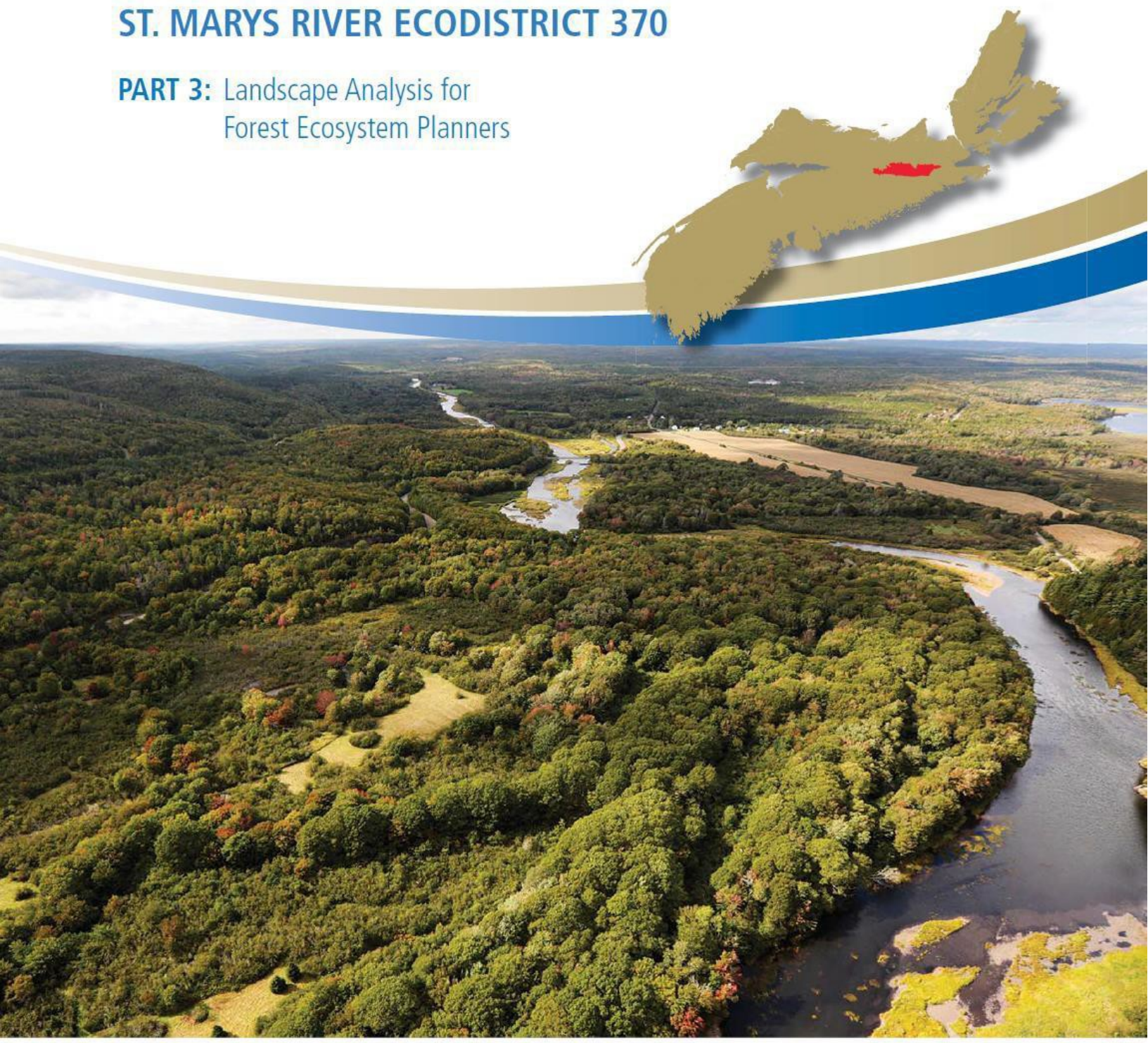
Department of Natural Resources

ECOLOGICAL LANDSCAPE ANALYSIS ST. MARYS RIVER ECODISTRICT 370

PART 3: Landscape Analysis for Forest Ecosystem Planners



ELA 2014-370

NOVA SCOTIA

Ecological Landscape Analysis, Ecodistrict 370: St. Marys River

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ISBN 978-1-55457-581-7

This report, one of 38 for the province, provides descriptions, maps, analysis, photos and resources of the St. Marys River 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 (1997 to 1999) – 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 St. Marys River – *For Forest Ecosystem Planners*

This in-depth Ecological Landscape Analysis (ELA) report is a lightly edited version of the original ELA produced by the 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. 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 seven distinctive elements in the St. Marys River Ecodistrict – one matrix, five 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).

Spruce Pine Hummocks is the matrix element, representing half of the ecodistrict's area. Low soil fertility leads to a forest dominated by black spruce and white pine, though red oak and red pine are found in some stands.

Tolerant Hardwood Hills and **Tolerant Hardwood Drumlins and Hummocks** are the two largest patch elements, representing a combined 39% of the area. Sugar maple and yellow birch are the dominant species. Red maple and red spruce are also common. White spruce is often found on abandoned fields. The other patch elements, in order of size, are **Spruce Pine Flats**, **Wetlands**, and **Floodplain**.

Valley Corridors is a linear element associated with major waterways in the ecodistrict.

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: anadromous fish, aquatic furbearers, deer, moose, wood turtle, sediment, people, rare plants, water, and goshawk.

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.

Connective management strategies to be considered include:

- Mitigating the potentially negative barrier effects of concentrated land use in the Valley Corridors element 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)

Most of the landscape flows identified are also linkages to adjacent areas or ecodistricts, as shown in Map 2.

Future management activities should 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 St. Marys River

Element	Seral Stage					
	Early	% *	Middle	%	Late	%
Spruce Pine Flats	OW2, SP8	30.0	SP6	18.0	**SP7**	30.0
Spruce Pine Hummocks	IH6, OW2, OW5, SP8	20.0	IH2, SH9, SP6	19.0	SP4, **SP5**, SP9	45.0
Tolerant Hardwood Hills	OF1, OF2, OF4, IH6	35.0	MW2, SH5, SH6, SH8, SH10, TH7	20.0	MW1, MW3, SH3, **TH1**, **TH2**, TH3, TH4, TH5, **TH8**	23.0
Tolerant Hardwood Drumlins and Hummocks	OF1, OF2, OF4, IH6	35.0	MW2, SH5, SH6, SH8, SH10, TH7	25.0	MW1, MW3, SH3, **TH1, TH2, TH8**	21.0
Floodplain	FP5, FP6	39.0	FP3	21.0	**FP1**	14.0
Wetlands	WC1, WC2, WC5, WC6, WC7, WD1, WD2, WD3, WD6, WD7, WD8					

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 overall EEI for the St. Marys River Ecodistrict is 55 to 65 (Appendices 12a and 12b). A little more than half of the land is in the extensive class.

The area distribution by ecological emphasis is indicated in Map 3.

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.

Appendix 7 and Map 5 depict the road index statistics for the St. Marys River Ecodistrict.

St. Marys River has an overall Road Index value of 4, which falls within the Remote RI range of 0 to 6 for lands with few roads. The Remote class accounts for 48% of the ecodistrict, with Forest Resource the next largest class at 39% (Appendix 7, Table 2).

Floodplain has the highest RI at 35, followed by Valley Corridors at 12 (Appendix 7, Table 3).

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.

As of 2013 in the St. Marys River Ecodistrict, there are documented occurrences (under the NSESA) of the following number of formally listed species at risk: six endangered, four threatened, and two vulnerable. In addition to the listed species, the national General Status process also identifies five orange-status species and 20 yellow-status species for a total of 25

other species of conservation concern in this district. The Atlantic Canada Conservation Data Centre lists 30 species for this ecodistrict as S1-S3 (extremely rare to uncommon).

Provincially designated species at risk found within the St. Marys River Ecodistrict include moose, little brown myotis, wood turtle, snapping turtle, brook floater mussel, and several bird species, including endangered species such as chimney swift, rusty blackbird, barn swallow, and Canada warbler. Common night hawk and olive-sided flycatcher are threatened and eastern wood pee-wee is vulnerable.

Other species of potential conservation concern known from the St. Marys River Ecodistrict include Atlantic salmon (fish); monarch butterfly, broadtailed shadowdragon, Maine snake tail, mustard white, black meadowhawk, and northern cloudwing (insects); cliff swallow, boreal chickadee, northern goshawk, and eastern bluebird (birds); and marsh bellflower, farwell's water milfoil, cut-leaved coneflower, dwarf billberry, blue vervain, thyme-leaved speedwell, deer-tongue panic grass, slender blue flag, Dudley's rush, Canada lily, small-flowered woodrush, large purple-fringed orchid, Richardson's pondweed, narrow-leaved blue-eyed grass, small burred, and sitka clubmoss (plants).

