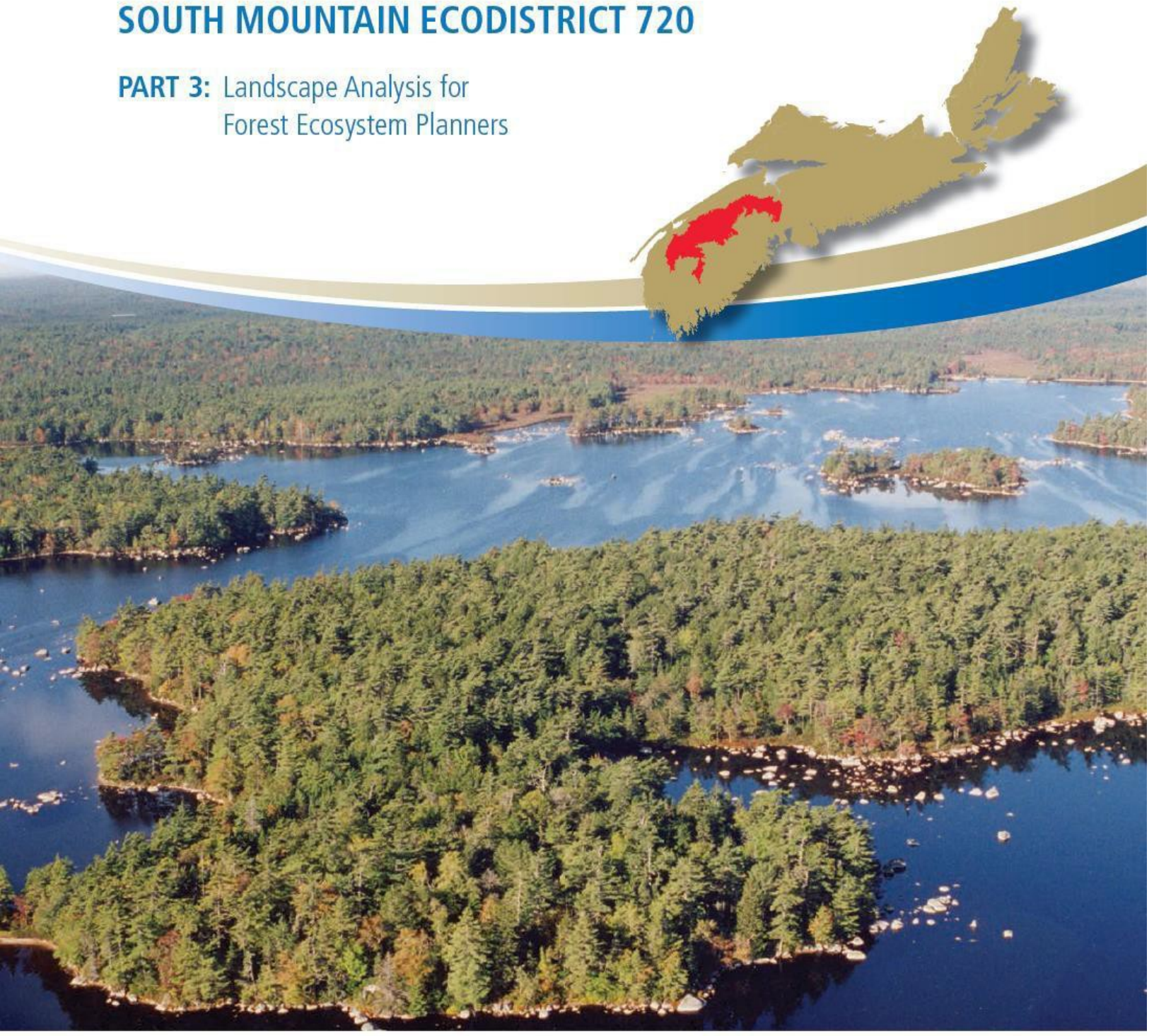
Department of Natural Resources

ECOLOGICAL LANDSCAPE ANALYSIS SOUTH MOUNTAIN ECODISTRICT 720

PART 3: Landscape Analysis for Forest Ecosystem Planners



ELA 2014-720

NOVA SCOTIA

Ecological Landscape Analysis, Ecodistrict 720: South Mountain

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ISBN 978-1-55457-597-8

This report, one of 38 for the province, provides descriptions, maps, analysis, photos and resources of the South Mountain Ecodistrict.

The 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 (2002) – stand volume, species composition
- Crown Lands Forest Model landbase classification (2006) – provides forest inventory update for harvesting & silviculture from satellite photography (2005), silviculture treatment records (2006) and forest age increment (2006)
- Roads & 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.

REPORT FOR ELA 2014-720

Table of Contents – Part 3

Tables

Appendices

Theme Maps Available on Website

Part 3: Landscape Analysis of South Mountain – *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:

Understanding the Landscape as an Ecological System

- Elements Within Landscapes
- Flow-Element Interactions
- Landscape Connectivity

Landscape Indicators

- Forest Composition Indicators
- Land Use Indicators

Fine Scale Features

- Priority Species and Other Special Occurrences
- Rare Ecosections
- Ecological Representivity

ELA Summary

- Element Interpretation
- Ecosystem Issues and Opportunities

Understanding the Landscape as an Ecological System

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

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

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

Elements Within Landscapes (Map 2)

The landscape analysis identified and mapped nine distinctive elements in the South Mountain Ecodistrict – one matrix, seven 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).

Red and Black Spruce Hummocks is the matrix element comprising about 63% of the ecodistrict. This element is dominated by red and black spruce, white pine and hemlock.

Spruce Hemlock Pine Hummocks and Hills is the largest patch element in the ecodistrict, which has a mainly shade-tolerant softwood climax forest. **Spruce Pine Flats** has a climax forest of black spruce. **Tolerant Mixedwood Drumlins** includes some species that do well in at least partial sun, such as red maple and white birch. The **Wetlands** element plays an important role in providing wildlife habitat for species such as moose, turtles, snakes, and rare plants. **Tolerant Mixedwood Hummocks** and **Tolerant Hardwood Hills** are two of the smaller patches in the ecodistrict. **Spruce Pine Hummocks** is found mainly in two parts of the ecodistrict – near Fisher Lake and Bear Lake.

Valley Corridors is a linear corridor element found along some of the major waterways. Many species use the water and land habitat.

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: people, deer, moose, trout, loons, furbearers, water, and goshawks.

Although most of South Mountain is forested and a lot of species move in and about, it is probably significantly more "patchy" in nature than the pre-settlement forest. This has likely had impacts on movement of interior dwelling species and smaller organisms. Damming of river systems and past logging drives has likely influenced riparian corridors and fish populations.

The ecodistrict is dominated by the Red and Black Spruce Hummocks matrix, which supports the potential for natural movement of species and water throughout.

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.

Comparisons forests prior to European settlement indicate that the ecological make-up of the landscape has changed. The past ecological structure of the ecodistrict was dominated by a softwood climax forest. Tolerant softwoods (red spruce, white pine, and hemlock) are thought to have made up 42% of the forested area with the black spruce-white pine association adding a further 33%. Other softwood, mixedwood, and hardwood climax types each contributed to less than 5% of the forested area.

The current landscape is now 50% softwood, 31% mixedwood, and 19% hardwood. Late seral species now make up 40% of the landscape and mid seral and early seral species 41% and 10% respectively. Fifty-two percent of the forest is in the mature developmental stage.

Relatively little of the ecodistrict has been converted (1%). Most of the converted area is dwellings and small agricultural fields located near the ecodistrict's major highways.

Riparian corridors along the ecodistricts headwaters and major rivers appear to be largely intact and offer connections to adjoining ecodistricts.

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.

River corridors promote connectivity.

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.

The matrix in the South Mountain Ecodistrict, because of its extent and distribution throughout the ecodistrict, plays an important connective function. Although 52% of the ecodistrict is categorized as mature (> 40 years old) there are sections of the matrix where connectivity is an issue. Fragmentation has been a result of harvesting during the past 20 to 30 years. These sections give rise to a patchwork of immature forest stands of questionable value for connectivity, within which there is likely to be a lot of edge habitat and little habitat for interior dwelling species, such as marten. The construction of forest roads has added to the fragmentation problem.

Since the time of European settlement, essentially all of the ecodistrict's accessible forest would have been harvested several times. Along with that has come a general change across the landscape of species composition (large increase in intolerant hardwoods), development classes, and seral stages that has likely resulted in a forest somewhat removed from its "natural state" with a resultant loss in habitat and connectivity.

The connection between some patches has been lessened by a loss of connectivity in the surrounding matrix. Similar to the matrix, many of the patch elements are likely lacking in interior habitat as the result of forest harvesting.

Riparian zones along the ecodistrict's many watercourses, besides being important habitat themselves, are important connections of ecosystem elements. It appears that these zones are well-forested although dams in the ecodistrict, aside from affecting fish migration, have likely had an impact on riparian zone structure and function. Harvesting practices adjacent to riparian zone have also impacted their integrity.

An additional concern in ecological planning is the maintenance of connectivity between conservation areas such as wilderness, old growth, and ecological reserves, which are often not ecologically related. Connectivity will be sustained by applying the natural disturbance guidelines for landscape composition and recognizing natural linkage opportunities.

Appendix 2 outlines management strategies and practices for various features in the ecodistrict. These strategies attempt to enhance connectivity by sustaining and restoring natural patterns within the ecodistrict.

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

South Mountain is a long, wide band running down the length of the interior portion of much of Western Nova Scotia. This ecodistrict and the many adjoining ones (nine different ecodistricts) are generally a mosaic of connected vegetation types allowing for the movement of many species. The strength of the linkage is somewhat lessened where a lot of land conversion has occurred, such as along portions of the Valley Slope Ecodistrict.

The hydrological system, an extremely important component of the ecodistrict, provides many linkages. Headwaters of many south flowing river systems (e.g. Mersey, Medway, LaHave, Roseway, Jordon, and Gold rivers) pass through adjoining ecodistricts on their way to the Atlantic Ocean.

Similarly, headwaters of north flowing rivers (e.g. Sissiboo, Bear, Annapolis, Nictaux, Gaspereau, and Avon rivers) pass through ecodistricts to the north on their way to the Bay of Fundy.

The hydrological system, through its links to the sea provides passageway for anadromous fish, such as salmon and gaspereau.

The road network highlighted by the north-south orientation of Highways 8, 10, 12, 14, and the road through Lake Paul provides linkages to ecodistricts on the north and south.

People through their recreational activities and industrial pursuits provide linkages to all adjoining ecodistricts. Future management could recognize significant links to neighbouring ecodistricts and manage 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 1 to 5 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 forest stands that are likely to be found within elements, along with the current percentage of each seral stage.

Table 8 – Forest Vegetation Types[1] Within Elements in South Mountain

Element	Seral Stage					
	Early	% *	Middle	%	Late	%
Spruce Pine Flats		7.0		29.0	**SP7**	56.0
Spruce Pine Hummocks	IH1, SP2, SP8	2.0	IH2, IH6, SP3, SP4, SP6, SH9	25.0	**SP5, SP7,** SP9	71.0
Red and Black Spruce Hummocks	IH3, IH4, IH5, IH6, MW4, MW5, SP8	9.0	MW2, SH5, SH6, SH9, SP6	39.0	**SH1, SH2, SH3, SH4, SP5, SP7**	43.0
Spruce Hemlock Pine Hummocks and Hills	IH3, IH4, IH5, IH6, MW4, MW5	15.0	SH5, SH6, MW2	50.0	**SH1, SH2, SH3, SH4,** MW1, MW3	26.0
Tolerant Hardwood Hills[2]	IH3, IH5, IH6, OF3	24.0	IH7, TH8	34.0	**TH1, TH2,** TH3, **TH5, TH6**	28.0
Tolerant Mixedwood Drumlins	OF1, OF2, OF3, OF4, IH3, IH5	14.0	IH6, IH7, MW2, MW4, SH5, SH6	40.0	TH1, TH2, TH5, **MW1, MW3,** SH1, SH2, SH3, SH4	38.0
Tolerant Mixedwood Hummocks	OF1, OF2, OF3, OF4, IH3, IH4, IH5	11.0	IH6, IH7, MW2, MW4, MW5, SH5, SH6	50.0	TH1, TH2, TH5, **MW1, MW3,** SH1, SH2, SH3, SH4	26.0
Wetlands	CE1, FP3, WC1, WC2, WC4, WC5, WC6, WC7, WC8, WD1, WD2, WD3, WD4, WD6, WD7, WD8, SP7					

View forest groups and vegetation types at http://novascotia.ca/natr/forestry/veg-types/veg-navigation.asp
To help with identification of vegetation types, the 14 forest groups in Nova Scotia designated by DNR are: Cedar (CE), Coastal (CO), Flood Plain (FP), Highland (HL), Intolerant Hardwood (IH), Karst (KA), Mixedwood (MW), Old Field (OF), Open Woodland (OW), Spruce Hemlock (SH), Spruce Pine (SP), Tolerant Hardwood (TH), Wet Coniferous (WC), Wet Deciduous (WD)
Bolded vegetation types indicate typical late successional community
[1] Forest Ecosystem Classification for Nova Scotia (2010).
[2] Red oak can be a component of this element.
*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) (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.

Conserving biodiversity, a central theme of forest ecosystem management, requires a balance of land uses in which practices that sustain ecological integrity dominate. The overall EEI rating for South Mountain is 72 to 77, which suggests a relatively high state of naturalness, and that conditions in the ecodistrict are generally favourable for biodiversity.

Based on Ecological Land Classification mapping, South Mountain has approximately 420,000 hectares of land used in determining EEC (not including wetlands and non-terrestrial conditions). Map 3 gives an indication of the location and sizes of the various EEC classes.

Approximately 74% of the area falls in the extensive EEC. This implies that land is managed for multiple values using ecosystem-based techniques that conserve biodiversity and natural ecosystem conditions.

