/veg-navigation.asp
To help with identification of vegetation types, the 14 forest groups in Nova Scotia designated by DNR are: Cedar (CE), Coastal (CO), Flood Plain (FP), Highland (HL), Intolerant Hardwood (IH), Karst (KA), Mixedwood (MW), Old Field (OF), Open Woodland (OW), Spruce Hemlock (SH), Spruce Pine (SP), Tolerant Hardwood (TH), Wet Coniferous (WC), Wet Deciduous (WD)
Bolded vegetation types indicate typical late successional community
[1] Forest Ecosystem Classification for Nova Scotia (2010)
*Percentage of element in each successional stage. Percentages may not total 100 due to unclassified lands (such as clearcuts and regenerating stands) not being included.

Land Use Indicators (Appendices 3, 4, 5; Maps 6, 7)

Two indices (Ecological Emphasis Index and Road Index) have been developed to measure the relative pressure that current human land use exerts on ecosystems.

Ecological Emphasis Index (Appendices 11, 12; Map 3)

A variety of land management practices occur across landscapes, ranging from natural reserve areas to highly modified urban environments. Conserving biodiversity requires a balancing of land use practices to sustain ecological integrity.

To assist in assessing land use intensities and develop appropriate practices, four levels of ecological integrity are defined based on the degree that the conservation of natural conditions is emphasized in the management practices and policies applied to the land:

- Reserve, such as parks or wilderness areas
- Extensive, which are lands managed or restored for multiple values using ecosystem-based techniques
- Intensive, optimizing resource production by management techniques that may reduce biological diversity, such as plantations, but also meet the Wildlife Habitat and Watercourses Protection Regulations (NSDNR, 2002)
  (See http://www.gov.ns.ca/natr/wildlife/habitats/protection)
- Converted, lands altered for agriculture, roads, or other human activities

All lands within the ecodistrict are assessed at the stand level and assigned one of these four ecological emphasis classes (EEC) based on past practices. These classes are mapped over all areas of the landscape using a one hectare grid. The Ecological Emphasis Index (EEI) is determined by assigning a weighting value to each class: Reserve (100), Extensive (75), Intensive (25), and Converted (0). An overall index value may be calculated for any area of interest, such as element, ecosection, ecodistrict, or ecoregion, by averaging the index values within the area to provide a relative indication of land use pressure.

The 117,317 hectares contained within the Cape Breton Coastal Ecodistrict are inherently capable of supporting approximately 81,440 hectares of forest, with remaining lands being non-forest ecosystems such as lakes, wetlands, and barrens.

The majority of the land – 72,214 hectares – is in the extensive class (Appendix 12a). Lands in this category are managed for multiple values using ecosystem-based techniques that conserve biodiversity and encourage natural ecosystem conditions and processes.

Reserve lands account for 11,086 hectares. The reserve class is divided into two categories: legal reserves and policy reserves.

The legal reserves are those that have legal status under the International Union for the Conservation of Nature and Natural Resources, such as wilderness areas, protected beaches, and designated provincial parks.

Policy reserves are set aside areas under various provincial policies, such as the old forests or the Eastern Habitat Joint Venture Lands. Representation within the Cape Breton Coastal is relatively good as there are two provincial parks and two wilderness areas. There may be opportunities within this ecodistrict to add to the reserve class by adding under-represented community types.

Lands converted from forests to other uses account for 6,892 hectares.

An additional 982 hectares fall in the intensive EEC and are intensively managed to optimize resource production form sites maintained in a native state. Despite intensive practices, these lands are an important component of landscape structure and composition. Management may eliminate or reduce the duration of some development processes, particularly mature old forest stages, and may result in non-natural succession, produce unnatural conditions such as exotic species, old field spruce, and monoculture plantations, or reduce structure and composition below ecologically desired levels.

The remaining lands are unclassified.

DNR will continue to develop and evaluate other measures of conservation risk.

Road Index (Appendices 6, 7; Map 5)

The GIS-based “Road Index” provides a standard assessment and mapping of road distributions across ecodistricts to assist planners to objectively explore options for managing road networks

and assess the intersection of road affects with other features of the landscape. Density, distance, and type of linear feature (e.g. road types, power lines) are used to calculate index values that indicate relative road pressure. The index value is mapped over all areas of the landscape using a one hectare grid. The overall index may be calculated for any area of interest, such as element, ecosection, ecodistrict, or ecoregion, by averaging the index values within the area to provide a relative indication of land use pressure. The index provides a numerical indicator of road influence that can be used to monitor temporal changes and compare different landscapes.

In discussing road ecology, Forman (2004) describes five distinctive landscape types in North America: city-suburb, agricultural, forestry, arid-grassland, and natural landscape. Each landscape type has a characteristic pattern of road networks with distinctive ecological effects and planning considerations (Forman & Hersperger 1996). These were adapted in Nova Scotia to classify five Road Index Benchmark Ranges associated with particular land use settings:

- Remote Landscape (RI 0 to 6): Unpopulated with few roads, trails, or other linear features
- Forest Resource (RI 7 to 15: Forest access roads are the primary linear feature
- Mixed Rural (RI 16 to 24): Mixed land use of rural settlement, forestry, and agriculture
- Agriculture/Suburban (RI 25 to 39): Suburban settlement and/or open agricultural fields
- Urban (RI 40 to 100): Urban environment with high building densities, roads, and few tracts of undeveloped land outside municipal parks

Road, trail, and utility corridors are vital components of human land use. However, transportation systems are expensive and produce many undesirable environmental effects, such as chronic siltation, invasion routes for exotic species, fragmentation, loss of productive land, and increased human presence.

Low road density areas are important features for biodiversity conservation. Planning should consider block scheduling options, life expectancy, class requirements, decommissioning strategies, and overall landscape function, in order to develop efficient access systems designed to minimize environmental impacts.

The Cape Breton Coastal Ecodistrict has an overall RI of 6 (Appendix 7, Table 3) that falls within the Remote class range of 0 to 6. A total of 48% of the ecodistrict falls within this category, while 33% of the ecodistrict has a Forest Resource RI value of 7 to 15 (Appendix 7, Table 2).

These areas with few roads in the Remote class are distributed in patches across the ecodistrict and are mostly associated with wetlands, wetland complexes, barrens, and forest lands with relatively low stocking levels.

The road systems often bisect the ecodistrict in a north to south direction and thus may contribute to habitat fragmentation. As expected, the highest road densities occur around the settlements or main transportation systems found along the coastline and near St. Peter’s and the east side of Guysborough Harbour.

There is very little area within the ecodistrict that falls in the Agricultural Suburban class at 3% or the Urban class at less than 1%. However, 16% is in the Mixed Rural class.

Fine Scale Features (Appendices 3, 4, 5; Maps 6, 7)

Data on the status and location of priority species, ecological land classification, representivity analysis, and other landscape characterization themes were used to identify special occurrences, rare ecosections, and ecological representivity. These fine scale features, which occur at a sub-landscape level, may require special management practices to conserve their uncommon characteristics.

Lindenmayer and Franklin (2002) refer to the importance of identifying "midspatial-scale" features and "patch-level habitats," including: 1) aquatic ecosystems, such as streams, lakes, and ponds; 2) wildlife corridors; 3) specialized habitats, such as cliffs, caves, thermal habitats, meadows, and vernal pools; 4) biological hotspots or places of intense biological activity, such as calving sites, over wintering grounds, and spawning habitats; and 5) remnants of old forest.

Priority Species and Other Special Occurrences (Appendix 3; Map 6)

Landscapes and ecosystems comprise many species of plants, animals, and other organisms. Some of these species are given priority in planning, management, and stewardship because they are rare and/or at risk of going extinct locally or on a larger scale. The status and location of these species are important and data are collected, compiled, and assessed on an ongoing basis.

The primary species data used in this report are from the Atlantic Canada Conservation Data Centre and DNR's Significant Habitat Database. Efforts are made to ensure data are as accurate and up-to-date as possible. Lists and maps indicate what is currently known. Due diligence tied to planning, management, and stewardship may require that surveys be carried out to update information or to fill gaps in our knowledge. Priority species may require special actions in terms of forest management and other activities that alter habitat and the landscape. If more information is required or if management specific to a priority species need to be developed, a regional biologist, Wildlife Division staff, or other species experts should be contacted.

This section includes species at risk (refer to Table 1a, Appendix 3), species of conservation concern (Table 1b, Appendix 3), other conservation features (Table 1c, Appendix 3), and heritage features (Table 1d, Appendix 3, where available). *The list of species at risk and species of conservation concern was obtained from the Atlantic Canada Conservation Data Centre (ACCDC) databases, current to 2013.*

Species at Risk

The term "species at risk" is generally used to describe those species that are, to some extent, protected under provincial or federal endangered species legislation. Usually these species are protected where they occur on provincial, federal, and private lands. In Nova Scotia, the two main pieces of endangered species legislation are the Nova Scotia Endangered Species Act (NSESA) and the federal Species at Risk Act (SARA). Species can be classified as "endangered," "threatened," "vulnerable/special concern," or as "extinct" or "extirpated." In most cases for species at risk, recovery planning and special management are in place, as well as legal protection (See http://novascotia.ca/natr/wildlife/biodiversity/at-risk-overview.asp).

Species of Conservation Concern

The term "species of conservation concern" refers to those species that are a high priority for conservation and special attention during planning, management, and stewardship. These species may be rare and/under a variety of threats but the threats do not currently warrant species at risk designation. In some cases these species could meet the criteria for a species at risk but a formal species at risk assessment has not been done. Species of conservation concern are a priority in landscape planning because a focus on them now can prevent these species from becoming species at risk later.

Species Ranking and Coding Systems

A number of ranking and coding systems identify and convey the status of species at risk and species of conservation concern. Some of this information is provided in Appendix 3 and Map 6 and is routinely used in planning, management, and stewardship activities.

Colour-coded "traffic light" systems are used provincially and nationally. These systems use "red to orange/yellow to green" categories to indicate the most at risk species (red) to the least at risk species (green). Details of these systems are available from the Wildlife Division.

A second system commonly used is NatureServe Conservation Data Centre system. This system uses numbers from one (extremely) to five (widespread, abundant) to denote the relative rarity and conservation concern for species. At the provincial scale numbers are prefixed with "S" to indicate that this is a state/provincial level rank. Ranks at the National (N) and Global (G) levels are also available for all species. In Nova Scotia, the Atlantic Canada Conservation Data Centre (http://www.accdc.com/) works with partners to provide ranks and data on species' occurrence.

Species at risk listed under the N.S. Endangered Species Act that occur within the Cape Breton Coastal Ecodistrict include: eight endangered, two threatened, and two vulnerable species.

Endangered species found within the Cape Breton Coastal Ecodistrict include little brown bat (*Myotis lucifugus*), as well as six bird species: red knot (*Calidris canutus rufa*), bicknells thrush (*Catharus bicknelli*), piping plover (*Charadrius melodus melodus*), rusty blackbird (*Euphagus carolinus*), barn swallow (*Hirundo rustica*), and Canada wabler (*Wilsonia Canadensis*). One endangered lichen, boreal felt lichen (*Erioderma pedicellatum*), is also found within the ecodistict. Two birds found here are listed threatened: common nighthawk (*Chordeiles minor*) and olive-sided flycatcher (*Contopus cooperi*). Both New Jersey rush (*Juncus ceasariensis*) and blue felt lichen (*Degelia plumbea*) are listed vulnerable under the NSEA.

Although not yet listed under the NSEA, several COSEWIC-listed species are found in Cape Breton Coastal Ecodistrict 810, including bank swallow (*Riparia riparia*; threatened), buff-breasted sandpiper (*Tryngites subruficollis*; special concern), Atlantic salmon (*Samlo salar*; endangered), and monarch butterfly (*Danaus plexippus*; special concern).

In addition to the listed species, the national general status process also identifies 23 orange-status species, 44 yellow-status species, and 25 green-status species for a total of 92 other species

of conservation concern in this ecodistrict (some green-status species are included because of their Atlantic Canada Conservation Data Centre rank). These species include eastern cougar (*Puma concolor*), 35 species of birds, striped bass (*Morone saxatilis*), triangle floater (*Alasmidonta undulata*), five butterflies, 57 plants, and four lichens.

Wildlife and Wildlife Habitat

Wildlife in the Cape Breton Coastal Ecodistrict includes relatively common species of plants, animals, and other organisms, along with some species that are rare and/or at risk in Nova Scotia.

Wildlife information for Cape Breton Coastal and other ecodistricts comes from a number of sources, including surveys, harvest statistics, hunter and trapper reports (abundance rankings), biological collections from harvested and road killed animals, and observations and reports from the public and DNR staff. Information on important sites is documented by DNR in the Significant Habitats Database and by the Atlantic Canada Conservation Data Centre in Sackville, N.B.

Old forests are recognized as providing important wildlife habitat. The provincial goal is to have a minimum 8% for old forests on provincial Crown land. Shade-tolerant hardwoods and softwoods may provide important wildlife structural components, such as cavity trees, and are encouraged across the landscape through appropriate silviculture systems.

Lakes and rivers are a significant portion of the ecodistrict, covering about 7,748 hectares or about 7% of the area. Wetlands, predominantly bogs and fens, also occupy a large part of this coastal area comprising a total of 15,660 hectares. In addition to those areas currently mapped as wetland, much of the forested land is imperfectly drained or worse which would qualify these sites as wetland. Coastal barrens occur along the length of the ecodistrict and on many of the coastal islands, including Scatarie Island.

A large portion of this ecodistrict has been identified as significant wildlife habitat, including sites with unusual concentrations of wildlife, habitats used by species at risk, or habitats that are few in number in the province.

The low elevations and proximity to the coast make Cape Breton Coastal a good wintering area for white-tailed deer (*Odocoileus virginianus*). Eighteen deer wintering areas (DWAs) have been identified, comprising a total area of about 10,000 hectares. The largest of these DWAs, Framboise/Lower St. Esprit, stretches along the coast for over 30 kilometres and varies from less than one kilometre to more than six kilometres width inland from the coast, comprising 5,814 hectares.

Within this large DWA, deer congregate from some distance inland, gradually confining their activity to the areas near the coast as winter progresses. Mature balsam fir and black spruce forests provide good protection from snow accumulation and storm-tossed seaweeds provide a source of food. Areas frequented most often for foraging on seaweed include several small coves open to the ocean where seaweeds accumulate on sand or cobble beaches and rocky shores, particularly during winter storms (e.g. Fox Cove, Capelin Cove, and Kelpy Cove).

The juxtaposition of good softwood cover stands in close proximity to beach areas with plentiful stranded seaweed determines the most heavily used sites. Deer access the coast using a series of defined trails established throughout the area which are used consistently from year to year.

DWAs further inland and not associated with the coast are typically situated on sheltered slopes with close juxtaposition of good cover stands of mature conifers and hardwood browse for winter feed. Special management practices for these sites will help to ensure winter forest cover is maintained in close proximity to feeding areas. (See DNR special management practice for DWAs at http://novascotia.ca/natr/wildlife/habitats/terrestrial/pdf/SMP_White-tailed_Deer.pdf).

Coniferous forests of fir and spruce predominate over much of the coastal area of the ecodistrict. The cool moist climate along the Atlantic Ocean lends a boreal character to these forests. Several birds characteristic of the boreal forest are common, including gray jay, boreal chickadee, ruby-crowned kinglet, and spruce grouse.

