Department of Natural Resources

ECOLOGICAL LANDSCAPE ANALYSIS VALLEY SLOPE ECODISTRICT 710

PART 3: Landscape Analysis for Forest Ecosystem Planners

ELA 2014-710

NOVA SCOTIA

Ecological Landscape Analysis, Ecodistrict 710: Valley Slope

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

ISBN 978-1-55457-596-1

This report, one of 38 for the province, provides descriptions, maps, analysis, photos and resources of the Valley Slope 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 and 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 2014-710

Table of Contents – Part 3

Part 3: Landscape Analysis of Valley Slope **45**
– For Forest Ecosystem Planners

Understanding the Landscape as an Ecological System 45
Elements Within Landscapes 46
Flow – Element Interactions 46
Landscape Connectivity 46
Links to Neighbouring Ecodistricts 48

Landscape Indicators 48
Forest Composition Indicators 48
Target Ranges for Composition Indicators 49
Forest Vegetation Types for Seral Stages in Each Element 50
Land Use Indicators 51
Ecological Emphasis Index 51
Road Index 52

Fine Scale Features 53
Priority Species and Other Special Occurrences 53
Rare Ecosections 58
Ecological Representivity 60

ELA Summary 60
Element Interpretation 60
Spruce Hemlock Pine Hummocks and Hills 61
Tolerant Hardwood Hills 63
Tolerant Mixedwood Slopes 64
Spruce Pine Flats 65
Wetlands 66
Pine Oak Hills and Hummocks 67
Valley Corridors 68
Ecosystem Issues and Opportunities 70

Tables

Table 7 Landscape Composition Target Ranges 50
Table 8 Forest Vegetation Types Within Elements in Valley Slope 50
Table 9 Elements, Ecosections, Disturbance Regimes and Climax Types 59

Appendices

Appendix 1: Flow - Element Interactions 71

Appendix 2a: Landscape Connectivity Worksheet 73
Appendix 2b: Connective Management Strategies 75

Appendix 3: Special Occurrences 76
Table 1a: Species at Risk 76
Table 1b: Other Species of Conservation Concern 77
Table 1c: Other Conservation Features 81
Table 1d: Heritage Features 83
Table 2: Comparison of EEC Index by Ecosection 84

Appendix 4:	Ecological Representivity Worksheet	86
Appendix 5:	Ecodistrict Reserves and Protected Areas Summary	87
Appendix 6:	Description of Road Density Index	88
Appendix 7:	Road Density Index Worksheets	90
Appendix 8:	Development Classes and Seral Stages	91
Appendix 9:	Vegetation Community Classification – Forest Model	93
Appendix 10:	Table 1: Forest Landscape Composition Worksheet	94
	Table 2: Composition of Forest Communities	102
	Table 3: Summary of 'Potential Climax' Forest Abundance	109
Appendix 11:	Ecological Emphasis Classes and Index Values	110
Appendix 12a:	Ecological Emphasis Index Worksheet – Elements	111
Appendix 12b:	Ecological Emphasis Index Worksheet – Ecosections	112
Appendix 13:	Glossary B: Terms in Parts 1, 2 and 3	113
	Literature Cited	121

Theme Maps Available on Website

Map 1	Land Capability
Map 2	Elements and Flows
Map 3	Ecological Emphasis Classes
Map 4	Natural Disturbances
Map 5	Road Index
Map 6	Special Occurrences
Map 7	Rare Ecosections
Map 8	IRM Classes
Map 9	Development Classes
Map 10	Seral Stages

Part 3: Landscape Analysis of Valley Slope – *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 seven distinctive elements in the Valley Slope Ecodistrict – one matrix, five patches and a corridor. A matrix is the dominant element. Patches are smaller yet still distinctive elements. Corridors are natural linear elements, such as river valleys, that extend across ecodistricts (see connectivity section for full discussion of matrix, patch, and corridor concepts).

Spruce Hemlock Pine Hummocks and Hills is the matrix element, representing more than 72% of the ecodistrict. This element naturally supports long-lived species that generally grow well in shade, such as softwoods of red spruce, hemlock, and white pine and hardwoods of sugar maple, yellow birch, and white ash. **Tolerant Hardwood Hills**, representing nearly 19% of the ecodistrict, is the largest patch element, followed by **Tolerant Mixedwood Slopes** at a little over 6%. The remaining three patch elements – **Spruce Pine Flats**, **Wetlands** and **Pine Oak Hills and Hummocks** – and the **Valley Corridors** corridor element are each less than 1% of the area. *A tiny Floodplain element is also part of the ecodistrict.*

The ecological structure of the ecodistrict has been altered from the type of forest that would have naturally occurred. Much of the forest would have supported a climax of tolerant softwood or tolerant mixedwoods. Less than one-third of the forest (up to 2006) is made up of late seral species.

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, southern flying squirrel, anadromous fish, bald eagles, deer, beaver, and cedar.

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

River corridors promote connectivity.

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

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

Connectivity takes many forms and operates at a wide range of scales. Among the structural ecosystem

components that support movement, three major systems can be identified:

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

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

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

The matrix in the Valley Slope, because of its size and distribution, plays an important connective function that affects connectivity between patches and corridors imbedded within it.

Historically, land use has likely had a significant influence on connectivity. Conversion from forested conditions has resulted in a loss of nearly one-quarter of the matrix, resulting in larger areas (particularly in the east) that are fragmented. Much of the ecodistrict has many roads, further increasing fragmentation.

Forest harvesting, particularly clearcutting, has caused a significant increase in early and mid seral forest community stages, with an abundance of intolerant species. The extent of tolerant species that existed naturally is not as readily known. Large patch sizes for species requiring interior habitat also appears to be lacking.

Connectivity between patch elements has likely been compromised because of the fragmented nature of the matrix. Similar to the matrix, species composition change and the lack of large interior habitat would be of concern.

Riparian corridors, besides being important habitat, can be critical connectors of ecosystem elements – particularly in a fragmented matrix

An additional concern in ecological planning is the maintenance of connectivity between conservation areas, such as wilderness or remote areas, and potential old growth. Since Valley Slope is long and often narrow, connectivity at some point must be considered at a larger scale, including conditions in adjacent ecodistricts.