The reserve class is divided into two categories: legal reserves and policy reserves. The legal reserves are those areas that have legal status under IUCN (International Union for the Conservation of Nature and Natural Resources) codes of I, II, III such as wilderness areas. The second type of reserve is those set aside under various provincial policies such as the Interim Old Forest Policy. Area could be added to the reserve class by attempting to increase representivity of some of the uncommon ecosections.

The intensive EEC (0.9 % of the land) is land managed intensively to optimize resource production from sites maintained in a native forested state. Despite intensive practices, these lands are an important component of landscape structure and composition.

Management may eliminate or reduce the duration of some development processes, particularly mature old forest stages, and may result in non-natural succession. Practices may produce unnatural conditions such as exotic species, old field spruce / pine, 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 the Forest Code of Practice.

Very little of South Mountain falls in the converted class (1%). This is usually land associated with human settlement or in some cases hydro power development. About 10% of the ecodistrict remains unclassified.

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

Road Index (Appendices 6, 7; Map 5)

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

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

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

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

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

Currently South Mountain has a low overall Road Index Value of 5.3 which falls within the "Remote" classification values range of 0 to 6. About 45% of the ecodistrict areas falls within this category (Appendix 7, Table 2) Most of the remainder of the ecodistrict falls within the "Forest Resource" category (37% of ecodistrict area).

The highest road index values in the ecodistrict occur along the major transportation routes (highway routes #8, #10, highway from Lake George to Lake Paul, #12, #14). These highway routes generally cross the ecodistrict in a north-south fashion and along with human settlement contribute to habitat fragmentation.

The larger remote areas in the ecodistrict are the Tobeatic and Cloud Lake wilderness areas but scattered throughout are smaller patches of "remote" area (Map 5).

Challenges in management of roads and trails could include:

- For Crown blocks, development of road and trail plans where the far-reaching implications of construction on the ecological landscape are considered. Proper planning can reduce the effects of construction on fragmentation, aquatic ecosystems, sensitive sites, and protected areas.
- Development of road and trail maintenance plans to ensure that deterioration does not cause negative ecological effects.
- Road Decommissioning. Road systems should be analysed to determine where decommissioning might be implemented. Factors such as resource management, scheduling, recreational activities, connectivity, and closeness to reserve areas might be possible, removal of bridges and culverts and establishment of a new forest.
- Minimizing the impact of road and trail construction by ensuring that best management practices are used in all facets of road and trail construction.
- Encouraging the sharing of road networks this should lessen the amount of road construction required.
- Improving ecological connectivity between wilderness areas and low road density areas.

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 were 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 (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 1 (extremely) to 5 (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.

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* (http://novascotia.ca/natr/library/forestry/reports/Old-Forest-Policy-2012.pdf).

Atlantic Coastal Plain Flora and Other Plants

A significant occurrence of rare species in the South Mountain ecodistrict is that of several species of plants belonging to a group known as Atlantic Coastal Plain Flora (ACPF). These plants became established in southwestern Nova Scotia as a result of a land bridge which existed between Nova Scotia and Massachusetts around 10,000 to 14,000 years ago. Sea level was likely about 110 metres lower than today, exposing a broad plain along the Atlantic coast (now under water). A rise in sea level from melting glaciers eventually cut off the bridge, leaving disjunctive populations of plants geographically and genetically isolated from more southern populations.

There are about 90 species in Nova Scotia that are considered to be part of the ACPF, 26 of which are present in the South Mountain Ecodistrict. As of 2014, four of these species are at risk, eight are sensitive, and one is of undetermined status.

At Risk:

- Southern twayblade (*Listera australis*)
- Spotted pondweed (*Potamogeton pulcher*)
- Intermediate mermaidweed *(Proserpinaca intermedia)*
- Northeastern bladderwort *(Utricularia resupinata)*

Sensitive:

- Buttonbush (*Cephalanthus occidentalis)*
- Swamp loosestrife (*Decodon verticillatus)* Pinebarren
- golden heather (*Hudsonia ericoides)* Woods-Rush
- (*Juncus subcaudatus var. planisepalus)*
- Redtop panic grass (*Panicum rigidulum var. pubescens)*
- Comb-leaved mermaidweek *(Proserpinaca pectinata)*
- Common Case's ladies'-tresses (*Spiranthes casei var. novaescotiae)*
- Netted chain fern (*Woodwardia areolata*)

Undetermined:

- Howe's sedge (*Carex atlantica ssp. capillacea)*

With the exception of Howe's sedge, these species have either red or yellow status in Nova Scotia, but are not yet listed under the NSESA. Howe's sedge is considered to be at risk but as yet has an undetermined status, due to a lack of information.

One other notable plant designated as at risk, but not an ACPF species, is the eastern white cedar. It is currently listed under the provincial Endangered Species Act as vulnerable. Stands of cedar are found at five sites in Digby and Annapolis counties.

Fish

Atlantic salmon have historically utilized the major rivers for spawning but are presently in decline. It is considered to be extirpated from a number of rivers in southwestern Nova Scotia. Soils here have a low capacity for buffering acid precipitation, and acid rain is believed to be the major cause of salmon and trout declines in the southwest. Salmon spawning persists in some rivers, such as the LaHave, traveling well up into the South Mountain ecodistrict. Gaspereau (sensitive status) and American shad are other salt water fish species that spawn in fresh water in the South Mountain ecodistrict.

Mainland Moose

In Nova Scotia, the mainland moose (*Alces alces americana*) has been designated an endangered species under the Nova Scotia Endangered Species Act. Mainland moose are genetically distinct from those on Cape Breton Island where moose populations are healthy. One of the remnant populations of moose on the mainland is in southwestern Nova Scotia, in a large area containing most of the Tobeatic Wilderness Area and extending southwest to Pubnico in Yarmouth County, and southeast to Liverpool in Queens County. Part of this population extends into the southwestern portion of the South Mountain ecodistrict. This area is considered to be occupied moose habitat, that is, there have been recurrent observations of moose in the area over time. However, moose are not restricted to this zone and are occasionally observed throughout the rest of the ecodistrict.

Moose are commonly associated with forested landscape habitats that have been altered by a disturbance regime, such as fire, wind, disease, or timber harvesting. The habitat requirements of moose are largely dependent on succession forest stages. Early succession hardwood trees and shrubs provide important browse while mature conifer cover is valuable for shelter and protection in winter and summer.

Prior to the introduction of forest harvesting as a disturbance regime, the availability of moose habitat in this ecodistrict would have historically been tied to natural disturbances. The natural disturbance regime (NDR) for South Mountain has been determined to be infrequent. Essentially, this would have meant a lesser availability of early successional hardwoods than in ecodistricts with frequent disturbance where fire would have played a major role in altering forest composition. It would be expected then, that the best moose habitat would have been patchy and not extensive in size.

The availability of suitable habitat for mainland moose is crucial in maintaining its future presence, and timber harvesting practices currently play an important role in creating necessary changes in the forest landscape. This change is important in providing food for moose, such as the succulent twigs, stems, and foliage of young deciduous trees and shrubs. Secluded wetland areas with an abundance of emergent vegetation are used for both feeding and cooling during the summer.

The Forestry / Wildlife Guidelines and Standards provide minimum habitat specifications for moose on Crown Land through the 8% retention for old growth, maintenance of a 20-metre minimum buffer zone along water courses and through the maintenance of reasonable age class distribution. Additional measures to provide for specific habitat needs of moose have been identified and special management practices addressing thermal refugia, aquatic feeding sites, calving areas, and clump size, are used on Crown land where appropriate. These may be required to some extent in Crown land harvests within much of the ecodistrict.

It is important to note that because moose occur in low numbers throughout a wide range in southwestern Nova Scotia, large areas of Crown land have been designated C2 because of a potential need for moose considerations in forest harvesting. The intent is to ensure that considerations for moose enter into management decisions at appropriate locations, not to protect forest habitat from active management. Preserving forest habitat and maintaining an unchanging forest in older age classes does not benefit moose in the long term; while this may provide needed cover, adequate food supplies will ultimately be lacking.

As of July 2012, interim Mainland Moose Special Management Zones have been identified for the province. Land use practices in support of moose are mandatory on Crown lands within these zones.

American Marten

American marten (*Martes americana*) are known to occur in at least a portion of the South Mountain ecodistrict, but their status throughout the ecodistrict is unknown. Formerly called pine marten, they were once more widespread throughout Nova Scotia but had declined to a few scattered populations by 1900.

In recent years several projects undertaken by DNR's Wildlife Division have aimed at shedding some light on the current distribution, abundance, and habitat selection of marten in southwestern Nova Scotia. Although historically described as a species of mature softwood, there is evidence that they are also using mixedwood forests and younger aged softwood stands, possibly related to the relatively moderate winter weather in this part of the Province. Food in the way of mice, voles and red squirrels (*Tamiasciuris hudsonicus*) would be available to marten in these stands, but denning requirements likely have to be met within mature softwood stands. Most of the ecosections in South Mountain likely have the capability to supply habitat, so it will be important to address marten habitat considerations in Crown land forest management decisions.

A reintroduction program based in Kejimkujik National Park occurred between 1987 and 1994. American marten in the South Mountain ecodistrict are most likely descendants of the northern

New Brunswick marten stock released in Kejimkujik National Park, especially considering the proximity of known occurrences to the park, in areas such as Maitland Bridge and West Dalhousie. However it is possible that these may have mixed with some remnants of the original southwest Nova Scotia population.

The American marten mainland population has been designated an undetermined species in Nova Scotia, as its status is currently under review. The Cape Breton population is listed as endangered, but more information on the status of marten in southwest Nova Scotia is needed before mainland marten also receive a possible designation under the Endangered Species Act.

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 ($\leq$ 2% of ecodistrict area) or under high land use pressure (> 75% land conversion) are identified in Appendix 3.

Table 9 – Elements, Ecosections, Disturbance Regimes and Climax Types			
720 South Mountain Ecodistrict			
Landscape Element and Type	**Ecosections***	**Dominant Natural Disturbance Regime[1]**	**Dominant Climax Type[2]**
Red and Black Spruce Hummocks (Matrix)	ICHO IMSM	Infrequent	red Spruce (rS), eastern Hemlock (eH), black Spruce (bS) white Pine (wP)
Spruce Hemlock Pine Hummocks and Hills (Patch)	IMHO WFHO WMHO WCKK WCDS	Infrequent	rS, eH, wP
Spruce Pine Flats (Patch)	ICSM IMSM	Frequent	bS, wP
Tolerant Mixedwood Drumlins (Patch)	WCDM WFDM WMDM	Gap	sugar Maple (sM), yellow Birch (yB), Beech (Be), rS, eH, wP
Wetlands (Patch)	WTLD	Open Seral (Frequent)	bS, red Maple (rM), Larch (tL)
Tolerant Mixedwood Hummocks (Patch)	IMDM WCRD WCSM	Infrequent	sM, yB, Be, rS, eH, wP
Tolerant Hardwood Hills (Patch)	WMKK	Gap	sM, yB, Be
Spruce Pine Hummocks (Patch)	ICKK ICRD	Frequent	bS, wP
Valley Corridors	Various	Various	Various

***Ecosection Explanations**: For example, in **ICHO**, **I** stands for Imperfectly drained under Soil Drainage **C** stands for Coarse-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., gravel) **M** – Medium-textured soils (e.g. loam) **F** – Fine-textured soils (e.g. clay)

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

[1] Dominant Natural Disturbance Regime is assigned to dominant ecosite condition of ecosection

[2] Climax species

South Mountain contains 14 ecosections that are rare at the ecodistrict level - WCDM, WMDM, IMHO, WMHO, WMKK, WCRD, WFDM, ICRD, WCSM, IMDM, IMSM, ICKK, WCDS, and WFHO. See Map 7.

The WFDM ecosection in the Tolerant Mixedwood patch has a higher degree of land use pressure and is 17.7% converted. Ecosections IMHO, IMSM, WMHO, and WMKK are slightly more than 5% converted. At the ecoregional level WFDM, WFHO, WMDM, WMKK, and IMDM are 17.7%, 14.0%, 13.5%, 9.9%, and 9.9% respectively converted.

Opportunities exist to implement practices to address conservation issues such as:

- conservation of species that are threatened as indicated by DNR's General Status Rank of Wild Species in Nova Scotia (yellow and red listed) or those listed as S1, S2 or S3 in the Atlantic Canada Conservation Data Centre rankings conservation of significant habitats
- identification and mapping of sites of cultural significance
- identify more tolerant hardwood candidate areas for old forest
- restore appropriate climax species in areas where resource use has significantly altered species composition – in particular areas where intolerant hardwood component has dramatically increased

Ecological Representivity (Appendices 4, 5)

Ecological representation 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.

Legally protected reserves within the South Mountain Ecodistrict include: Cloud Lake, McGill Lake, and Tobeatic wilderness areas; Ponhook and Sporting Lake nature reserves; Sites of Ecological Significance at Big Pine and Silvery lakes; Tobeatic Wildlife Management Area; Upper Clements Game Sanctuary; and Kejimkujik National Park.

Policy protected reserves are made up of: the IRM classification which includes Old Forest set aside under the provincial Interim Old Forest Policy; Designated Provincial Parks and Park Reserves at Lake George and Falls Lake; and Operational Non-Designated Parks and Reserves at Gaspereau Lake and Upper Clements Wildlife Park.

The reserve classes account for 13% of the area of South Mountain Ecodistrict. See Appendices 4 and 5.

Several of the ecosections in the ecodistrict have no representation in the reserve category. They are ICRD, IMDM, IMSM, WCSM, WFDM, WFHO, and WMDM. Furthermore, several of these ecosections have little Crown-owned land making increases in representivity difficult. Private land participation would be required.

Representation could be considered by including additional areas in reserve class for those ecosections currently not represented.

ELA Summary

Element Interpretation (All appendices and maps)

The **South Mountain Ecodistrict** is a fairly homogenous land mass underlain by granite that extends from the headwaters of the Tusket River to Panuke Lake. The headwaters for some of the province's longest rivers, including the Medway, Mersey, LaHave, Jordan, and Roseway, are located in this ecodistrict.