Old Forest

The Interim Old Forest Policy requires a minimum of 8% of Crown land within each ecodistrict be identified and protected. The stands are selected to provide representation of landscape elements with the best old forest and old forest restoration opportunities. *In 2012, DNR released an updated Old Forest Policy, containing new Integrated Resource Management (IRM) decision-making procedures (see http://novascotia.ca/natr/library/forestry/reports/Old-Forest-Policy-2012.pdf).*

St. Marys River has 2,508 hectares of old forest representing 5% of the Crown land in the ecodistrict.

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.

The analysis identified ecosystems requiring "fine filter" management attention to conserve their uncommon characteristics and sustain the ecological representation of natural conditions.

Within the St. Marys River Ecodistrict, seven ecosections – ICHO, ICSM, IFHO, IMRD, WCHO, WFKK, and WTLD – each represent less than 2% of the ecodistrict area. These seven ecosections combined form 7% of the ecodistrict.

Table 9 – Elements, Ecosections, Disturbance Regimes and Climax Types

370 St. Marys River Ecodistrict			
Landscape Element and Type	**Ecosections***	**Dominant Natural Disturbance Regime**	**Dominant Climax Type**
Spruce Pine Hummocks (Matrix)	IMHO IMRD WCHO WMHO	Frequent	black Spruce (bS), white Pine (wP)
Tolerant Hardwood Hills (Patch)	WFDM WFHO WFKK WMKK	Gap	sugar Maple (sM), yellow Birch (yB), Beech (Be)
Tolerant Hardwood Drumlins and Hummocks (Patch)	WMDM	Infrequent	sM, yB, Be
Spruce Pine Flats (Patch)	IFHO IMSM	Frequent	bS, wP
Wetlands (Patch)	WTLD	Open Seral (Frequent)	bS, red Maple (rM), tamarack (tL)
Floodplain (Patch)	ICHO ICSM	Gap	sM, white Ash (wA), aE (American Elm)
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

Opportunities for future management to implement existing policies and develop additional, effective practices to address fine filter conservation issues include:

- Conservation of uncommon forest species for which genetic viability may be threatened as indicated by DNR's General Status of Wildlife rating system. Many of these species are also listed under the Nova Scotia Endangered Species Act or the Canada Species at Risk Act and many of these have recovery plans in place to direct conservation actions.

- Recognition of fine-filter management opportunities related to conservation of significant habitats.
- Conservation 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 IRM classification to include old forest, Eastern Habitat Joint Venture Sites, non-designated provincial park reserves, and non-designated sites of ecological significance.

The IUCN is The World Conservation Union (formerly the International Union for the Conservation of Nature) which developed a standard 10 class international system for categorizing and reporting on the worlds protected areas.

The Indian Man Lake Nature Reserve is a legal reserve under IUCN I, II or III, accounting for 126 hectares (Appendix 5). Under policy reserves, the province's Old Growth Policy protects 2,508 hectares of forest on Crown land. Provincial parks and reserves account for another about 63 hectares. In total there are 2,697 hectares with legal reserve or policy reserve protection.

ELA Summary

Element Interpretation (All appendices and maps)

The physical boundaries of this ecodistrict are easily recognized, both on the ground and from aerial photography, due to the prominence of the two parallel faults that resulted in a graben – a downfaulted block lying between two faults – and the subsequent escarpments that delineate the ecodistrict.

The East River St. Marys parallels the Chedabucto Fault from Eden Lake to Melrose. The West River St. Marys gathers its headwaters near Trafalgar and flows east along the St. Marys Fault to Melrose to the confluence of the two rivers which then flow south to the Atlantic Ocean. The total area of the ecodistrict is 852 square kilometres, or 9% of the ecoregion.

The ecodistrict is underlain by siltstones and sandstones of the Horton Group. For the most part the topographic pattern of the ecodistrict is hummocky. Wetlands are associated with the level terrain. Most of the soils are well drained, stony to gravelly sandy loams developed on till veneers of the Horton sandstones and shales.

Fresh water totals 4% of the ecodistrict, or 3,438 hectares.

The shallow coarse soils, for the most part, support forests of black spruce and white pine. The better forests of red spruce and tolerant hardwoods will be found on the drumlins and upper slopes of the hills. Historically, repeated burnings have resulted in extensive barrens in the ecodistrict (e.g. Eden Barrens and Barren Brook). Fires on the shallow, sandy soils may also have reduced the fertility of the soils and their ability to produce stands of better productivity contributing to the abundance of fire species such as the black spruce.

Titus Smith, who travelled the area in 1801, described abundant sugar maple, black cherry, and American elm along the intervales of the St. Marys River. He entered in his journal that "above the lakes [Glenelg] for two miles there is an intervale from one half to three quarters of a mile broad, very low and often flooded. The timber is of a large size, chiefly sugar maple, elm and yellow birch and some oak."

In the spruce-pine forest, natural disturbances occur frequently on the imperfectly drained sandy soils and in most cases this disturbance is fire. Based on the observations of Titus Smith and in B.E. Fernow's 1912 forest inventory, extensive barren lands have occupied the western portion of this ecodistrict for at least 300 years.

Based on 40 years of fire records (1959 to 1999) the occurrence of lightning-caused fires in this ecodistrict is the third highest in the province (about 3.5 fires per year per 1 million hectares). The provincial average is 1.33 fires per year per 1 million hectares.

Shallow-rooted forests of black spruce on moist to wet soils are also susceptible to blowdown and breakage from the high winds associated with hurricanes and winter storms.

Insects and diseases have been known to cause extensive damage to the pine forests of this ecodistrict. Both the white pine weevil and white pine blister rust have caused tree deformation and mortality. Most recently the scleroderris canker has caused damage to managed stands of red pine.

Where tolerant hardwood forests occur, stand disturbance is less frequent and small gaps in the canopy are created by hurricanes and windstorms. Stands can develop as uneven-aged forests with old growth characteristics.

Spruce Pine Hummocks
(Matrix) (IMHO, IMRD, WCHO and WMHO ecosections) (40,106 ha)

Black spruce and white pine, which is the most common and widely distributed climax forest type in this ecodistrict, have been identified as being part of the matrix element. Somewhat unique to the eastern mainland is the scattered occurrence of red oak in all vegetation types associated with the matrix.

This element is subject to frequent disturbance patterns and fire has been prominent in creating portions of this forest type. In the 1970s a large fire burned in the western third of the matrix. Salvage cutting, as a result of the fire and subsequent harvesting, has resulted in over 70% of the

matrix being in the establishment to young development classes. An extensive planting program followed the salvage operation.

Flows

Anadromous fish (spawning habitat, food, nutrients, water quality); aquatic furbearers (habitat, food); deer (winter cover, habitat, food); moose (habitat, food); wood turtle (food, habitat, cover, wintering); sediment (tributaries, natural erosion, runoff from land use practices); people (recreation, transportation, employment, forest products, minerals); rare plants (habitat); water (quality/quantity, sediment); goshawk (habitat, foraging).

Composition

St. Marys River Ecodistrict 370 (based on statistics up to 2006)
Composition of Spruce Pine Hummocks

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	54%	18%	28% (21 Mat + 7 OF)	7%
Seral Stage	Early	Mid	Late	Unclassified
	20%	19%	45%	16%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	78%	4%	8%	10%

Desired Condition

Even distribution of early, mid, and late successional vegetation types appropriate to respective ecosections, with consideration for some large patches capable of providing interior forest conditions. Maintenance of the scattered occurrence of red oak.

Issues

- With 72% of the forest less than 40 years old, it will be important to maintain the remaining level of mature forest while increasing the overall percentage of mature and old growth.
- The importance of maintaining appropriate forest cover of this matrix element in the watersheds of the East and West St. Marys rivers will be critical in maintaining Atlantic salmon populations.
- The amount of early establishment forest is being exacerbated by the removal of disease-killed red pine plantations established on the 1976 Trafalgar burn.
- Repeated forest fires in the past 200 years and intensive harvesting have reduced nutrient levels in an already impoverished landscape and longer rotations will be required to recover site productivity.

Tolerant Hardwood Hills

(Patch) (WFDM, WFHO, WFKK and WMKK ecosections) (17,455 ha)

This element includes hummocks, drumlins, and knolls made up of well-drained fine to medium-texture soils, tending toward a late vegetation type of red maple, yellow birch, and sugar maple.