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

Many of the landscape flows – such as people, deer, fish and eagles – have linkages to adjacent ecodistricts. People provide linkages through an assortment of activities (recreation, transportation, settlement, and industrial activities) and link with Annapolis Valley, South Mountain, Clare and Central Lowlands ecodistricts.

Deer make use of the adjoining Annapolis Valley and South Mountain ecodistricts for food and shelter. Eagles use South Mountain for nesting.

The streams provide an obvious connection. Numerous first and second order streams either originate or pass through Valley Slope, providing linkages to South Mountain, Annapolis Valley, Clare and the Central Lowlands ecodistricts.

The forest of this ecodistrict links to the well-forested South Mountain Ecodistrict and the much-converted Annapolis Valley Ecodistrict.

All future management activities should recognize significant linkages to adjoining ecodistricts and manage these areas to enhance and sustain connectivity functions.

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 Ecological Landscape Analysis protocol.

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

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

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

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

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

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

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

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

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

Target Ranges for Composition Indicators

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

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

Table 7 - Landscape Composition Target Ranges (by Development Class / Disturbance Regime)				
Natural Disturbance Regime	**Development Class**			
	Forest Establishment	**Young Competing Forest**	**Mature Forest (including multi-aged and old forest)**	**Multi-aged and Old Forest**
Frequent Stand Initiating	5 - 30%	5 - 30%	>40% early, mid, and late seral representation	>8%
Infrequent Stand Initiating	5 - 20%	5 - 20%	>60% most in mid and late seral stages	>16%
Gap Replacement	0 - 15%	0 - 15%	>70% most in late seral stage	>24%

Forest Vegetation Types for Seral Stages in Each Element

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

Table 8 – Forest Vegetation Types[1] Within Elements in Valley Slope						
Element	**Seral Stage**					
	Early	**% ***	**Middle**	**%**	**Late**	**%**
Floodplain	*IH3, IH5, IH6, OF3, MW4, MW5*	*22.0*	*SH5, SH6*	*45.0*	***MW1, MW3, SH1**, SH2, SH3, SH4*	*33.0*
Pine Oak Hills and Hummocks	IH1, SP8	45.0	IH2, IH6, SH9, SP4, SP6	23.0	SP5, **SP9**, SH4, TH6	27.0
Spruce Pine Flats		14.0		36.0	**SP7**	45.0
Spruce Hemlock Pine Hummocks and Hills	IH3, IH5, IH6, MW4, MW5	27.0	SH5, SH6, MW2	37.0	**SH1, SH2, SH3, SH4,** MW1, SP9	26.0
Tolerant Hardwood Hills	IH3, IH5, IH6, OF1, OF3	14.0	IH7, TH6, TH8	40.0	**TH1, TH2,** TH3, **TH5**	36.0
Tolerant Mixedwood Slopes	IH3, IH5, IH6	20.0	MW2, MW4, MW5, SH4, SH5, SH6	39.0	**MW1, MW3,** SH1, SH2, SH3	34.0
Wetlands	WC1, WC2, 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)
*Percentage of element (2007 inventory) 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 based on past practices. These classes are mapped over all areas of the landscape using a one hectare grid. The Ecological Emphasis Index (EEI) is determined by assigning a weighting value to each class: Reserve (100); Extensive (75); Intensive (25); and Converted (0). An overall index value may be calculated for any area of interest, such as element, ecosection, ecodistrict or ecoregion, by averaging the index values within the area to provide a relative indication of land use pressure.

The overall ecological emphasis index for Valley Slope is 51 to 56. This is one of the lower ecological emphasis indexes in the Western Ecoregion and suggests that the intensity of land use may be of concern as far as its impact on biodiversity.

About 61% of the land falls in the extensive ecological emphasis class (EEC). This implies land managed for multiple values using ecosystem-based techniques that conserve biodiversity and natural ecosystem conditions and practices.

A little over 19% of the ecodistrict has been converted. This is land that has been changed to an unnatural state for human use, mostly settlements, farms, urban development, and transportation and utility corridors.

The reserve class accounts for less than 1% of the area and is divided into two categories: legal reserves and policy reserves. The legal reserves are those areas that have legal status under the IUCN (International Union for the Conservation of Nature and Natural Resources) codes of I,

II, or III such as wilderness areas, protected beaches, and designated provincial parks. The second type of reserves is those set aside under various provincial policies, such as the Old Forest Policy.

A little over 8% of the ecodistrict falls in the intensive class, representing lands managed intensively to optimize resource production from sites maintained in a native forested state. Management may eliminate or reduce the duration of some development processes, particularly old forest stages, and may include exotic species, old field spruce, and monoculture plantations. Despite intensive practices, these lands are an important component of landscape structure and composition.

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, powerlines) 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.

Valley Slope has an overall Road Index value of approximately 17, which falls within the Mixed Rural Index range of 16 to 24 for lands of rural settlement mixed with forest resource and some agriculture. Only 3% of the ecodistrict has a Remote Road Index, occurring in small scattered blocks, although its southern boundaries often abut areas of Remote Road Index in the adjoining South Mountain Ecodistrict.

The highest road densities occur around settlements and the major transportation systems are primarily along the ecodistrict's northern boundaries, with the largest area being in the eastern end (Map 5). The Valley Corridors element has a high Road Index of 83.

Roads can contribute to habitat fragmentation and environmental degradation. Since nearly 95% of land ownership in the ecodistrict is in private hands, efforts could be made to:

- Encourage sharing of access roads and decommissioning of excess roads
- Educating about proper road construction
- Encourage road maintenance
- Encourage maintenance of unroaded areas and promote linkages among them and other areas without roads, either within or outside the ecodistrict

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

As of 2013 in the Valley Slope Ecodistrict, there are documented occurrences (under the NSESA) of the following number of formally listed species at risk: five endangered, two threatened, and four vulnerable. In addition to the listed species, the national General Status process also identifies 21

orange species, 44 yellow-status species, and 36 green species for a total of 101 other species of conservation concern in this district.

Designated species at risk found within the Valley Slope Ecodistrict include Atlantic salmon, American eel, wood turtle, and several bird species (red knot, chimney swift, bobolink, and Canada warbler).