The climate consists of warm, early springs and warm, dry summers which, when combined with the coarse, shallow soils, creates periods in the growing season where moisture deficits can be significant. Winters are moderately mild, although if snow is going to accumulate in western Nova Scotia, it is most apt to do so in this ecodistrict due to the higher elevation.

The predominant soils are well-drained, coarse, sandy loams that have developed on granite till. One should not expect to find any soils with a significant proportion of silt or clay. For the most part the soils are coarse-textured, shallow to bedrock, stony, and dry. Furthermore, the landscape is dotted with large granite boulders which restrict operability and, in some cases, limit stocking levels within forest stands

There are many drumlins scattered throughout the ecodistrict, but they do not dominate the landscape to the extent that they require a separate ecodistrict designation (less than 3% of the total area of the ecodistrict).

Red and Black Spruce Hummocks
(Matrix) (ICHO, WCHO ecosections) (275,724 ha)

The matrix, occupying 63% of the total ecodistrict area, comprises coarse-textured soil occurring on generally hummocky ground. Soils may be either imperfectly or well-drained. The well-drained portions, usually on the hummocks, are likely to support a climax community of tolerant softwoods. The flatter, imperfectly drained soils between hummocks are expected to have a climax of black spruce with some white pine.

Fernow's report of 1912 shows an ecodistrict that had been extensively harvested, little virgin forest, large burned over areas, some barrens, and a few scattered agricultural areas.

Currently, the matrix, mostly forested, comprises softwood (53%), mixedwood (31%), and hardwood (14%). The softwood covertype is largely mature or multi-aged late seral species of red or black spruce. Softwood communities of spruce-fir, pine, tolerant softwoods, and balsam fir occur but over much smaller areas. White pine can be found as scattered individuals throughout many of the forest stands in the ecodistrict.

Mixedwoods are predominately mature or multi-aged, mid seral species such as the intolerant hardwoods, red maple, and white birch, with spruce or pine. Red oak occurs on some of the driest sites, which often have a fire history, or as scattered individuals throughout different stand types.

Hardwoods are dominated by mature intolerant hardwoods including red maple, white birch, aspen, and sometimes red oak. Tolerant hardwoods are less common.

The last 20 or so years have seen significant harvesting in the ecodistrict. Fragmentation may be an issue in selected areas. Portions of the ecodistrict, outside of the protected areas, which have not seen much harvesting in recent times, include areas to the east and west of the Tobeatic Wilderness Area and east of the Cloud Lake Wilderness Area.

Habitat for wildlife would benefit from having roughly equal areas in the various stand size classes: small (<10 ha), medium (10 to 100 ha), and large (>100 ha). Currently there is more area in the mid-size class. Increases in the amount of small and large stand sizes would be beneficial. Activities in areas which now feature large stand sizes should ensure that this characteristic is maintained or enhanced.

Representivity is not an issue in the matrix as ample area is included in legal reserves (see Appendix 5), mostly in wilderness areas.

The two dominant vegetation communities in the ecodistrict, tolerant softwoods and black spruce-white pine, have large areas identified under the Interim Old Forest Policy – 24% and 27% respectively of the total Crown land with these community types in the ecodistrict (Stewart and Neily, 2008). The goal of the policy was to set aside as old growth and old forest a minimum of 8% of Crown land in each ecodistrict. Unclassified (current forest community not known) land accounts for 9% of the element's 275,692 hectares.

The ICHO ecosection, forming part of this element, contains numerous wetlands. Activities near wetlands should maintain the integrity of the wetland and adjacent riparian zone. The Ecological Emphasis Index (EEI), a measure of the "naturalness" of conditions in the matrix, has a value of 73 to 78, which is one of the higher element values in the ecodistrict. This indicates a fairly natural landscape. Only 2,289 hectares are intensively managed and only 1,091 hectares have been converted.

Flows

People (hunting, fishing, ATV, cottages and camps, forest industry); deer (habitat); moose (cover, browse from clearcuts); trout (habitat, important feeder streams); loons (nesting, habitat); furbearers (habitat, overland travel); goshawk (habitat); water (catchment area, numerous lakes).

Composition

South Mountain Ecodistrict 720 (based on statistics up to 2007)

Composition of Red and Black Spruce Hummocks

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	16%	10%	74% (51 Mat + 23 OF)	23%
Seral Stage	Early	Mid	Late	Unclassified
	9%	39%	43%	9%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	53%	14%	31%	2%

Desired Condition

Hummocks supporting a climax forest of tolerant softwoods. Largely mature with mid and late seral species dominant. Some representation of younger development classes. Flatter areas supporting a climax forest of black spruce with the occasional white pine and some pure stands of pine. Mature stands with early, mid and late seral species representation. Development class areas typical of frequent natural disturbance regime.

Issues

- only 53.3% of the element is softwood (large amounts of intolerant species)
- 48% of the element is early and mid succession
- 9% of the matrix remains unclassified
- amount of area in small and large stand classes
- fragmentation
- protection of wetlands

The matrix plays an important role in the connectivity of the ecodistrict. Fragmentation of the matrix may become an issue when excessive forest harvesting takes place. While the overall age of the matrix is mature or multi-age (74%), there are sections of the matrix where a large amount of harvesting has occurred (north of Fourth Lake in Digby County, west and north of Dargie Lake, south of Paradise Lake, east and south of Scrag Lake, Aylesford / Gaspereau Lake area, and western Hants County). The seral stage composition (approximately 48% early or mid seral) of the matrix may also negatively effect connectivity as some organisms may be more adapted to moving through a climax matrix.

Spruce Hemlock Pine Hummocks and Hills

(Patch) (WCKK, WCDS, IMHO, WFHO, WMHO ecosections) (77,303 ha)

This patch element is the largest of all the patches. Distributed across the ecodistrict, it contains 77, 303 hectares. This element is concentrated at the ecodistrict's eastern end. The patch is characterized by a hilly terrain on well-drained course-textured soils. Where the sites are dry, as on some hilltops, a climax forest of red oak, white pine, and red pine could be expected. Wetter locations, as on side slopes, feature a tolerant softwood climax. Conditions show largely mature or multi-aged forest.

Generally, the ecodistrict is dominated by mid-seral species. The softwood, mixedwood, and hardwood covertypes make up 28%, 36%, and 35% of the patch. Softwoods are mostly late seral species such as red spruce with lesser amounts of pine fir. Mixedwoods are largely dominated by mid seral species associations such as spruce or pine with the intolerant hardwoods (red maple, birch, aspen) or oak. The hardwoods are mostly a mid seral species combination such as red maple, aspen, white birch, and red oak. It appears that significant harvesting has occurred within this patch in the past 20 or so years. As such, fragmentation and lack of interior habitat maybe an issue.

Within this element, a tolerant hardwood stand at Lamb Lake is a significant ecological site. Rare plants, squaw root, and downy rattlesnake plantain are both present in this element. This patch has fairly good representation under reserve on Crown land. The EEI is 70 to 75. Approximately 9.2% of the land is not yet classified.

Flows

People (recreation, hunting); deer (habitat, acorns, important food source); moose (habitat); trout (habitat); furbearers (habitat, riparian zone important); water (feeder streams).

Composition

South Mountain Ecodistrict 720 (based on statistics up to 2007)
Composition of Spruce Hemlock Pine Hummocks and Hills

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	16%	7%	77% (58 Mat + 19 OF)	19%
Seral Stage	Early	Mid	Late	Unclassified
	15%	50%	26%	9%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	28%	35%	36%	2%

Desired Condition

An element dominated by mature mid and late seral species featuring a climax of tolerant softwoods on moister sites and pine-oak on the dry sites. Representation of establishment and young forest development classes to a smaller extent.

Issues

- low amount of late seral species
- high amount of intolerant hardwoods
- opportunities to increase late seral species in mixedwood
- fragmentation
- unclassified areas

Spruce Pine Flats

(Patch) (ICSM, IMSM ecosections) (22,495 ha)

This patch type is found on imperfectly drained soil on flat terrain often close to watercourses. Wetlands ecosections make up a significant portion of the element (approximately 30%). Wetlands in the form of red maple fens along the watercourses are noticeable. The climax landscape is dominated by black spruce, often slower growing as a result of drainage. The present softwood component (70.5% of the area) is largely the late seral black spruce – mostly mature or multi-aged. The mixedwood component is often mid seral and made up of red maple, some white birch, and trembling aspen with black spruce, red spruce, balsam fir, or pine.

The hardwood covertype, present on only 6.9% of the area, is intolerant hardwood, usually red maple. The largest areas of this element can be located at Fourth and Fifth flowage, along Bear River, west of Round Lake, and along the North River.

Some harvesting has occurred in the last 20 years, but this has not been extensive.
Of the ecosections comprising this patch, IMSM is unique in the ecodistrict (0.1%) but not in the ecoregion (5.4%). ICSM is rare in the ecoregion (2.0%) but not the ecodistrict (5.2%). Neither of these ecosections are ecologically represented in either legal or policy reserves. Approximately 5.2% of IMSM has been converted. Ample area of the black spruce community (5,518 ha) have been identified under the Old Forest Policy for South Mountain.

The Ecological Emphasis index is 78 to 82, the highest of any of the elements.

Flows

People (recreation – fishing and hunting; trapping, forest harvesting); moose (habitat, softwood cover, wetland use); trout (habitat); furbearers (habitat, food, travel); water (wetlands within catchment areas, storage and filtration, numerous waterways).

Composition

South Mountain Ecodistrict 720 (based on statistics up to 2007)

Composition of Spruce Pine Flats

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	12%	15%	73% (42 Mat + 31 OF)	31%

Seral Stage	Early	Mid	Late	Unclassified
	7%	29%	56%	8%

Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	71%	7%	20%	2%

Desired Condition

A black spruce-dominated landscape with all developmental classes well represented. Connectivity maintained between many wetlands in this patch.

Issues

- representivity of IMSM

Tolerant Mixedwood Drumlins

(Patch) (WCDM, WFDM, WMDM ecosections) (13,465 ha)

This patch type can be found on scattered, small, well-drained drumlins which occur as drumlin fields, mostly in Annapolis County near Fisher Lake, Alma Lake, Porcupine Lake, and Dargie Lake. A more isolated drumlin field is east of Murphy Lake in Kings County. Tolerant mixedwoods are the climax forest.

This element has near equal representation of mixedwood and hardwood covertype (34.8% and 34.3% respectively). Both covertypes being primarily in the mid and late seral stages. The hardwood component of mixedwood stands is mostly intolerant species such as red maple or white birch in combination with tolerant softwoods such as red spruce or white pine. Tolerant hardwoods occur in these mixedwood stands but to a much lesser extent than the intolerant.

The hardwood covertype appears to have a fairly good representation of the later seral species such as sugar maple, yellow birch, and beech, though intolerant hardwoods, as a result of harvesting practices, are still more abundant.

The softwood covertype (29.1% of the area) is dominated by red spruce with much lesser amounts of pine, fir, and hemlock.

Largely mature or multi-aged (70.9%), this patch element also has considerable area in the establishment and young forest age classes (29%). The ecosections making up this element - WCDM, WMDM, and WFDM all make up less than 2% of the ecodistrict. WCDM also is less than 2% of the ecoregion and WFDM is only marginally above at 2.2%.

WMDM and WFDM have no representation in the reserve category and WCDM has 4.5% of its area in the reserve class. WFDM has the lowest EEI in the ecodistrict. Approximately 18% has been converted. About 8% of the ecodistrict is unclassified.

Flows

People (hunting, fishing, ATV, cottages, forestry); deer (browse); furbearers (overland travel); water (protection of riparian corridor integrity); goshawk (nesting).

Composition

South Mountain Ecodistrict 720 (based on statistics up to 2007)

Composition of Tolerant Mixedwood Drumlins

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	22%	7%	71% (57 Mat + 14 OF)	14%
Seral Stage	Early	Mid	Late	Unclassified
	14%	40%	38%	8%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	29%	34%	35%	2%

Desired Condition

Continuous, generally mature, uneven-aged, mixedwood forest composed primarily of late seral red spruce, eastern hemlock, white pine, sugar maple, yellow birch, and beech.

Issues

- very little area in the reserve class
- inadequate amount of mature late seral species
- large area in younger age-classes
- relatively high conversion rate of WFDM
- amount of unclassified area

Wetlands

(Patch) (WTLD ecosection) (13,289 ha)

The wetland patch is characterized by various wetland types, most often bogs, fens or lakeshore wetlands, and surrounding vegetation which is predominately a climax forest of slow growing black spruce on poorly drained soils. The wetland element is often associated with the ecodistrict's many waterways and many of the wetland patches are interconnected by these waterways.

The wetland patch is interspersed throughout the ecodistrict, often embedded in the matrix. Some of the larger wetland patches are located at Moosehead Lake, Lohnes Lake, west branch of the Medway, southwest of Big LaHave Lake, along the West, Salmontail, and southwest branch of the Avon River. There is little of this element type in the extreme eastern side of the ecodistrict.

It appears that not much harvesting has occurred in the wetland patches, although harvesting appears to be quite common immediately adjacent to the wetlands. The present-day forest around these wetlands is still largely the late seral black spruce. Some mixedwoods, spruce with intolerant hardwoods or intolerant hardwood communities are present. These are likely the result of past harvesting or fire.

Wetlands and the areas immediately adjacent to wetlands play an important role in habitat, water collection, filtering, and potentially for moose habitat. Species at risk such as Blanding's turtle, ribbon snakes, and rare coastal plain plants are present. Nearly 17% of the wetland area is in the legal reserve category so representation is not an issue. Little intensive management or conversion has occurred. The EEI is high (78 to 79), the result of only intensive management and little conversion.

Flows

People (fishing, trapping); deer (cover, food); moose (food, thermal refuge in summer); furbearers (habitat, travel); water (storage, filter, catchment).