There are about two dozen bald eagle (*Haliaeetus leucocephalis*) nests in the ecodistrict. Most eagle nests are located in close proximity to coastal water and typically are situated in forest stands that contain a number of super-canopy trees (for nesting), often along steep valleys and often associated with a stream. White pine is the most common tree species used by eagles for nesting although other species of either coniferous trees (e.g. spruce) or deciduous trees (e.g. red maple) are also used.

Although a nest may be abandoned over time as individual trees become decadent, eagles tend to return to the same forest stands to nest year after year. Nesting eagles are sensitive to forest harvesting and other disturbance during the nesting season. Their dependence on suitable stands of nest trees may also be locally limiting. Special management practices for eagle nests is aimed at maintaining nesting areas for years to come.
(See http://novascotia.ca/natr/wildlife/habitats/terrestrial/pdf/SMP_Bald_Eagle_Nests.pdf).

Osprey (*Pandion haliaetus*) nest along the length of the ecodistrict, often on coastal islands, from Isle Madame east to Baleine. Unlike eagles, ospreys prefer spruce trees or often manmade structures such as power and light poles to nest. Shallow coastal waters or inland lakes provide habitat for a variety of fish that are their chief prey.

Among the forest raptors that occur in the ecodistrict, northern goshawk (*Accipiter gentilis*) is one of the species most sensitive to forest harvesting, silviculture, and other developments. Goshawk occurs throughout the ecodistrict and nests in mature hardwood and mixedwood stands. Although populations appear to fluctuate depending on abundance of snowshoe hare, forest stands suitable for nesting is a limiting factor for this species locally. Most nests in this ecodistrict occur in yellow birch trees.

The coastal areas and offshore islands of Cape Breton Coastal are important habitat for waterfowl, seabirds, shorebirds, terns, herons, and ospreys, including many species that are colonial nesters. Coastal waters, wetlands, beaches, and cliffs are used by a variety of birds for staging, breeding, and wintering.

Shorebirds, including sandpipers, plovers, yellowlegs, dowitchers, and other species, congregate in numbers on mudflats and salt marsh during summer-fall migration from breeding areas in the north. A variety of species have been recorded at sites across the ecodistrict from Port Shoreham Beach (Ragged Head) in Guysborough County east to Scatarie.

The mudflat and salt marsh complex at the confluence of Fullers River and MacKenzies River at Fullers Bridge in Fourchu is a significant staging area for shorebirds. Mudflats and beaches at Point Michaud beach also attract a large number of species.

In addition to the many common species, rare birds such as red knot (*Calidris canutus rufa*), buff-breasted sandpiper (*Tryngites subruficollis*), and Hudsonian godwit (*Limosa haemastica*) may be encountered along the shores of Cape Breton Coastal. Purple sandpipers (*Calidris maritima*) occur along the most exposed and wave-washed rocky coasts of headlands and islands throughout winter.

In winter, several sea ducks, including common eider (*Somateria mollissima*), black scoter (*Melanitta nigra*), surf scoter (*Melanitta perspicillata*), white-winged scoter (*Melanitta deglandi*), long-tailed duck (*Clangula hyemalis*), common goldeneye (*Bucephala clangula*), bufflehead (*Bucephala albeola*), and greater scaup (*Aythya marila*), frequent the coastal areas with notable concentrations in the waters off Scatarie Island and in the area of Lennox Passage.

Local concentrations of dabbling ducks, such as American black duck (*Anas rubripes*) and mallard (*Anas platyrhynchos*), as well as divers, such as common merganser (*Mergus merganser*) and red-breasted merganser (*Mergus serrator*), also occur in more sheltered estuarine waters.

Unusual species such as Harlequin duck (*Histrionicus histrionicus*) also winter along these shores.

The coastal barrens along this shore from Scatarie Island to Cape Auguet in Isle Madame support staging Hudsonian whimbrel (*Numenius phaeopus hudsonicus*) and occasional nesting colonies of Leach's storm petrel (*Oceanodroma leucorhoa*). Cliffs associated with coastal headlands support nesting colonies of herring gull (*Larus argentatus*), great black-backed gull (*Larus marinus*), black-legged kittiwake (*Rissa tridactyla*), black guillemot (*Cepphus grylle*), double-crested cormorant (*Phalacrocorax auritus*), and great cormorant (*Phalacrocorax carbo*).

Beaches are used only occasionally by piping plover (*Charadrius melodus melodus*) though no confirmed breeding has been recorded for this ecodistrict.

Seals – most commonly grey seal (*Halichoerus grypus*) – whelp in localized sites along the shore with concentrations identified at several sites, including coastal islands such as the Basque Islands off Point Michaud and Hay Island off Scatarie where hundreds of grey seals birth their young.

Common loon (*Gavia immer*), which typically nests on islands or emergent beds within lakes or rivers, has been recorded at 22 lakes across the ecodistrict.

Atlantic salmon (*Salmo salar*) has been recorded in at least 13 streams in Cape Breton Coastal. These waterways and several other streams and lakes provide good habitat for brook trout (*Salmo fontinalis*) and support runs of rainbow smelt (*Osmerus mordax*) and gaspereau (*Alosa pseudoharengus*). American shad (*Alosa sapidissima*), striped bass (*Morone saxatilis*), and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) are found in a few locations. Among the freshwater mussels that occur in the ecodistrict, the eastern pearlshell (*Margaritifera margaretifera*) occurs most commonly in larger streams such as Catalone River and Grand River.

The rare coastal plain plant New Jersey rush (*Juncus caesariensis*) has been recorded at about 50 sites, most of which are in Richmond County. Ecodistrict 810 accounts for over 80% of the known population in Cape Breton. This plant grows on the edge of bogs and fens and has a distribution unlike many other coastal plain species, most of which are found in southwestern Nova Scotia. These are the only known locations in Canada for this plant and together they represent more than half of the known world population.

Boreal felt lichen (*Erioderma pedicellatum*) was first discovered in Cape Breton in 2008 at Framboise in the Cape Breton Coastal Ecodistrict. This area of Richmond County remains the centre of the species range in Cape Breton with about half of the known sites located in Ecodistrict 810. Boreal felt lichen, along with several species which share similar habitat - wet balsam fir forest along the Atlantic coast – is known from about 40 sites in the ecodistrict.

Species that share similar forest habitat include salted shell lichen (*Coccocarpi palmicola*), northern coral lichen (*Sphaerophorus globosus*), oldgrowth rag lichen (*Platisimatia norvegica*), and textured lungwort lichen (*Lobaria scrobiculata*). Special management practices for forest harvest and silviculture in boreal felt lichen habitat will help to conserve this and related species. (See http://novascotia.ca/natr/wildlife/habitats/terrestrial/pdf/SMP_Boreal_Felt_Lichen.pdf).

Significant dunes systems such as those found at Belfry Beach, Morrisons-Framboise Beach, and Point Michaud Beach, provide a diversity of habitats for low-growing plants tolerant of high winds and salt spray. Salt-loving (halophytic) plants such as American beach grass (*Ammophila breviligulata*) and beach pea (*Lathyrus japonicus*) predominate nearest the ocean, gradually being replaced inland by lichens, low shrubs such as northern bayberry (*Morella pensylcanica*), and stunted white spruce (*Picea glauca*).

Several other rare plants that also occur in northern regions of Canada and are considered part of the arctic-alpine flora are found in wet areas or on coastal headlands and islands. Species include Swedish bunchberry (*Cornus suecica*), northern blueberry (*Vaccinium boreale*), and alpine bilberry (*Vaccinium uliginosum*) found on Scatarie and a few other headlands in the ecodistrict.

The coastal area at Baleine in Cape Breton County has been identified as a significant wildlife habitat due to the presence of rare plants, especially the arctic-alpine floral species.

Species found on the coastal barrens and bogs there include spurred gentian (*Helenia deflexa*), loose-flowered alpine sedge (*Carex rariflora*), multi-rayed goldenrod (*Solidago multiradiata*), northern blueberry, lesser wintergreen (*Pyrola minor*), marsh lousewort (*Pedicularis palustris*), and Michaux's dwarf birch (*Betula michauxii*).

The lands at Baleine are an outstanding example of undisturbed coastal ecosystems ranging from beaches and rocky shores to barrens, bogs, and coastal forest. Similar habitats also occur further west along the coast from Lorraine to Fortress Louisbourg.

Two coastal areas were listed by the International Biological Program (IBP) in the early 1970s: Gabarus-Belfry Gut for black-legged kittiwakes and fragile coastal vegetation, including grape-fern; and Point Michaud for its sand dune systems.

Since the time of the identification of these sites by the IBP, the Gabarus Wilderness Area has been established, incorporating much of the former IBP site. In a similar vein, the IBP site at Point Michaud is largely contained within the Point Michaud Protected Beach, which has since been established.

One Ducks Unlimited impoundment at Shoal Lake in Richmond County is currently maintained in Cape Breton Coastal. This unique site provides breeding habitat for a few unusual birds such as pied-billed grebe (*Podilymbus podiceps*).

Rare Ecosections (Appendices 3, 12b; Map 7)

The Ecological Land Classification for Nova Scotia (Neily et al. 2003) classifies ecosections based on similar characteristics of landform, soils, and vegetation. These are the smallest mapped unit, and they repeat within ecodistricts. Ecosections have characteristic natural disturbance regimes and climax types.

Landscape elements were identified by combining ecosections with similar characteristics. Table 9 provides explanations of ecosections and their relationship to elements. Ecosections that are rare (< 2% of ecodistrict area) or under high land use pressure (> 75% land conversion) are identified in Appendix 3.

Within the Cape Breton Coastal Ecodistrict, 12 ecosections – IFRD, IFSM, IMKK, IMRD, IMSM, PFHO, WCRD, WFDM, WFRD, WMRD, XXCB, AND XXMS – each comprise 2% or less of the ecodistrict area.

Of these 12 ecosections, IFRD, IFSM, WFDM, WMRD, and XXCB have the highest land use pressures. An example of an ecosection under stress is at Cap La Ronde beach in Richmond County, where the beach system is under pressure from aggregate extraction.

Another ecosection which has undergone extreme pressure from human activity is WFDM, where part of the ecosection has been converted from the climax type of red maple and yellow birch to a predominantly white spruce covertype.

Table 9 – Elements, Ecosections, Disturbance Regimes andClimax Types

810 Cape Breton Coastal Ecodistrict			
Landscape Element and Type	**Ecosections***	**Dominant Natural Disturbance Regime**	**Dominant Climax Type**
Coastal Spruce (Matrix)	IFHO IFRD IFSM IMDM IMHO IMKK IMRD IMSM WCRD WFHO WFRD WMHO WMRD	Frequent	balsam Fir (bF), black Spruce (bS), white Spruce (wS)
Coastal Mixedwood Hills and Drumlins (Patch)	WFDM WFKK WMDM WMKK	Frequent	bF, red Maple (rM), white Birch (wB), yellow Birch (yB)
Wetlands (Patch)	PFHO PMHO WTLD	Open Seral	bS, tamarack (tL), rM
Coastal Beach (Patch)	XXCB	N/A	N/A
Salt Marsh (Patch)	XXMS	Open Seral (tidal flooding)	*Spartina spp.* (cordgrass)
Valley Corridors (Corridor)	Various	Various	Various

***Ecosection Explanations**: For example, in **WMHO**, **W** stands for Well-drained under Soil Drainage **M** stands for Medium-textured under Soil Texture and **HO** stands for Hummocky under Topographic Pattern

Soil Drainage: **W –** Well-drained **I –** Imperfectly drained **P** – Poorly drained **WTLD** – Wetland

Soil Texture: **C** – Coarse-textured soils (e.g. sands) **M** – Medium-textured soils (e.g. loams) **F** – Fine-textured soils (e.g. clays)

Topographic Pattern: **SM** – Smooth or flat **KK** – Hills **HO** – Hummocky **DM** – Drumlinoid **RD** – Ridges **DS** – Canyons and steep slopes

This ecosection is located in the same area of Isle Madame as is the Cap La Ronde beach system. The IMKK ecosection, whose climax community is made up of coastal white spruce, black spruce, and balsam fir, represents 0.2% of the ecodistrict at 261 hectares, but only forms 0.1 % of the entire ecoregion. This uncommon ecosection is found only in the wilderness area at Gabarus in Cape Breton County.

The WRCD ecosection, only represented in one area of the ecodistrict at Battery Provincial Park

in St. Peter's, is 32 hectares in size and its representation is so tiny that it shows up in the statistics as a 0% for the ecodistrict.

These 12 ecosections combined form 11.5% of the ecodistrict.

Opportunities for future management to address fine filter conservation issues include:

- Conservation of uncommon forest species for which genetic viability may be threatened.
- Consideration of management opportunities related to conservation of significant habitats.
- Recognition of uncommon community conditions (e.g. old age, large live and dead trees, and species associations).

Ecological Representivity (Appendices 4, 5)

Ecological representivity describes the degree that the range of natural ecosystem diversity (elements, ecosections) is secured within reserve systems (e.g. Parks, Wilderness, Old Growth Policy).

The overall goal is biodiversity conservation through protection of natural habitat diversity. Ecological representation is employed as a "coarse scale" ecosystem planning concept. The analysis evaluated and identified the reserve status of the ecosections and climax communities located within the ecodistrict where two levels of reserves were recognized: legally protected reserves, such as Wilderness Areas; and policy protected reserves under the Integrated Resource Management (IRM) classification to include old forest, Eastern Habitat Joint Venture Sites, non- designated provincial park reserves, and non-designated sites of ecological significance.

National parks, provincial wilderness areas, protected beaches, areas protected under the Special Places Act, and sites of ecological significance under moratorium are the legal reserves, accounting for 2% of this ecodistrict. Two wilderness areas – Scatarie Island and Gabarus – are located within the Cape Breton Coastal Ecodistrict, while one – Middle River-Framboise – straddles the boundary between this ecodistrict and the Bras d'Or Lowlands Ecodistrict.

Two designated provincial parks in the ecodistrict – Battery in St. Peter's and Lennox Passage – are both in Richmond County. One national park – Fortress Louisbourg – is also in the ecodistrict.

These Crown reserves total about 9,400 hectares (Appendix 5). The provincial Old Growth Policy protects another 3,714 hectares of forest stands on Crown land.

ELA Summary

Element Interpretation (All appendices and maps)

This coastal ecodistrict extends along the north shore of Chedabucto Bay and the east coast of Cape Breton Island and has a Maritime Boreal coastal forest. This forest includes stands of white

spruce, balsam fir, and black spruce extending several kilometres inland. In sheltered areas and on drumlins, occasional white pine and tolerant hardwoods are found. However, red maple and white birch dominate the hardwood component of the coastal forests. Throughout the ecodistrict, small patches of jack pine and scattered red oak occur.

Sedimentary rocks such as siltstones, sandstones, shales, and conglomerates predominate the Chedabucto north shore, Isle Madame, and northeasterly to Loch Lomond. However, from Point Michaud to Scatarie Island, volcanic granites, rhyolites, and andesite as well as metamorphic sediments (slate and quartzite) underlay a deep deposit of glacial till, sand, and gravels with the underlying bedrock visible only along the coast.

The glacial history of the Cape Breton portion of this ecodistrict includes various depths of glacial deposits and drumlins.

Two dominant soils define the ecodistrict. On the north shore of Chedabucto Bay, finer textured, well to imperfectly drained soils occur and extend to St. Peter's. From L'Ardoise to Mira Bay, coarse, better-drained soils are found, especially on the drumlins and elevated glacial deposits. Several large areas of coarse-textured, imperfectly drained soils will be found around the Bays of Fourchu and Gabarus and some poorly drained coarse soils at Little Lorraine.