Other species of conservation concern known for the Valley Slope Ecodistrict include striped bass (fish); southern flying squirrel and fisher (mammals); Northern maidenhair fern (ferns); vesper bluet and mustard white (insects); willet, northern goshawk, eastern bluebird, and blue-winged teal (birds); and downy rattlesnake plantain, coastal plain blue-eyed grass, wild comfrey, round-lobed hepatica, northern bog violet, and smooth sweet cicely (plants).

Old Forest

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

Although 7.9% of the Crown land has been identified under the policy, the majority is in the sugar maple-yellow birch-beech community type. Opportunities might exist to identify more area in the red spruce-eastern hemlock-white pine community type which currently stands at 5% of the area occupied by this type on Crown lands.

Most of the other community types will occur almost exclusively on non-Crown lands so inclusion of these community types as old forest will require participation by private owners.

Birds

As of 2008, ten formally listed bird species have been found in the ecodistrict. Five of these are listed under the NSESA as endangered: (chimney swift, red knot, rusty blackbird, barn swallow and Canada warbler); and two as threatened (common nighthawk and olive-sided flycatcher). Nationally, only one of these species (red knot) is designated as endangered by COSEWIC and SARA. There has been a nationwide decline in chimney swifts and common nighthawks, as well as other aerial insectivores due to declines in insect food species and nesting habitat.

One species – barn swallow – has threatened status under COSEWIC but is not presently listed under the NSESA in Nova Scotia. Habitat loss and land use practices in recent years have impacted all of these species. Finally, the eastern bluebird is a yellow-status species in Nova Scotia, but is not listed under the NSESA and also does not have any national designation. Bluebird declines go much farther in history, and are related to land use changes and competition with introduced species.

Mammals

The mainland moose 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, southeast to Liverpool, and northwest to Digby. This area is considered to be "occupied moose habitat" (an area with recurrent observations of moose over time). However, some moose wander long distances and they are occasionally observed in ecodistricts outside of this zone. DNR records show that moose have been observed within and near the Valley Slope Ecodistrict.

Moose are commonly associated with forested landscape habitats that have been altered or disturbed by an event such as fire, wind (i.e. blow down), disease, or timber harvesting. The habitat requirements of moose are largely dependent on successional forest stages. Early succession hardwood trees and shrubs provide necessary browse vegetation while mature conifer cover is valuable for shelter, thermal cover, and protection in winter and summer.

Prior to the introduction of forest harvesting as a disturbance regime, the availability of moose habitat would have historically been tied to natural disturbances. The natural disturbance regimes for this ecodistrict have been determined to be mainly gap and infrequent disturbance. Essentially, this would mean less availability of early successional hardwoods than in ecodistricts with frequent disturbance regimes where fire would have played a major role in altering forest composition.

Southern flying squirrels, such as the one shown above, have been found in the Valley Slope Ecodistrict. (Kiyono Katsumata photo)

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 forest development 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.

However, because of the low proportion of Crown land ownership in the Valley Slope, opportunities for managing Crown forests as potential moose habitat will be limited.

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.

Fisher and American marten are two species in the weasel family that are believed to be undergoing population recovery in southwestern Nova Scotia. Both were once more widespread throughout Nova Scotia but had declined to a few scattered populations by 1900. Reintroduction efforts for both species have taken place in recent decades: fisher in the 1940s and 1960s; marten in the 1980s. Fishers have a yellow status, while mainland American marten have no formal status. The Cape Breton population of American marten is listed as endangered under the NSESA.

The southern flying squirrel is a disjunctive species in Nova Scotia, geographically separated from other populations to the south. Smaller than the more common northern flying squirrel, the southern flying squirrel is confirmed for only a very few regions in the province, all within western Nova Scotia. The southern flying squirrel has been given yellow status. This species requires mature hardwoods for the production of nuts for food and for denning opportunities. Southern flying squirrels have been found in the northeastern end of the ecodistrict, in stands containing tolerant hardwoods along the Gaspereau River and in the Kentville ravine.

Fish

Human influences have caused a decline in brook trout populations in Nova Scotia and as a result, this species has been given a yellow status. Given the abundance of watercourses and branching tributaries in the Valley Slope, there should be considerable quality habitat for brook trout, including excellent spawning sites, available in this ecosection.

There are also several anadromous fish species considered to be at risk or a conservation concern that have been reported to occur in watercourses within Valley Slope.

Atlantic salmon, which have no formal provincial status in Nova Scotia, have historically utilized rivers in this ecosection for spawning but are presently in decline and are considered to be extirpated from most rivers in the southwest. These salmon are divided into several populations, all of which are designated as endangered by COSEWIC and some are protected under the federal Species at Risk Act. The inner Bay of Fundy population, which occurs in Valley Slope, is nationally endangered.

Survey data over since the late 1990s show that salmon have been found in tributaries of the Gaspereau River and the Annapolis River, as well as in Moose River, Bear River and Acacia Brook, which flow directly into the Annapolis Basin. The salmon occurring on the Gaspereau River would be considered part of the inner Bay of Fundy population; the remainder would be of the outer Bay of Fundy population.

Another anadromous fish with a red status in Nova Scotia that occurs in waters within the Valley Slope Ecodistrict is the striped bass. Once common in the Annapolis River, striped bass have not spawned there since the 1970s. DNR records show reports of them in the Bear River estuary and upper reaches of the Gaspereau River. The Bay of Fundy population of this species is designated federally as threatened.

In addition, gaspereau is a yellow-status anadromous fish species that undergoes spring upstream migrations in some Nova Scotia rivers. Within the Valley Slope, gaspereau spawn in the upper reaches of the Gaspereau River. American shad, a larger herring species, also spawns annually in the freshwater streams in this ecodistrict.

Reptiles

Wood turtles have been found in watercourses in the northeastern end of the Valley Slope and in the Annapolis River, which runs adjacent to the ecodistrict in a few locations. These turtles are uncommon province-wide and in southwestern Nova Scotia. General wildlife status for the species is yellow and wood turtles are listed as threatened provincially and nationally.