Composition

South Mountain Ecodistrict 720 (based on statistics up to 2007)

Composition of Wetlands

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	7%	22%	71% (45 Mat + 26 OF)	26
Seral Stage	Early	Mid	Late	Unclassified
	8%	32%	57%	3%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	70%	9%	20%	1%

Desired Condition

A series of wetlands and wetland complexes. Wetland complexes interconnected by existing waterways. Areas adjacent to wetlands featuring low impact forestry.

Issues

- management of riparian zones and forest adjacent to wetlands – maintaining integrity of wetlands
- maintaining connectivity along riparian zones

Tolerant Mixedwood Hummocks

(Patch) (IMDM, WCRD, WCSM ecosections) (3,108 ha)

This patch element is dominated by a climax of tolerant softwoods and tolerant hardwoods. The better-drained areas where soil texture is coarse (sandy) would appear to support tolerant softwoods. A moderate soil texture (silty) which is well-drained can expect a tolerant hardwood climax. Black spruce would appear on the poorest drained sections of the element.

The present day forest is largely mature or multi-aged (71.5%) and predominately mid seral species (49.6%).

The softwood covertype (36.8%) is mostly mature red spruce with some fir, pine, and hemlock. The mixedwood covertype (32.7%) is largely mid seral and comprised of intolerant hardwoods with spruce and pine.

The majority of the hardwood covertype is intolerant although some tolerant hardwood is present.

This element, comprising patches scattered through the eastern two-thirds of the ecodistrict, has in some cases experienced significant harvesting. Fragmentation in some of the element (particularly WCSM) may be a concern.

Connectivity between some of the patches would appear to have been impacted by harvesting in intervening elements (i.e. area around Gaspereau Lake).

Each ecosection (WCSM, IMDM, WCRD) is unique (less than 1% of area) in the ecodistrict. WCSM and IMDM are not represented in the reserve class.

The element has an EEI of 70 to 77.

Flows

People (recreation, forestry); deer (cover, food); trout (stream habitat); loons (habitat); furbearers (habitat); goshawk (habitat).

Composition

South Mountain Ecodistrict 720 (based on statistics up to 2007)

Composition of Tolerant Mixedwood Hummocks

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	17%	11%	72 % (57 Mat + 15 OF)	15%
Seral Stage	Early	Mid	Late	Unclassified
	11%	50%	26%	13%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	37%	28%	33%	2%

Desired Condition

Patches composed primarily of either tolerant softwoods or tolerant hardwoods. The tolerant softwoods are located on well-drained sandy soils dominated by mature mid and late seral species with good representation of other developmental classes. The tolerant hardwoods are found on silty soils, generally forming a continuous cover of mature trees indicative of gap disturbance regime. The flatter, poorly drained areas support black spruce in various developmental stages.

Issues

- fragmentation
- connectivity
- unique ecosection
- representivity

Tolerant Hardwood Hills

(Patch) (WMKK ecosection) (2,189 ha)

These scattered hills inherently supported a tolerant hardwood climax community. Some of the larger areas are located close to Gaspereau Lake, Aylesford Lake, near Stoddarts, and at Saunders Meadow.

Past harvesting practices have resulted in a forest dominated by mature mid seral mixedwoods (red Maple, red spruce), and mid seral hardwoods – usually red maple. The tolerant hardwood component is very low.

Ecosection WMKK is rare at both the ecodistrict and ecoregion levels, 0.5% and 1.0% respectively. This ecosection would not seem to have adequate representation as only 8 hectares (0.3%) of the ecosection is under reserve. Approximately 14.5% of the area is unclassified.

The ecodistrict, according to the Ecological Land Classification, has 3,017 hectares which support a climax of tolerant hardwood under the Interim Old Forest Policy. Only 28 hectares (less than 1%) have been set aside. The Tolerant Hardwood Hills has the lowest EEI in the ecodistrict at 60 to 68.

Flows

People (recreational, potential valuable forest products); deer (summer cover, seasonal food); furbearers (travel); goshawk (nesting).

Composition

South Mountain Ecodistrict 720 (based on statistics up to 2007)

Composition of Tolerant Hardwood Hills

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	20%	4%	76% (63 Mat + 13 OF)	13%
Seral Stage	Early	Mid	Late	Unclassified
	24%	34%	28%	14%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	18%	36%	46%	<1%

Desired Condition

Uneven-aged hardwood forest of tolerant late seral species (sugar maple, yellow birch, beech).

Issues

- low hectares of tolerant hardwoods selected in Old Forest Policy
- only 0.3% of the element is in the reserve class
- small amount of late seral tolerant hardwoods
- unclassified land

Spruce Pine Hummocks

(Patch) (ICKK, ICRD ecosections) (1,276 ha)

The black spruce-white pine species association is the climax community on these imperfectly drained, sandy soils. Presently a softwood covertype (74.6%) of mostly late seral mature or multi-aged black spruce and white pine exists.

Mixedwood and hardwood covertypes make up 20.2% and 5.2% of the element respectively. Intolerant hardwoods are common in the mixedwood stands with pine and spruce. DNR Forest Inventory indicates both intolerant and tolerant hardwoods make up the element's minor hardwood component. Only 12% of the forest is in the establishment or young forest stage.

Ecosections ICRD and ICKK both make up less than 0.5% of the ecodistrict and ecoregion. There is no representation in the reserve class for either ecosection.

Two different areas make up this element, located at Fisher Lake, Annapolis County, and Bear Lake, Kings County. Fernow reports that these were burned-over areas.

The EEI is 77.

Flows

Deer (habitat); moose (habitat); trout (stream habitat); furbearers (overland travel).

Composition

South Mountain Ecodistrict 720 (based on statistics up to 2007)

Composition of Spruce Pine Hummocks

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	2%	10%	88% (59 Mat + 29 OF)	29%

Seral Stage	Early	Mid	Late	Unclassified
	2%	25%	71%	2%

Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	75%	5%	20%	0%

Desired Condition

A mix of seral stages and development classes typical of a frequent natural disturbance regime (NDR). Black spruce with scattered white pine or occasional pine-dominated stands as common features.

Issues

- no representation in the reserve class
- low amount of establishment and young forest
- low level of early seral communities
- high amount of multi-aged and old growth

Valley Corridors

(Corridor) (ICHO, WTLD, WCHO, ICSM, WCKK, ICRD, WMHO, WCDM, WMDM ecosections) (28,504 ha)

The South Mountain Ecodistrict has 34,312 hectares (7.5% of the ecodistrict) of inland waters. Riparian corridors within the Valley Corridors element have been delineated along portions of some of the major hydrological systems in the ecodistrict. These include the Sissiboo, Bear, Medway, Mersey, Annapolis, Nictaux, LaHave, Gaspereau, Gold, and Avon rivers.

The riparian corridors around the waterways are extremely important for biodiversity and ecosystem function. Many species utilize both aquatic and terrestrial habitats. These corridors pass through forested communities which currently are made up of predominately mature or multi-aged late seral softwood forest. Red and black spruce are most common with lesser amounts of pine and hemlock. Mature and multi-aged mid seral mixedwoods dominated by spruces and intolerant hardwoods are less common but cover a significant area.

During early settlement times it is likely that riparian corridors were harvested, and as in many Nova Scotia communities, floated down the rivers to mills. Some drainage to waterways in the riparian zone has likely taken place.

The many dams along the ecodistrict waterways have likely resulted in some changes to riparian zone structure and function. Sections of some of the zone have been converted noticeably in: parts of the Avon near Falls Lake, Murphy Lake, Mockingigh Lake; some of the Gaspereau system south of Gaspereau Lake and along the west side of Aylesford Lake; on the Nictaux north of McGill Lake to Trout Lake and the Sissiboo around Fourth and Fifth lake flowages.

Along portions of the many riparian zones, considerable harvesting has taken place immediately adjacent to the corridors. Care should be taken to incorporate appropriate practices in these adjacent areas to protect the integrity of the riparian corridor.

Flows

People (recreational – fishing, canoeing, camps, hunting, ATV, trapping); deer (travel, corridors, wintering areas along Avon River); moose (travel, food); trout (habitat, travel corridors to spawning areas in small streams); loons (habitat in lakes); furbearers (travelway, food source); water (collection area, connected to wetlands).

Composition

South Mountain Ecodistrict 720 (based on statistics up to 2007)

Composition of Valley Corridors

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	4%	8%	88% (62 Mat + 26 OF)	26%
Seral Stage	Early	Mid	Late	Unclassified
	8%	40%	51%	1%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	51%	14%	35%	<1%

Desired Condition

A continuous forested strip in a more or less natural state. Low impact forestry is practiced.

Issues

- ensure appropriate practices occur in stands adjacent to riparian corridors to maintain health and vigor of the corridor

Ecosystem Issues and Opportunities (All appendices and maps)

Management of the forest resource in the South Mountain 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:

- managing climax forest communities in relation to the NDR
- development class and seral stage increase of the amount of late seral species through silviculture/harvesting practices
- looking for opportunities to increase the amount of patch size for interior dwelling wildlife species
- recognizing the importance of riparian zones on all watercourses and manage to maintain their integrity
- developing road construction and maintenance plans that take into account ecological concerns
- looking for opportunities to improve connectivity by attempting to restore natural communities where connectivity gaps exist
- improving representivity by considering ecosections ICRD, IMDM, IMSM, WCSM, WFDM, WFHO, and WMDM as candidates
- ensuring that appropriate management practices are utilized in relation to rare, uncommon, and threatened species sites and habitat

Opportunities exist to implement practices to address conservation issues such as:

- conservation of species that are threatened as indicated by DNR's General Status Rank of Wild Species in Nova Scotia (yellow and red listed) or those listed as S1, S2 or S3 in the Atlantic Canada Conservation Data Centre rankings
- conservation of significant habitats
- identification and mapping of sites of cultural significance
- identify more tolerant hardwood candidate areas for old forest
- restore appropriate climax species in areas where resource use has significantly altered species composition – in particular areas where intolerant hardwood component has dramatically increased

Appendix 1: Flow - Element Interactions

Element	Deer	Moose	Trout	Loons	Furbearers	Water	People	Goshawk
Red and Black Spruce Hummocks	- Habitat, clearcuts important as a food source, travel and cover	- Habitat, softwood cover, browse in clearcuts, movement	- Habitat, feeder streams important	- Lakes nesting, habitat	- Habitat, riparian zone, food - Overland travel	- Catchment area, numerous lakes and streams - Water quality	- Hunting, fishing, ATV, cottage and camps, transportation - Forest, industry important and extensive	- Habitat
Spruce Hemlock Pine Hummocks and Hills	- Habitat, acorns important food source - Cover browse in cutovers	- Habitat - Cover browse in cutovers	- Habitat, feeder streams important - Stream habitat	_____	- Habitat, riparian zone, food - Stream habitat riparian zone - Overland travel	- Numerous feeder streams, riparian zones - Water quality - Recharge area	- Recreation, hunting - Hunting, fishing, ATV, cottage use, - Important to forest industry	- Habitat, nesting and feeding
Spruce Pine Flats	_____	- Habitat - Softwood cover - Wetland use	- Habitat	_____	- Habitat riparian zone, food, travel	- Wetlands within catchment areas, storage, filtrations - Numerous waterways, riparian zones	- Recreation (fishing and hunting) - Trapping - Potential harvesting of black spruce	_____

Appendix 1: Flow - Element Interactions

Element	Deer	Moose	Trout	Loons	Furbearers	Water	People	Goshawk
Tolerant Mixedwood Drumlins	- Fertile sites important as food source, browse in cutovers				- Overland travel	- Often abut waterways important in riparian corridor integrity	- Hunting, fishing, ATV, cottage use - Importance to forest industry	- Nesting
Wetlands	- Cover, food	- Food, travel - thermal refuge in summer			- Travel	- Storage, filter catchment	- Fishing, trapping	
Tolerant Mixedwood Hummocks	- Cover, food		- Stream habitat riparian zone	- Habitat	- Habitat	- Recharge areas - Abut riparian zones	- Recreation - Forestry	- Habitat
Tolerant Hardwood Hills	- Summer cover - Seasonal food				- Travel	- Recharge	- Recreational - Potential high value products	- Nesting
Spruce Pine Hummocks	- Habitat	- Habitat	- Stream habitat		- Overland travel			

Appendix 1: Flow - Element Interactions

Element	Deer	Moose	Trout	Loons	Furbearers	Water	People	Goshawk
Valley Corridors (along ecodistrict major water systems: Medway, Mersey, Sissiboo, LaHave, Nictaux, Gaspereau, Avon, St. Croix, Gold, Bear Rivers)	- Travel corridors and feeding (oak along many of the river systems) - Wintering areas along Avon River	- Travel corridor and feeding	- Habitat travel corridors to spawning areas in small streams - Dams, fish ladders on some systems	- Habitat in lakes along waterways (nesting, feeding)	- Travel way, food source	- Collection area for run-off - Often associated with wetlands which store, filter, and recharge - Dams on many water systems	- Recreational (fishing, canoeing, camps, past forest harvesting, hunting, ATV) - Trapping - Past log drives	

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
Red and Black Spruce Hummocks	Matrix	High	ICHO, WCHO	Landscape	Frequent/ Infrequent (wind, fire)	Climax - bS wP - rS eH wP Current Forest Predominately - rS/bS - Pine - mixedwoods - intolerant hardwood	All elements	- Fragmentation - Species Composition - Patch size - Connectivity	- Harvesting practices - Amount of intolerant hardwoods - Small and large patch size areas - maintenance of overland connectivity between landscape elements	- Manage under appropriate natural disturbance guidelines - Promote climax species in silviculture practices - Promote equal area of small, mid and large patch sizes - consider connectivity in harvesting / silviculture planning
Spruce Hemlock Pine Hummocks and Hills	Patch	High	WCKK IMHO, WMHO, WFHO (larger patches at Burnt Dam Flowage, Leminster)	Local	Infrequent	Climax - rS eH wP - rO wP rP Current Forest - Intolerant hardwood, mixedwoods - Intolerant hardwood - rS Climax - rS eH wP Current Forest - rS - Intolerant mixedwoods - Intolerant hardwood	- Matrix, softwood hummocks	- Fragmentation of individual patches - Internal composition - Connectivity - Species composition	- Harvesting practices - Amount of intolerant species - State of intervening matrix - Increase in intolerant species component - Under represented ecosections	- Patch aggregate - Promote climax species in silviculture / harvesting - Manage intervening habitat to sustain connectivity - Adapt management/silviculture practices to promote climax species - Look for opportunities to improve representivity