Lakes and rivers are significant within this ecodistrict occupying 7,745 hectares, or 7% of the ecodistrict.

The coastal forests are subjected to serious wind damage and exposure, abundant moisture and cool temperatures and are susceptible to fungus attack and consequent liability to windfall. As such, balsam fir seldom exceeds 70 years of age. These windfall areas quickly regenerate to another crop of balsam fir either from new seed fall or advanced regeneration. Other natural disturbance agents creating both stand and individual tree mortality include spruce budworm, larch sawfly and, to a lesser extent, fire.

Since the construction of the Canso Causeway in 1953, there has been no movement of spring ice from the Gulf of St. Lawrence through the Strait of Canso where currents once flowed at upwards of 20 knots per hour from St. Georges Bay.

Spring ice still comes through the Cabot Strait from the Gulf of St. Lawrence and then gets blown against the Cape Breton coast. The impact of this reduced quantity of offshore ice in the spring has yet to be determined, but it could be hypothesized that the current extent of coastal forest in this ecodistrict is in response to the late, cool, wet springs when ice remained offshore well into May.

Coastal Spruce

(Matrix) (IFHO, IFRD, IFSM, IMDM, IMHO, IMKK, IMRD, IMSM, WCRD, WMHO and WMRD ecosections) (56,344 ha)

The Coastal Spruce matrix element of the Cape Breton Coastal Ecodistrict has historically been shaped by frequent stand-initiating disturbances, predominantly repeated wind storms, and insect infestations, while forest management has also strongly influenced the makeup of the element.

During the period of European settlement there may have been an influence from fires, intentionally started to clear pasture land.

The matrix is currently dominated by late seral softwood stands of white and black spruce and balsam fir, located on both well-drained and imperfectly drained fine to medium-textured soils. This softwood type makes up 71% of the element while mixedwood comprises 16% and the hardwood type 7%. The remaining 6% of the Coastal Spruce element is unclassified.

It is common to find eastern larch on imperfectly to poorly drained soils and white pine can occasionally be found in very sheltered locations.

On the well-drained drumlin soils in the St. Esprit and Framboise areas, mixedwood stands of white spruce, black spruce, and balsam fir can be found in association with yellow and white birch and occasionally red maple. In a few locations, pure hardwood stands of yellow birch and white birch and occasionally red maple grow on well-drained medium to coarse-textured soils. This is the case near Gull Lake in Cape Breton County.

In Guysborough County, in the western portion of the ecodistrict, red maple dominates the hardwood component of the mixedwood stands as well as the hardwood stands in the area. White birch is found associated with the red maple in this area.

In Cape Breton County, in the eastern end of the ecodistrict, yellow and white birch are found associated with diminishing amounts of red maple as the coastline is approached. However, contrary to the situation in the St. Esprit and Framboise area of Richmond County where red maple is very seldom seen in close proximity to the Atlantic coast, in Guysborough and Cape Breton counties, red maple is found right up to the shoreline.

Flows

Human (timber, recreation, hunting, off-highway vehicles (OHV)); deer (primary habitat, travel, winter cover); goshawk (mature - primary habitat, most often nest in yellow birch, large patches/large trees, open understory); water (catchment, filter, groundwater recharge).

Composition

Cape Breton Coastal Ecodistrict 810 (based on statistics up to 2006)

Composition of Coastal Spruce

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	32%	27%	41% (22 Mat + 19 OF)	19%
Seral Stage	Early	Mid	Late	Unclassified
	7%	18%	64%	11%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	71%	7%	16%	6%

Desired Condition

Late seral spruce and balsam fir-dominated softwood stands in a variety of patch sizes, development stages, and seral stages. Inclusion of tolerant and intolerant hardwood and mixedwood knoll stand and improved connectivity among reserves, wetlands, and river corridors.

Issues

The Coastal Spruce matrix element has been impacted significantly since European settlement by forest harvesting, fires, and insect and windstorm damage. The challenge will be to try to move toward a more balanced age class structure with more diversity in the forest, which may help in resisting insect and wind damage in the future.

As well, developing proactive ecosystem-based management practices will be a challenge for the future planners.

Coastal Mixedwood Hills and Drumlins

(Patch) (WFDM, WFKK, WMDM and WMKK ecosections) (45,369 ha)

The Coastal Mixedwood Hills and Drumlins patch element is located mainly on well-drained drumlins with predominantly fine-textured to medium-textured soils.

The present forest is made up of 62% softwood, 20% mixedwood, and 11% hardwood forest.

Most of the softwood component is made up of late seral white and black spruce and balsam fir, while the mixedwood portion is composed of the same softwood species mixed with yellow and white birch with some red maple. The red maple tends to be more abundant in the extreme western end of the element, especially in Guysborough County where it dominates the mixedwood and hardwood component.

In Cape Breton County, in the eastern end of the element, again red maple is fairly abundant, found frequently in close proximity to the coastline. However, in the central portion, in the Framboise and St. Esprit area of the element, the yellow and white birch is dominant and red maple is rarely found in the mixedwood stands until one goes further inland.

White pine is found occasionally in sheltered locations.

The hardwood portion of the element follows the same trend as the mixedwood except that there is much less of a softwood presence in these hardwood stands.

Flows

Human (timber, recreation, hunting, OHV); deer (primary habitat, travel, winter cover); goshawk (mature - primary habitat, most often nest in yellow birch, large patches/large trees, open understory); migratory birds (habitat, nesting sites, travel along coastline, nest in interior water bodies); water (catchment, filter, groundwater recharge).

Composition

Cape Breton Coastal Ecodistrict 810 (based on statistics up to 2006)
Composition of Coastal Mixedwood Hills and Drumlins

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	36%	26%	38% (28 Mat + 10 OF)	10%
Seral Stage	Early	Mid	Late	Unclassified
	9%	21%	57%	13%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	62%	11%	20%	7%

Desired Condition

Predominantly mature softwood, mixedwood, and hardwood stands with a sustained community of late seral species.

Issues

The Coastal Mixedwood Hills and Drumlins patch element has been impacted for many years by forestry and land clearing for farming. The typical mixedwood forest has, in many areas, been changed from the mixedwood covertype to a more softwood-dominated forest. Old farm fields have often regenerated into pure white spruce stands that were not originally found in the element. The challenge may be to develop ecosystem-based management strategies to work towards restoring some semblance of the original forest communities in the element.

Wetlands
(Patch) (PFHO, PMHO and WTLD ecosections) (5,659 ha)

The Wetlands patch element is dominated by bogs and fens that occupy a large part of the Cape Breton Coastal Ecodistrict. This extensive wetland patch is at least partially a result of impeded drainage and a cool climate.

Some of the largest bog complexes are found in the coastal areas at Gabarus, Fourchu, Louisbourg, and Baleine, as well as on Scatarie Island. There are also many smaller wetlands scattered over the ecodistrict, which are important to wildlife and in some instances provide habitat for uncommon plants.

Flows

Deer (one of the main flows in the wetland patch are deer that often pass through the wetland complexes in their travels from the interior to the coast); migratory birds (Canada geese use some of the wetlands as resting spots in their migrations); people (sometimes travel in the wetlands while hunting or on route to inland water bodies to fish; a negative but very real flow in some of the wetlands is OHV traffic which causes a great deal of damage to the sensitive wetland complexes).

Composition

Cape Breton Coastal Ecodistrict 810 (based on statistics up to 2006) **Composition of Wetlands**				
Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	31%	21%	48% (28 Mat + 20 OF)	20%
Seral Stage	Early	Mid	Late	Unclassified
	5%	13%	73%	9%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	86%	3%	8%	3%

Desired Condition

Undisturbed bog and fen complexes with patches of black spruce on the better-drained hummocks.

Issues

The Wetlands patch element is found dispersed across the ecodistrict and the very nature of the wetlands raises issues around road development, infilling, and drainage.

Indiscriminate OHV use is harming many sensitive wetland complexes. The challenge will be to educate the public as to the vitality of these wetlands and their ecological value to the ecosystem as a whole. Developing sound ecosystem-based management techniques will be a challenge as well to ensure the conservation of this element.

Coastal Beach

(Patch) (XXCB ecosection) (1,122 ha)

The Coastal Beach element is generally in good condition in the Cape Breton Coastal Ecodistrict. Late seral white and black spruce are usually found associated with the coastal beach systems. Beach grasses, such as maram grass, help to stabilize the dune systems.

Coastal ponds (barachois) are often found adjacent to the coastal beaches. Some beach complexes in this patch element are stressed (e.g. Cap La Ronde beach on Isle Madame in Richmond County, where sand and gravel removal has impacted the integrity of the beach).

Flows

Humans (fishing, trapping, settlement, roads, camping, hiking); water (coastal ponds, marine estuaries); deer (winter habitat and feeding); furbearers (travel, food, habitat); migratory birds (travel routes, summer habitat).

Composition

Cape Breton Coastal Ecodistrict 810 (based on statistics up to 2006)

Composition of Coastal Beach

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	21%	37%	42% (29 Mat + 13 OF)	13%
Seral Stage	Early	Mid	Late	Unclassified
	1%	4%	81%	14%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	88%	1%	6%	5 %

Desired Condition

Natural beach systems with a minimum of human intervention.

Issues

The Coastal Beach element has many issues associated with development of beach complexes, extraction of beach aggregate for construction, and indiscriminate OHV use on dune systems resulting in destruction of wildlife habitat and sensitive beach grass communities.

Piping plover can be found on a few of these coastal beaches and their nesting habitat is at risk from human traffic. The challenge will be to maintain and enhance the integrity of these coastal beaches through proactive ecosystem-based management.

Salt Marsh

(Patch) (XXMS ecosection) (15 ha)

The Salt Marsh element makes up a small but unique habitat patch with areas of salt marsh scattered along the southern coast of Cape Breton, most notably in the Fourchu and Fullers River areas. Primary production from photosynthesis in salt marshes is exceedingly high even in temperate latitudes. Resulting nutrient enrichment from growth of plants and marine algae supports a rich and diverse assemblage of aquatic invertebrates and fish.

Along the southern coast of Cape Breton, as elsewhere in Nova Scotia, salt marshes also support migratory birds, shorebirds, waterfowl, terns, herons, ospreys, and eagles, as well as furbearers such as otter and mink. There is a long history of loss of salt marsh throughout Nova Scotia, particularly through dyking and conversion to farmland. In the Cape Breton Coastal ecodistrict, loss of salt marsh to development has been fairly localized and incremental.

Flows

Humans (fishing, trapping, settlement, roads, camping, hiking); water (coastal ponds, marine estuaries); deer (winter habitat and feeding); furbearers (travel, food, habitat); migratory birds (travel routes, summer habitat).

Composition

*Note: Since the entire Salt Marsh element is only 15 hectares, meaningful statistics on the composition of the element could not be obtained.

Desired Condition

Natural salt marsh ecosystem with a minimum of human intervention.

Issues

This element makes up only a tiny portion of the ecodistrict and, as such, is a very important. The issues are common to all wetlands, in that indiscriminate OHV use and human development are potentially major impacts on salt marshes. Channel dredging, infills, and general land development are challenges for the future management of this element.

Valley Corridors

(Corridor) (Various ecosections) (1,063 ha)

The two corridor elements that have been identified in the Cape Breton Coastal Ecodistrict are the Mira and Framboise rivers and Grand River corridors. The Mira and Framboise rivers corridor runs from just north of Victoria Bridge and follows the drainage to the uppermost headwaters of the Mira River and then over a short divide and follows the Framboise River system southward to the coast.

This corridor is traveled by people and aquatic mammals, as well as anadromous fish species. The actual corridor is made up of wetlands spread out in a linear fashion following both sides of the major watercourses. The area surrounding and interspersed with this corridor is dominated by the Coastal Spruce matrix element with the northwestern portion passing through the Coastal Mixedwood Hills and Drumlins patch element.

Softwood stands are predominant with white spruce, black spruce, and balsam fir being the main species. White pine is found occasionally scattered on well-drained soils and eastern larch on imperfectly drained soil types.

In the portions of the corridor that pass through the Coastal Mixedwood Hills and Drumlins element, the softwood species again predominate but the proportion of mid to late seral stage hardwood species, such as yellow birch and white birch, increases.

Red maple begins to appear in the mixedwood and hardwood stands further inland. The land adjoining the Mira and Framboise rivers corridor has been significantly altered by human activities, such as farming. The Grand River corridor comprises predominantly wetlands found along the mouth of the river as well an alluvial gravel deposits found in the northern portion of the corridor.

Flows

Human (farming, canoeing, fishing, trapping, settlement, roads, and gravel deposits associated with intervale lands, camping, light recreation associated with river slopes - Grand River and the Mira and Framboise rivers); water (major drainages - permanent and secondary); deer (habitat and feeding); furbearers (travel, food, major habitat); anadromous fish (habitat, migratory routes, spawning beds).

Composition

Cape Breton Coastal Ecodistrict 810 (based on statistics up to 2006)

Composition of Valley Corridors

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	39%	25%	36% (23 Mat + 13 OF)	13%
Seral Stage	Early	Mid	Late	Unclassified
	8%	21%	60%	11%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	82%	2%	8%	8%

Desired Condition

Series of well-connected slopes in a natural forest condition with some altered land use features.

Issues

The Valley Corridors element in the Cape Breton Coastal Ecodistrict has issues associated with human development, including impacts from clearing of land for farming and gravel removal from alluvial deposits along the bottom end of the Grand River corridor.

Land clearing has resulted in some of the natural forest being changed over to old field white spruce and the challenge will be to use proactive ecosystem-based management techniques to restore some semblance of the biodiversity that may have been present before European settlement.

Ecosystem Issues and Opportunities (All appendices and maps)

Management of the forest resource in the Cape Breton Coastal Ecodistrict should focus on forest biodiversity conservation across the range of spatial scales.

General principles could include maintenance of connectivity, maintenance of landscape heterogeneity, maintenance of stand structural complexity, and maintenance of the integrity of aquatic systems (Lindenmayer and Franklin 2002). Actions taken toward these principles could consider:

- Acknowledging that human activities cause most of the issues facing the ecodistrict, such as cottage developments, road building, infilling of wetlands, and the unnatural opening of channels in coastal beach systems.
- OHV use in an improper manner is threatening many sensitive habitats.
- Forestry activities have their effect as well, but with better enforcement of regulations designed to protect wildlife and the environment, forestry use is slowly improving with better planning and best practices.
- Future challenges include providing better education of the public in all aspects of resource use and promoting more ecosystem-based best management in this ecodistrict.