Plants

A total of 44 plant species, including lichens, known to occur in the Valley Slope are considered to be provincial "species at risk" (orange status, 16) or "sensitive" (yellow status, 28). None of these is listed under the NSESA, nor are any identified as species of national concern.
Notable species of conservation concern in the ecodistrict include eastern white cedar, downy rattlesnake plantain, wild comfrey, southern twayblade and northern maidenhair fern. Eastern white cedar has been designated vulnerable in Nova Scotia, the only Valley Slope plant species listed in the mid-2000s under the NSESA.

Eastern white cedar has been identified at several sites in the ecodistrict, most of them between Prospect in Kings County and Carleton Corner in Annapolis County.

Northern bog violet, slender cottongrass, small yellow ladies slipper and yellow nodding ladies'-tresses are a few of the many yellow-status species found here. Two of the Valley Slope species with yellow status – Case's ladies'-tresses and grassleaf rush – are considered by botanists to be part of a group of geographically isolated plants known as the Atlantic Coastal Plain Flora (ACPF), which occur primarily in southwestern Nova Scotia. This is a low number of ACPF species compared to the other ecosections in southwestern Nova Scotia, where generally there are many rare and at risk ACPF plant species, several with provincial and national endangered status.

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.

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

710 Valley Slope Ecodistrict			
Landscape Element and Type	**Ecosections***	**Dominant Natural Disturbance Regime**	**Dominant Climax Type**
Spruce Hemlock Pine Hummocks and Hills (Matrix)	ICHO IFHO IMHO WCHO WFHO WFKK WMHO WMSM	Infrequent	red Spruce (rS), eastern Hemlock (eH), white Pine (wP)
Tolerant Hardwood Hills (Patch)	WCKK WMKK WFSM	Gap	sugar Maple (sM), yellow Birch (yB), Beech (Be)
Tolerant Mixedwood Slopes (Patch)	WCDS WFDS WMDS	Gap	sM, yB, Be, rS, eH, wP
Spruce Pine Flats (Patch)	ICSM IFSM	Frequent	black Spruce (bS), wP
Wetlands (Patch)	WTLD	Open Seral (Frequent)	bS, red Maple (rM), tamarack (tL)
Pine Oak Hills and Hummocks (Patch)	WCRD	Infrequent	wP, red Oak (rO) red Pine (rP)
Valley Corridors (Corridor)	Various	Various	Various

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

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

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

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

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

Valley Slope contains 10 ecosections that are rare at the ecodistrict level – ICHO, ICSM, IFSM, IMHO, IMSM, WCDS, WCRD, WFSM, WMSM and WTLD. Ecosection WFSM is 93% converted to other uses. Ecosections IFSM and WFSM are also rare at the ecoregion level. A number of ecosections (IFHO, WFDS, WFHO, WFKK, WMDS and WMKK), although more common from the ecodistrict perspective, are rare when looking at the ecoregion.

The black spruce and red oak-white pine-red pine community types are very rare in the ecodistrict. Practices or policies that might be implemented or devised to address conservation issues include:

- 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 or climax communities considered to be rare.
- Identification of sites of cultural significance.
- Identification of more old forest.
- Ecological restoration where resource use has significantly altered species composition (i.e. in areas where the 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 Integrated Resource Management 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 Valley Slope include a small portion of the Cloud Lake Wilderness Area and the Grand-Pré National Historic Site.

Policy protected reserves in the ecodistrict are made up of the IRM (Integrated Resource Management) classification which includes the operational non-designated Upper Clements Wildlife Park, Upper Clements Provincial Park, and Old Forest at Paradise.

The reserve classes account for about 0.8% of the ecodistrict. A summary of the Valley Slope representivity can be found in Appendix 4. Appendix 5 provides a summary of ecodistrict reserves and protected areas.

Since all ecosections have little or no component of Crown land ownership, efforts to increase representivity will require participation from private landowners and organizations, such as the Nature Conservancy of Canada and the Nova Scotia Nature Trust.

Considerations in improving representation might focus on:

- ecosections of the matrix, which for its size have relatively little representivity
- ecosections that have no representivity
- improving connectivity between riparian corridors

ELA Summary

Element Interpretation (All appendices and maps)

The ecodistrict is a series of hills and slopes with a northwesterly aspect, bounded by the Annapolis Valley 610 and the South Mountain 720 ecodistricts that extend from the Bear River and Acacia valleys in the west to Mount Denson in the east.

With a climate warmed by the westerly exposure and far enough inland that the cold waters of the Bay of Fundy do not impact local climate, these fertile slopes have been used extensively for apple orchards and mixed farming.

Between Annapolis Royal and Middleton, granites constitute the bedrock. Soils on this parent material tend to be coarse to moderately coarse, well-drained, and commonly gravelly with surface stones limiting both machine operability and tree stocking levels. Slates, schists, and quartzites underlie the slopes in Kings County, providing well-drained, moderately coarse to medium-textured soils. There are only two areas of the ecodistrict where finer-textured soils occur and these are underlain by sandstones near Middleton and Hantsport.

This ecodistrict has the lowest area of freshwater in the ecoregion. Only about 0.5 % of the ecodistrict comprises lakes and rivers.

On the upper slopes of the well-drained ecosections, the climax forests are tolerant hardwoods. Sugar maple, beech, and yellow birch, with scattered white pine, dominate these sites. Farther down the slope on the deep moist soils and in the shaded ravines, a climax forest of hemlock, red spruce, and white pine is found. A good example of this type of climax forest occurs at Kentville Ravine and at other areas along Highway 101 between the Bridgetown and Digby exits. The lower slopes often support characteristics of forest elements that would be present in the adjacent Annapolis Valley Ecodistrict.

Natural disturbance agents in the ecodistrict are primarily associated with hurricanes and are of an infrequent nature. The beech bark canker, introduced in the 1890s, has reduced the beech to an understory species, although scattered disease-free individuals are not uncommon.

Spruce Hemlock Pine Hummocks and Hills

(Matrix) (ICHO, IFHO, IMHO, WCHO, WFHO, WFKK, WMHO and WMSM ecosections) (63,760 ha)

The Spruce Hemlock Pine Hummocks and Hills matrix makes up more than 70% of the ecodistrict. Primarily comprising well-drained soils, the climax community of this element is tolerant softwood.