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	High	Many of major river systems (Tusket, Sissiboo, Bear, Medway, Mersey, Annapolis, Nictaux, LaHave, Gaspereau, Gold, Avon Rivers)	Landscape	- varied most appearing to be frequent	<u>Climax</u> - bS wP - rS eH wP <u>Current</u> - rS/bS - Intolerant mixedwoods - Pine - Intolerant hardwoods	Most elements	- Dams - Internal composition - Integrity of riparian corridor	- Alteration of water flow and riparian vegetation - Amount of intolerant species - Harvesting within and adjacent to riparian corridor	- Practice "low impact" forestry to promote climax species - Maintain integrity by addressing issues such as windthrow in and adjacent to riparian corridors - Treat corridor as habitat not just water protection
Spruce Pine Flats	Patch	High	ICSM IMSM	Landscape (patches scattered across landscape) often associated with waterways	Frequent	<u>Climax</u> - bS - Wetlands - rM fens <u>Current forest</u> - bS - Intolerant mixedwoods - wP - Intolerant hardwood	Matrix, Wetland	- In selected areas possible loss of integrity of riparian corridors along element waterways - Connectivity - Internal species composition	- Harvesting within element and adjacent land - Harvesting in intervening matrix - Intolerant hardwoods	- Appropriate harvesting practices to minimize damage to riparian corridors - Harvest according to natural disturbance regime guidelines, enhance connectivity - Manage better quality sites for climax species

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
Tolerant Mixedwood Drumlins	Patch	Moderate	WCDM WMDM WFDM - Concentrated in central portion of ecodistrict	Landscape - Large patch in east separated from cluster in central portion of ecodistrict	Gap	Climax - rS eH wP sM yB Be Current Forest - rS - Intolerant mixedwood - Intolerant hardwood	Matrix	- Species composition - Patch size - Harvesting practices	- Amount of intolerant hardwoods - Decrease in patch sizes as result of harvesting - Ownership education	- Promote climax species in silviculture / harvest - Make efforts to increase through patch aggregation - Use of appropriate harvesting practices - Planting rS
Wetlands	Patch	High	WTLD	Scattered over landscape	Open Seral	Wetlands and bogs, scattered small patches of bS, tL, rM	- Matrix	- Maintenance of wetland integrity - Connectivity (harvesting, hydroelectric)	- Harvesting adjacent to wetlands - Flow of species overland between wetlands and through waterways	- Follow appropriate harvesting practices adjacent to wetlands - Manage landscape for connectivity
Spruce Pine Hummocks	Patch	Low (area) High (unique)	ICKK, ICRD	local	Frequent	Climax - bS wP Current Forest - bS - wP - Intolerant mixedwoods	- Matrix - Softwood/ hardwood hummocks	- Connectivity	- Isolation of patches	- Manage matrix permeability (harvest according to natural disturbance regime)

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
Tolerant Mixedwood Hummocks	Patch	Low (area) High (unique)	WCSM IMDM WCRD	Local	Infrequent	Climax - rS eH wP - sM yB Be - bS Current Forest - rS/bS - Intolerant hardwood, mixedwood - Intolerant hardwood	- Matrix - bS/wP hills - Riparian corridors - Pine-Oak Hills and Hummocks	- Connectivity - Internal composition - Fragmentation of patch	- Isolation of patches - Amount of intolerant species - Harvesting practices	- Manage matrix permeability (harvest according to natural disturbance regime) - Promote climax species in siliviculture and harvesting - Encourage patch aggregation
Tolerant Hardwood Hills	Patch	- High (uniqueness) - Low (area)	WMKK (south of Gaspereau Lake)	Local	Gap	Climax - sM yB Be Current Forest - Intolerant hardwood - Tolerant hardwood - rS - wS (old fields)	Elements - Matrix, Spruce-Hemlock-Pine Hummocks and Hills, tolerant softwood, pine oak hills	- Connectivity - Species composition - Harvesting methods	- Connectivity between patches (harvesting in intervening elements) - amount of intolerant hardwoods - Ownership education	- Manage intervening elements (mostly matrix) to maintain enhanced connectivity - Promote tolerant hardwood in forestry practices - Promote education

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 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 720)

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	Threatened
Canada Warbler	*Wilsonia canadensis*	Endangered		Threatened
DICOTS Black Ash	-			
Plymouth Gentian	*Fraxinus nigra*	Threatened	N/A	N/A
Sage Willow	*Sabatia kennedyana*	Endangered	Threatened	Endangered
	Salix candida	Endangered	N/A	N/A
FISH	-			
American Eel	*Anguilla rostrata*	N/A	N/A	Threatened
Atlantic Salmon - Inner Bay of Fundy population	*Salmo salar pop. 1*	N/A	Endangered	Endangered
GYMNOSPERMS				
Eastern White Cedar	*Thuja occidentalis*	Vulnerable	N/A	N/A
INSECTS	-			
Monarch	*Danaus plexippus*	N/A	Special Concern	Special Concern
MAMMALS	-			
Moose	*Alces americanus*	Endangered	N/A	N/A
Southern Flying Squirrel	*Glaucomys volans*	N/A	Special Concern	N/A
REPTILES Snapping	-			
Turtle	*Chelydra serpentina*	Vulnerable	Special Concern	Special Concern
Blanding's Turtle - Nova Scotia population	*Emydoidea blandingii*	Endangered	Endangered	Endangered
Eastern Ribbonsnake - Atlantic population	*Thamnophis sauritus pop. 3*	Threatened	Threatened	Threatened

Appendix 3: Special Occurrences (Ecodistrict 720)

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

Species		Provincial General Status Rank	ACCDC S-Rank*
Common Name	**Scientific Name**		
AMPHIBIANS	-		
Four-toed Salamander	*Hemidactylium scutatum*	Secure (Green)	S3
BIRDS			
Pine Siskin	*Carduelis pinus*	Sensitive (Yellow)	S3S4B,S5N
Bay-breasted Warbler	*Dendroica castanea*	Sensitive (Yellow)	S3S4B
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Sensitive (Yellow)	S3S4B
Common Loon	*Gavia immer*	May Be At Risk (Orange)	S3B,S4N
Great Crested Flycatcher	*Myiarchus crinitus*	May Be At Risk (Orange)	S2B
Gray Jay	*Perisoreus canadensis*	Sensitive (Yellow)	S3S4
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Sensitive (Yellow)	S3S4B
Boreal Chickadee	*Poecile hudsonica*	Sensitive (Yellow)	S3
Common Tern	*Sterna hirundo*	Sensitive (Yellow)	S3B
BRYOPHYTES			
Anomalous Bristle Moss	*Orthotrichum anomalum*	Sensitive (Yellow)	S2S3
Toothed-leaved Nitrogen Moss	*Tetraplodon angustatus*	Sensitive (Yellow)	S2S3
a Moss	*Thelia hirtella*	Sensitive (Yellow)	S2?
DICOTS			
Hooked Agrimony	*Agrimonia gryposepala*	Secure (Green)	S3
Running Serviceberry	*Amelanchier stolonifera*	Green (Secure)	S3?
Swamp Milkweed	*Asclepias incarnata*	Secure (Green)	S3
Swamp Milkweed	*Asclepias incarnata ssp. pulchra*	Undetermined	S2S3
Yellow Bartonia	*Bartonia virginica Bidens*	Secure (Green)	S3
Swamp Beggarticks	*discoidea Cephalanthus*	Purple (Extirpated)	SH
Common Buttonbush	*occidentalis Conopholis*	Sensitive (Yellow)	S3
American Cancer-root	*americana Decodon*	May Be At Risk (Orange)	S1S2
Swamp Loosestrife	*verticillatus Desmodium*	Sensitive (Yellow)	S3
Large Tick-Trefoil	*glutinosum Galium*	May Be At Risk (Orange)	S1
Northern Bedstraw	*boreale*	May Be At Risk (Orange)	S2
Kalm's Hawkweed	*Hieracium kalmii*	Undetermined	S2?
Kalm's Hawkweed	*Hieracium kalmii var. kalmii*	Undetermined	S2?
Pinebarren Golden Heather	*Hudsonia ericoides*	Sensitive (Yellow)	S2
Disguised St John's-wort	*Hypericum dissimulatum*	Sensitive (Yellow)	S2S3
Yellow-seeded False Pimperel	*Lindernia dubia*	Secure (Green)	S3S4
Farwell's Water Milfoil	*Myriophyllum farwellii*	Sensitive (Yellow) May	S2
Smooth Sweet Cicely	*Osmorhiza longistylis*	Be At Risk (Orange)	S2
Rugel's Plantain	*Plantago rugelii*	Undetermined	S2

Appendix 3: Special Occurrences (Ecodistrict 720)

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

Species		Provincial General Status Rank	ACCDC S-Rank*
Common Name	**Scientific name**		
Racemed Milkwort	*Polygala polygama*	Undetermined	S1
Pennsylvania Smartweed	*Polygonum pensylvanicum*	Secure (Green)	S3
Stout Smartweed	*Polygonum robustius*	Secure (Green)	S3S4
Intermediate Mermaidweed	*Proserpinaca intermedia*	Orange (May Be At Risk)	S1
Marsh Mermaidweed	*Proserpinaca palustris*	Green (Secure) Yellow	S3
Comb-leaved Mermaidweed	*Proserpinaca pectinata*	(Sensitive)	S3
Eastern Cudweed	*Pseudognaphalium obtusifolium*	Green (Secure)	S3S4
Virginia Meadow Beauty	*Rhexia virginica*	Secure (Green)	S3
Swamp Rose	*Rosa palustris*	Secure (Green)	S3
Elliott's Goldenrod	*Solidago latissimifolia*	Green (Secure)	S3
Little Floating Bladderwort	*Utricularia radiata*	Secure (Green)	S3
Inverted Bladderwort	*Utricularia resupinata*	May Be At Risk (Orange)	S1S2
Zigzag Bladderwort	*Utricularia subulata*	Secure (Green) Sensitive	S3
Dwarf Bilberry	*Vaccinium caespitosum*	(Yellow) Secure (Green)	S2
Highbush Blueberry	*Vaccinium corymbosum*	Secure (Green)	S3
Arrow-Leaved Violet	*Viola sagittata var. ovata*		S3S4
FERNS AND THEIR ALLIES			
Northern Maidenhair Fern	*Adiantum pedatum*	May Be At Risk (Orange)	S1
Variegated Horsetail	*Equisetum variegatum*	Secure (Green) Secure	S3
Southern Bog Clubmoss	*Lycopodiella appressa*	(Green) Secure (Green)	S3S4
Northern Clubmoss	*Lycopodium complanatum*	Sensitive (Yellow)	S3S4
Northern Adder's-tongue	*Ophioglossum pusillum*	Undetermined Secure	S2S3
Appalachian Polypody	*Polypodium appalachianum*	(Green) Sensitive	S3?
Little Curlygrass Fern	*Schizaea pusilla*	(Yellow)	S3
Netted Chain Fern	*Woodwardia areolata*		S2S3
FISH			
Atlantic Salmon	*Salmo salar*	May Be At Risk (Orange)	S2
INSECTS			
Mottled Darner	*Aeshna clepsydra*	Secure (Green)	S3
Hoary Elfin	*Callophrys polios*	Secure (Green)	S3S4
Silvery Checkerspot	*Chlosyne nycteis*	Undetermined	S2
Orange Bluet	*Enallagma signatum*	May Be At Risk (Orange)	S1
Vesper Bluet	*Enallagma vesperum*	Sensitive (Yellow)	S2S3
Prince Baskettail	*Epitheca princeps*	Sensitive (Yellow) Secure	S2
Harvester	*Feniseca tarquinius*	(Green)	S3S4
Harlequin Darner	*Gomphaeschna furcillata*	Sensitive (Yellow)	S3

Appendix 3: Special Occurrences (Ecodistrict 720)

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

Species		Provincial General Status Rank	ACCDC S-Rank*
Common Name	**Scientific Name**		
Northern Pearly-Eye	*Lethe anthedon*	Secure (Green)	S3
Elfin Skimmer	*Nannothemis bella*	Secure (Green)	S3
Mustard White	*Pieris oleracea*	Yellow (Sensitive)	S2
Green Comma	*Polygonia faunus*	Secure (Green)	S3
Question Mark	*Polygonia interrogationis*	Green (Secure)	S3B
Grey Comma Satyr	*Polygonia progne*	Secure (Green)	S3S4
Comma Banded	*Polygonia satyrus*	Sensitive (Yellow)	S1
Hairstreak	*Satyrium calanus*	Undetermined	S2
Forcipate Emerald	*Somatochlora forcipata*	May Be At Risk (Orange)	S2
Delicate Emerald	*Somatochlora franklini*	Sensitive (Yellow) Secure	S1
Clamp-Tipped Emerald	*Somatochlora tenebrosa*	(Green) Secure (Green)	S3
Aphrodite Fritillary	*Speyeria aphrodite*	Secure (Green)	S3S4
Grey Hairstreak	*Strymon melinus*		S2
LICHENS			
Black-foam Lichen	*Anzia colpodes*	Sensitive (Yellow) May	S3?
Rimmed Shingles Lichen	*Fuscopannaria leucosticta*	Be At Risk (Orange)	S1S2
Blistered Jellyskin Lichen	*Leptogium corticola*	Sensitive (Yellow)	S2S3
MAMMALS			
Southern Flying Squirrel	*Glaucomys volans*	Yellow (Sensitive)	S2S3
Fisher	*Pekania pennanti*	Yellow (Sensitive)	S2
Cougar - Eastern pop.	*Puma concolor pop. 1*	Undetermined	SH
MONOCOTS			
Silvery-flowered Sedge	*Carex argyrantha*	Secure (Green)	S3S4
Howe's Sedge	*Carex atlantica ssp. capillacea*	Undetermined	S2
Hidden-scaled Sedge	*Carex cryptolepis*	Secure (Green)	S3?
Hop Sedge	*Carex lupulina*	Secure (Green)	S3
Necklace Spike Sedge	*Carex ormostachya*	May Be At Risk (Orange)	S1
Early Coralroot	*Corallorhiza trifida*	Secure (Green) Secure	S3
Toothed Flatsedge	*Cyperus dentatus*	(Green) Secure (Green)	S3S4
Deer-tongue Panic Grass	*Dichanthelium clandestinum*	Secure (Green) Secure	S3
Eaton's Witchgrass	*Dichanthelium spretum*	(Green) Sensitive	S3S4
Quill Spikerush	*Eleocharis nitida*	(Yellow)	S3
Yellow Spikerush	*Eleocharis olivacea*	May Be At Risk (Orange)	S2S3
Downy Rattlesnake-Plantain	*Goodyera pubescens*	Sensitive (Yellow)	S2
Lesser Rattlesnake-plantain	*Goodyera repens*	Sensitive (Yellow)	S3
Sharp-Fruit Rush	*Juncus acuminatus*		S3S4