Currently the majority of this element is in the establishment to young development classes with 60% of the area in a softwood covertype.

The prominence of balsam fir compared to the predicted vegetation types should be looked at to determine if this is a result of land use practices or a difference between how these ecosections actually respond and the predicted conditions.

Flows

Anadromous fish (nutrients/food, water quality, habitat); deer (foraging); moose (foraging); wood turtle (foraging, movement); sediment (filter sediments from land use and natural processes); people (recreation, transportation, employment, forest products, minerals); rare plants (habitat); water (quality/quantity, sediments); goshawk (nesting, foraging).

Composition

St. Marys River Ecodistrict 370 (based on statistics up to 2006)
Composition of Tolerant Hardwood Hills

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	50%	19%	31% (26 Mat + 5 OF)	5%
Seral Stage	Early	Mid	Late	Unclassified
	35%	20%	23%	22%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	60%	14%	19%	7%

Desired Condition

Most of the element type in mid to late vegetation types the prominence of balsam fir within this element type should be investigated further.

Issues

- Clearcut harvest of tolerant hardwood in this element has created an opportunity for the regeneration of a balsam fir component which has been enhanced by forestry inputs such as weeding and spacing resulting in a decrease in the amount of tolerant hardwood forests.
- Currently 69% of the element is immature resulting in a significant shortage of older forest.
- The intensive use of this element for settlement and wood supply increases the potential for fragmentation and isolation of this patch-level element which is widely distributed throughout the ecodistrict.

- Lower softwood slopes of this large patch element, especially those slopes along the West River St. Marys, are critical deer wintering yards in this ecodistrict and forest harvesters need to be aware of the landscape context of this important habitat.

Tolerant Hardwood Drumlins and Hummocks

(Patch) (WMDM ecosection) (14,196 ha)

This large patch-level element occurs in two separate drumlin fields, the largest extending from Smithfield to Cross Roads Country Harbour and the other along the south end of Eden Lake. The well-drained medium-textured soils create the conditions for shade-tolerant forests of red spruce, maple, and yellow birch. The crests and upper slopes are dominated by yellow birch and red maple with lesser amounts of sugar maple. Further downslope forests grade into mixedwoods and eventually softwood forests of red spruce.

The dominant natural disturbance in this forest complex is infrequent stand-level renewal caused by insects, disease, windthrow, or storm breakage. Small gaps and patches created in the canopy between disturbance events create the opportunity for uneven-aged forests and eventually old growth. Forest harvesting creates conditions for early successional species such as white birch, red maple, aspen, and balsam fir.

A portion of this element has been converted to other uses, primarily agriculture and settlement. When fields are abandoned, white spruce are quick to reforest the sites.

The prominence of balsam fir as compared to the predicted vegetation types should be looked at to determine if this is a result of land use practices or a difference between how these ecosections actually respond and the predicted conditions.

Flows

Anadromous fish (nutrients/food, water quality, habitat); aquatic furbearers (habitat, foraging); deer (habitat, foraging); moose (habitat, foraging); wood turtle (foraging, movement); sediment (filter sediments from land use and natural processes); people (recreation, transportation, employment, forest products, minerals); water (quality/quantity, sediments); goshawk (foraging).

Composition

St. Marys River Ecodistrict 370 (based on statistics up to 2006)
Composition of Tolerant Hardwood Drumlins and Hummocks

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	50%	17%	33% (29 Mat + 4 OF)	4%
Seral Stage	Early	Mid	Late	Unclassified
	35%	25%	21%	19%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	54%	15%	20%	11%

Desired Condition

The prominence of balsam fir as compared to the predicted vegetation types should be investigated further.

Issues

- Clearcut harvest of the yellow birch and red maple forest in this element has created an opportunity for the regeneration of a balsam fir component which has been enhanced by forestry inputs such as weeding and spacing resulting in a decrease in the amount of tolerant hardwood forests.
- Lower softwood slopes of this large patch element, especially along the West River St.
- Marys and upper waters of the Country Harbour River, are critical deer wintering yards in this ecodistrict and forest harvesters needs to be aware of the landscape context of this important habitat.

Spruce Pine Flats

(Patch) (IFHO and IMSM ecosections) (2,828 ha)

The majority of this patch is on moist ecosites with fine to medium-textured soils, resulting in frequently disturbed black spruce, with lesser amounts of larch and red maple. Better-drained portions develop through to intervale type hardwood stands of American elm, sugar maple, and white ash.

Flows

Anadromous fish (nutrients/food, water quality, habitat); aquatic furbearers (habitat, foraging); deer (habitat, foraging); moose (habitat, foraging); wood turtle (habitat, foraging); sediment (filter sediments from land use and natural processes); people (recreation, transportation, employment, forest products, minerals); rare plants (habitat); water (quality/quantity, sediments).

Composition

St. Marys River Ecodistrict 370 (based on statistics up to 2006)
Composition of Spruce Pine Flats

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	50%	20%	30% (23 Mat + 7 OF)	7%
Seral Stage	Early	Mid	Late	Unclassified
	30%	18%	30%	22%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	70%	10%	10%	10%

Desired Condition

Stand conditions tending toward a predominantly black spruce forest with some hardwood on portions of the element with better drainage. A relatively even distribution of vegetation types appropriate to the respective ecosections.

Issues

- Moist to wet soils are sensitive to machine harvesting. Stands are not suitable for partial harvesting due to their susceptibility to windthrow.
- Element is primarily on level terrain associated with the East and West Rivers St. Marys and Country Harbour River and activities in this element require careful attention and control of the potential for off-site movement of pollutants, such as sediment which can be detrimental to the spawning beds of Atlantic salmon.

Wetlands

(Patch) (WTLD ecosection) (973 ha)

Based on ecosection statistics, wetlands represents less than 2% of the ecodistrict area and is therefore considered uncommon. Statistics based on covertype indicate a higher percentage of wetlands. This discrepancy should be investigated further.

Flows

Anadromous fish (nutrients/food, water quality, habitat); aquatic furbearers (habitat, foraging); deer (habitat, foraging); moose (habitat, foraging); wood turtle (foraging, movement); sediment (filter sediments from land use and natural processes); people (recreation, transportation, employment, forest products, minerals); rare plants (habitat); water (quality/quantity).

Composition

St. Marys River Ecodistrict 370 (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
	63%	12%	25% (21 Mat + 4 OF)	4%
Seral Stage	Early	Mid	Late	Unclassified
	21%	9%	53%	17%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	78%	4%	10%	8%

Desired Condition

Adjoining natural forest cover and adequate associated drainage patterns to accommodate functioning wetlands.

Issues

- Scattered distribution in this ecodistrict increases the ecological importance of wetlands.
- They are often a significant component of natural corridors associated with the larger rivers and streams.
- Significant area of smaller wetlands is embedded in the Spruce Pine Hummocks element where they provide critical habitat and landscape connectivity.
- Wetlands need to be isolated from road construction to maintain their ecological integrity and isolation.
- There is a need to be aware of seasonal wood turtle requirements of this element and to schedule activities to avoid conflict with this endangered species.

Floodplain

(Patch) (ICHO and ICSM ecosections) (125 ha)

Mixture of smooth and hummocky ecosections, adjacent watercourses, portions of this patch are included in the corridors.

Drainage such that there is a tendency toward gap disturbed hardwood intervales. Red oak occurring in the early and mid-successional vegetation types.

The ecosections making up this patch are considered rare for the ecodistrict (<2%). This is the smallest and most heavily converted patch.

Flows

Anadromous fish (nutrients/food, water quality, habitat); aquatic furbearers (habitat, foraging); deer (habitat, foraging); moose (habitat, foraging); wood turtle (foraging, movement); sediment (filter sediments from land use and natural processes); people (recreation, transportation, employment, forest products, minerals); rare plants (habitat); water (quality/quantity).

Composition

St. Marys River Ecodistrict 370 (based on statistics up to 2006)
Composition of Floodplain

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	43%	13%	44% (31 Mat + 13 OF)	13%
Seral Stage	Early	Mid	Late	Unclassified
	39%	21%	14%	26%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	66%	4%	16%	14%

Desired Condition

Most of this element type in mid to late successional vegetation types with the maintenance of a component of red oak.

Issues

- Old, late seral floodplain forests are rare and are needed to assist in the re-establishment of the natural floodplain forest on abandoned agricultural lands.
- Element has been largely converted to other land uses and forest cover needs to be maintained and increased to maintain and enhance the quality of the major rivers for Atlantic salmon.
- There is a need to be aware of seasonal wood turtle requirements of this element and to schedule activities to avoid conflict with this endangered species.