The current forest is mostly mature (57%). Softwoods, mixedwoods, and hardwoods make up 30%, 37%, and 32% respectively in the matrix. Softwoods are largely late seral red spruce or the early seral white spruce occurring on abandoned farmland. Mixedwoods are often mid seral red maple or white birch with red spruce. Hardwoods are mostly the intolerant red maple or white birch. There are smaller areas of tolerant hardwood.

The matrix contains many small streams flowing north into the Cornwallis and Annapolis rivers and others flowing south into the South Mountain Ecodistrict. Although smaller wetlands do not

make up a big portion of the ecodistrict, those present are often associated with waterways in the matrix.

Almost one-fifth of the matrix has been converted from a forested state – largely to urban or agriculture areas. This conversion of lands from forest to other uses is most prominent in the eastern part of the matrix, resulting in fragmentation. Forest harvesting is prominent from Rockland westward. The connective function of the matrix among patch elements has been reduced as a result of the fragmentation.

Ecosections IMHO and ICHO make up less than 2% of the ecodistrict. Representivity is a concern as six of the seven ecosections in this element have less than 0.3% of the ecosection in the reserve class and some of these have no representation. IMHO is the one ecosection with a significant area in reserve (6.7% of ecosection area).

There is a need to identify old forest areas – likely on private land – within this element.

Flows

People (transportation, agriculture, settlement, forestry, fishing, hunting, input to and temperature control of 1st and 2nd order streams); bald eagles (perching, nesting); beaver (habitat-riparian zone); cedar (seepage zones and brooks).

Composition

Valley Slope Ecodistrict 710 (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
	15%	7%	78% (57 Mat + 21 OF)	21%
Seral Stage	Early	Mid	Late	Unclassified
	27%	37%	26%	10%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	30%	32%	37%	1%

Desired Condition

Predominately mature mid and late seral species dominated by tolerant softwoods. Some representation of younger age classes. Maintenance of connectivity between patch elements, reserves and corridors.

Issues

- species composition (large amount of intolerant hardwood)
- riparian management along many streams and wetlands
- fragmentation and connectivity
- representivity and rare ecosections (IMHO, ICHO)
- old forest

- unclassified area

Tolerant Hardwood Hills
(Patch) (WCKK, WMKK and WFSM ecosections) (16,680 ha)

This patch element, found on well-drained sandy or loam-textured soils located on hilly terrain, supports a climax forest of tolerant hardwoods. Most of this element occurs interspersed among the matrix between Clementsport and West Inglisville, with smaller areas south and west of Factorydale and a larger area south of Halfway River.

Approximately 8% of the patch element has been converted from a forested state. The forest is largely mature (60%) and comprises near equal amounts of mixedwood and hardwood covertypes – 44% and 36% respectively. Mixedwoods are most often mid or late seral, often red spruce with red maple, white birch, or tolerant hardwoods. The hardwood covertype contains more intolerant than tolerant communities with red maple, white birch and aspen prominent in the former and sugar maple-yellow birch-ash in the latter. The softwood covertype is most often red or white spruce, with white spruce found on former agricultural land.

The tolerant hardwood climax forest associated with the ecosections in this element make up 19% of the ecodistrict, but less than 2% of the ecoregion. Two of the ecosections in this element (WCKK and WMKK) have relatively small areas in the reserve classification – WCKK at 1.4% and WMKK at 4.4%. There appear to be a limited number of remote or areas without roads that could remain in this state. Approximately 11.9% of the area has not been classified.

Flows

People (transportation, settlement, agriculture, forestry, fishing, hunting); southern flying squirrel (important habitat); bald eagles (nesting); deer (food, general habitat).

Composition

Valley Slope Ecodistrict 710 (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
	15%	6%	79% (60 Mat + 19 OF)	19%
Seral Stage	Early	Mid	Late	Unclassified
	14%	40%	36%	10%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	19%	36%	44%	1%

Desired Condition

Mostly mature late seral tolerant hardwood landscape of sugar maple, yellow birch, and beech with a minor component of younger development classes and a good representation of old growth.

Issues

- species composition (amount of intolerant hardwood)
- representivity
- shortage of areas without roads
- area required to be classified

Tolerant Mixedwood Slopes

(Patch) (WCDS, WFDS and WMDS ecosections) (5,419 ha)

This element comprises narrow, well-drained, steep-sided, ravine-like landforms often found along sections of the ecodistrict's rivers or brooks. Occasionally this element crosses the width of the ecodistrict but generally it does not. The larger examples of this patch element occur along the Bear and Gaspereau rivers.

The climax forest is tolerant mixedwoods. The present forest is dominated by mixedwoods and hardwoods, both at 38%, with softwoods making up the smallest component (23%). These covertypes are largely mature. Mixedwoods are often red spruce with intolerant hardwoods, such as red maple. Occasionally, tolerant hardwoods form part of the mixedwoods. The hardwood covertype is dominated by intolerants, such as red maple or white birch, with tolerant hardwoods present to a lesser extent. Red spruce and white spruce are the more common softwoods.

Approximately 14% has been converted to a non-forested state. The tolerant mixedwood climax community of the ecosections in this patch element represents only 0.3% of the ecoregion and 6.5% of the ecodistrict.

WCDS is considered rare in the ecodistrict, occupying less than 1% of the area. Representivity is an issue as ecosections WMDS and WFDS have little or no areas in the reserve class and no areas in the ecodistrict identified under the Interim Old Forest Policy.

Flows

People (settlement, fishing, hunting, trapping); southern flying squirrel (habitat); fish (temperature control and nutrient input to large and small waterways); bald eagles (hunting area); deer (travel corridor); and beaver (general habitat).

Composition

Valley Slope Ecodistrict 710 (based on statistics up to 2007)

Composition of Tolerant Mixedwood Slopes

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	9%	3%	88% (70 Mat + 18 OF)	18%
Seral Stage	Early	Mid	Late	Unclassified
	20%	39%	34%	7%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	23%	38%	38%	1%

Desired Condition

A more or less continuous canopy of uneven-aged tolerant mixedwoods with a minor representation of younger development classes and a good representation of old growth.