Appendix 1: Flow - Element Interactions

Element	Humans	Water	Deer	Anadromous Fish	Aquatic Furbearers	Reptiles and Amphibians	Migratory Birds	Goshawk
Matrix Coastal Spruce	Forestry, woods roads, OHVs, outdoor recreation (hunting, fishing, trapping, etc.)	Surface water quality, catchment, filtration, groundwater recharge and discharge	Primary habitat, wintering areas, travel ways	Water quality maintenance, riparian habitat (e.g. stream cooling, undercut banks)	Riparian habitat, denning, travel, woody browse (beaver)	Primary habitat (some species, e.g. garter snake)	Breeding habitat (e.g. wood warblers)	Foraging habitat (primary prey habitat, e.g. hare and squirrel)
Patches Coastal Mixedwood Hills and Drumlins	Forestry, woods roads, OHVs, outdoor recreation (hunting, fishing, trapping, etc.)	Surface water quality, catchment, filtration, groundwater recharge and discharge	Primary habitat, wintering areas, travel ways	Water quality maintenance, riparian habitat	Riparian habitat, denning, travel, woody browse (beaver)	Primary habitat (some species e.g. redback salamander)	Breeding habitat (e.g. wood warblers)	Primary breeding habitat, foraging habitat
Wetlands	Woods roads, outdoor recreation (hunting, trapping OHVs, etc.)	Water quality, catchment, filtration, groundwater recharge, discharge, nutrient enrichment	Foraging habitat, fawning areas	Water quality maintenance, nursery areas, cover	Primary habitat, foraging habitat, travel ways	Primary habitat (some species, e.g. green frog)	Breeding habitat (e.g. waterfowl)	--
Coastal Beach	Outdoor recreation (e.g. swimming, OHVs)	--	Primary foraging habitat especially in winter (e.g. Deep, Capelin, Kelpy coves)	Temporary barrier to some species (e.g. Belfry Gut)	--	--	Breeding, foraging, and staging habitat (e.g. shorebirds)	--
Salt Marsh	--	Nutrient enrichment through primary production (photosynthesis)	Minor foraging	Nutrient enrichment through primary production (photosynthesis), prey, habitat	Foraging areas (e.g. mink, otter)	--	Breeding, foraging, and staging habitat (e.g. willet)	–

Appendix 2a: Landscape Connectivity Worksheet

Feature	Structure Type (corridor, matrix, patch, island)	Importance in Ecodistrict (high, moderate, low)	Significant Cases (species, ecosections, specific rivers)	Scale and Pattern of Operation (local, landscape)	Associated Natural Disturbance Regime	Characteristic Community	Characteristic Neighbour(s)	Barriers - Impediments to Functionality	Significant Issues	Management Strategy
Coastal Spruce	Matrix	High	Old forest areas	Dominant feature of the landscape	Frequent	wS bS bF	Mixedwood drumlins (rM yB), watercourses, wetlands, coastal beaches, or salt marsh	Some loss and fragmentation due to local development and roads.	Conservation of DWAs and other sensitive habitats (e.g. eagle nesting areas).	--
Coastal Mixedwood Hills and Drumlins	Patch	Moderate	Framboise to St. Esprit area	Significant feature within the ecodistrict creating locally distinct forest/habitat type	Gap Mosaic	rM yB	Late seral softwood (wS bS bF), watercourses, and wetlands	Minor agricultural conversion; some stand conversion to softwood	Conservation of DWAs and other sensitive habitats (e.g. Goshawk nesting areas).	--
Water	Patch/ Island	High	Mira River, Grand River, and Gabarus-Belfry-McCuish Lake system	Few large rivers, many smaller streams; lakes of various sizes are a prominent feature across the ecodistrict	--	--	Late seral softwood (wS bS bF) and wetlands	Overall minor and/or local impacts form development or roads	Water quality degradation elated to road building and forestry/ construction activities	--
Wetlands	Patch	High	Large bog complexes at Gabarus, Fourchu, New Boston to Louisbourg, Baleine, and Scatarie Island	Wetlands, especially bogs are a prominent feature throughout the ecodistrict	Open seral	Sphagnum bogs including extensive coastal bogs; fens along watercourses	Late seral softwood (wS bS bF) and watercourses	No significant impediments overall; local loss and fragmentation from development and roads	Conservation of wetland function; Species at Risk	--

Appendix 2a: Landscape Connectivity Worksheet

Feature	Structure Type (corridor, matrix, patch, island)	Importance in Ecodistrict (high, moderate, low)	Significant Cases (species, ecosections, specific rivers)	Scale and Pattern of Operation (local, landscape)	Associated Natural Disturbance Regime	Characteristic Community	Characteristic Neighbour(s)	Barriers - Impediments to Functionality	Significant Issues	Management Strategy
Coastal Beach	Patch	Moderate	Along entire length of ecodistrict with larger sand beaches at Framboise Cove, Belfry, and Point Michaud	Stretch across entire ecodistrict	Open seral	Sand and cobble beaches, rocky shores, and cliffs	Late seral softwood (wS bS bF)	Local losses due to development; impacts due to OHVs and other disturbance	Beach aggregate extraction, OHV damage, human developments, channel openings	
Salt Marsh	Patch	Moderate	Larger areas of salt marsh at Fourchu and Fullers River	Isolated local patches of unique habitat	Open seral	Salt marshes typically dominated by Spartina grasses	Late seral softwood (wS bS bF), coastal beaches	Water flow obstructions (fresh water and salt water), alteration of marsh and adjoining habitat, sedimentation, water quality	Incremental loss and degradation	

Appendix 2b: Connective Management Strategies

Structure Type	Attributes	Conditions of Concern	Management Strategies
Matrix	percolation, large patch, interior habitat	fragmentation, excessive edge	1. Promote contiguous forest structure using strategies such as patch aggregation and overstory-sustaining selection cutting 2. Promote large patch structure and interior conditions 3. Mitigate large scale, long term, fragmentation of the matrix that could impede percolation 4. Manage age and structure appropriate to natural disturbance regime (NDR). For gap and infrequently disturbed ecosections maintain 60% mature cover
Patch Ecosystems	patch size, nearest neighbour, edge / interior, intervening habitat condition	undesirable connections, internal composition, excessive separations, threats to key patch	1. Identify and map key patch representatives (high quality, or critical link/distance) 2. Maintain natural isolations, as well as necessary "nearest neighbour" distances 3. Identify potential metapopulation habitat dynamics (if applicable)
Linear Corridors	continuous connection	barriers, interruptions, excessive edge	1. Mitigate unnatural barriers 2. Map and Manage along natural boundaries 3. Conserve "interior" conditions where appropriate through strategic management of neighbouring ecosystems 4. Sustain continuity, through management of overstory and interior structure appropriate to NDR 5. Follow habitat regulations for buffer management. Establish wider buffers with natural boundaries along major waterways

Appendix 3: Special Occurrences (Ecodistrict 810)

Table 1a: Species at Risk (species protected by endangered species legislation on all lands)

SPECIES		DESIGNATION		
Common Name	**Scientific Name**	**Provincial**	**Federal**	**COSEWIC**
BIRDS	-			
Red Knot rufa ssp	*Calidris canutus rufa*	Endangered	N/A	Endangered
Bicknell's Thrush	*Catharus bicknelli*	Endangered	Special Concern	Threatened
Piping Plover melodus ssp	*Charadrius melodus melodus*	Endangered	Endangered	Endangered
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Threatened
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened	Threatened
Rusty Blackbird	*Euphagus carolinus*	Endangered	Special Concern	Special Concern
Barn Swallow	*Hirundo rustica*	Endangered	N/A	Threatened
Bank Swallow	*Riparia riparia*	N/A	N/A	Threatened
Buff-breasted Sandpiper	*Tryngites subruficollis*	N/A	N/A	Special Concern
Canada Warbler	*Wilsonia canadensis*	Endangered	Threatened	Threatened
FISH				
Atlantic Salmon - Eastern Cape Breton population	*Salmo salar*	N/A	N/A	Endangered
INSECTS				
Monarch	*Danaus plexippus*	N/A	Special Concern	Special Concern
LICHENS				
Blue Felt Lichen	*Degelia plumbea*	Vulnerable	Special Concern	Special Concern
Boreal Felt Lichen - Atlantic pop.	*Erioderma pedicellatum*	Endangered	Endangered	Endangered
MAMMALS				
Little Brown Myotis	*Myotis lucifugus*	Endangered	N/A	Endangered
MONOCOT				
New Jersey Rush	*Juncus caesariensis*	Vulnerable	Special Concern	Special Concern

Appendix 3: Special Occurrences (Ecodistrict 810)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management, and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
BIRDS	-		
Northern Goshawk	*Accipiter gentilis*	Secure (Green)	S3S4
Spotted Sandpiper	*Actitis macularius*	Sensitive (Yellow)	S3S4B
Blue-winged Teal	*Anas discors*	May Be At Risk (Orange)	S3B
Purple Sandpiper	*Calidris maritima*	Sensitive (Yellow)	S3N
Least Sandpiper	*Calidris minutilla*	Secure (Green)	S1B,S5M
Semipalmated Sandpiper	*Calidris pusilla*	Sensitive (Yellow)	S3M
Pine Siskin	*Carduelis pinus*	Sensitive (Yellow)	S3S4B,S5N
Black Guillemot	*Cepphus grylle*	Secure (Green)	S3S4
Semipalmated Plover	*Charadrius semipalmatus*	Secure (Green)	S1S2B,S5M
Killdeer	*Charadrius vociferus*	Sensitive (Yellow)	S3S4B
Bay-breasted Warbler	*Dendroica castanea*	Sensitive (Yellow)	S3S4B
Blackpoll Warbler	*Dendroica striata*	Sensitive (Yellow)	S3S4B
Cape May Warbler	*Dendroica tigrina*	Sensitive (Yellow)	S3?B
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Sensitive (Yellow)	S3S4B
Wilson's Snipe	*Gallinago delicata*	Sensitive (Yellow)	S3S4B
Common Loon	*Gavia immer*	May Be At Risk (Orange)	S3B,S4N
Hudsonian Godwit	*Limosa haemastica*	Sensitive (Yellow)	S3M
Red-breasted Merganser	*Mergus serrator*	Secure (Green)	S3B,S5N
Northern Gannet	*Morus bassanus*	Secure (Green)	SHB,S5M
Hudsonian Whimbrel	*Numenius phaeopus hudsonicus*	Sensitive (Yellow)	S3M
Fox Sparrow	*Passerella iliaca*	Secure (Green)	S3S4B
Gray Jay	*Perisoreus canadensis*	Sensitive (Yellow)	S3S4
Cliff Swallow	*Petrochelidon pyrrhonota*	May Be At Risk (Orange)	S3B
Great Cormorant	*Phalacrocorax carbo*	Sensitive (Yellow)	S3
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Sensitive (Yellow)	S3S4B
Pine Grosbeak	*Pinicola enucleator*	May Be At Risk (Orange)	S3?B,S5N
American Golden-Plover	*Pluvialis dominica*	Sensitive (Yellow)	S3M
Boreal Chickadee	*Poecile hudsonica*	Sensitive (Yellow)	S3
Black-legged Kittiwake	*Rissa tridactyla*	Sensitive (Yellow)	S2B,S4S5N
Common Tern	*Sterna hirundo*	Sensitive (Yellow)	S3B
Arctic Tern	*Sterna paradisaea*	May Be At Risk (Orange)	S3B
Greater Yellowlegs	*Tringa melanoleuca*	Sensitive (Yellow)	S3B,S5M
Willet	*Tringa semipalmata*	May Be At Risk (Orange)	S2S3B
Tennessee Warbler	*Vermivora peregrina*	Sensitive (Yellow)	S3S4B

Appendix 3: Special Occurrences (Ecodistrict 810)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management, and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
Wilson's Warbler	*Wilsonia pusilla*	Sensitive (Yellow)	S3S4B
BRYOPHYTES			
Coastal Hook Moss	*Sanionia orthothecioides*	Undetermined	S1
Hooked Scorpion Moss	*Scorpidium scorpioides*	Sensitive (Yellow)	S2?
DICOTS			
Fernald's Serviceberry	*Amelanchier fernaldii*	Undetermined	S2?
Running Serviceberry	*Amelanchier stolonifera*	Secure (Green)	S3?
Woodland Angelica	*Angelica sylvestris*	Secure (Green)	S3S4
Frankton's Saltbush	*Atriplex franktonii*	Secure (Green)	S3S4
Michaux's Dwarf Birch	*Betula michauxii*	Sensitive (Yellow)	S2
Small-flowered Bittercress	*Cardamine parviflora var. arenicola Cornus*	Sensitive (Yellow)	S2
Swedish Bunchberry	*suecica Crassula*	Sensitive (Yellow)	S1S2
Water Pygmyweed	*aquatica Epilobium*	Sensitive (Yellow)	S2
Downy Willowherb	*strictum Galium*	Sensitive (Yellow)	S3
Labrador Bedstraw	*labradoricum*	Sensitive (Yellow)	S2
Northern Comandra	*Geocaulon lividum*	Sensitive (Yellow)	S3
Spurred Gentian	*Halenia deflexa*	Sensitive (Yellow)	S2S3
Spurred Gentian	*Halenia deflexa ssp. brentoniana*	Undetermined	S1?
Southern Mudwort	*Limosella australis*	Sensitive (Yellow)	S3
Marsh Lousewort	*Pedicularis palustris*	May Be At Risk (Orange)	S1
Sharp-fruited Knotweed	*Polygonum raii*	Undetermined	S2S3
Alpine Bistort	*Polygonum viviparum*	May Be At Risk (Orange)	S1
Canada Cinquefoil	*Potentilla canadensis*	Undetermined	S3?
Lesser Pyrola	*Pyrola minor*	Sensitive (Yellow)	S2
Cursed Buttercup	*Ranunculus sceleratus*	May Be At Risk (Orange)	S1S2
Northern Dewberry	*Rubus flagellaris*	Undetermined	S1?
Triangular-valve Dock	*Rumex salicifolius var. mexicanus*	Sensitive (Yellow)	S2
Bloodroot	*Sanguinaria canadensis*	Secure (Green)	S3S4
Multi-rayed Goldenrod	*Solidago multiradiata*	May Be At Risk (Orange)	S1S2
Saltmarsh Starwort	*Stellaria humifusa*	Sensitive (Yellow)	S2
Horned Sea-blite	*Suaeda calceoliformis*	Secure (Green)	S2S3
Canada Germander	*Teucrium canadense*	Sensitive (Yellow)	S3
Northern Blueberry	*Vaccinium boreale*	May Be At Risk (Orange)	S2
Alpine Bilberry	*Vaccinium uliginosum*	Sensitive (Yellow)	S2

Appendix 3: Special Occurrences (Ecodistrict 810)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management, and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
FERNS AND THEIR ALLIES			
Appalachian Fir-Clubmoss	*Huperzia appalachiana*	Undetermined	S1S3
Acadian Quillwort	*Isoetes acadiensis*	Sensitive (Yellow)	S3
Sitka Clubmoss	*Lycopodium sitchense*	Secure (Green)	S3?
Little Curlygrass Fern	*Schizaea pusilla*	Secure (Green)	S3
Low Spikemoss	*Selaginella selaginoides*	May Be At Risk (Orange)	S2
FISH			
Striped Bass	*Morone saxatilis*	May Be At Risk (Orange)	S1
INSECTS			
Baltimore Checkerspot	*Euphydryas phaeton*	Secure (Green)	S3
Dorcas Copper	*Lycaena dorcas*	Not Assessed ()	S1
Question Mark	*Polygonia*	Secure (Green)	S3B
Forcipate Emerald	*interrogationis*	May Be At Risk (Orange)	S2
Grey Hairstreak	*Somatochlora forcipata*	Secure (Green)	S2
	Strymon melinus		
LICHENS			
Powdered Honeycomb Lichen	*Cavernularia hultenii*	May Be At Risk (Orange)	S1S2
Poor-man's Shingles Lichen	*Parmeliella parvula*	May Be At Risk (Orange)	S1?
Tree Pelt Lichen	*Peltigera collina*	Sensitive (Yellow)	S2S3
Peppered Moon Lichen	*Sticta fuliginosa*	Sensitive (Yellow)	S3?
MAMMALS			
Cougar - Eastern population	*Puma concolor pop. 1*	Undetermined	SH
MOLLUSKS			
Triangle Floater	*Alasmidonta undulata*	Secure (Green)	S2S3
MONOCOTS			
Wild Chives	*Allium schoenoprasum var. sibiricum*	May Be At Risk (Orange)	S2
Atlantic Sedge	*Carex atlantica ssp. capillacea*	Undetermined	S2
Livid Sedge	*Carex livida var. radicaulis*	May Be At Risk (Orange)	S1
Loose-flowered Alpine Sedge	*Carex rariflora*	May Be At Risk (Orange)	S1
Sparse-Flowered Sedge	*Carex tenuiflora*	May Be At Risk (Orange)	S1