Appendix 3: Special Occurrences (Ecodistrict 720)

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

Species		Provincial General Status Rank	ACCDC S-Rank*
Common Name	**Scientific Name**		
Woods-Rush	*Juncus subcaudatus var. planisepalus*	Sensitive (Yellow) May	S3
Southern Twayblade	*Listera australis*	Be At Risk (Orange)	S2
Redtop Panic Grass	*Panicum rigidulum var. pubescens*	Sensitive (Yellow)	S3
Tuckerman's Panic Grass	*Panicum tuckermanii*	Sensitive (Yellow)	S2S3
Hooker's Orchid	*Platanthera hookeri*	Secure (Green)	S3
Large Round-Leaved Orchid	*Platanthera macrophylla*	Sensitive (Yellow)	S2
Small Round-leaved Orchid	*Platanthera orbiculata*	Secure (Green)	S3
Spotted Pondweed	*Potamogeton pulcher*	May Be At Risk (Orange)	S1S2
Narrow-leaved Blue-eyed-grass	*Sisyrinchium angustifolium*	Secure (Green) Secure	S3S4
Eastern Blue-Eyed-Grass	*Sisyrinchium atlanticum*	(Green)	S3S4
Round-leaved Greenbrier	*Smilax rotundifolia (Atlantic pop.)*	Secure (Green)	S3
Case's Ladies'-Tresses	*Spiranthes casei var. casei*	May Be At Risk (Orange)	S1
Case's Ladies'-Tresses	*Spiranthes casei var. novaescotiae*	Yellow (Sensitive)	S2
Yellow Ladies'-tresses	*Spiranthes ochroleuca*	Yellow (Sensitive)	S2S3
Eastern Skunk Cabbage	*Symplocarpus foetidus*	Green (Secure)	S3S4
Eastern Skunk Cabbage	*Symplocarpus foetidus*	Secure (Green)	S3S4
Pale False Manna Grass	*Torreyochloa pallida var. pallida*	Purple (Extirpated)	S1

*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 720)
Table 1c: Other Conservation Features

Feature	Type	Information Source	Legislation or Status Ranking System
Loon Nesting Lakes	Bird Habitat	Significant Habitats of Nova Scotia Database (SHNSD)	Nova Scotia Environment Act Nova Scotia Forest Act (Wildlife Habitat and Watercourse Protection Regs)
Raptor Nests - Bald eagle, Osprey	Bird Habitat	SHNSD	Nova Scotia Wildlife Act (NSWA)
Natural Watershed Municipal Water Supply - Cornwallis, Lawrencetown, Annapolis Royal, Kentville, Falmouth, Hantsport, Windsor	Water Supply	NS Restricted Land Use Layer (RLUL)	Nova Scotia Environment Act
Wilderness Areas – Cloud Lake, McGill Lake, and Tobeatic.	Ecosystems/ Recreation	NS Restricted Land Use Layer (RLUL)	NS Wilderness Protection Act
Provincial Parks – Lake George, and Falls Lake	Ecosystems/ Recreation	NS Restricted Land Use Layer (RLUL)	Nova Scotia Parks Act
Nature Reserves - Panuke Lake and Sporting Lake	Ecosystems	NS Restricted Land Use Layer (RLUL)	NS Special Places Protection Act
National Park - Kejimkujik National Park	Ecosystems/ Recreation	NS Restricted Land Use Layer (RLUL)	Canada National Parks Act
Non-designated Parks and Reserves - Gaspereau Lake, and Upper Clements Wildlife Park	Ecosystems/ Recreation	NS Restricted Land Use Layer (RLUL)	Nova Scotia Parks Act
Provincial Wildlife Management Area - Tobeatic WMA	Wildlife habitat	NS Restricted Land Use Layer (RLUL)	Nova Scotia Wildlife Act (NSWA)

Appendix 3: Special Occurrences (Ecodistrict 720)
Table 1d: Heritage Features

Feature	Type	Information Source
Indian Burial Grounds – Gaspereau Lake	Cultural/Community Heritage	Aboriginal Traditional Knowledge Local Knowledge NSDNR Database
Native Artifacts	Cultural/Community Heritage	Aboriginal Traditional Knowledge Local Knowledge NSDNR Database
Historic Provincial Roadways – Lequille	Cultural/Community Heritage	Local Knowledge
Native Reserve Lands – Bear River, St Croix, and New Ross	Cultural/Community Heritage	Service Nova Scotia
Canadian Heritage River – Shelburne River	Natural Heritage (Environment)	NS Restricted Land Use Database
Abandoned Mines	Geological and Cultural Heritage	NS Abandoned Mines Database

Appendix 3: Special Occurrences

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

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

Ecosection	Climax Type	Ecodistrict Occurrence						Ecoregion Occurrence					
		Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted	Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted
		Ha	%	Ha	%			Ha	%	Ha	%		
ICHO	Bs wP	183,172	40.2	151,307	33.2	72 to 77	0.8	270,098	16	419,644	24.9	75 to 79	1.4
ICKK	bS wP	466	0.1	151,307	33.2	80 to 82	0.0	2,314	0.1	419,644	24.9	67 to 74	7.6
ICRD	bS wP	913	0.2	151,307	33.2	75	0.3	7,277	0.4	419,644	24.9	63 to 72	3.4
ICSM	bS	23,527	5.2	21,532	4.7	78 to 82	0.5	37,858	2.2	75,102	4.5	76 to 79	2.5
IMDM	rS eH wP	594	0.1	192,174	42.2	65 to 74	1.9	25,961	1.5	616,727	36.6	64 to 69	9.9
IMHO	rS eH wP	3,631	0.8	192,174	42.2	64 to 70	5.4	222,050	13.2	616,727	36.6	70 to 73	3.0
IMSM	bS	497	0.1	21,532	4.7	63 to 70	5.2	92,050	5.5	75,102	4.5	71 to 74	3.7
WCDM	rS eH wP sM yB Be	7,403	1.6	13,593	3.0	68 to 75	0.7	10,837	0.6	187,322	11.1	71 to 76	0.9
WCDS	rS eH wP	408	0.1	192,174	42.2	76	0.0	1,045	0.1	616,727	36.6	66 to 67	9.2
WCHO	rS eH wP	100,064	22	192,174	42.2	73 to 78	0.8	187,670	11.1	616,727	36.6	73 to 77	3.9
WCKK	rS eH wP	70,141	15.4	192,174	42.2	70 to 76	1.2	152,022	9	616,727	36.6	66 to 73	3.5
WCRD	rS eH wP	1,933	0.4	192,174	42.2	76 to 78	4.0	2,880	0.2	616,727	36.6	70 to 75	5.2

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

Appendix 3: Special Occurrences

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

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

Ecosection	Climax Type	Ecodistrict Occurrence						Ecoregion Occurrence					
		Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted	Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted
		Ha	%	Ha	%			Ha	%	Ha	%		
WCSM	rS eH wP	681	0.1	192,174	42.2	58 to 75	0.0	681	0.0	616,727	36.6	58 to 75	0.0
WFDM	rS eH wP sM yB Be	1,051	0.2	13,593	3.0	52 to 57	17.7	37,395	2.2	187,322	11.1	52 to 59	17.7
WFHO	rS eH wP	222	0	192,174	42.2	69 to 74	0.2	31,687	1.9	616,727	36.6	53 to 60	14.0
WMDM	rS eH wP sM yB Be	5,140	1.1	13,593	3.0	67 to 71	3.9	132,982	7.9	187,322	11.1	58 to 63	13.5
WMHO	rS eH wP	3,509	0.8	192,174	42.2	66 to 70	6.7	154,580	9.2	616,727	36.6	64 to 69	7.5
WMKK	sM yB Be	2,232	0.5	3,262	0.7	60 to 68	6.1	17,019	1	59,619	3.5	60 to 65	9.9
WTLD	wetlands	15,291	3.4	0	0.0	77 to 78	1.9	87,241	5.2	0	0.0	77 to 78	3.0

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

Appendix 4: Ecological Representivity Worksheet

Ecosystem			Crown Responsibility	Legal Reserves		Policy Reserves (including unproclaimed legal reserve proposals)		Ecological Emphasis Classification "Reserve Class"					
Ecosection	Climax Type	Area (ha)	Percent of Area on Crown (%)	Crown Area (ha)	Private Area (ha)	Crown Area (ha)	Private Area (ha)	Crown		Private		Total Reserve	
								ha	% (EcoS)	ha	% (EcoS)	ha	% (EcoS)
ICHO	bS wP	183,172	33.9	23,105	0	480	0	23,584	12.9	0	0.0	23,584	12.9
WCHO	rS eH wP	100,064	37.5	17,891	0	106	0	17,996	18.0	0	0.0	17,996	18.0
WCKK	rS eH wP	70,141	30.3	6,404	0	216	0	6,619	9.4	0	0.0	6,619	9.4
XXWA	NONE	34,297	0.2	0	0	0	0	0	0.0	0	0.0	0	0.0
ICSM	bS	23,527	42.5	6,727	0	0	0	6,727	28.6	0	0.0	6,727	28.6
WTLD	wetlands	15,291	37.8	3,011	0	2	0	3,013	19.7	0	0.0	3,013	19.7
WCDM	rS eH wP sM yB Be	7,403	11.8	287	0	44	0	331	4.5	0	0.0	331	4.5
WMDM	rS eH wP sM yB Be	5,140	4.9	0	0	0	0	0	0.0	0	0.0	0	0.0
IMHO	rS eH wP	3,631	10.7	0	0	19	0	19	0.5	0	0.0	19	0.5
WMHO	rS eH wP	3,509	37.0	0	0	97	0	97	2.8	0	0.0	97	2.8
WMKK	sM yB Be	2,232	23.1	8	0	0	0	8	0.3	0	0.0	8	0.3
WCRD	rS eH wP	1,933	33.0	484	0	2	0	487	25.2	0	0.0	487	25.2
WFDM	rS eH wP sM yB Be	1,051	11.8	0	0	0	0	0	0.0	0	0.0	0	0.0
ICRD	bS wP	913	0.1	0	0	0	0	0	0.0	0	0.0	0	0.0
WCSM	rS eH wP	681	13.4	0	0	0	0	0	0.0	0	0.0	0	0.0
IMDM	rS eH wP	594	0.0	0	0	0	0	0	0.0	0	0.0	0	0.0
IMSM	bS	497	12.9	0	0	0	0	0	0.0	0	0.0	0	0.0
ICKK	bS wP	466	78.7	0	0	122	0	122	26.1	0	0.0	122	26.1
WCDS	rS eH wP	408	49.4	0	0	8	0	8	1.9	0	0.0	8	1.9
WFHO	rS eH wP	222	0.0	0	0	0	0	0	0.0	0	0.0	0	0.0
Total		**455,169**		**57,915**	**0**	**1,095**	**0**	**58,289**		**0**		**59,010**	

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)
Wilderness Areas	43,838	0	Operational Non Designated Parks and Reserves	119	0
National Parks and Adjuncts	14,027	0	Old Forest	36,507	0
Sites of Ecological Significance Under Moratorium	266	0	Designated Provincial Parks and Park Reserves	9	0
Areas under the Special Places Act	23	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 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, water course 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, unroaded and lightly roaded areas 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 & Hersperger, 1996). Forman and 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 maps.

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.