Issues

- species composition
- representivity
- old growth
- unclassified area

Spruce Pine Flats
(Patch) (ICSM and IFSM ecosections) (768 ha)

This small element is found scattered throughout the ecodistrict, generally in small sections. Located on flat terrain, generally along waterways and associated with wetlands, the soils are usually clays that are fairly moist.

Wetter areas support a climax forest of black spruce with lesser amounts of red maple and vegetation common to wetlands. Better drained areas have a climax forest of red spruce and white pine.

The current forest is more than three-quarters mature.

The softwood covertype (34%) is largely black spruce on the wetter areas with drier areas having white pine and sometimes white pine, red spruce, white spruce or balsam fir.

Mixedwoods (44%) are usually mid seral containing intolerant hardwoods with spruce or fir.

The hardwood covertype (21%) is mostly the early seral red maple, white birch, and aspen.

Since this element is associated with wetlands and often occurs on wet soils, care needs to be taken to prevent activities that might damage the integrity of the wetlands or the adjacent riparian corridor.

The ecosections in this patch, IFSM and ICSM, are considered rare in the ecodistrict, each representing less than 1%. These ecosections have no area in the reserve category. The climax species associated with these ecosections is found on only 1% of the ecodistrict and no area has been identified under provincial Interim Old Forest Policy.

Flows

People (agriculture, settlement, fishing, hunting); fish (shade and nutrient input); deer (cover and food); and beaver (habitat).

Composition

Valley Slope Ecodistrict 710 (based on statistics up to2007)

Composition of Spruce Pine Flats

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	7%	3%	90% (77 Mat + 13 OF)	13%
Seral Stage	Early	Mid	Late	Unclassified
	14%	36%	45%	5%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	34%	21%	44%	1%

Desired Condition

Wetter areas of predominately mature black spruce. Better drained areas mostly mature red spruce or white pine with some younger age classes and earlier seral stages present.

Issues

- rare ecosections and representivity
- small amount of late seral softwoods
- potential integrity of wetlands and riparian zone
- old growth

Wetlands

(Patch) (WTLD ecosection) (360 ha)

Wetlands play an important role in water collection, filtration, and groundwater re-charge. The Wetlands element in this ecodistrict is characterized by low flat areas containing 70% wetlands and the remaining surrounding area with an inherent climax forest of black spruce, red maple, and tamarack. The wetlands are associated with existing waterways and are usually meadows, fens, or bogs.

The forested portion of the wetlands is mostly mature or multi-aged and nearly 50% mixedwoods – mainly mid seral in nature and comprising spruce with intolerant hardwoods. The softwood covertype is reported to be mostly early seral species, such as white spruce, or late seral, such as black or red spruce. Hardwood covertype is mostly intolerant species – red maple or white birch.

The Wetlands element is generally located in a few small areas to the east or west of the Nictaux River. Although little harvesting has taken place within the wetlands, there has been some harvesting immediately adjacent to them. Care should be taken in ensuring that harvesting in adjacent ecosections does not place the integrity of the Wetlands element at risk (e.g. windthrow, damage from road construction).

This element is important not only for the ecological functions it enables, but also because of its uniqueness (360 hectares in the ecodistrict).The ecosection WTLD making up this element has no area

in the reserve class. Besides the Wetlands element, smaller wetlands are present throughout different elements in the ecodistrict. Efforts should also be made to maintain their integrity.

Flows

People (fishing, forestry); fish (habitat in streams and within wetlands); deer (wooded swamps, cover); cedar (possible occurrences in some swamps).

Composition

Valley Slope Ecodistrict 710 (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
	15%	4%	81% (49 Mat + 32 OF)	32%
Seral Stage	Early	Mid	Late	Unclassified
	35%	38%	17%	10%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	27%	24%	49%	<1%

Desired Condition

Relatively undisturbed and well-connected wetlands among a black spruce dominated forest.

Issues

- rare ecosection
- representivity
- practices in adjacent forests

Pine Oak Hills and Hummocks

(Patch) (WCRD ecosection) (190 ha)

This well-drained patch element found on sandy soils in a ridged topography on the ecodistrict's northern boundary supports a climax community of red oak-white pine-red pine. The current forest is mostly mature (70%) or multi-aged (23%) and should be investigated to determine if red oak and red pine are present.

The prevalent covertype is mixedwood with a good representation of all seral stages. Trembling aspen, red maple, and possibly red oak with white spruce, and the occasional red spruce in the early stage; red maple, white birch, and possibly red oak with red/black spruce or white pine in the middle stage; and white pine or red spruce with hardwoods in the late stage. The hardwood covertype is mostly the intolerant red maple, trembling aspen, or white birch. The softwood covertype is mostly white pine, white spruce, or balsam fir.

Within the ecodistrict, there are no areas in the reserve class and no area identified under the Old Forest Policy with the pine-oak climax. Tributaries of the Nictaux and Black rivers flow out of opposite ends of the element.

The WCRD ecosection, because it makes up only 0.2% of the ecodistrict, is considered unique. The climax community associated with the ecodistrict makes up 0.2% of the ecodistrict community types and 3.2% of the ecoregion's community types.

Flows

People (fishing and forestry); southern flying squirrel (mature cover important habitat); bald eagles (nesting and roosting); and deer (habitat and food).

Composition

Valley Slope Ecodistrict 710 (based on statistics up to 2007)

Composition of Pine Oak Hills and Hummocks

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	5%	2%	93% (70 Mat + 23 OF)	23%

Seral Stage	Early	Mid	Late	Unclassified
	46%	23%	27%	4%

Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	17%	36%	47%	<1%

Desired Condition

Predominately mature community featuring mostly mid and late seral species including white pine, red oak, and red pine, with some representation of younger development classes.

Issues

- unique area
- no area in reserve class
- no old growth set aside
- development class composition with only 7% in the establishment and young classes

Valley Corridors

(Corridor) (Various ecosections) (765 ha)

Valley Slope Ecodistrict has 414 hectares (0.5% of ecodistrict) of inland waters. Although riparian zones exist on all waterways, riparian corridors have been delineated along some of the larger streams in the ecodistrict. These include Acacia, Bear, Moose, Allains, Round Hill, Nictaux and Gaspereau rivers. These corridors around the waterways are extremely important for biodiversity and ecosystem function. Many species utilize aquatic and terrestrial habitat.