Valley Corridors

(Corridor) (Various ecosections) (6,053 ha)

The most evident linear features within this ecodistrict are made up of ecosections associated with watercourses. The most prominent of these watercourses have been identified as corridors for this analysis. These corridors also provide linkage to adjoining ecodistricts.

Some of the ecosections included within the corridors are considered rare for the ecodistrict (<2%).

Flows

Anadromous fish (nutrients/food, water quality, habitat); aquatic furbearers (habitat, food, movement); deer (foraging); moose (foraging); wood turtle (foraging, movement); sediment (filter sediments from land use and natural processes); people (recreation, transportation, employment, forest products, minerals); rare plants (habitat); water (quality/quantity, sediments).

Composition

St. Marys River Ecodistrict 370 (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%	12%	49% (35 Mat + 14 OF)	14%
Seral Stage	Early	Mid	Late	Unclassified
	29%	31%	22%	18%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	65%	10%	17%	8%

Desired Condition

Generally continuous forest cover with an emphasis toward lower impact resource management.

Issues

- Corridors following the major rivers are fragmented due to land use conversion, transportation routes, and settlement, and forest cover is critical to maintain the integrity of the corridor.
- Barriers created by loss of mature forest cover along corridors can negatively influence use.
- There is a need to be aware of seasonal wood turtle requirements of this element and to schedule activities to avoid conflict with this endangered species.

Ecosystem Issues and Opportunities (All appendices and maps)

Management of the forest resource in the St. Marys River 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:

- Recognition that St. Marys River Ecodistrict is rural in nature. While not subject to high settlement land use, the ecodistrict has been heavily influenced by forestry activity over the last 40 years, which has greatly fragmented the forest.
- Maintaining a balance among the four ecological emphasis classes, attempting to keep EEI above 50. The overall EEI is 55 to 65.
- Managing forest communities toward development class and seral stages distributions appropriate to the natural disturbance regimes for the site.
- Investigating the extent to which this ecodistrict has been used as an industrial wood supply area, creating practical and economic issues in working toward more balanced development and seral classes.
- Enhancing connectivity of the corridor elements by maintaining and, where required, restoring natural forest conditions, subject to ownership constraints.
- Strategically planning for the construction, maintenance, and abandonment of access roads to conserve the distribution of low road density areas.

Appendix 1: Flow - Element Interactions

Element	Anadromous Fish	Aquatic Furbearers	Deer	Moose	Wood Turtle	Sediment	People	Rare Plants	Water	Goshawk
Matrix Spruce Pine Hummocks (WCHO, WMHO, IMHO, IMRD)	Spawning habitat, food, nutrients, water quality	Habitat, food	Winter cover, habitat, food	Habitat, food	Food, habitat, cover, wintering	Tributaries, natural erosion, runoff land use practices	Recreation, transportation, employment, forest products, minerals	Habitat	Quality / quantity, sediments	Habitat, foraging
Patches Tolerant Hardwood Hills (WMKK, WFHO, WFDM, WFKK)	Nutrients / food, water quality, habitat		Foraging	Foraging	Foraging, movement	Filter sediments from land use and natural processes	Recreation, transportation, employment, forest products, minerals	Habitat	Quality / quantity, sediments	Nesting, foraging
Tolerant Hardwood Drumlins and Hummocks (WMDM)	Nutrients / food, water quality, habitat	Habitat, foraging	Habitat, foraging	Foraging, cover	Foraging, movement	Filter sediments from land use and natural processes	Recreation, transportation, employment, forest products, minerals		Quality / quantity, sediments	Foraging
Spruce Pine Flats (IMSM, IFHO)	Nutrients / food, water quality, habitat	Habitat, foraging	Habitat, foraging	Foraging, cover	Foraging, movement	Filter sediments from land use and natural processes	Recreation, transportation, employment, forest products, minerals	Habitat	Quality / quantity, sediments	-
Wetlands (WTLD)	Nutrients / food, water quality, habitat	Habitat, foraging	Habitat, foraging	Foraging, cover	Foraging, movement	Filter sediments from land use and natural processes	Recreation, transportation, employment, forest products, minerals	Habitat	Quality / quantity, sediments	-
Floodplain (ICSM, ICHO)	Nutrients / food, water quality, habitat	Habitat, food, movement	Winter cover, habitat, food, movement	Habitat, food	Food, habitat, cover, wintering, movement	Filter sediments from land use and natural processes	Recreation, transportation, employment, forest products, minerals	Habitat	Quality / quantity, sediments	-
Corridor Valley Corridors	Water quality maintenance; riparian habitat; access to spawning beds; fish ladders around power dams	Habitat, food, movement	Travel ways; Food; Water; Cover	Habitat, food	Food, habitat, cover, wintering, movement	Filter sediments from land use and natural processes	Forestry, Access Roads, Mineral Exploration, Outdoor Recreation (hunting, fishing, hiking, off-highway vehicles (OHV))	Habitat	Quality / quantity, sediments	Foraging

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
Matrix Spruce Pine Hummocks	Matrix	High	Trafalgar, Eden Barrens WCHO WMHO IMHO IMRD	Landscape	Frequent	Black spruce, White pine	Areas of the landscape where drumlins are concentrated, wetlands, and black spruce flats.	Lack of old growth potential	Maintenance of connectivity throughout the ecodistrict. Loss of fire as a renewal agent.	Stand-level disturbances with patch sizes similar to those created naturally. Renewal of fire ecosystems.
Tolerant Hardwood Hills	Patch	High	WMKK WFHO, WFDM WFKK	Landscape	Gap	Yellow birch, red maple	WMHO	Stand conversion from tolerant hardwoods to softwood plantations.	Fragmentation.	Maintain mature hardwood forests
Tolerant Hardwood Drumlins and Hummocks	Patch	Moderate	WMDM	Local	Infrequent	Tolerant hardwood on upper slopes with red spruce on lower slopes	Various	Stand conversion from hardwood to softwood plantations.	Over harvesting. Fragmentation.	Maintain mature hardwood forests
Spruce Pine Flats	patch	Moderate	IMSM, IFHO	Landscape	Frequent, Infrequent	Wet forests of Black spruce, with larch and red maple	Matrix	Forestry	Lack of mature cover	Longer rotation. Careful harvesting on the wet soils to avoid site degradation.
Wetlands	Patch	High	WTLD	Local	Open Seral Frequent	Shrubby wetlands around lakes	Various	Loss of habitat when adjacent forests are altered through harvesting	Off-site pollutants and alteration due to road construction.	Buffer to maintain wetland integrity and water quality
Floodplain	Patch	High	St. Marys River and tributaries ICHO and ICSM	Landscape	Various	Riparian forests of red maple and balsam fir forests on moist to wet soils	Various	Road crossings	Corridors link adjacent ecodistricts to the north and south. Flows provided from interior upland to Atlantic coastal.	Buffer riparian zone to maintain water quality for fish habitat and connectivity.

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
Valley Corridors	Corridor	Moderate	Long narrow riparian zones linking the coastal and inland ecodistricts Various ecosections	Linear connectors with the coastal and inland environments	Frequent	Riparian forests of bF, bS, and rM.	Mixedwood forests of rM, yB, and rS, eH and wP on slopes along watercourses	Fragmentation and continuity of connectivity.	Sedimentation and water quality degradation. Habitat loss.	Maintain appropriate riparian and machine exclusion zones. Reduce road access through corridors.