Department of Natural Resources 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	2,640
Utility corridors	3	125
Gravel Roads and active railways	6	1,493
Paved streets and roads collectors	10	204
Highways	15	9

Table 2: Distribution of Road Index Classes

Road Index Value		Area of Ecodistrict Affected	
Indication	Range	Hectares	Percent
Remote	0 to 6	205,133	45.1
Forest Resource	7 to 15	170,347	37.4
Mixed Rural	16 to 24	63,521	14.0
AgricultureSuburban	25 to 39	15,845	3.5
Urban	40 to 100	315	0.1
Total		**455,161**	**100.0**

Table 3: Road Index Values for Each Landscape Element Type		
Landscape Element	**Area (ha)**	**Road Index**
Valley Corridors	28,504	11.8
Red and Black Spruce Hummocks	275,724	4.1
Spruce Pine Flats	22,495	4
Spruce Pine Hummocks	1,276	2.1
Tolerant Hardwood Hills	2,189	11.7
Tolerant Mixedwood Drumlins	13,465	8
Spruce Hemlock Pine Hummocks	77,303	5.6
Tolerant Mixedwood Hummocks	3,108	5.8
Wetlands	13,289	6.1
Total	**437,353***	**5.3**
*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

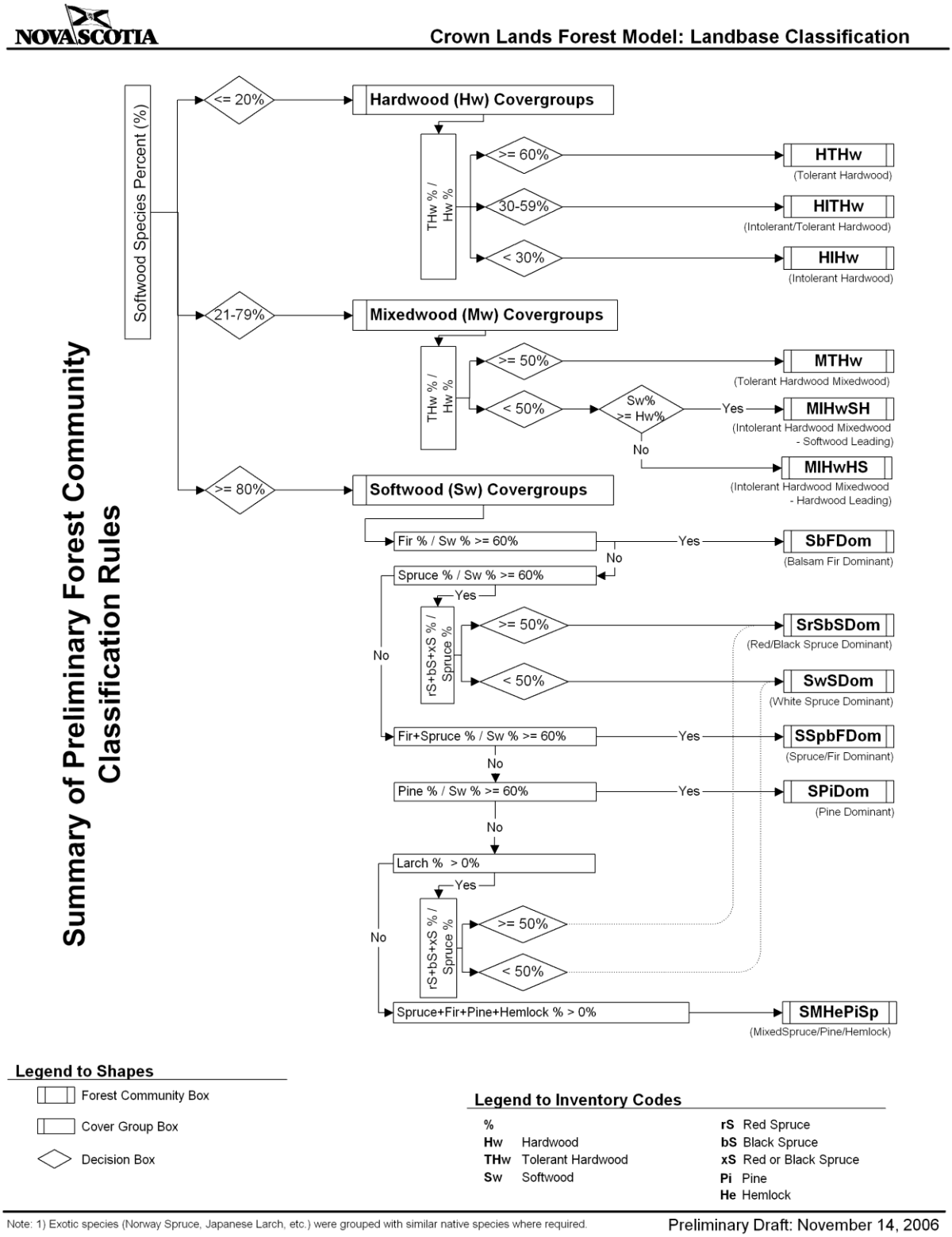
Development Class	Seral Stage
1. Forest Establishment (Height 0 to 6 m) • establishment of new growth following a stand-initiating disturbance • high diversity of forbs, shrubs, and tree regeneration, many of which are short-live shade-intolerant "pioneer" species • peak seed production by forbs and 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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	5	5	5	5	1	1	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	3	1	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	3	2	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	3	2	3	3	2	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	3	2	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	5	5	5	4	1	1	1
XS	red and black spruce	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
YB	yellow birch	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

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

Appendix 9: Vegetation Community Classification – Forest Model



Appendix 10: Table 1: Forest Landscape Composition Worksheet (South Mountain 720)

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)				
Red and Black Spruce Hummocks (Matrix)	ICHO (64.3%) WCHO (35.7%)	Softwood	bS wP rS eH wP	Frequent Infrequent	52.9 47.1	Early	1,185	1,340	923	431	3,879	138,110; 53.3	EARLY	23,332; 9.0
						Mid	4,478	7,289	9,817	9,101	30,685			
						Late	3,521	11,427	51,629	24,925	91,501			
						Uncl	12,045	0	0	0	12,045			
		Mixedwood				Early	2,625	1,454	2,400	1,325	7,803	79,284; 30.6	MID	102,050; 39.4
						Mid	3,263	3,280	27,937	15,548	50,028			
						Late	100	490	8,352	5,735	14,678			
						Uncl	6,776	0	0	0	6,776			
		Hardwood				Early	854	727	8,241	883	10,705	37,132; 14.3	LATE	110,393; 42.6
						Mid	484	525	18,525	1,804	21,338			
						Late	38	116	3,750	311	4,214			
						Uncl	876	0	0	0	876			
		Unclassified				Early	766	1	178	0	945	4437; 1.7	UNCL	23,188; 9.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	3,492	0	0	0	3,492			
Total					**275,724***	**# ha**	**40,502**	**26,648**	**131,749**	**60,063**	**258,963**			
						%	**15.6%**	**10.3%**	**50.9%**	**23.2%**	**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 (South Mountain 720)

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 Hemlock Pine Hummocks and Hills (Patch)	WCKK (90.1%) IMHO (4.7%) WMHO (4.4%) WCDS (0.5%) WFHO (0.3%)	Softwood	rS eH wP	Infrequent	56,413; 73.0	Early	389	450	428	177	1,443	21,007; 28.2	EARLY	11,794; 15.8
						Mid	855	1,082	1,681	1,116	4,734			
						Late	377	761	7,918	3,194	12,251			
						Uncl	2,580	0	0	0	2,580			
		Mixedwood	rO wP rP	Infrequent	20,890; 27.0	Early	1,230	892	1,471	770	4,363	26,766; 35.9	MID	36,943; 49.5
						Mid	1,368	882	8,619	4,636	15,505			
						Late	74	80	2,353	1,726	4,233			
						Uncl	2,664	0	0	0	2,664			
		Hardwood				Early	531	451	4,225	467	5,674	25,722; 34.5	LATE	19,081; 25.6
						Mid	425	599	13,775	1,904	16,704			
						Late	12	92	2,265	228	2,596			
						Uncl	748	0	0	0	748			
		Unclassified				Early	114	2	199	0	315	1,146; 1.5	UNCL	6,824; 9.1
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	831	0	0	0	831			
Total					**77,303***	**# ha**	**12,199**	**5,292**	**42,932**	**14,218**	**74,641**			
						%	**16.3%**	**7.1%**	**57.5%**	**19.0%**	**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 (South Mountain 720)

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 (Corridor)	ICHO (20.0%) WTLD (7.2%) WCHO (6.1%) ICSM (5.3%) WCKK (1.7%) ICRD (0.4%) WMHO (0.3%) WCDM (0.2%) WMDM (0.2%)	Softwood	bS wP rS eH wP bS		9,630; 33.8	Early	14	30	34	19	96	4,430; 51.0	EARLY	665; 7.7
						Mid	35	154	339	209	737			
						Late	39	314	2,167	1,005	3,525			
						Uncl	72	0	0	0	72			
		Mixedwood	rO wP rP rS eH wP sM yB Be		250; 0.9	Early	24	28	92	40	183	3,013; 34.7	MID	3458; 39.8
						Mid	31	78	1,321	600	2,030			
						Late	2	20	444	299	764			
						Uncl	35	0	0	0	35			
		Hardwood	rM		355; 1.2	Early	12	25	309	35	380	1,211; 13.9	LATE	4,425; 50.9
						Mid	1	21	601	69	691			
						Late	0	1	117	19	136			
						Uncl	4	0	0	0	4			
		Unclassified				Early	5	0	0	0	5	33; 0.4	UNCL	139; 1.6
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	28	0	0	0	28			
Total					**28,504***	**# ha**	**300**	**669**	**5,424**	**2,292**	**8,686**			
						%	**3.5%**	**7.7%**	**62.4%**	**26.4%**	**100.0%**			

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Appendix 10: Table 1: Forest Landscape Composition Worksheet (South Mountain 720)

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 (Patch)	ICSM (97.9%) IMSM (2.1%)	Softwood	bS	Frequent	15,699; 69.8	Early	125	188	75	35	423	14,165; 70.5	EARLY	1444; 7.2
						Mid	173	785	748	883	2,588			
						Late	121	1,696	4,846	3,794	10,457			
						Uncl	697	0	0	0	697			
		Mixedwood				Early	112	158	155	90	514	4,047; 20.1	MID	5794; 28.8
						Mid	87	149	1,162	1,052	2,451			
						Late	1	29	357	306	693			
						Uncl	388	0	0	0	388			
		Hardwood	rM		2343; 10.4	Early	25	8	248	40	321	1,388; 6.9	LATE	11,333; 56.4
						Mid	0	11	663	80	754			
						Late	0	3	153	27	183			
						Uncl	130	0	0	0	130			
		Unclassified				Early	186	0	0	0	186	492; 2.4	UNCL	1522; 7.6
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	306	0	0	0	306			
Total					**22,495***	**# ha**	**2,351**	**3,026**	**8,408**	**6,306**	**20,092**			
						%	**11.7%**	**15.1%**	**41.8%**	**31.4%**	**100.0%**			

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Appendix 10: Table 1: Forest Landscape Composition Worksheet (South Mountain 720)

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 Mixedwood Drumlins (Patch)	WCMD (54.6%) WMDM (37.9%) WFDM (7.5%)	Softwood				Early	89	63	83	27	261	3,690; 29.1	EARLY	1,805; 14.2
						Mid	146	164	366	253	929			
						Late	232	106	1,364	423	2,124			
						Uncl	376	0	0	0	376			
		Mixedwood	rS eH wP sM yB Be	Gap	13,465; 100.0	Early	350	93	163	96	701	4,409; 34.8	MID	5,018; 39.6
						Mid	395	244	1,291	507	2,437			
						Late	56	42	596	208	902			
						Uncl	370	0	0	0	370			
		Hardwood				Early	116	44	534	39	733	4,345; 34.3	LATE	4,861; 38.4
						Mid	207	106	1,185	155	1,653			
						Late	65	70	1,648	53	1,836			
						Uncl	123	0	0	0	123			
		Unclassified				Early	110	0	0	0	110	232; 1.8	UNCL	991; 7.8
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	122	0	0	0	122			
Total					**13465***	**# ha**	**2,756**	**931**	**7,229**	**1,760**	**12,675**			
						%	**21.7%**	**7.3%**	**57.0%**	**13.9%**	**100.0%**			

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Appendix 10: Table 1: Forest Landscape Composition Worksheet (South Mountain 720)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Wetlands (Patch)	WTLD (100.0%)	Softwood	bS	Edaphic	3986; 30.0	Early	30	47	34	21	131	4,660; 70.0	EARLY	516; 7.7
						Mid	65	282	231	302	879			
						Late	69	878	1,528	1,012	3,487			
						Uncl	163	0	0	0	163			
		Mixedwood				Early	28	34	56	32	150	1,357; 20.4	MID	2,117; 31.8
						Mid	26	141	479	260	905			
						Late	0	27	161	64	252			
						Uncl	50	0	0	0	50			
		Hardwood	rM		1329; 10.0	Early	6	23	181	24	235	604; 9.1	LATE	3,775; 56.7
						Mid	3	16	286	27	332			
						Late	0	0	34	2	36			
						Uncl	1	0	0	0	1			
		Unclassified				Early	0	0	0	0	0	35; 0.5	UNCL	249; 3.7
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	35	0	0	0	35			
Total					**13289***	**# ha**	**476**	**1,446**	**2,991**	**1,743**	**6,656**			
						%	**7.2%**	**21.7%**	**44.9%**	**26.2%**	**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)				
Tolerant Mixedwood Hummocks (Patch)	WCRD (60.8%) WCSM (21.2%) IMDM (17.9%)	Softwood	rS eH wP bS	Infrequent	2,110; 67.9	Early	6	13	1	3	23	1,086; 36.8	EARLY	323; 10.9
						Mid	69	85	58	45	257			
						Late	4	86	381	106	576			
						Uncl	229	0	0	0	229			
		Mixedwood				Early	8	32	23	28	91	964; 32.7	MID	1462; 49.6
						Mid	12	63	411	139	624			
						Late	0	9	70	59	138			
						Uncl	111	0	0	0	111			
		Hardwood	sM yB Be	Gap	999; 32.1	Early	1	16	171	9	197	832; 28.2	LATE	767; 26.0
						Mid	0	25	525	32	581			
						Late	0	6	31	16	53			
						Uncl	2	0	0	0	2			
		Unclassified				Early	6	3	3	0	12	65.1; 2.2	UNCL	396; 13.4
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	54	0	0	0	54			
Total					**3,108 ***	**# ha**	**502**	**338**	**1,672**	**435**	**2,948**			
						%	**17.0%**	**11.5%**	**56.7%**	**14.8%**	**100.0%**			

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							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 (Patch)	WMKK (100.0%)	Softwood				Early	16	22	38	22	98	360; 17.8	EARLY	477; 23.7
						Mid	0	7	40	1	48			
						Late	8	1	101	23	132			
						Uncl	82	0	0	0	82			
		Mixedwood				Early	56	27	123	30	236	925; 45.8	MID	688; 34.1
						Mid	0	9	240	55	304			
						Late	0	0	141	50	191			
						Uncl	195	0	0	0	195			
		Hardwood	sM yB Be		2,189; 100.0	Early	9	15	117	0	142	729; 36.1	LATE	561; 27.8
						Mid	16	4	295	22	336			
						Late	0	0	172	66	238			
						Uncl	13	0	0	0	13			
		Unclassified				Early	3	0	0	0	3	4; 0.2	UNCL	292; 14.5
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	2	0	0	0	2			
Total					**2,189***	**# ha**	**399**	**84**	**1,266**	**269**	**2,018**			
						%	**19.8%**	**4.2%**	**62.7%**	**13.3%**	**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 (South Mountain 720)