The majority of the corridors exhibit gap or infrequent disturbance regimes. The current forest is nearly all mature (72%) or multi-aged (23%) and largely mid or late seral. Mixedwoods of intolerant hardwoods and white pine, spruce, and sometimes hemlock are prominent. Some mixedwoods with tolerant hardwood are also present. The hardwood covertype largely comprises intolerant hardwoods although tolerants are not uncommon. Red spruce, pine, and hemlock dominate the least common softwood covertype.

About 11% of the corridors have been converted from forests to other uses. Dams are present on some of the rivers.

Corridors have the highest Road Density Index in the ecodistrict and will have an impact on habitat use and ecological function.

Resource use practices in areas adjacent to riparian corridors need to take into account their possible impact on the corridor. For example, because of the narrow corridor, blowdown may be an issue if not mitigated by practices in the adjacent forest.

Flows

People (settlement); deer (food).

Composition

Valley Slope Ecodistrict 710 (based on statistics up to2007)

Composition of Valley Corridors

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	3%	2%	95% (72 Mat + 23 OF)	23%
Seral Stage	Early	Mid	Late	Unclassified
	16%	44%	37%	3%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	20%	40%	40%	<1%

Desired Condition

A continuous strip of generally mature forested communities. A zone of low impact forestry practices.

Issues

- high Road Density Index
- converted areas
- resource practices in riparian zone

Ecosystem Issues and Opportunities (All appendices and maps)

Management of the forest resource in the Valley Slope 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 natural disturbance regime (NDR), development class and seral stage.
- Investigating the possibility of increasing the amount of late seral species in elements where the predicted climax is a tolerant species through silviculture activities, such as partial cuts or thinnings in the appropriate mid seral stands or planting of abandoned agricultural land.
- Benefiting wildlife by increasing the number of large patch areas.
- Looking for opportunities to decrease the level of fragmentation, particularly in the matrix, and ensure adequate levels of connectivity exist between wetlands and riparian corridors.
- Recognizing the importance of riparian corridors on all water courses both as protectors of aquatic ecosystems and as habitat. Look into maintaining the integrity of corridors through appropriate management practices (type of harvesting, rate of harvesting) within the corridor and in adjacent areas.
- Protection of existing wetlands and wetland complexes. Ensure wetland integrity is not compromised by resource management activity (harvesting, road construction).
- Recognizing the importance of wetland-adjacent land relationships for biodiversity.
- Recognizing the full scope of ecological effects on the landscape resulting from road construction. Where applicable, developing road plans for Crown land. Engaging the public over issues such as road plans, road decommissioning and sharing access roads.
- Recognizing that private landowners are the largest landowners and avenues should be investigated to elicit their participation in ecological management at the landscape level.
- Improving representivity by considering additional ecosections – ICHO, ICSM, IFHO, IFSM, IMSM, WCHO, WCKK, WCRD, WFDS, WFHO, WFKK, WFSM, WMDS, WMHO, WMSM, and WTLD. These ecosections have little or no representivity.
- Locating more old growth forest in community types where it is lacking, such as black spruce, red oak-white pine-red pine, tolerant mixedwood.
- Ecosections ICHO, ICSM, IFSM, IMHO, IMSM, WCDS, WCRD, WFSM, WMSM and WTLD are considered rare ecosections (less than 2% of the ecodistrict area).
- Consider maintaining an acceptable balance among the four ecological emphasis classes.

Appendix 1: Flow - Element Interactions

Element	People	Southern Flying Squirrel	Anadromous Fish	Bald Eagles	Deer	Beaver	Cedar
Matrix 1. Spruce Hemlock Pine Hummocks and Hills (WFKK, WFHO, WMHO, WCHO, IFHO, IMHO, ICHO, WMSM)	- transportation, agriculture, settlement, forestry, fishing, hunting		- numerous first and second order streams - important for spawning and stream-side vegetation - important food source and temperature control	- mature climax trees perching and roosting sites	- young, early successional stands important for food - mature mid and late successional provide cover, general habitat	- use of smaller streams and early successional species along riparian zones	- along seepage zones and brooks - deer browsing
Patches 1. Tolerant Hardwood Hills (WCKK, WMKK, WFSM)	- transportation, agriculture, settlement, forestry, fishing, hunting	- late successional mature hardwood - important habitat		- nesting sites in mature stands	- food in young early successional stage - food in late successional stage (beech nuts) - bedding and general habitat		
2. Tolerant Mixedwood Slopes (WMDS, WFDS, WCDS)	- settlement, fishing, hunting, trapping	- late successional mature hardwood and mixedwood - important habitat	- major rivers and streams important for migration and spawning, nutrient input, temperature control	- hunting area	- travel corridor - food (beech nuts)	- general habitat	
3. Spruce Pine Flats (ICSM, IFSM)	- agriculture, settlement, fishing, hunting		- shade and nutrient-food input to streams		- mature, late successional provides cover - young early successional food source	- habitat	
4. Wetlands (WTLD)	- fishing, forestry		- habitat in streamside wetlands		- wooded swamps provide cover	- use dependent on vegetation type	- possible occurrence in some swamps
5. Pine Oak Hills and Hummocks (WCRD)	- fishing, forestry	- late successional mature cover - important habitat	- headwaters of streams - spawning	- nesting and roosting in mature seral stages	- early successional provides browse - mid and late successional mature important for food cover		

Appendix 1: Flow - Element Interactions

Element	People	Southern Flying Squirrel	Anadromous Fish	Bald Eagles	Deer	Beaver	Cedar
Valley Corridors (Gaspereau, Black, Phails, Nictaux, South, Round Hill, Moose, Bear, Acacia rivers, Allains Creek)	- power generation, settlement, fishing, hunting, bird watching, swimming, canoeing	- late successional mature hardwood habitat	- food, cover, temperature regulation, migration, and spawning	- forage and nesting	- travel corridor - habitat	- lower stream gradient (flatter areas) areas of beaver habitat	