Appendix 3: Special Occurrences (Ecodistrict 810)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management, and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
Early Coralroot	*Corallorhiza trifida*	Secure (Green)	S3
Quill Spikerush	*Eleocharis nitida*	Secure (Green)	S3
Few-flowered Spikerush	*Eleocharis quinqueflora*	May Be At Risk	S2
Russet Cotton-Grass	*Eriophorum chamissonis*	(Orange) Secure	S3S4
Lesser Rattlesnake-plantain	*Goodyera repens*	(Green) Sensitive	S3
Slender Blue Flag	*Iris prismatica*	(Yellow)	S1
Bulbous Rush	*Juncus bulbosus*	May Be At Risk (Orange)	S1
Moor Rush	*Juncus stygius ssp. americanus*	Undetermined	S1S2
Woods-Rush Loesel's	*Juncus subcaudatus var. planisepalus*	Sensitive (Yellow)	S3
Twayblade Southern	*Liparis loeselii*	Sensitive (Yellow)	S3S4
Twayblade	*Listera australis*	Secure (Green)	S2
Small-flowered Woodrush	*Luzula parviflora*	May Be At Risk (Orange)	S3S4
Large Purple Fringed Orchid	*Platanthera grandiflora*	Secure (Green)	S3
White-stemmed Pondweed	*Potamogeton praelongus*	Secure (Green)	S3?
Narrow-leaved Blue-eyed-grass	*Sisyrinchium angustifolium*	Sensitive (Yellow)	S3S4
Northern Burreed	*Sparganium hyperboreum*	Secure (Green)	S1S2
Small Burreed	*Sparganium natans*	Sensitive (Yellow)	S3
Pale False Manna Grass	*Torreyochloa pallida var. pallida*	Secure (Green)	S1
		Extirpated	

*Atlantic Canada Conservation Data Centre S-Ranks, where S1: extremely rare; S2: rare; S3: uncommon; S4: usually widespread, fairly common; S5: widespread, abundant; S#S#: A range between two consecutive ranks for a species/community denotes uncertainty about the exact rarity (e.g. S1S2); Consult http://www.accdc.com/en/ranks.html for descriptions of other ranks.

Provincial General Status Ranks as assessed in 2010 (http://www.wildspecies.ca/wildspecies2010).

Appendix 3: Special Occurrences (Ecodistrict 810)
Table 1c – Other Conservation Features

Feature	Type	Information Source	Legislation or Status Ranking System
Deer wintering areas	Forest habitat	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	N/A
Loon nesting lakes	Freshwater lakes	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Migratory Birds Convention Act
Eagle nesting areas	Forest habitat	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Nova Scotia Wildlife Act
Osprey nesting areas	Forest habitat	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Nova Scotia Wildlife Act
Hawk and owl nesting areas	Forest habitat	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Nova Scotia Wildlife Act
Waterfowl breeding, staging, and wintering areas	Freshwater wetlands, salt marshes and coastal waters	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Migratory Birds Convention Act
Seabird nesting colonies	Coastal headlands, cliffs, and islands	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Migratory Birds Convention Act
Shorebird breeding and staging areas	Coastal barrens, beaches, salt marshes, and mudflats	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Migratory Birds Convention Act

Appendix 3: Special Occurrences (Ecodistrict 810)
Table 1c – Other Conservation Features

Feature	Type	Information Source	Legislation or Status Ranking System
Tern nesting areas	Beaches, salt marshes, mudflats and coastal islands	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Migratory Birds Convention Act
Great blue heron rookeries	Forest habitat	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Migratory Birds Convention Act
Fish habitat areas	Rivers, streams, and lakes	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Canada Fisheries Act
Dragonfly, damselfly, and butterfly habitats	Upland and wetland habitats	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Nova Scotia Endangered Species Act
Freshwater mussel habitat	Rivers, streams, and lakes	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Nova Scotia Endangered Species Act
Rare plant habitat	Upland and wetland habitats	Significant Habitats of Nova Scotia Database; Atlantic Canada Conservation Data Centre database	Nova Scotia Endangered Species Act
NSDNR Old Forest Reserves	Old forest habitat	Old Forest Database	Policy reserve
Eastern Habitat Joint Venture Lands	Habitat	DNR Restricted Land Use Database	Legal Agreement

Appendix 3: Special Occurrences (Ecodistrict 810)
Table 1c – Other Conservation Features

Feature	Type	Information Source	Legislation or Status Ranking System
Ducks Unlimited Projects	Wetlands	Significant Habitats of Nova Scotia Database	Legal agreement
Provincial Wildlife Management Areas	Provincial Wildlife Management Area	DNR Restricted Land Use Database	Nova Scotia Wildlife Act
Nature Reserves	Ecosystem	DNR Restricted Land Use Database	Special Places Protection Act
Wilderness Areas	Ecosystem/ recreation	DNR Restricted Land Use Database	Nova Scotia Wilderness Areas Protection Act
Provincial Parks	Ecosystem/ recreation	DNR Restricted Land Use Database	Nova Scotia Parks Act
Operational/Non-Designated Parks and Reserves	Ecosystem/ recreation	DNR Restricted Land Use Database	Nova Scotia Parks Act
Protected Beaches	Ecosystem	DNR Restricted Land Use Database	Nova Scotia Beaches Protection Act
Designated Water Supply Areas	Designated Water Supply Area	DNR Restricted Land Use Database	Nova Scotia Environment Act
Non-Designated Water Supply Areas	Non-Designated Water Supply Area	DNR Restricted Land Use Database	Nova Scotia Environment Act
IBP Sites	International Biological Program Site	DNR Restricted Land Use Database	N/A

Appendix 3: Special Occurrences (Ecodistrict 810)
Table 1d – Heritage Features

Feature	Type	Information Source
Indian Burial Grounds –	Cultural/Community Heritage	Aboriginal Traditional Knowledge Local Knowledge NSDNR Database
Native Artifacts –	Cultural/Community Heritage	Aboriginal Traditional Knowledge Local Knowledge NSDNR Database
Abandoned Mines	Geological and Cultural Heritage	NS Abandoned Mines Database
First Nations Reserve Lands	Cultural	NSDNR Restricted Land Use Database
National Historic Site – St. Peters Canal	Cultural/Community Heritage	NSDNR Restricted Land Use Database
Significant Geological Feature – fossils cliffs	Geological and Cultural Heritage	Local Knowledge

Appendix 3: Special Occurrences

Table 2: Comparison of Ecological Emphasis Classification Index by Ecosection (Within Ecodistrict and Ecoregion)

Ecosections that form 2% or less of the ecodistrict and/or ecoregion area or are more than 75% converted are highlighted. The table provides a sense of how unique or uncommon an ecosection and its associated climax communities are within the ecodistrict and across the ecoregion. The EEC Index value conveys an indication of relative land use pressure on the ecosection.

Ecosection	Climax Type	Ecodistrict Occurrence						Ecoregion Occurrence					
		Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted	Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted
		Ha	%	Ha	%			Ha	%	Ha	%		
IFHO	wS bS bF	6,537	5.6	76,656	65.3	60 to 64	10.1	7,124	1.5	76,656	16.5	59 to 63	12.1
IFRD	wS bS bF	1,493	1.3	76,656	65.3	65 to 69	5.8	1,493	0.3	76,656	16.5	65 to 69	5.8
IFSM	wS bS bF	512	0.4	76,656	65.3	58 to 61	13.2	512	0.1	76,656	16.5	58 to 61	13.2
IMDM	wS bS bF	6,205	5.3	76,656	65.3	48 to 59	11.4	6,820	1.5	76,656	16.5	48 to 58	10.6
IMHO	wS bS bF	27,966	23.8	76,656	65.3	72 to 76	1.8	129,784	27.9	76,656	16.5	67 to 70	5.3
IMKK	wS bS bF	262	0.2	76,656	65.3	100	0.0	2,289	0.5	76,656	16.5	62 to 65	9.8
IMRD	wS bS bF	125	0.1	76,656	65.3	59	20.3	13,717	2.9	76,656	16.5	66 to 71	5.9
IMSM	wS bS bF	36	0.0	76,656	65.3	72 to 75	0.0	12,363	2.7	76,656	16.5	62 to 64	8.3
PFHO	wetlands	314	0.3	0	0.0	65 to 72	3.2	314	0.1	0	0.0	65 to 72	3.2
PMHO	wetlands	2,765	2.4	0	0.0	82 to 83	0.3	20,283	4.4	0	0.0	73 to 74	2.2
WCRD	wS bS bF	32	0.0	76,656	65.3	88	13.0	6,144	1.3	76,656	16.5	76	8.3
WFDM	rM yB	209	0.2	21,539	18.4	39 to 43	34.8	6,656	1.4	32,800	7.0	40 to 43	34.0
WFHO	bS wS	3,444	2.9	3,822	3.3	58 to 62	12.9	4,122	0.9	64,953	13.9	57 to 60	14.8
WFKK	wS bS bF	15,283	13.0	76,656	65.3	52 to 59	12.5	15,283	3.3	76,656	16.5	52 to 59	12.5
WFRD	bS wS	539	0.5	3,822	3.3	73	0.3	539	0.1	64,953	13.9	73	0.3

*Area of Climax Type refers to the total area of the climax community in the ecodistrict and in the ecoregion.

Appendix 3: Special Occurrences

Table 2: Comparison of Ecological Emphasis Classification Index by Ecosection (Within Ecodistrict and Ecoregion)

Ecosections that form 2% or less of the ecodistrict and/or ecoregion area or are more than 75% converted are highlighted. The table provides a sense of how unique or uncommon an ecosection and its associated climax communities are within the ecodistrict and across the ecoregion. The EEC Index value conveys an indication of relative land use pressure on the ecosection.

Ecosection	Climax Type	Ecodistrict Occurrence						Ecoregion Occurrence					
		Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted	Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted
		Ha	%	Ha	%			Ha	%	Ha	%		
WMDM	wS bS bF	11,799	10.1	76,656	65.3	61 to 70	3.4	27,860	6.0	76,656	16.5	52 to 60	14.5
WMHO	wS bS bF	8,984	7.7	76,656	65.3	67 to 72	4.5	37,939	8.1	76,656	16.5	60 to 64	11.6
WMKK	wS bS bF	18,387	15.7	76,656	65.3	58 to 66	6.9	47,030	10.1	76,656	16.5	61 to 69	6.1
WMRD	wS bS bF	803	0.7	76,656	65.3	65	10.0	11,884	2.6	76,656	16.5	70 to 71	4.1
WTLD	wetlands	2,749	2.3	0	0.0	75 to 77	2.4	14,587	3.1	0	0.0	72 to 73	2.5
XXCB	coastal beach	1,122	100.0	0	0.0	69-70	24.0	1,517	70.0	0	0.0	68-70	19.0
XXMS	salt marsh	15	0.0	0	0.0	69	0.0	48	0.0	0	0.0	71	0.0

*Area of Climax Type refers to the total area of the climax community in the ecodistrict and in the ecoregion.

Appendix 4: Ecological Representivity Worksheet

Ecosystem			Crown Responsibility	Legal Reserves		Policy Reserves (including unproclaimed legal reserve proposals)		Ecological Emphasis Classification "Reserve Class"					
Ecosection	Climax Type	Area (ha)	Percent of Area on Crown (%)	Crown Area (ha)	Private Area (ha)	Crown Area (ha)	Private Area (ha)	Crown		Private		Total Reserve	
								ha	% (EcoS)	ha	% (EcoS)	ha	% (EcoS)
IMHO	wS bS bF	27,966	51.4	1,143	0	255	0	1,398	5.0	0	0	1,398	5.0
WMKK	wS bS bF	18,387	31.8	1,119	7	144	0	1,263	6.9	7	0	1,271	6.9
WFKK	wS bS bF	15,283	16.2	119	0	92	0	211	1.4	0	0	211	1.4
WMDM	wS bS bF	11,799	46.2	59	0	102	0	162	1.4	0	0	162	1.4
WMHO	wS bS bF	8,984	42.4	572	45	325	0	897	10.0	45	0	943	10.5
IFHO	wS bS bF	6,537	10.6	0	4	68	0	68	1.0	4	0	72	1.1
IMDM	wS bS bF	6,205	9.5	0	1	138	0	138	2.2	1	0	140	2.2
WFHO	bS wS	3,444	11.9	0	0	65	0	65	1.9	0	0	65	1.9
PMHO	wetlands	2,765	87.5	747	0	172	0	919	33.2	0	0	919	33.2
WTLD	wetlands	2,749	46.5	390	0	10	0	400	14.5	0	0	400	14.5
IFRD	wS bS bF	1,493	12.7	0	0	0	0	0	0.0	0	0	0	0.0
XXCB	coastal beach	1,113	28.6	223	147	68	0	290	26.1	147	0	438	39.4
WMRD	wS bS bF	803	27.4	0	0	0	0	0	0.0	0	0	0	0.0
WFRD	bS wS	539	11.2	0	0	0	0	0	0.0	0	0	0	0.0
IFSM	wS bS bF	512	9.7	0	0	0	0	0	0.0	0	0	0	0.0
PFHO	wetlands	314	17.9	0	0	0	0	0	0.0	0	0	0	0.0
IMKK	wS bS bF	262	100.0	262	0	0	0	262	100.0	0	0	262	100.0
WFDM	rM yB	209	18.0	0	0	38	0	38	18.0	0	0	38	18.0
IMRD	wS bS bF	125	0.0	0	0	0	0	0	0.0	0	0	0	0.0
IMSM	wS bS bF	36	100.0	0	0	0	0	0	0.0	0	0	0	0.0
WCRD	wS bS bF	32	86.1	0	0	27	0	27	86.1	0	0	27	86.1
XXMS	salt marsh	14	1.9	0	0	0	0	0	1.9	0	0	0	1.9
Total		**108,444**		**4,633**	**206**	**1,505**	**0**	**6,138**		**206**		**6,344**	

See Appendix 12b for full Ecological Emphasis worksheet.

Appendix 5: Ecodistrict Reserves and Protected Areas Summary

Legal Reserves			Policy Reserves (including unproclaimed legal proposals)		
Act Designation	Area by Ownership		Policy Program	Area by Ownership	
	Crown (ha)	Private (ha)		Crown (ha)	Private (ha)
National Historic Sites and Parks	4,743	0	Old Forest	3,714	0
Wilderness Areas	4,586	0	Operational Non Designated Parks and Reserves	0	308
Sites of Ecological Significance Under Moratorium.	0	2,218	Designated Provincial Parks and Park Reserves	93	0
Protected Beaches	48	205			
Operational Non Designated Parks and Reserves	34	0			
Designated Provincial Parks and Park Reserves	2	0			

Source: Crown Lands Forest Model Landbase Classification
Some of these programs may occur in the same area. For example, much of the Old Forest Policy forests are located in the Wilderness Areas.

Appendix 6: Description of Road Density Index

Road, trail, and utility corridors provide the background structure for transporting people and goods and are integral components of human land use. However, transportation systems are expensive and have a wide range of negative environmental impacts including, watercourse siltation, habitat fragmentation, dispersal obstruction, plant and animal mortality, exotic species invasion, loss of productive land, and an overall increase in human presence (Forman & Deblinger 2000, Reed et. al. 1996, Lindenmayer & Franklin 2002).