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 370)

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

SPECIES		DESIGNATION		
Common Name	**Scientific Name**	**Provincial**	**Federal**	**COSEWIC**
BIRDS				
Chimney Swift	*Chaetura pelagica*	Endangered	Threatened	Threatened
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Threatened
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened	Threatened
Eastern Wood-Pewee	*Contopus virens*	Vulnerable	N/A	Special Concern
Rusty Blackbird	*Euphagus carolinus*	Endangered	Special Concern	Special Concern
Barn Swallow	*Hirundo rustica*	Endangered	N/A	Threatened
Canada Warbler	*Wilsonia canadensis*	Endangered	Threatened	Threatened
INSECTS				
Monarch	*Danaus plexippus*	N/A	Special Concern	Special Concern
FISH				
Atlantic Salmon - Southern Upland pop.	*Salmo Salar* (Southern Upland pop.)	N/A	N/A	Endangered
LICHENS				
Boreal Felt Lichen - Atlantic pop.	*Erioderma pedicellatum* (Atlantic pop.)	Endangered	Endangered	Endangered
MAMMALS				
Little Brown Myotis	*Myotis lucifugus*	Endangered	N/A	Endangered
Moose	*Alces alces*	Endangered	N/A	N/A
MOLLUSKS	-	-	-	-
Brook Floater	*Alasmidonta varicosa*	Threatened	N/A	Special Concern
REPTILES				
Snapping Turtle	*Chelydra serpentina*	Vulnerable	Special Concern	Special Concern
Wood Turtle	*Glyptemys insculpta*	Threatened	Threatened	Threatened

Appendix 3: Special Occurrences (Ecodistrict 370)

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
Bay-breasted Warbler	*Dendroica castanea*	Sensitive (Yellow)	S3S4B
Cape May Warbler	*Dendroica tigrina*	Sensitive (Yellow)	S3?B
Yellow-bellied Flycatcher	*Empidonaxflaviventris*	Sensitive (Yellow)	S3S4B
Wilson's Snipe	*Gallinago delicata*	Sensitive (Yellow)	S3S4B
Common Loon	*Gavia immer*	May Be At Risk (Orange)	S3B,S4N
Fox Sparrow	*Passerella iliaca*	Secure (Green)	S3S4B
Gray Jay	*Perisoreuscanadensis*	Sensitive (Yellow)	S3S4
Cliff Swallow	*Petrochelidonpyrrhonota*	May Be At Risk (Orange)	S3B
Boreal Chickadee	*Poecile hudsonica*	Sensitive (Yellow)	S3
Greater Yellowlegs	*Tringa melanoleuca*	Sensitive (Yellow)	S3B,S5M
Tennessee Warbler	*Vermivora peregrina*	Sensitive (Yellow)	S3S4B
DICOTS			
Marsh Bellflower	*Campanulaaparinoides*	Sensitive (Yellow)	S3
Farwell's Water Milfoil	*Myriophyllum farwellii*	Sensitive (Yellow)	S2
Stout Smartweed	*Polygonum robustius*	Secure (Green)	S3S4
Cut-Leaved Coneflower	*Rudbeckia laciniata*	Sensitive (Yellow)	S2
Bloodroot	*Sanguinaria canadensis*	Secure (Green)	S3S4
Dwarf Bilberry	*Vaccinium caespitosum*	Sensitive (Yellow)	S2
Blue Vervain	*Verbena hastata*	Secure (Green)	S3
Thyme-Leaved Speedwell	*Veronica serpyllifolia ssp. humifusa*	Sensitive (Yellow)	S2S3
FERNS AND THEIR ALLIES			
Sitka Clubmoss	*Lycopodium sitchense*	Secure (Green)	S3?
INSECTS			
Pepper and Salt Skipper	*Amblyscirtes hegon*	Secure (Green)	S2
Common Roadside-Skipper	*Amblyscirtes vialis*	Secure (Green)	S2
Common Branded Skipper	*Hesperia comma*	Secure (Green)	S3
Northern Pygmy Clubtail	*Lanthus parvulus*	Secure (Green)	S3
Northern Pearly-Eye	*Lethe anthedon*	Secure (Green)	S3
Broadtailed Shadowdragon	*Neurocorduliamichaeli*	N/A	S1
Maine Snaketail	*Ophiogomphusmainensis*	May Be At Risk (Orange)	S1
Mustard White	*Pieris oleracea*	Sensitive (Yellow)	S2
Green Comma	*Polygonia faunus*	Secure (Green)	S3

Appendix 3: Special Occurrences (Ecodistrict 370)

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***
Question Mark	*Polygonia interrogationis*	Secure (Green)	S3B
Grey Comma	*Polygonia progne*	Secure (Green)	S3S4
Black Meadowhawk	*Sympetrum danae*	Sensitive (Yellow)	S3
Northern Cloudywing	*Thorybes pylades*	Sensitive (Yellow)	S2
MAMMALS			
Cougar - Eastern population	*Puma concolor pop. 1*	Undetermined	SH
MOLLUSKS			
Eastern Lampmussel	*Lampsilis radiata*	Sensitive (Yellow)	S2
MONOCOTS			
Deer-tongue Panic Grass	*Dichanthelium clandestinum*	Secure (Green)	S3
Slender Blue Flag	*Iris prismatica*	May Be At Risk (Orange)	S1
Dudley's Rush	*Juncus dudleyi*	Sensitive (Yellow)	S2?
Canada Lily	*Lilium canadense*	Sensitive (Yellow)	S2S3
Small-flowered Woodrush	*Luzula parviflora*	Secure (Green)	S3S4
Large Purple Fringed Orchid	*Platantheragrandiflora*	Secure (Green)	S3
Richardson's Pondweed	*Potamogetonrichardsonii*	May Be At Risk (Orange)	S2S3
Narrow-leaved Blue-eyed-grass	*Sisyrinchium angustifolium*	Secure (Green)	S3S4
Small Burreed	*Sparganium natans*	Secure (Green)	S3

*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 370)
Table 1c – Other Conservation Features

Feature	Type	Information Source	Legislation or Status Ranking System
Loon Nesting Sites	Habitat	NS Significant Species & Habitats	Canadian Migratory Bird Convention Act, Wildlife Act
Deer Wintering Areas	Habitat	NS Significant Species & Habitats	Wildlife Act
Goshawk Nests	Habitat	NS Significant Species & Habitats	Wildlife Act
Wood Turtle Rivers (East, North, West Branches of St. Marys)	Habitat	NS Significant Species & Habitats	Wildlife Act, NS Endangered Species Act, Species at Risk Act, COSEWIC
St. Marys River	Ecosystem	NS Significant Species & Habitats	NS Environment Act, Forestry Act, Fisheries Act
St. Marys Corridor Lands	Ecosystem	Provincial Database	NS Wildlife Act, NS Environment Act
Indian Man Lake Nature Reserve	Ecosystem	Provincial Database	NS Wildlife Act, NS Environment Act, Special Places Protection Act

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 relativeland 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	%		
ICHO	aE sM wA	591	0.7	2,165	2.5	44 to 50	32.3	34,403	3.1	11,044	1.0	58 to 69	3.8
ICSM	aE sM wA	400	0.5	2,165	2.5	25 to 28	57.0	8,335	0.8	11,044	1.0	53 to 58	16.4
IFHO	bS	1,525	1.8	5,360	6.3	57 to 68	2.5	31,024	2.8	95,529	8.7	51 to 59	12.8
IMHO	bS wP	16,332	19.2	41,848	49.1	58 to 67	1.2	121,008	11.1	43,240	4.0	60 to 69	3.4
IMRD	bS wP	638	0.7	41,848	49.1	37 to 61	1.0	3,120	0.3	43,240	4.0	53 to 64	5.8
IMSM	bS	2,935	3.4	5,360	6.3	58 to 66	8.4	9,670	0.9	95,529	8.7	50 to 55	17.4
WCHO	bS wP	466	0.5	41,848	49.1	50 to 55	23.0	69,678	6.4	43,240	4.0	58 to 65	8.5
WFDM	sM yB	3,066	3.6	5,125	6.0	51 to 64	10.3	3,066	0.3	55,327	5.1	50 to 62	10.3
WFHO	sM yB	3,440	4.0	5,125	6.0	53 to 67	4.2	19,086	1.7	55,327	5.1	49 to 57	14.0
WFKK	sM yB	815	1.0	5,125	6.0	57 to 67	8.1	75,788	6.9	55,327	5.1	49 to 57	12.3
WMDM	rS	14,917	17.5	11,146	13.1	56 to 68	3.8	20,068	1.8	99,080	9.1	57 to 68	3.1
WMHO	bS wP	24,413	28.7	41,848	49.1	52 to 62	0.8	84,128	7.7	43,240	4.0	55 to 65	5.2
WMKK	sM yB Be	10,741	12.6	15,216	17.9	57 to 69	1.7	184,216	16.8	518,002	47.4	58 to 66	5.8
WTLD	wetlands	1,458	1.7	0	0.0	55 to 65	5.3	6,085	0.6	0	0.0	60 to 64	6.7