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 (Patch)	ICRD (63.5%) ICKK (36.5%)	Softwood	bS wP	Frequent	1276; 100.0	Early	0	3	0	2	5	754; 74.6	EARLY	21; 2.1
						Mid	2	7	80	53	143			
						Late	0	35	396	175	606			
						Uncl	0	0	0	0	0			
		Mixedwood				Early	0	2	1	0	4	204; 20.2	MID	254; 25.1
						Mid	0	2	51	40	93			
						Late	0	24	45	22	91			
						Uncl	17	0	0	0	17			
		Hardwood				Early	0	13	0	0	13	53; 5.2	LATE	718; 71.1
						Mid	0	2	16	0	18			
						Late	0	15	2	5	22			
						Uncl	0	0	0	0	0			
		Unclassified				Early	0	0	0	0	0	0; 0.0	UNCL	17; 1.7
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	0	0	0	0	0			
Total					**1276***	**# ha**	**19**	**104**	**591**	**297**	**1,011**			
						%	**1.9%**	**10.3%**	**58.5%**	**29.4%**	**100.0%**			

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

Appendix 10: Table 2: Composition of Forest Communities (in South Mountain 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
Red and Black Spruce Hummocks	ICHO WCHO	Infrequent	bS wP rS eH wP rS eH wP bS wP	S	SrSbS Dom	86,987	34.2%	L	**ICHO Moist-Poor** early - rM, bS, tL mid - rM, bS late - bS (wP) **Well** early - WB, rM, aspen mid - bF, rS late - rS, eH, wP **WCHO Well -Drained** early - wB, rM, aspen mid - bF, rS late - rS, eH, wP **Dry** early - rP, aspen, WB, rM, rO mid - rP, rO,bS, wP late - bs, wP, rO
				S	SSpbF Dom	19,246	7.6%	M	
				S	Spi Dom	17,510	6.9%	L	
				S	SMHePiSp	9,315	3.7%	L	
				S	SbF Dom	4,248	1.7%	M	
				S	SwS Dom	804	0.3%	E	
				M	MIHwSH	46,543	18.3%	E	
				M	MIHwHS	27,519	10.8%	E	
				M	MTHW	5,223	2.1%	L	
				H	HiHw	26,281	10.3%	E	
				H	HiTHw	6,542	2.6%	M	
				H	HTHw	4,310	1.7%	L	
Total						**254,526**	**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 South Mountain 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-Hemlock- Pine Hummocks and Hills	WCKK IMHO WFHO WMHO WCDS	Infrequent	rS, eH, wP	S	SrSbS Dom	12,998	17.7%	L	**Dry** early - rP, aspen, wB, rM, rD mid - rP, rO, bs, wP late - bs, wP, rO **Well-Drained** early - rP, aspen, wB, rM, rO mid - rP, rO, bS, wP late - bS, wP, rO
				S	SspbF Dom	2,758	3.8%	M	
				S	Spi Dom	2,168	3.0%	L	
				S	SbF Dom	1,441	2.0%	M	
				S	SM He Pi Sp	1,160	1.6%	L	
				S	SwS Dom	482	0.7%	E	
				M	MIHwSH	13,462	18.3%	E	
				M	MIHwHS	11,016	15.0%	E	
				M	MTHw	2,288	3.1%	L	
				H	HIHw	15,188	20.7%	E	
				H	HITHw	7,943	10.8%	M	
				H	HTHw	2,591	3.5%	L	
Total						**73,495**	**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 South Mountain 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	ICSM IMSM	Frequent Frequent	bS rM wetlands	S	SrSbSDom	10,716	54.7%	L	bS, rM, tL, bF wetlands and bogs
				S	SSpbF Dom	1,333	6.8%	L	
				S	SPi Dom	1,171	6.0%	L	
				S	SbF Dom	487	2.5%	L	
				S	SMHePiSp	423	2.2%	L	
				S	SwS Dom	35	0.2%	E	
				M	MIHwSH	2,511	12.8%	E	
				M	MIHwHS	1,347	6.9%	E	
				M	MTHw	189	1.0%	L	
				H	HIHw	870	4.4%	E	
				H	HITHw	312	1.6%	M	
				H	HTHw	206	1.1%	L	
Total						**19,600**	**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 South Mountain 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 Mixedwood Drumlins	WCDM WFDM WMDM	Gap	rS eH wP sM yB Be	S	SrSbSDom	1,993	16.0%	M	**Well-Drained** early - ws (old fields), rM, wB, aspen mid - rO, rM late - sM, yB, Be **Moist** early - rM, wB, aspen mid - bF, rS late - rS, eH, wP
				S	SSpbF Dom	627	5.0%	M	
				S	SMHePiSp	444	3.6%	L	
				S	SPi Dom	334	2.7%	L	
				S	SbF Dom	180	1.4%	M	
				S	SwS Dom	113	0.9%	E	
				M	MIHwSH	2,107	16.9%	E	
				M	MIHwHS	1,433	11.5%	E	
				M	MTHw	869	7.0%	L	
				H	HTHw	1,829	14.7%	L	
				H	HIHw	1,507	12.1%	E	
				H	HITHw	1,008	8.1%	M	
Total						**12,443**	**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 South Mountain 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	Edaphic	wetlands bS rM	S	SrSbSDom	3,664	55.3%	L	Wetlands, bogs, scattered small patches of bS, tL, rM
				S	Spi Dom	367	5.5%	L	
				S	SSpbFDom	320	4.8%	L	
				S	SMHePiSp	201	3.0%	L	
				S	SbF Dom	100	1.5%	E	
				S	SwS Dom	8	0.1%	E	
				M	MIHwSH	799	12.1%	E	
				M	MIHwHS	499	7.5%	E	
				M	MTHw	59	0.9%	L	
				H	HIHw	467	7.1%	E	
				H	HITHw	98	1.5%	M	
				H	HTHw	39	0.6%	L	
Total						**6,621**	**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 South Mountain 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 Mixedwood Hummocks	IMDM WCRD WCSM	Infrequent	rS, eH, wP sM, yB, Be bS	S	SrSbSDom	783	27.2%	M	**WCRD, WCSM** Well-Drained early - wB, rM, aspen mid - bF, rS late - rS, eH, Wp **Dry** early - rP, aspen wB, rM, rO mid - rP, rO, bS, wP late - bS, wP, rO **IMDM** **Well-Drained** early - wS (old fields), rM, wB, aspen mid - rO, rM late - sM, yB, Be **Moist** early - rM, wB, aspen mid - bF, rS late - rS, eH, wP
				S	SSpbFDom	151	5.2%	M	
				S	SPiDom	78	2.7%	L	
				S	SbFDom	53	1.8%	E	
				S	SMHePiSp	22	0.8%	L	
				M	MIHwSH	556	19.3%	E	
				M	MIHwHS	317	11.0%	E	
				M	MTHw	91	3.2%	L	
				H	HIHw	585	20.3%	E	
				H	HITHw	189	6.5%	M	
				H	HTHw	59	2.0%	L	
Total						**2,882**	**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 South Mountain 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	WMKK	Gap	sM, yB, Be	S	SrSbSDom	180	9.0%	M	**Well-Drained** early - wS (old fields) - rM, wB, aspen mid - rO, rM late - sM, yB, Be **Moist** early - rM, wB, aspen mid - bF, rS late - rS, eH, wP
				S	SwSDom	92	4.6%	E	
				S	SSpbFDom	45	2.3%	M	
				S	SbFDom	36	1.8%	E	
				S	SPiDom	6	0.3%	L	
				M	MIHwSH	451	22.4%	E	
				M	MIHwHS	395	19.6%	E	
				M	MTHw	79	3.9%	L	
				H	HIHw	369	18.3%	E	
				H	HTHw	201	10.0%	L	
				H	HITHw	159	7.9%	M	
Total						**2,014**	**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 South Mountain 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	ICRD ICKK	Frequent	bS, wP	S	SrSbSDom	372	36.8%	L	**Moist- Poor** early - rM, bS, tL mid - rM, bS late - bS (wP) **Well-Drained** early - wB, rM, aspen mid - bF, rS late - rS, eH, wP
				S	SPiDom	208	20.6%	L	
				S	SSpbFDom	114	11.3%	M	
				S	SMHePiSp	59	5.8%	L	
				S	SbFDom	2	0.2%	M	
				M	MIHwSH	132	13.1%	E	
				M	MTHw	58	5.8%	E	
				M	MIHwHS	13	1.3%	L	
				H	HTHw	22	2.2%	L	
				H	HIHw	20	2.0%	E	
				H	HITHw	11	1.1%	M	
Total						**1,011**	**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 South Mountain Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Valley Corridors	ICHO WTLD WCHO ICSM WCKK ICRD WMHO WCDM WMDM	Frequent/ Infrequent Edaphic Frequent/ Infrequent Frequent Infrequent	bS wP rS eH wP wetlands bs rm rS eH wP bSwP bS rM wetlands rS eH wP rO wP rP	S	SrSbSDom	2,424	28.0%	L	Dependent on ecosection which corridor passes through - see successional types for various ecosections in previously mentioned elements in this table.
				S	SPiDom	932	10.8%	L	
				S	SMHePiSp	520	6.0%	L	
				S	SSpbFDom	444	5.1%	M	
				S	SbFDom	105	1.2%	M	
				S	SwSDom	5	0.1%	E	
				M	MIHwSH	1,700	19.6%	E	
				M	MIHwHS	1,109	12.8%	E	
				M	MTHw	205	2.4%	L	
				H	HIHw	870	10.1%	E	
				H	HITHw	203	2.3%	E	
				H	HTHw	138	1.6%	L	
Total						**8,654**	**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
rS eH wP	192,174	42.2%	616,727	36.6%
bS wP	151,307	33.2%	419,644	24.9%
bS	21,532	4.7%	75,102	4.5%
RO wP rP	21,042	4.6%	53,643	3.2%
rS eH wP sM yB Be	13,593	3.0%	187,322	11.1%
rM	4,031	0.9%	12,902	0.8%
sM yB Be	3,262	0.7%	59,619	3.5%
Total	406,942	89.3%*	1,424,959	84.6%**

*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
Red and Black Spruce Hummocks	275,591	40,707	202,321	2,289	1,910	28,364	200,111 to 214,293	73 to 78
Spruce Hemlock Pine Hummocks and Hills	77,286	6,728	59,811	768	1,239	8,740	53,963 to 58,333	70 to 75
Spruce Pine Flats	22,470	6,323	14,176	81	79	1,811	17,428 to 18,333	78 to 82
Tolerant Mixedwood Drumlins	13,463	332	10,919	337	432	1,443	8,966 to 9,688	67 to 72
Wetlands	13,278	2,602	10,219	20	152	286	10,342 to 10,485	78 to 79
Valley Corridors	12,041	1,674	9,563	25	584	196	8,901 to 8,999	74 to 75
Tolerant Mixedwood Hummocks	3,107	487	2,126	0	78	417	2,185 to 2,394	70 to 77
Tolerant Hardwood Hills	2,189	8	1,603	96	134	349	1,321 to 1,496	60 to 68
Spruce Pine Hummocks	1,276	121	1,136	0	2	17	977 to 986	77
Total	**420,701**	**58,981**	**311,873**	**3,616**	**4,609**	**41,623**	**304,197 to 325,009**	**72 to 77**

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

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

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

EEI values are benchmarks that will be monitored over time.

Appendix 12b: Ecological Emphasis Index Worksheet – Ecosections

Ecosection	Total Land Area (ha)	Ecological Emphasis Classes					Ecological Emphasis Index	
		Reserve Area (ha)	Extensive Forest Management Area (ha)	Intensive Forest Management Area (ha)	Conversion to Non-Forest Area (ha)	Unclassified Land Use Area (ha)	Effective Area Range (ha)	EEC Index Range
ICHO	183,164	23,584	139,219	1,319	1,450	17,591	132,726 to 141,522	72 to 77
ICKK	466	122	327	0	0	17	371 to 380	80 to 82
ICRD	913	0	911	0	2	0	683	75
ICSM	23,527	6,727	14,843	74	123	1,757	18,316 to 19,195	78 to 82
IMDM	594	0	476	0	11	106	384 to 437	65 to 74
IMHO	3,631	19	2,879	49	197	487	2,312 to 2,556	64 to 70
IMSM	497	0	395	8	26	68	315 to 349	63 to 70
WCDM	7,403	331	5,956	124	55	938	5,063 to 5,532	68 to 75
WCDS	408	8	400	0	0	0	308	76
WCHO	100,066	17,996	69,377	983	769	10,941	73,010 to 78,480	73 to 78
WCKK	70,140	6,619	54,039	645	858	7,979	49,304 to 53,294	70 to 76
WCRD	1,933	487	1,295	0	77	74	1,476 to 1,513	76 to 78
WCSM	681	0	443	0	0	238	392 to 511	58 to 75
WFDM	1,051	0	665	90	185	111	549 to 604	52 to 57
WFHO	222	0	196	5	1	20	153 to 163	69 to 74
WMDM	5,140	0	4,416	124	202	398	3,442 to 3,641	67 to 71
WMHO	3,509	97	2,841	75	236	259	2,311 to 2,441	66 to 70
WMKK	2,232	8	1,640	100	136	349	1,350 to 1,524	60 to 68
WTLD	15,289	3,013	11,669	23	283	300	11,846 to 11,996	77 to 78
Total	**420,862**	**59,010**	**311,986**	**3,617**	**4,612**	**41,632**	**304,311 to 325,127**	**72 to 77**

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.)
Precommercial 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 land base designated under the Wilderness Areas Protection Act (e.g. Canso Barrens).

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