In order to reduce conflicts with natural systems and improve transportation safety there is clearly a need to incorporate landscape ecology into the planning of transportation networks (Forman 2004, Forman & Hersperger 1996, Spellerberg 1998). The emerging science of road ecology advocates integrating spatial analysis of the transportation system with ecological landscape analysis as a fundamental step in transportation system planning (Forman 1999, Lindenmayer & Franklin 2002, Diaz & Apostol 1992).

Efficient access systems can be strategically designed to minimize environmental impacts by incorporating factors such as harvest scheduling, life expectancy, location, road class requirements, decommissioning, and mitigation measures (Lindenmayer & Franklin 2002, Forman, 2004). Selection of transportation routes should incorporate knowledge of landscape functions to improve compatibility with natural ecosystem flows and connectivity (Forman & Hersperger, 1996). Furthermore, areas without roads and/or few roads are important for biodiversity conservation and should be considered during planning (USDA Forest Service 1999).

The GIS-based “Road Index” procedure calculates and maps the spatial influence of the transportation network. It is a management tool designed to help planners gauge the relative influence of man-made linear features within landscapes. It was designed to help integrate the transportation system into an ecological landscape analysis process. In addition to mapping, the index provides a numerical indicator of road influence that can be used to monitor temporal changes and compare different landscapes.

Main Concepts

The influence of the transportation network on the ecological landscape varies with three main factors: 1) the type of transportation feature (e.g. highway, power line, trail, etc.); 2) the density of linear features in a given area; and 3) the distance of an area from transportation features (Forman 2004, Lindenmayer & Franklin 2002, Forman & Deblinger 2000). The Road Index is a weighting of these three factors reflecting their relative influence on ecosystem function.

Road density has a well-documented influence on many factors, including wildlife movements, fragmentation, human access, hydrology, and fire patterns (Forman and Hersperger, 1996). Forman & Deblinger (2000) report great variance in road effect zones, with average cumulative effects extending 300 metres from road edges, and some impacts penetrating up to a kilometre. Consequently, Index values are determined by assessing the transportation network within a one kilometre radius. The Index algorithm is applied to a grid of one hectare squares representing the landscape in question. The calculation provides a measure of the density of the transportation network and the specific distance to the transportation features.

The resulting index values are scaled to provide a potential range of 0 to 100. For the purpose of map interpretation these values have been grouped into benchmark ranges that reflect characteristic patterns of land use in Nova Scotia.

In Nova Scotia, as in most populated jurisdictions, transportation networks are continuously changing as new roads and utilities are constructed and unused roads and trails deteriorate. As such, any analysis of the current state of these features must be based on reasonably up to date data. In this province, the Geomatics Centre, administered by Service Nova Scotia and Municipal Relations, is responsible for mapping transportation features which they include in their 1:10000 topographic series mapping.

On a provincial level, this work is updated on a ten-year repeat cycle and includes changes to existing features and the delineation of new features. Before undertaking road analysis, the Geomatics Centre should be contacted to ensure that the most current data is used to calculate the Road Index values. This data should be further updated using Landsat satellite imagery to add significant new roads and utilities that are over 500 metres in length on lands currently with a remote or forest resource index value.

DNR Forestry Branch maintains a table relating the topographic series attribute coding used by the Geomatics Centre to the feature categories used in the Road Index calculations, along with ArcView programs allowing the data to be formatted correctly. An inventory of recent Landsat satellite images is also available.

Full report contained in the Ecological Landscape Analysis Guidebook
http://www.gov.ns.ca/natr/library/forestry/reports/Procedural%20Guide%20For%20Ecological%20Landscape%20Analysis.pdf

Appendix 7: Road Density Index Worksheets

Road index values for all tables are benchmarks that will be monitored over time to evaluate trends.

Table 1: Length of Access Systems and Index Weighting for Different Road Types

Road Type	Road Index Weighting	Length (km)
Trails, tracks, abandoned roads, and railways	1	1,080
Utility corridors	3	64
Gravel Roads and active railways	6	719
Paved streets and roads collectors	10	337
Highways	15	20

Table 2: Distribution of Road Index Classes

Road Index Value		Area of Ecodistrict Affected	
Indication	**Range**	**Hectares**	**Percent**
Remote	0 to 6	56,015	47.7
Forest Resource	7 to 15	38,923	33.2
Mixed Rural	16 to 24	18,906	16.1
Agriculture Suburban	25 to 39	3,230	2.8
Urban	40 to 100	243	0.2
Total		**117,317**	**100.0**

Table 3: Road Index Values for Each Landscape Element Type

Landscape Element	Area (ha)	Road Index
Valley Corridors	1,063	12
Coastal Spruce	56,344	5
Coastal Beach	1,122	12
Coastal Mixedwood Hills and Drumlins	45,369	6
Salt Marsh	15	15
Wetlands	5,659	5
Total	**109,572***	**6**

*Water is excluded from this table. Rounding, overlapping, and averaging of figures may lead to small differences in tables.

Appendix 8: Development Classes and Seral Stages

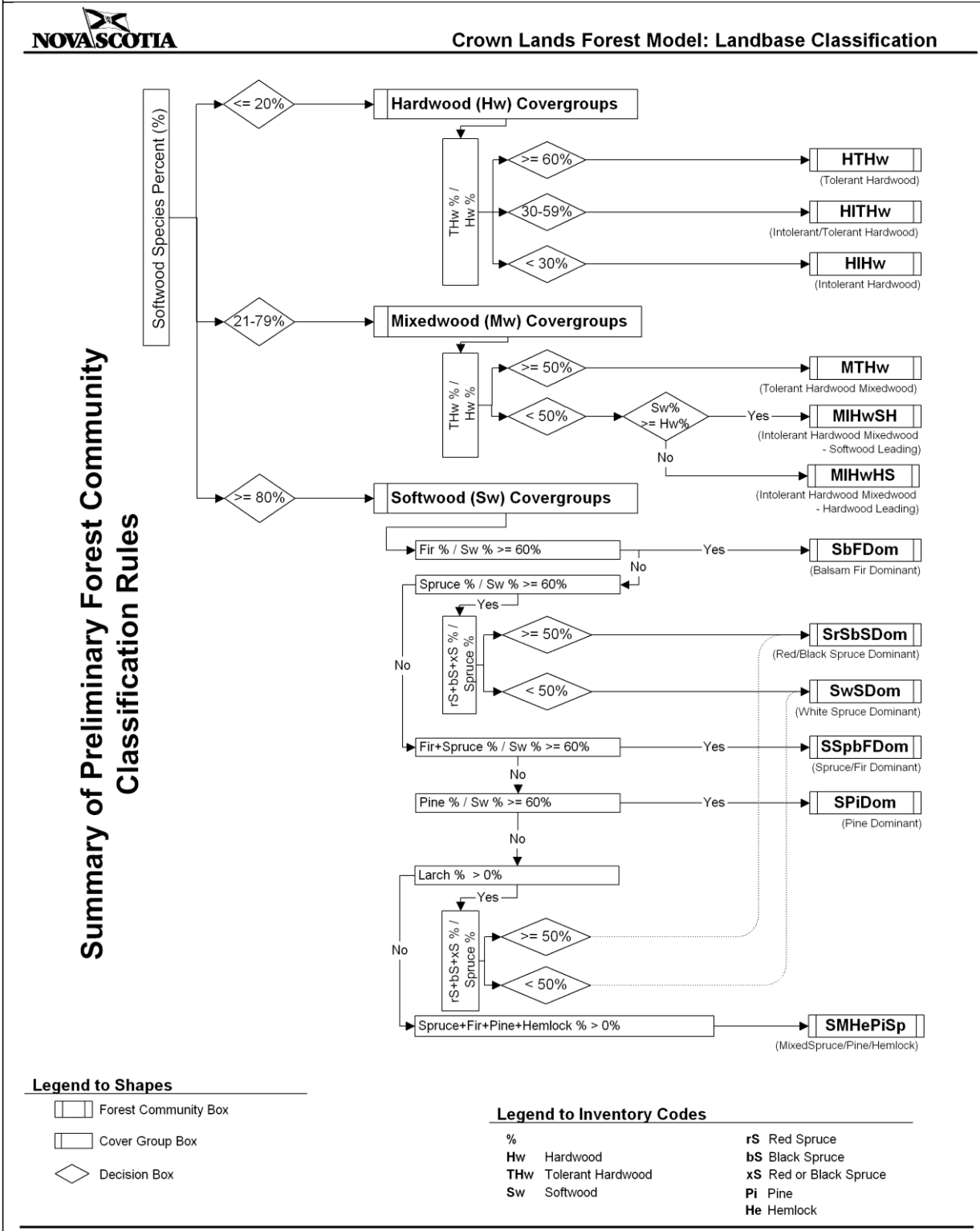
Development Class	Seral Stage
1. Forest Establishment (Height 0 to 6 m) • establishment of new growth following a stand-initiating disturbance • high diversity of forbs, shrubs, and tree regeneration, many of which are short-live shade-intolerant "pioneer" species • peak seed production by forbs and shrubs • approximate age 0 to 25 years	Early Seral Species (Score 10 to 23) • new growth dominated by pioneer tree species or unclassified regeneration Mid Seral Species (Score 24 to 37) • regeneration composed of a mixture of pioneer, mid-climax, and climax species Late Seral Species (Score 38 to 50) • regeneration dominated by climax species
2. Young Forest (Height 7 to 11 m) • young forests with developing tree canopies characterized by vigorous self-thinning and crown differentiation • early tree seed production, no understory development • approximate age 25 to 40 years	Early Seral Species (Score 10 to 23) • canopy dominated by pioneer tree species Mid Seral Species (Score 24 to 37) • canopy composed of a mixture of pioneer, mid-climax, and climax species Late Seral Species (Score 38 to 50) • canopy dominated by climax species
3. Mature Forest (Height > 11 m) • stands dominated by upper canopy with full differentiation into dominance classes • self-thinning process reduced • tree seed production prominent and regular • individual tree mortality creates canopy gaps that are soon closed by neighbouring tree growth • increased light initiates regeneration and early understory development • approximate age 40 to 125 years	Early Seral Species (Score 10 to 23) • canopy dominated by pioneer species • over maturity initiates canopy breakup and understory development Mid Seral Species (Score 24 to 37) • climax species in mixture with pioneers in the overstory • often reflecting a transition to climax domination following a period of sub-canopy development Late Seral Species (Score 38 to 50) • canopy dominated by climax species • over maturity initiates gap dynamic processes leading to multi-aged and old growth conditions
Multi-aged and old growth forest (Varying height and age and Old Growth ID) • dominant overstory exhibiting a variety of crown sizes and canopy densities • canopy gaps promote development of multi-layered understory and recruitment to overstory	Early Seral Species (Score 10 to 23) • canopy likely to break up and be replaced by developing understory Mid Seral Species (Score 24 to 37) • pioneer dominated overstory with canopy recruitment from a climax species-dominated understory Late Seral Species (Score 38 to 50) • climax species-dominated overstory maintained through gap dynamic processes

Summary of species-level seral score values by ecodistrict (Source: NSDNR - January 2014 revision)

Species		Ecodistrict																																				
		100	210	220	310	320	330	340	350	360	370	380	410	420	430	440	450	510	520	530	540	550	560	610	620	630	710	720	730	740	750	760	770	780	810	820	830	840	910	
Code	**Name**																																							
AS	ash	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
BA	black ash	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
BC	black cherry	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
BE	beech	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
BF	balsam fir	5	5	5	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	5	1	1
BP	balsam poplar	1	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	3	1
BS	black spruce	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
EC	eastern cedar	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
EH	eastern hemlock	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	exotic species	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
GB	grey birch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IH	intolerant hardwood	3	2	4	2	2	2	2	2	4	2	2	2	2	2	2	2	2	2	2	2	4	3	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2
IW	ironwood	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
JP	jack pine	2	3	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
LA	largetooth aspen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OH	other hardwood	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
OS	other softwood	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
PC	pin cherry	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RM	red maple	3	2	4	2	2	2	2	2	4	2	5	2	2	2	2	2	2	2	2	2	5	3	2	2	2	2	2	2	2	2	2	3	2	3	3	2	2	2	2
RO	oak	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
RP	red pine	3	3	3	3	3	3	3	3	3	4	3	3	3	4	3	3	3	3	4	4	4	4	4	4	4	3	4	3	3	3	4	4	3	4	4	3	3	3	3
RS	red spruce	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
SM	sugar maple	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ST	striped maple	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
TA	aspen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TH	tolerant hardwood	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
TL	eastern larch	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
UC	unclassified	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
WA	white ash	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
WB	white birch	3	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
WE	white elm	2	2	4	2	4	2	2	2	2	2	2	2	2	2	2	2	4	4	4	2	2	2	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2
WP	white pine	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
WS	white spruce	4	4	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	4	1	1
XS	red and black spruce	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
YB	yellow birch	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

A look-up table assigns each species in the forest inventory a value from one to five for its position on the successional scale. The look-up table may change by ecodistrict since climax on the coast or the Cape Breton Highlands differs from inland and lowland districts. This successional value is multiplied by the species' percent in the stand to give a stand successional score. Each stand may have up to four species, and the four percentages add to 10, so the stand successional scores range from 10 to 50. These scores are subdivided into three successional categories: 10 to 23 early, 24 to 37 mid, and 38 to 50 late.

Appendix 9: Vegetation Community Classification – Forest Model



Appendix 10: Table 1: Forest Landscape Composition Worksheet (Cape Breton Coastal 810)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Coastal Spruce (Matrix)	IFHO (11.5%) IMHO (49.1%) WMHO (15.6%)	Softwood	wS bS bF bS wS	Frequent	52,348; 92.9	Early	124	124	62	15	326	29,144; 70.5	EARLY	2,956; 7.2
						Mid	176	640	320	652	1,788			
						Late	3,791	8,736	5,462	6,625	24,613			
						Uncl	2,418	0	0	0	2,418			
	IMDM (11.0%) WFHO (6.1%) IFRD (2.6%)	Mixedwood				Early	137	17	5	7	166	6,616; 16.0	MID	7,266; 17.6
						Mid	2,209	945	1,067	486	4,708			
						Late	504	376	425	234	1,540			
						Uncl	204	0	0	0	204			
	WMRD (1.4%) IFSM (6.8%) WFRD (1.0%)	Hardwood	rM yB rM	Frequent	3,306; 5.9	Early	657	350	350	0	1,358	2,874; 7.0	LATE	26,505; 64.2
						Mid	172	59	530	10	771			
						Late	17	3	330	2.8	352			
						Uncl	0	0	0	0	0			
	IMKK (<1.0%) IMRD (<1.0%) IMSM (<1.0%) WCRD (<1.0%)	Unclassified				Early	706	11	30	0	747	2,681; 6.5	UNCL	4,590; 11.1
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	1,934	0	0	0	1,934			
Total					**56,344***	**# ha**	**13,048**	**11,260**	**8,581**	**8,033**	**40,923**			
						%	**31.9%**	**27.5%**	**21.0%**	**19.6%**	**100.0%**			

Left side of table refers to "potential" forest, interpreted from the Ecological Land Classification. Right side refers to "current" forest condition, summarized from inventory in the Forest Model. All multi-aged stands can be considered mature and added to mature totals. *Total area of element.