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)
WMHO	bS wP	24,413	77.3	78	0	866	0	944	3.9	0.0	0.0	944	3.9
IMHO	bS wP	16,332	75.2	48	0	557	0	604	3.7	0.0	0.0	604	3.7
WMDM	rS	14,917	51.5	0	0	724	0	724	4.9	0.0	0.0	724	4.9
WMKK	sM yB Be	10,741	58.7	0	0	46	0	46	0.4	0.0	0.0	46	0.4
WFHO	sM yB	3,440	40.8	0	0	129	0	129	3.8	0.0	0.0	129	3.8
WFDM	sM yB	3,066	30.8	0	0	47	0	47	1.5	0.0	0.0	47	1.5
IMSM	bS	2,935	26.0	0	0	41	0	41	1.4	0.0	0.0	41	1.4
IFHO	bS	1,525	52.1	0	0	10	0	10	0.7	0.0	0.0	10	0.7
WTLD	wetlands	1,458	41.8	0	0	29	0	29	2.0	0.0	0.0	29	2.0
WFKK	sM yB	815	17.7	0	0	22	0	22	2.7	0.0	0.0	22	2.7
IMRD	bS wP	638	100.0	0	0	0	0	0	0.0	0.0	0.0	0	0.0
ICHO	aE sM wA	591	5.4	0	0	0	0	0	0.0	0.0	0.0	0	0.0
WCHO	bS wP	466	5.4	0	0	0	0	0	0.0	0.0	0.0	0	0.0
ICSM	aE sM wA	400	0.1	0	0	0	0	0	0.0	0.0	0.0	0	0.0
Total		**81,735**		**126**	**0**	**2,470**	**0**	**2,596**		**0.0**		**2,596**	

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)
Areas under the Special Places Act	126		Old Forest	2,508	0
			Operational Non Designated Parks / Reserves	59	
			Designated Provincial Parks / Park Reserves	4	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	864
Utility corridors	3	24
Gravel Roads and active railways	6	524
Paved streets and roads collectors	10	116
Highways	15	0

Table 2: Distribution of Road Index Classes

Road Index Value		Area of Ecodistrict Affected	
Indication	Range	Hectares	Percent
Remote	0 to 6	40,528	48.0
Forest Resource	7 to 15	33,284	39.4
Mixed Rural	16 to 24	10,201	12.1
Agriculture Suburban	25 to 39	465	0.6
Urban	40 to 100	0	0.0
Total		**84,478**	**100.0**

Table 3: Road Index Values for Each Landscape Element Type

Landscape Element	Area (ha)	Road Index
Spruce Pine Hummocks	40,106	2
Valley Corridors	6,053	12
Tolerant Hardwood Hills	17,455	4
Tolerant Hardwood Drumlins and Hummocks	14,196	4
Spruce Pine Flats	2,828	7
Floodplain	125	35
Wetlands	973	6
Total	**81,736**	**4**

*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

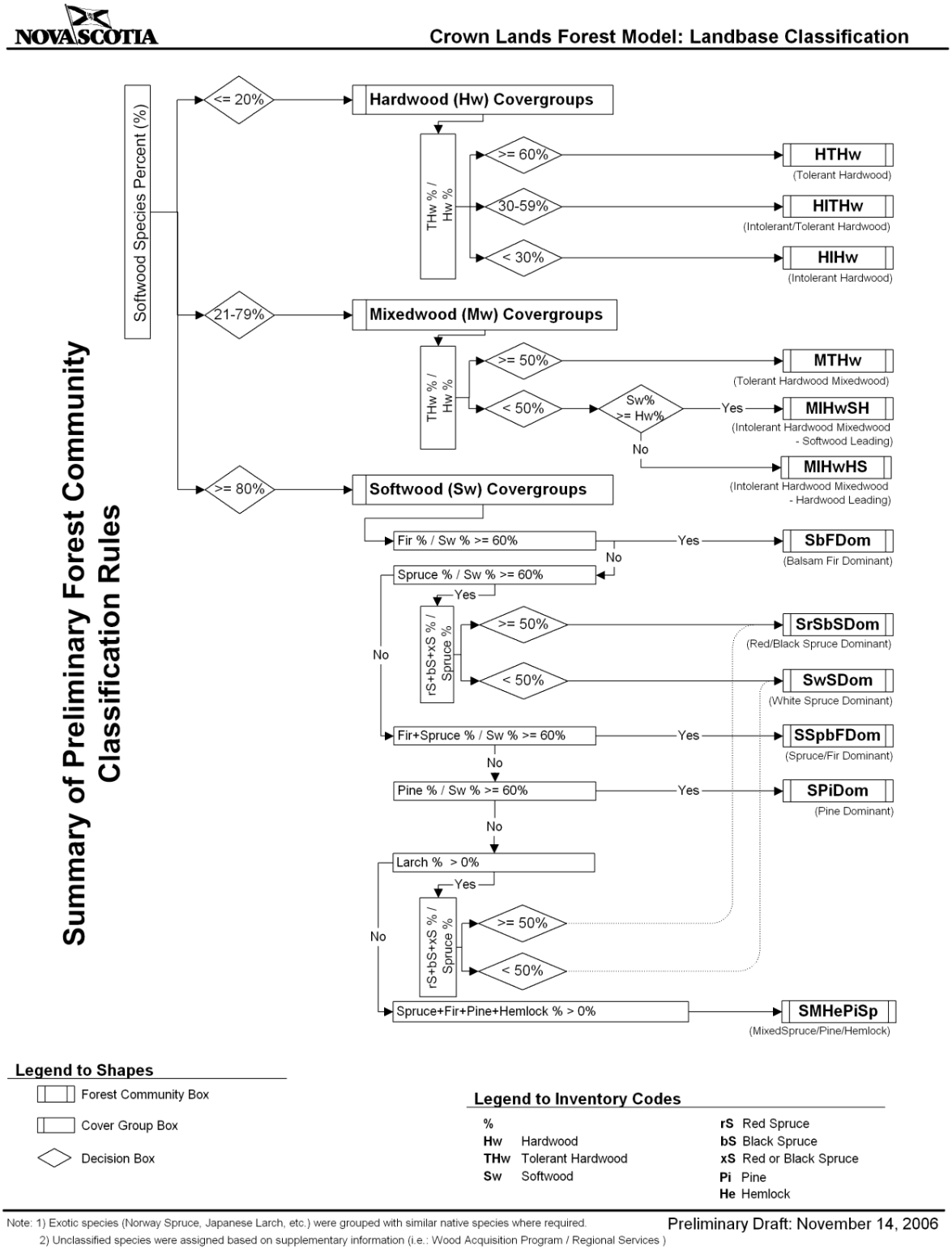
Development Class	Seral Stage
1. Forest Establishment (Height 0 to 6 m) • establishment of new growth following a stand-initiating disturbance • high diversity of forbs, shrubs, and tree regeneration, many of which are short-live shade-intolerant "pioneer" species • peak seed production by forbs and 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
4. 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																																						
Code	Name	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	920
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	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	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&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 1 to 5 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 - 23 early, 24 - 37 mid and 38 - 50 late.

Appendix 9: Vegetation Community Classification – Forest Model



Appendix 10: Table 1: Forest Landscape Composition Worksheet (St. Marys River 370)

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)				
Spruce Pine Hummocks Matrix	WMHO (59.3%) IMHO (38.4%) IMRD (1.6%) WCHO (0.7%)	Softwood	bS wP	Frequent	40,106; 100.0	Early	1,280	1,217	569	86	3,152	27,382; 77.9	EARLY	7,057; 19.5
						Mid	1,558	1,262	1,242	674	4,735			
						Late	7,565	3,325	3,515	1,183	15,587			
						Uncl	3,909	0	0	0	3,909			
		Mixedwood				Early	421	164	297	80	962	2,792; 7.9	MID	6,553; 18.6
						Mid	282	150	660	208	1,300			
						Late	0	7	125	49	182			
						Uncl	348	0	0	0	348			
		Hardwood				Early	123	157	276	14	569	1,351; 3.8	LATE	16,012; 45.5
						Mid	57	22	429	10	518			
						Late	2	6	235	1	243			
						Uncl	20	0	0	0	20			
		Unclassified				Early	2,036	30	83	0	2,148	3,637; 10.3	UNCL	5,766; 16.4
						Mid	0	0	0	0	0			
						Late	0.0	0.0	0.0	0.0	0			
						Uncl	1,489	0	0	0	1,489			
Total					**40,106***	**# ha**	**19,090**	**6,338**	**7,430**	**2,304**	**35,162**			
						%	**54.3%**	**18.0%**	**21.1%**	**6.6%**	**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 (St. Marys River 370)