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Cape Breton Coastal 810)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Coastal Mixedwood Hills and Drumlins Patch	WMKK (40.2%) WFKK (33.7%) WMDM (25.6%) WFDM (0.5%)	Softwood	wS bS bF	Frequent	27,095; 59.7	Early	22	149	39	21	231	23,092; 62.1	EARLY	3,280; 8.8
						Mid	149	405	276	304	1,135			
						Late	3,954	7,024	5,117	2,852	18,948			
						Uncl	2,778	0	0	0	2,778			
		Mixedwood				Early	33	8	18	0	59	7,287; 19.6	MID	7,667; 20.7
						Mid	1,777	1,211	1,711	381	5,079			
						Late	521	528	493	195	1,736			
						Uncl	413	0	0	0	413			
		Hardwood	rM yB	Infrequent	18,274; 40.3	Early	680	308	1,082	10	2,079	3,981; 10.7	LATE	21,065; 56.6
						Mid	187	132	1,099	35	1,453			
						Late	0	3	379	1.0	382			
						Uncl	66	0	160	0	226			
		Unclassified				Early	714	37	160	0	911	2,840; 7.6	UNCL	5,187; 13.9
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	19,229	0	0	0	19,229			
Total					**45,369***	**# ha**	**30,524**	**9,805**	**10,532**	**3,799**	**54,659**			
						%	**55.8%**	**17.9%**	**19.3%**	**6.9%**	**100.0%**			

Left side of table refers to "potential" forest, interpreted from the Ecological Land Classification. Right side refers to "current" forest condition, summarized from inventory in the Forest Model. All multi-aged stands can be considered mature and added to mature totals. *Total area of element.

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Cape Breton Coastal 810)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Valley Corridors	IMHO (18.1%) WMHO (12.3%) WMDM (11.0%) WMKK (6.8%) WTLD (6.2%) PMHO (5.8%) IFSM (4.2%) IFHO (3.7%)	Softwood	wS bS bF bS	Frequent	749; 70.4	Early	2	6	12	6	25	530; 81.6	EARLY	52; 7.9
						Mid	14	33	25	17	90			
						Late	117	123	92	51	383			
						Uncl	32	0	0	0	32			
		Mixedwood				Early	0	0	0	0	0	49; 7.6	MID	133; 20.5
						Mid	23	1	9	7	40			
						Late	4	1	2	0	6			
						Uncl	0	0	0	0	0			
		Hardwood	rM yB	Infrequent	156; 14.6	Early	2	0	6	0	8	12; 1.9	LATE	390; 60.1
						Mid	0	0	4	0	4			
						Late	0	0	1	0.0	1			
						Uncl	0	0	0	0	0			
						Early	19	0	0	0	19	58; 8.9	UNCL	74; 11.5
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	39	0	0	0	39			
Total					**1,063***	**#ha**	**251**	**163**	**151**	**82**	**647**			
						%	**38.8%**	**25.2%**	**23.3%**	**12.7%**	**100.0%**			

Left side of table refers to "potential" forest, interpreted from the Ecological Land Classification. Right side refers to "current" forest condition, summarized from inventory in the Forest Model. All multi-aged stands can be considered mature and added to mature totals. *Total area of element.

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Cape Breton Coastal 810)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Wetlands Patch	PMHO (47.3%) WTLD (47.1%) PFHO (5.6%)	Softwood	bS	None	1,698; 30.0	Early	13	16	3	0	32	1,723; 85.5	EARLY	106; 5.2
						Mid	4	48	62	49	164			
						Late	139	517	408	337	1,400			
						Uncl	128	0	0	0	128			
		Mixedwood				Early	1	0	0	0	1	161; 8.0	MID	266; 13.2
						Mid	7	27	45	11	90			
						Late	18	15	25	1	59			
						Uncl	11	0	0	0	11			
		Hardwood				Early	22	3	12	0	37	50; 2.5	LATE	1,460; 72.5
						Mid	5	0	7	0	13			
						Late	0	0	0	0.0	0			
						Uncl	0	0	0	0	0			
		Unclassified				Early	35	0	0	0	35	80; 4.0	UNCL	183; 9.1
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	45	0	0	0	45			
Total					**5,659***	**#ha**	**428**	**626**	**561**	**399**	**2,014**			
						%	**21.3%**	**31.1%**	**27.9%**	**19.8%**	**100.0%**			

Left side of table refers to "potential" forest, interpreted from the Ecological Land Classification. Right side refers to "current" forest condition, summarized from inventory in the Forest Model. All multi-aged stands can be considered mature and added to mature totals. *Total area of element.

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Cape Breton Coastal 810)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Coastal Beach Patch	None	Softwood	Nil			Early	0	0	0	0	0	203; 88.1	EARLY	2; 1.0
						Mid	1	1	0	0	2			
						Late	11	80	58	31	181			
						Uncl	20	0	0	0	20			
		Mixedwood	Nil			Early	0	2	0	0	2	13; 5.7	MID	9; 4.0
						Mid	1	2	3	0	6			
						Late	0	0	4	0	5			
						Uncl	0	0	0	0	0			
		Hardwood	Nil			Early	0	0	0	0	0	2; 0.7	LATE	186; 80.5
						Mid	1	0	0	0	1			
						Late	0	0	0	0.0	0			
						Uncl	0	0	0	0	0			
		Unclassified				Early	0	0	0	0	0	13; 5.5	UNCL	34; 14.5
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	13	0	0	0	13			
Total					**1,122***	**#ha**	**49**	**85**	**66**	**31**	**230**			
						%	**21.2%**	**37.0%**	**28.4%**	**13.4%**	**100.0%**			

Left side of table refers to "potential" forest, interpreted from the Ecological Land Classification. Right side refers to "current" forest condition, summarized from inventory in the Forest Model. All multi-aged stands can be considered mature and added to mature totals. *Total area of element.

Appendix 10: Table 2: Composition of Forest Communities (in Cape Breton Coastal Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Coastal Spruce Matrix	IFHO IFRD IFSM IMDM IMHO IMKK IMRD IMSM WCRD WFHO WFRD WMHO WMRD	Freq	wS bS bF	S	SrSbSDom	17,490	45.3%	L	**Moist sites:** wS, bS
				S	SbFDom	5,930	15.3%	L	
				S	SSpbFDom	3,726	9.6%	L	**Well-drained:** Early successional pioneer species
				S	SwSDom	1,981	5.1%	L	
				S	SMHePiSp	11	0.0%	L	Mid- successional, rM, wB
				S	SPiDom	6	0.0%	L	Late successional – wS, bS
				M	MIHwSH	3,835	9.9%	E/M	
				M	MIHwHS	2,656	6.9%	E/M	
				M	MTHw	126	0.3%	L	
				H	HIHw	2,351	6.1%	E	
				H	HTHw	359	0.9%	L	
				H	HITHw	164	0.4%	M/L	
Total						**39,634**	**100.0%**		

*Forest Community Codes:			
	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Cape Breton Coastal Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Coastal Mixedwood Hills and Drumlin	WFDM WFKK WMDM WMKK	Infreq Freq	rM yB, wS bS bF	S	SbFDom	6,139	25.7%	L	**Well-drained:** wS, bS, rM, yB
				S	SwSDom	3,344	14.0%	L	
				S	SSpbFDom	3,112	13.0%	L	
				S	SPiDom	4	0.0%	L	
				S	SMHePiSp	3	0.0%	L	
				M	MIHwSH	4,176	17.5%	E/M	
				M	MIHwHS	2,967	12.4%	E/M	
				M	MTHw	144	0.6%	L	
				H	HIHw	2,937	12.3%	E	
				H	HITHw	625	2.6%	M/L	
				H	HTHw	419	1.8%	L	
Total						**23,870**	**100.0%**		

*Forest Community Codes:			
	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Cape Breton Coastal Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Valley Corridors	IFHO IFSM IMHO PMHO WMDM WMHO WMKK WTLD XXWA	Freq, None, Infreq	wS bS bF	S	SrSbSDom	320	54.2%	L	**Moist** bS
				S	SbFDom	78	13.1%	L	
				S	SwSDom	71	12.0%	L	**Well-drained:** Early successional pioneer species
				S	SSpbFDom	61	10.4%	L	
				M	MIHwSH	28	4.8%	E/M	Mid-successional rM, wB
				M	MIHwHS	21	3.6%	E/ML	Late successional wS, bS
				H	HIHw	11	1.8%	E	
				H	HITHw	1	0.2%	M/L	
Total						**591**	**100.0%**		

*Forest Community Codes:			
	SrSbSDom-Red Black Spruce Dominant	SpiDom-Pine Dominant	MTHw-Tolerant Hardwood Mixedwood
	SwSDom-White Spruce Dominant	SMHePiSp-Mixed Spruce Pine Hemlock	HIHw-Intolerant Hardwood
	SspbFDom-Spruce Fir Dominant	MIHwSH-Intolerant Hardwood Mixedwood S	HTHw-Tolerant Hardwood
	SbFDom-Balsam Fir Dominant	MIHwHS-Intolerant Hardwood Mixedwood H	HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Cape Breton Coastal Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Wetlands Patch	PFHO PMHO WTLD	None	None	S	SrSbSDom	1,171	60.6%	L	**Moist sites:** bS **Well-drained:** Early successional pioneer species Mid - successional rM, wB Late successional bS **Wet:** Wetlands of shrubs and stunted trees
				S	SspbFDom	248	12.8%	L	
				S	SbFDom	247	12.8%	L	
				S	SwSDom	56	2.9%	L	
				M	MIHwSH	124	6.4%	E/M	
				M	MIHwHS	35	1.8%	E/M	
				M	MTHw	2	0.1%	L	
				H	HIHw	49	2.6%	E	
Total						**1,933**	**100.0%**		

*Forest Community Codes:	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Cape Breton Coastal Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Coastal Beach	XXCB	None	Coastal Beach	S	SrSbSDom	101	46.5%	L	**Well-drained:** wS, bS
				S	SwSDom	79	36.4%	L	
				S	SbFDom	17	7.8%	L	
				S	SSpbFDom	6	2.5%	L	
				M	MIHwSH	8	3.6%	E/M	
				M	MIHwHS	5	2.4%	E/M	
				H	HIHw	2	0.7%	E/M	
Total						**218**	**100.0%**		

*Forest Community Codes:			
	SrSbSDom-Red Black Spruce Dominant	SpiDom-Pine Dominant	MTHw-Tolerant Hardwood Mixedwood
	SwSDom-White Spruce Dominant	SMHePiSp-Mixed Spruce Pine Hemlock	HIHw-Intolerant Hardwood
	SspbFDom-Spruce Fir Dominant	MIHwSH-Intolerant Hardwood Mixedwood S	HTHw-Tolerant Hardwood
	SbFDom-Balsam Fir Dominant	MIHwHS-Intolerant Hardwood Mixedwood H	HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Cape Breton Coastal Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Salt Marsh	XXMS	None	Salt Marsh	S	SrSbSDom	11	100.0%	L	
Total						**11**	**100.0%**		

*Forest Community Codes:	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10:
Table 3: Summary of "Potential Climax" Forest Abundance
(Based on ELC Interpretations)

Climax Type	Ecodistrict		Ecoregion	
	Hectares	Percent	Hectares	Percent
wS bS bF	76,656	65.3%	76,656	16.5%
rM yB	21,539	18.4%	32,800	7.0%
bS wS	3,822	3.3%	64,953	13.9%
bS	1,748	1.5%	86,878	18.6%
rM	324	0.3%	922	0.2%
Total	**104,089**	**88.7%***	**262,208**	**56.2%****

*Total does not add up to 100% because wetlands not added.
**Total does not add up to 100% because not all climax vegetation types in region are found in this ecodistrict
Source: Crown Lands Forest Model Landbase Classification.

Appendix 11: Ecological Emphasis Classes and Index Values

The classification includes all upland conditions, both forested and non-forested, under all types of administration and land use practices. It does not include water or other non-terrestrial conditions.

Ecological Emphasis Class	Conservation Factor	Description
Reserve	**1**	• Reserved lands which meet biodiversity conservation goals through preservation of natural conditions and processes. Resource management activities are not usually permitted except where required to perpetuate desired natural conditions. This class is assigned based on the types of laws and policies governing the management (for example: Wilderness, Parks, Conservation Easement, Old Forest Policy).
Extensive	**0.75**	• Lands managed for multiple values using ecosystem-based techniques that conserve biodiversity and natural ecosystem conditions and processes. • Forestry practices employ ecosystem-based prescriptions which consider natural disturbance regimes, successional trends, structure, and composition. Natural regeneration is favoured to provide the next forest. Practices may include protection from fire and insects. • Management complies with the Forest Code of Practice, and excludes the use of herbicides, exotic tree species, off-site native species, genetically modified organisms, and stand conversion.
Intensive	**0.25**	• Lands managed intensively to optimize resource production from sites maintained in a native state (e.g. forested). Despite intensive practices these lands are an important component of landscape structure and composition. • Management may eliminate or reduce the duration of some development processes, particularly mature old forest stages, and may result in non-natural succession. Practices may produce unnatural conditions such as exotic species, old field spruce, and monoculture plantations, or reduce structure and composition below ecologically desirable levels. Forests are protected from fire, insects, and competing vegetation. • Management adheres to environmental regulations and policies such as the Wildlife Habitat and Watercourse Protection Regulations, and Forest Code of Practice.
Converted	**0**	• Land converted to an unnatural state for human use, or areas where practices have significantly degraded site productivity (e.g. agriculture, urban development roads, Christmas trees, seed orchards, forest soil compaction).

Appendix 12a: Ecological Emphasis Index Worksheet – Elements

Landscape Element	Total Land Area (ha)	Ecological Emphasis Classes					Ecological Emphasis Index	
		Reserve Area (ha)	Extensive Forest Management Area (ha)	Intensive Forest Management Area (ha)	Conversion to Non-Forest Area (ha)	Unclassified Land Use Area (ha)	Effective Area Range (ha)	EEC Index Range
Coastal Spruce	54,521	6,698	38,599	558	2,977	5,689	37,209 to 40,054	68 to 73
Coastal Mixedwood Hills and Drumlins	42,328	2,378	28,603	415	3,640	7,292	25,757 to 29,403	61 to 69
Wetlands	5,587	1,569	3,724	6	70	218	4,418 to 4,527	79 to 81
Valley Corridors	1,002	0	828	2	41	131	654 to 720	65 to 72
Coastal Beach	1,076	440	444	1	164	27	779 to 793	72 to 74
Salt Marsh	14	0	13	0	1	0	10	70
Total	**104,528**	**11,085**	**72,211**	**982**	**6,893**	**13,357**	**68,831 to 75,510**	**66 to 72**

These classes have been given a weighting percentage representing their ecological emphasis level: Reserve (100), Extensive (75), Intensive (25), and Converted (0). These percentages are applied to the area of land in each class to determine the "effective area" which is divided by "total area" to calculate the index.

The Unclassified land is too young to determine if it is being managed extensively or intensively. Therefore, an EEI range is reported based on it being all one or the other.

Water was not included as an element type. Areas were rounded to the nearest hectare.

EEI values are benchmarks that will be monitored over time.

Appendix 12b: Ecological Emphasis Index Worksheet – Ecosections

Ecosection	Total Land Area (ha)	Ecological Emphasis Classes					Ecological Emphasis Index	
		Reserve Area (ha)	Extensive Forest Management Area (ha)	Intensive Forest Management Area (ha)	Conversion to Non-Forest Area (ha)	Unclassified Land Use Area (ha)	Effective Area Range (ha)	EEC Index Range
IFHO	6,239	72	4,924	0	659	584	3,910 to 4,202	63 to 67
IFRD	1,462	0	1,261	0	86	115	975 to 1,032	67 to 71
IFSM	480	0	385	0	67	28	296 to 310	62 to 65
IMDM	5,601	140	3,244	49	705	1,463	2,951 to 3,682	53 to 66
IMHO	27,536	4,983	19,262	341	503	2,447	20,127 to 21,350	73 to 78
IMKK	262	262	0	0	0	0	262	100
IMRD	124	0	99	0	25	0	74	60
IMSM	36	0	34	0	0	2	26 to 27	72 to 75
PFHO	312	0	257	0	10	45	204 to 227	65 to 73
PMHO	2,765	919	1,761	4	8	73	2,259 to 2,296	82 to 83
WCRD	31	27	0	0	4	0	28	87
WFDM	181	38	54	0	73	16	82 to 90	46 to 50
WFHO	3,257	65	2,513	0	443	236	2,009 to 2,127	62 to 65
WFKK	14,073	211	9,566	162	1,916	2,218	7,981 to 9,090	57 to 65
WFRD	529	0	526	0	2	1	394 to 395	75
WMDM	11,433	162	8,521	88	398	2,264	7,141 to 8,273	62 to 72
WMHO	8,776	1,154	6,168	172	406	876	6,042 to 6,480	69 to 74
WMKK	16,926	1,972	10,640	165	1,277	2,872	10,711 to 12,147	63 to 72
WMRD	781	0	701	0	80	0	525	67
WTLD	2,671	645	1,863	1	65	97	2,066 to 2,115	77 to 79
Total	**103,475**	**10,650**	**71,779**	**982**	**6,727**	**13,337**	**68,064 to 74,733**	**66 to 72**

For an explanation of calculations and other information to help better understand this table, please refer to the bottom of Appendix 12a.

Appendix 13:

Glossary B: Terms in Parts 1, 2, and 3

Aspect	The direction of a downhill slope expressed in degrees or as a compass point.
Atlantic Coastal Plain Flora (ACPF)	A group of 90 species of taxonomically unrelated wetland plants that inhabit lake and river shores, bogs, fens, and estuaries and which are found primarily in southwestern Nova Scotia. The distribution of this group of plants extends down the eastern coast of the USA with isolated populations in Nova Scotia and along the Great Lakes.
Biodiversity	The diversity of plants, animals, and other living organisms, in all their forms and level of organization, including genes, species, ecosystems, and the evolutionary and functional process that link them.
Canopy	The uppermost continuous layer of branches and foliage in a stand of trees.
Climax forest community	A relatively stable and self-perpetuating forest community condition that maintains itself (more or less) until stand-level disturbance causes a return to an earlier successional stage. The final stage of natural succession for its environment.
Climax vegetation	A forest or non-forest community that represents the final stage of natural succession for its environment.
Coarse filter approach	A habitat-based approach to conserving biodiversity by maintaining a natural diversity of structures within stands and representation of ecosystems across landscapes. The intent is to meet the habitat requirements of most native species over time. Usually combined with a fine filter approach to conserve specific rare species and ecosystems.
Coarse Woody Debris (CWD)	Dead tree stems greater than 7.5 centimetres in diameter and laying horizontally at 45 degrees or less. Provides habitat for many species and is a source of nutrients for soil development.
Commercial thinning	Silviculture treatment that “thins” out an overstocked stand by removing trees that are large enough to be sold as products, such as poles or fence posts. This treatment is carried out to improve the health and growth rate of the remaining crop trees.

Composition	The proportion of biological components within a specified unit such as a stand or landscape: **Stand or Species Composition.** The proportion of each plant species in a community or stand. May be expressed as a percentage of the total number, basal area, or volume of all species in that community. **Landscape Composition.** The proportion of each community type within a landscape. Community type may be defined by vegetation type, covertype, seral stage, or development class (age).
Connectivity	The way a landscape enables or impedes movement of resources, such as water and animals.
Converted	Lands removed from a natural state (e.g. forest) and changed to other uses (e.g. agriculture, urban, settlement, road).
Corridor	Corridors are natural linear communities or elements, such as river valleys, that link parts of the ecodistrict. They are a fundamental feature of the "matrix, patch, corridor" concept of landscape structure.
Crown land and Provincial Crown land	Used in the Ecological Landscape Analysis to include all land under the administration and control of the Minister of Natural Resources under the Forests Act, Section 3; as well as the lands under the administration and control of the Minister of Environment under the Wilderness Areas Protection Act. Also includes Federal Parks in the accounting of protected area representation.
Covertype	Refers to the relative percentage of softwood versus hardwood species in the overstory of a stand. In this guide, covertype classes are: **Softwood:** softwood species compose 75% or more of overstory **Hardwood:** hardwood species compose 75% or more of overstory **Mixedwood:** softwood species composition is between 25% and 75%
Development class	The description of the structure of forests as they age and grow (e.g. establishment forest, young forest, mature forest, multi-aged / old forest).
Disturbance	An event, either natural or human-induced, that causes a change in the existing condition of an ecological system.
Ecodistrict	The third of five levels in the Ecological Land Classification for Nova Scotia Volume 1, and a subdivision of ecoregions. Characterized by distinctive assemblages of relief, geology, landform, and vegetation. Used to define the landscape unit for these Ecological Landscape Analysis reports.

Ecological land classification	A classification of lands from an ecological perspective based on factors such as climate, physiography, and site conditions. The Ecological Land Classification for Nova Scotia Volume 1 delineates ecosystems at five hierarchical scales: ecozone, ecoregion, ecodistrict, ecosection, and ecosite.
Ecological integrity	The quality of a natural unmanaged or managed ecosystem in which the natural ecological processes are sustained, with genetic, species, and ecosystem diversity assured for the future.
Ecoregion	The second level of the Ecological Land Classification for Nova Scotia Volume 1, and a subdivision of ecozone. Used to characterize distinctive regional climate as expressed by vegetation. There are nine ecoregions identified in Nova Scotia.
Ecosection	The fourth of five levels in the Ecological Land Classification for Nova Scotia Volume 1, and a subdivision of ecodistricts. An ecological land unit with a repeating pattern of landform, soils, and vegetation throughout an ecodistrict.
Ecosite	The fifth of five levels in the Ecological Land Classification for Nova Scotia Volume 1, and a subdivision of ecosections. Characterized by conditions of soil moisture and nutrient regimes. Although not mapped, the Acadian and Maritime Boreal ecosites of the province are fully described in the Forest Ecosystem Classification for Nova Scotia (2010).
Ecosystem	A functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size – a log, pond, field, forest, or the Earth's biosphere – but it always functions as a whole unit. Ecosystems are commonly described according to the major type of vegetation, such as a forest ecosystem, old-growth ecosystem, or range ecosystem. Can also refer to units mapped in the DNR Ecological Land Classification system.
Ecozone	The first of five levels in the Ecological Land Classification for Nova Scotia Volume 1. Ecozones are continental ecosystems characterized by the interactions of macroclimate, soils, geographic and physiographic features. The entire province is contained within the Acadian ecozone, one of 15 terrestrial ecozones in Canada.
Edge effect	Habitat conditions (such as degree of humidity and exposure to light or wind) created at or near the more-or-less well-defined boundary between ecosystems, as, for example, between open areas and adjacent forest.

Element	A landscape ecosystem containing characteristic site conditions that support similar potential vegetation and successional processes. Elements were mapped by combining ecosections with similar climax vegetation and natural disturbance interpretations. Depending on their role in the ecosystem, elements may be described as matrix, patch or corridor.
Endangered species	A wildlife species facing imminent extirpation or extinction. A species listed as endangered under the federal or Nova Scotia endangered species legislation (NS Endangered Species Act or federal Species at Risk Act).
Even-aged	A forest, stand, or vegetation type in which relatively small age differences exist between individual trees. Typically results from stand-initiating disturbance.
Extensive land use	Lands managed for multiple values using ecosystem-based techniques that conserve biodiversity and natural ecosystem conditions and processes.
Extinct species	A species that no longer exists. A species declared extinct under federal or Nova Scotia endangered species legislation (NS Endangered Species Act or federal SARA).
Extirpated species	A species that no longer exists in the wild in Nova Scotia but exists in the wild outside the province. A species declared extirpated under federal or Nova Scotia endangered species legislation (Nova Scotia Species at Risk Act or federal SARA).
Fine filter approach	An approach to conserving biodiversity that is directed toward individual species and critical ecosystems that are typically rare or threatened. This approach is usually combined with the coarse filter approach to conserving natural ranges of habitat.
Forest management	The practical application of scientific, economic, and social principles to the administration and working of a forest for specified objectives. Particularly, that branch of forestry concerned with the overall administrative, economic, legal, and social aspects and with the essentially scientific and technical aspects, especially silviculture, protection, and forest regulation.
Frequent stand initiating	Disturbances usually occur more frequently than the average lifespan of the dominant species and are of sufficient intensity to destroy most of the existing trees, promoting a new forest within relatively short periods of time.
Gap replacement	An absence of stand-initiating disturbances supports the development of a dominant overstory that is sustained through dynamic processes of canopy gap formation, understory development, and overstory recruitment. Gap formation ranges from individual tree mortality to periodic gap formation events that are rarely of a stand-initiating intensity.

Habitat	The place where an organism lives and/or the conditions of that environment including the soil, vegetation, water, and food.
Infrequent stand initiating	The time between stand-initiating disturbances is usually longer than the average longevity of dominant species, thereby supporting processes of canopy gap formation and understory development in mature forests.
Inherent conditions	Refers to the natural condition of ecosystems based on their enduring physical features. This is the potential condition expected in the absence of human influence.
Integrated Resource Management (IRM)	A decision-making process whereby all resources are identified, assessed, and compared before land use or resource management decisions are made. The decisions themselves, whether to approve a plan or carry out an action on the ground, may be either multiple or single use in a given area. The application of integrated resource management results in a regional mosaic of land uses and resource priorities which reflect the optimal allocation and scheduling of resource uses.
Intensive land use	Lands managed intensively to optimize resource production from sites maintained in a forested state.
Land capability (LC)	LC values represent the maximum potential stand productivity (m^3/ha/yr) under natural conditions.
Landform	A landscape unit that denotes origin and shape, such as a floodplain, river terrace, or drumlin.
Landscape	An expanse of natural area, comprising landforms, land cover, habitats, and natural and human-made features that, taken together, form a composite. May range in scale from a few hectares to large tracts of many square kilometres in extent.
Long range management frameworks	A strategic, integrated resource plan at the subregional level. It is based on the principles of enhanced public involvement, consideration of all resource uses and values, consensus-based decision making, and resource sustainability.
Matrix	A widespread vegetation forest community which dominates the landscape and forms the background in which other smaller scale communities (patches) occur. The most connected or continuous vegetation type within the landscape, typically the dominant element. (Matrix is a fundamental feature of the “matrix, patch, corridor” concept of landscape structure.).

Mature forest	A development class within the sequence of: 1) forest establishment; 2) young forest; 3) mature forest; and 4) multi-aged and old growth. Mature forests include multi-aged and old growth. Forests are typically taller than 11 metres, have an upper canopy fully differentiated into dominance classes, and regularly produce seed crops. Mature forests may develop over long periods, transitioning from early competitive stages where canopy gaps from tree mortality soon close, to later stages where openings persist and understories develop to produce multi-aged and old growth.
Memorandum of understanding (MOU)	An agreement between ministers defining the roles and responsibilities of each ministry in relation to the other or others with respect to an issue over which the ministers have concurrent jurisdiction.
Mixed stand	A stand composed of two or more tree species.
Multiple use	A system of resource use where the resources in a given land unit serve more than one user.
Natural disturbance	A natural force that causes significant change in forest stand structure and/or composition such as fire, wind, flood, insect damage, or disease.
Natural disturbance regimes	The patterns (frequency, intensity, and extent) of fire, insects, wind, landslides, and other natural processes in an area. Natural disturbances inherently influence the arrangement of forested ecosystems and their biodiversity on a given landscape. Three disturbance regimes recognized in Nova Scotia are: **Frequent:** Disturbances which result in the rapid mortality of an existing stand and the establishment of a new stand of relatively even age. The time interval between stand-initiating events typically occurs more frequently than the longevity of the climax species that would occupy the site – therefore, evidence of gap dynamics and understory recruitment is usually absent. This regime results in the establishment and perpetuation of early to mid-successional vegetation types. **Infrequent:** Stand-initiating disturbances which result in the rapid mortality of an existing stand and the establishment of a new stand of relatively even-age, but the time interval between disturbance events is normally longer than the average longevity of the dominant species – allowing gap dynamics and understory recruitment to evolve and become evident (eventually creating uneven-aged stands). This regime generally leads to the establishment and/or perpetuation of mid to late successional vegetation types. **Gap replacement:** Stand-initiating disturbances are rare. Instead, disturbances are characterized by gap and small patch mortality, followed by understory recruitment, resulting in stands with multiple age classes. This regime generally leads to the establishment and/or perpetuation of late successional vegetation types.

Old growth	Climax forests in the late stage of natural succession, the shifting mosaic phase, marked by mature canopy processes of gap formation and recruitment from a developed understory. Typical characteristics include a multi-layered canopy of climax species containing large old trees, decadent wolf trees, and abundant snags and coarse woody debris. In Nova Scotia, stands older than 125 years are classed as old growth.
Patch	A discrete community or element nested within a surrounding landscape, which is often a matrix forest. (Patch is a fundamental feature of the "matrix, patch, corridor" concept of landscape structure.)
Pre-commercial thinning	A silviculture treatment to reduce the number of trees in young stands before the stems are large enough to be removed as a forest product. Provides increased growing space and species selection opportunities to improve future crop tree growth.
Reserve	An area of forest land that, by law or policy, is usually not available for resource extraction. Areas of land and water set aside for ecosystem protection, outdoor and tourism values, preservation of rare species, gene pool and wildlife protection (e.g. wilderness areas, parks).
Riparian	Refers to area adjacent to or associated with a stream, floodplain, or standing water body.
Road deactivation	Measures taken to stabilize roads and logging trails during periods of inactivity, including the control of drainage, the removal of sidecast where necessary, and the re-establishment of vegetation for permanent deactivation.
Seral stage	Any stage of succession of an ecosystem from a disturbed, unvegetated state to a climax plant community. Seral stage describes the tree species composition of a forest within the context of successional development.
Species	A group of closely related organisms which are capable of interbreeding, and which are reproductively isolated from other groups of organisms; the basic unit of biological classification.
Species at risk	Legally recognized designation for species at federal and/or provincial levels that reflects varying levels of threats to wildlife populations. The four categories of risk are extirpated, endangered, threatened, and species of special concern.
Succession	An orderly process of vegetation community development that over time involves changes in species structure and processes.

Threatened species	A species that is likely to become endangered if the factors affecting its vulnerability are not reversed. A species declared as threatened under the federal or Nova Scotia species at risk legislation (NS Endangered Species Act or federal SARA).
Tolerance	The ability of an organism or biological process to subsist under a given set of environmental conditions. The range of these conditions, representing its limits of tolerance, is termed its ecological amplitude. For trees, the tolerance of most practical importance is their ability to grow satisfactorily in the shade of, and in competition with, other trees.
Vernal pool	A seasonal body of standing water that typically forms in the spring from melting snow and other runoff, dries out in the hotter months of summer and often refills in the autumn.
Vulnerable species	A species of special concern due to characteristics that make it particularly sensitive to human activities or natural activities or natural events. May also be referred to as “species of special concern.” A species declared vulnerable under the federal or Nova Scotia endangered species legislation (NS Endangered Species Act or federal SARA).
Wilderness area	A part of the provincial landbase designated under the Wilderness Areas Protection Act (e.g. Canso Barrens).

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