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	IMSM (22.6%) IMHO (15.2%)	Softwood	bS bS wP rS	Frequent Infrequent	3,451; 57.0	Early	115	145	270	104	634	2,634; 64.6	EARLY	1,195; 29.3
						Mid	197	120	271	148	736			
						Late	309	127	287	103	826			
						Uncl	439	0	0	0	439			
	WTLD (8.0%) ICHO (8.9%)	Mixedwood				Early	48	20	123	83	273	687; 16.8	MID	1,249; 30.6
						Mid	62	25	184	64	335			
						Late	0	2	33	19	53			
						Uncl	26	0	0	0	26			
	WMDM (11.9%) IFHO (4.4%)	Hardwood	aE sM wA SM yB Be SM yB	Gap	1,891; 30.9	Early	20	41	108	9	179	396; 9.7	LATE	905; 22.2
						Mid	17	7	132	23	179			
						Late	0	0	27	0	27			
						Uncl	12	0	0	0	12			
	ICSM (5.4%) WMHO (10.6%) WFHO (5.7%)	Unclassified				Early	104	0	5	0	109	358; 8.8	UNCL	726; 17.8
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	249	0	0	0	249			
Total					**6,053***	**# ha**	**1,597**	**486**	**1,440**	**553**	**4,075**			
						%	**39.2%**	**11.9%**	**35.3%**	**13.6%**	**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 (St. Marys River 370)

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)				
Tolerant Hardwood Hills	WMKK (60.8%) WFHO (17.7%) WFDM (17.5%) WFKK (4.0%)	Softwood	rS	Infrequent	2,052.0; 11.8	Early	1,209	973	544	108	2,834	9,538; 59.4	EARLY	5,569; 34.7
						Mid	508	425	393	197	1,523			
						Late	1,629	696	529	205	3,058			
						Uncl	2,123	0	0	0	2,123			
		Mixedwood				Early	459	322	558	115	1,454	2,975; 18.5	MID	3,263; 20.3
						Mid	111	137	390	136	773			
						Late	0	5	58	14	77			
						Uncl	671	0	0	0	671			
		Hardwood	sM yB Be sM yB	Gap	15,403; 88.2	Early	70	268	384	15	736	2,343; 14.6	LATE	3,709 23.1
						Mid	90	174	672	32	968			
						Late	0	55	519	0	574			
						Uncl	65	0	0	0	65			
		Unclassified				Early	381	69	95	0	545	1,200; 7.5	UNCL	3,513 21.9
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	654	0	0	0	654			
Total					**17,455***	**# ha**	**7,970**	**3,122**	**4,141**	**822**	**16,055**			
						%	**49.6%**	**19.4%**	**25.8%**	**5.1%**	**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 (St. Marys River 370)

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)				
Tolerant Hardwood Drumlins and Hummocks	WMDM (100.0%)	Softwood	rS 60.0 bS 10.0	Infrequent	9937; 70.0	Early	794	755	481	87	2,117	7,052; 53.4	EARLY	4,681; 35.4
						Mid	319	531	477	139	1,466			
						Late	1,340	376	462	122	2,299			
						Uncl	1,169	0	0	0	1,169			
		Mixedwood				Early	476	185	417	94	1,171	2,715; 20.6	MID	3,262; 24.7
						Mid	138	133	534	65	869			
						Late	31	9	52	5	96			
						Uncl	579	0	0	0	579			
		Hardwood	sM yB Be 30.0	Infrequent	4,258; 30.0	Early	311	100	272	5	688	1,988; 15.0	LATE	2,724; 20.6
						Mid	138	127	632	30	926			
						Late	0	15	307	6	328			
						Uncl	46	0	0	0	46			
		Unclassified				Early	576	26	103	0	705	1,459; 11.0	UNCL	2,547; 19.3
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	754	0	0	0	754			
Total					**14,196***	**# ha**	**6,670**	**2,256**	**3,735**	**552**	**13,213**			
						%	**50.5%**	**17.1%**	**28.3%**	**4.2%**	**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 (St. Marys River 370)

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)				
Spruce Pine Flats	IMSM (55.5%) IFHO (44.5%)	Softwood	bS	Frequent	2,200.0; 77.8	Early	125	160	95	17	397	1,662; 70.5	EARLY	716; 30.4
						Mid	99	91	58	27	274			
						Late	310	167	131	68	675			
						Uncl	316	0	0	0	316			
		Mixedwood				Early	15	24	71	25	135	231; 9.8	MID	417; 17.7
						Mid	8	3	29	22	62			
						Late	0	0	2	0	2			
						Uncl	32	0	0	0	32			
		Hardwood	aE sM wA	Frequent	627.6; 22.2	Early	33	15	60	3	110	234; 9.9	LATE	712; 30.2
						Mid	1	6	73	1	81			
						Late	0	3	32	0	35			
						Uncl	8	0	0	0	8			
		Unclassified				Early	68	1	5	0	74	231; 9.8	UNCL	513; 21.7
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	157	0	0	0	157			
Total					**2,828***	**# ha**	**1,170**	**469**	**555**	**163**	**2,357**			
						%	**49.7%**	**19.9%**	**23.6%**	**6.9%**	**100.0%**			

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Appendix 10: Table 1: Forest Landscape Composition Worksheet (St. Marys River 370)

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)				
Floodplain	ICHO (41.8%) ICSM (58.2%)	Softwood				Early	1	3	8	9	21	51; 66.2	EARLY	30; 38.7
						Mid	2	6	0	0	8			
						Late	5	0	6	0	10			
						Uncl	12	0	0	0	12			
		Mixedwood				Early	0	1	5	0	6	12; 15.5	MID	16; 20.9
						Mid	2	0	3	1	5			
						Late	0	0	0	0	0			
						Uncl	0	0	0	0	0			
		Hardwood	aE sM wA	Gap	125; 100.0	Early	0	0	0	0	0	4; 4.6	LATE	11; 13.9
						Mid	1	0	2	0	3			
						Late	0	0	0	0	0			
						Uncl	0	0	0	0	0			
		Unclassified				Early	2	0	1	0	3	11; 13.7	UNCL	20; 26.5
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	8	0	0	0	8			
Total					**125***	**# ha**	**33**	**10**	**24**	**10**	**77**			
						%	**42.9%**	**13.3%**	**31.1%**	**12.6%**	**100.0%**			

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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	WTLD (100.0%)	Softwood	bS	None	389; 40.0	Early	29	19	24	2	74	508; 77.8	EARLY	139; 21.3
						Mid	5	7	16	1	28			
						Late	220	43	56	19	338			
						Uncl	68	0	0	0	68			
		Mixedwood				Early	7	4	9	3	22	67; 10.2	MID	54; 8.2
						Mid	5	1	7	0	13			
						Late	0	0	1	0	1			
						Uncl	31	0	0	0	31			
		Hardwood				Early	0	0	5	0	5	26; 4.0	LATE	348; 53.4
						Mid	0	2	11	0	12			
						Late	0	0	9	0	9			
						Uncl	0	0	0	0	0			
		Unclassified				Early	37	0	2	0	39	52; 7.9	UNCL	112 17.1
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	13	0	0	0	13			
Total					**973***	**# ha**	**414**	**75**	**139**	**25**	**653**			
						%	**63.4%**	**11.5%**	**21.4%**	**3.8%**	**100.0%**			

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Appendix 10: Table 2: Composition of Forest Communities (in St. Marys River 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
Spruce Pine Hummocks Matrix	IFHO	Frequent	bS	S	SrSbSDom	16,852	53.5%	L	**Dry to Well-drained** Early VTs: rM, wB, gB, pC Mid VTs: bS, rP, wP, rO Late VTs: bS, wP **Moist** Early – Late VTs: bS, wP **Poorly drained** Early - Late VTs: bS, tL, rM
				S	SbFDom	3,632	11.5%	M	
	IMHO	Frequent	bS wP	S	SPiDom	3,566	11.3%	M/L	
	IMRD	Frequent	bS wP	S	SSpbFDom	2,341	7.4%	M/L	
	WCHO	Frequent	bS wP	S	SwSDom	719	2.3%	E	
	WMDM	Infrequent	rS	S	SMHePiSp	274	0.9%	L	
	WMHO	Frequent	bS wP	M	MIHwSH	1,694	5.4%	M	
	WMKK	Gap	sM yB Be	M	MIHwHS	893	2.8%	E	
	XXWA	None	NONE	M	MTHw	205	0.6%	L	
				H	HIHw	902	2.9%	E/M	
				H	HTHw	246	0.8%	L	
				H	HITHw	203	0.6%	M/L	
Total						**31,525**	**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

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Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Valley Corridors	ICHO	Gap	aE sM wA	S	SrSbSDom	1,423	38.3%	L	**Well-drained** Early – Mid VTs: bF, wS, rM, Wb Late VTs: rS, eH, wP, yB, sM, Be **Moist** Early – Late VTs: bF, bS, rM **Poorly drained** Early - Late VTs: bS, bF, rM, tL **Floodplains** Early – Mid VTs: bC, wS, rO, rM Late VTs: sM, yB, wA, aE
	ICSM	Gap	aE sM wA	S	SbFDom	437	11.7%	M	
	IFHO	Frequent	bS	S	SSpbFDom	432	11.6%	E	
	IMHO	Frequent	bS wP	S	SwSDom	256	6.9%	M/L	
	IMSM	Frequent	bS	S	SPiDom	58	1.5%	M/L	
	WCHO	Frequent	bS wP	S	SMHePiSp	30	0.8%	L	
	WFDM	Infrequent	sM yB	M	MIHwSH	387	10.4%	M	
	WFHO	Infrequent	sM yB	M	MIHwHS	229	6.2%	E	
	WFKK	Infrequent	sM yB	M	MTHw	71	1.9%	L	
	WMDM	Infrequent	rS	H	HIHw	293	7.9%	E/M	
	WMHO	Frequent	bS wP	H	HITHw	76	2.0%	M/L	
	WMKK	Gap	sM yB Be	H	HTHw	28	0.7%	L	
	WTLD	None	None						
	XXWA	None							
Total						**3,717**	**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 St. Marys River 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
Tolerant Hardwood Hills	WFDM WFHO WFKK WMKK	Infrequent Infrequent Infrequent Gap	sM yB sM yB sM yB sM yB B	S	SrSbSDom	4,300	28.9%	L	**Well-drained** Early VTs: rM, wB Mid to Late VTs: rM, yB, sM **Moist** Early to Mid-VTs: bF, rS, rM, Late VTs: rS, yB **Old Fields** Early VTs: wS
				S	SbFDom	3,223	21.7%	M	
				S	SSpbFDom	1,127	7.6%	M/L	
				S	SwSDom	510	3.4%	E	
				S	SPiDom	370	2.5%	M/L	
				S	SMHePiSp	9	0.1%	L	
				M	MIHwSH	1,789	12.0%	M	
				M	MIHwHS	903	6.1%	E	
				M	MTHw	283	1.9%	L	
				H	HIHw	1,157	7.8%	E/M	
				H	HTHw	633	4.3%	L	
				H	HITHw	553	3.7%	M/L	
Total						**14,855**	**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

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Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Tolerant Hardwood Drumlins and Hummocks	WMDM XXWA	Infrequent None	rS None	S	SrSbSDom	2,985	25.4%	L	**Well-drained** Early VTs: rM, wB Mid to Late VTs: rM, yB, sM **Moist** Early to Mid-VTs: bF, rS, rM, Late VTs: rS, yB **Old Fields** Early VTs: wS
				S	SbFDom	2,374	20.2%	M	
				S	SSpbFDom	1,083	9.2%	M/L	
				S	SwSDom	426	3.6%	E	
				S	SPiDom	160	1.4%	M/L	
				S	SMHePiSp	24	0.2%	L	
				M	MIHwSH	1,404	11.9%	M	
				M	MIHwHS	963	8.2%	E	
				M	MTHw	349	3.0%	L	
				H	HIHw	1,303	11.1%	E/M	
				H	HTHw	368	3.1%	L	
				H	HITHw	317	2.7%	M/L	
Total						**11,754**	**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 St. Marys River 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
Spruce Pine Flats	IFHO IMSM XXWA	Frequent Frequent None	bS bS None	S	SrSbSDom	894	42.0%	L	**Moist** Early – Late VT: bS, tL, rM **Poor** Early- Late VT: bS, tL, rM, alders, winterberry, false holly
				S	SbFDom	480	22.6%	M	
				S	SSpbFDom	198	9.3%	M/L	
				S	SwSDom	83	3.9%	E	
				S	SPiDom	6	0.3%	L	
				S	SMHePiSp	1	0.0%	M/L	
				M	MIHwSH	136	6.4%	M	
				M	MIHwHS	83	3.9%	E	
				M	MTHw	13	0.6%	L	
				H	HIHw	146	6.9%	E/M	
				H	HTHw	52	2.4%	L	
				H	HITHw	36	1.7%	M/L	
Total						**2,126**	**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 St. Marys River 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
Floodplain	ICHO ICSM XXWA	Gap Gap None	aE sM wA aE sM wA None	S	SwSDom	17	26.3%	L	**Well-drained** Early VTs: bC, rM, wS Mid to Late VTs: sM, wA, aE **Poorly drained** Early to Mid-VTs: bS, tL, rM, willow, alder **Inactive Floodplain VTs:** rS, yB, eH, bF **Old Fields** Pioneer Species: bC, chokecherry, alders, hawthorne, willows Mid VTs: rO, rM
				S	SrSbSDom	16	24.9%	M	
				S	SSpbFDom	9	13.1%	E	
				S	SbFDom	8	12.5%	M/L	
				M	MIHwSH	6	9.2%	E	
				M	MIHwHS	4	5.8%	M	
				M	MTHw	2	3.4%	L	
				H	HITHw	3	4.7%	E/M	
Total						**65.5**	**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 St. Marys River 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	WTLD	None		S	SrSbSDom	285	47.4%	L	**Moist** Early – Late VTs: bF, bS, rM **Poor** Early - Late VTs: bS, rM, tL
				S	SPiDom	122	20.3%	M/L	
				S	SwSDom	47	7.8%	E	
				S	SbFDom	39	6.5%	M	
				S	SSpbFDom	15	2.5%	M/L	
				M	MIHwSH	41	6.8%	M	
				M	MIHwHS	16	2.7%	E/M	
				M	MTHw	10	1.7%	L	
				H	HIHw	14	2.4%	E/M	
				H	HTHw	9	1.5%	L	
				H	HITHw	3	0.4%	M/L	
Total						**601**	**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
bS wP	41,848	49.1%	43,240	4.0%
sM yB Be	15,216	17.9%	518,002	47.4%
rS	11,146	13.1%	99,080	9.1%
bS	5,360	6.3%	95,529	8.7%
sM yB	5,125	6.0%	55,327	5.1%
aE sM wA	2,165	2.5%	11,044	1.0%
Total	**80,861**	**94.9%***	**822,222**	**75.2%****

*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
Spruce Pine Hummocks	41,139	1,545	21,494	8,994	495	8,611	22,067 to 26,372	54 to 64
Tolerant Hardwood Hills	17,700	244	10,757	1,717	701	4,282	9,811 to 11,952	55 to 68
Tolerant Hardwood Drumlins and Hummocks	14,579	719	8,248	1,607	551	3,454	8,171 to 9,897	56 to 68
Spruce Pine Flats	3,466	46	2,170	307	211	732	1,933 to 2,300	56 to 66
Valley Corridors	2,306	21	1,810	49	291	134	1,425 to 1,492	62 to 65
Wetlands	1,082	21	572	240	46	204	560 to 662	52 to 61
Floodplain	563	0	223	6	271	63	184 to 216	33 to 38
Total	**80,835**	**2,596**	**45,274**	**12,920**	**2,566**	**17,480**	**44,151 to 52,891**	**55 to 65**

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)	Reserve Area (ha)	Ecological Emphasis Classes				Ecological Emphasis Index	
			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
ICHO	564	0	317	2	191	55	252 to 279	45 to 50
ICSM	371	0	113	8	228	23	92 to 103	25 to 28
IFHO	1,468	10	954	166	38	300	842 to 992	57 to 68
IMHO	16,264	605	9,803	2,534	199	3,123	9,372 to 10,933	58 to 67
IMRD	638	0	150	168	6	313	233 to 389	37 to 61
IMSM	2,840	41	1,919	146	246	488	1,638 to 1,882	58 to 66
WCHO	410	0	263	0	108	40	207 to 227	50 to 55
WFDM	3,007	47	1,676	226	317	741	1,546 to 1,916	51 to 64
WFHO	3,405	130	1,814	373	146	943	1,819 to 2,290	53 to 67
WFKK	790	22	510	39	67	153	452 to 529	57 to 67
WMDM	14,725	725	8,361	1,610	563	3,467	8,265 to 9,998	56 to 68
WMHO	24,300	945	11,667	6,324	202	5,163	12,567 to 15,148	52 to 62
WMKK	10,666	46	6,893	1,080	183	2,463	6,102 to 7,334	57 to 69
WTLD	1,436	28	869	246	76	217	795 to 904	55 to 63
Total	**80,884**	**2,597**	**45,308**	**12,921**	**2,569**	**17,488**	**44,181 to 52,924**	**55 to 65**

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 diversityof 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 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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