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
Spruce Hemlock Pine Hummocks and Hills	Matrix	High	ICHO IFHO IMHO WCHO WFHO WFKK WMHO WMSM	Landscape	Infrequent	- climax tolerant softwood - current forest red spruce, white spruce, mixedwood, intolerant hardwood	- all elements	- ownership (property size) - urbanization - agriculture - change in forest species composition (> intolerant hardwoods, white spruce) - economic climate - dissections (possible barrier)	- land conversion - harvesting - fragmentation - roads - patch size	- land purchase by government - extension and education - mimic natural disturbance regime where possible - ecological restoration - municipal/provincial dialogue
Tolerant Hardwood Hills	Patch	High	WCKK WMKK WFSM	Landscape	Gap	- climax tolerant hardwood - current forest mixedwood, intolerant hardwood, red spruce, white spruce, some tolerant hardwood	- matrix - dissections	- condition in the matrix - interior conditions (patch sizes), change in species composition - ownership (property size)	- harvesting practices - fragmentation	- land purchase by government - extension and education - ecological restoration - patch aggregation - manage under gap disturbance regime
Tolerant Mixedwood Slopes	Patch	High	WCDS WFDS WMDS	Local	Gap	- climax tolerant mixedwood - current forest mixedwood, red spruce, intolerant and tolerant hardwood	WMKK, WFKK, WFHO, WMHO	- conditions in matrix or associated ecodistrict - roads - settlement (Bear, Acacia Rivers) and on fringes - some flowage creation (Lumsden Dam)	- harvesting in matrix - uniqueness within region	- Ensure connectivity is addressed in adjacent ecodistricts if dissections converge

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
Spruce Pine Flats	Patch	Low	ICSM IFSM	Local	Frequent	- climax black spruce - current forest black spruce, mixedwood intolerant hardwood	WFKK, WCKK	- ecosection south of Harmony numerous smaller waterways susceptible to blowdown from harvesting in adjacent ecosections		- ensure concerns of potential blowdown addressed in possible adjacent harvest blocks
Wetlands	Patch	High	WTLD	Landscape	Open Seral	- current forest intolerant hardwood (red maple), mixedwood, black/white spruce, shrubs	WFKK, IFHO, WCKK	- alteration	- conversion - infilling - forest harvest produces in adjacent ecosections	- education - land use practices - mimic natural disturbance if appropriate in adjacent ecosections - maintain wetland and water quality
Pine Oak Hills and Hummocks	Patch	Low	WCRD	Local	Infrequent	- climax oak, white pine, red pine - current forest intolerant mixedwood, intolerant hardwood, white pine	WFHO	- changes in species composition	- amount of early seral species	- appropriate forest practices to increase late seral species
Valley Corridors	Corridor	High	Various	Landscape	Variable	- current forest largely mixedwood with some tolerant softwood and black spruce	- primarily matrix	- loss of linear continuity in waterways	- hydroelectric structures - potential building of mercury behind dams	- alternate sources of electrical power - adoption of forest practices to maintain riparian zone integrity

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 710)

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

SPECIES		DESIGNATION		
Common Name	**Scientific Name**	**Provincial**	**Federal**	**COSEWIC**
BIRDS				
Red Knot	*Calidris canutus rufa*	Endangered	Endangered	Endangered
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	Special Concern	Special Concern
Bobolink	*Dolichonyx oryzivorus*	Vulnerable	Threatened	Threatened
Rusty Blackbird	*Euphagus carolinus*	Endangered	Special Concern	Special Concern
Barn Swallow	*Hirundo rustica*	Endangered	Threatened	Threatened
Bank Swallow Canada	*Riparia riparia*	N/A	Threatened	Threatened
Warbler	*Wilsonia canadensis*	Endangered	Threatened	Threatened
FISH				
American Eel	*Anguilla rostrata*	N/A	N/A	Threatened
Striped bass – Bay of Fundy population	*Morone saxatilis pop. 2*	N/A	N/A	Endangered
Atlantic Salmon - Inner Bay of Fundy population	*Salmo salar*	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
REPTILES				
Snapping Turtle	*Chelydra serpentina*	Vulnerable	Special Concern	Special Concern
Wood Turtle	*Glyptemys insculpta*	Threatened	Threatened	Threatened
MAMMALS				
Southern Flying Squirrel	*Glaucomys volans*	N/A	Not at Risk	Special Concern

Appendix 3: Special Occurrences (Ecodistrict 710)

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

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**AC CDC S-Rank***
BIRDS			
Northern Goshawk	*Accipiter gentilis*	Green (Secure) Yellow	S3S4
Spotted Sandpiper	*Actitis macularius*	(Sensitive) Orange (May	S3S4B
Blue-winged Teal	*Anas discors*	Be At Risk)	S3B
Common Goldeneye	*Bucephala clangula*	Green (Secure)	S2B,S5N
Least Sandpiper	Calidris minutilla	Green (Secure)	S1B,S5M
Semipalmated Sandpiper	*Calidris pusilla*	Yellow (Sensitive)	S3M
Semipalmated Plover	*Charadrius semipalmatus*	Green (Secure)	S1S2B,S5M
Killdeer	*Charadrius vociferus*	Yellow (Sensitive)	S3S4B
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Yellow (Sensitive)	S3S4B
Wilson's Snipe Common	*Gallinago delicata*	Yellow (Sensitive)	S3S4B
Loon Hudsonian Godwit	*Gavia immer Limosa*	Orange (May Be At Risk)	S3B,S4N
Brown-headed Cowbird	*haemastica Molothrus*	Yellow (Sensitive) Green	S3M
Great Crested Flycatcher	*ater Myiarchus crinitus*	(Secure)	S2S3B
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Orange (May Be At Risk)	S2B
Scarlet Tanager	*Piranga olivacea*	Yellow (Sensitive)	S3S4B
American Golden-Plover	*Pluvialis dominica*	Undetermined	S2B
Eastern Phoebe	*Sayornis phoebe*	Yellow (Sensitive)	S3M
Eastern Bluebird	*Sialia sialis*	Yellow (Sensitive)	S3S4B
Greater Yellowlegs	*Tringa melanoleuca*	Yellow (Sensitive)	S3B
Willet	*Tringa semipalmata*	Yellow (Sensitive)	S3B,S5M
Solitary Sandpiper	*Tringa solitaria*	Orange (May Be At Risk)	S2S3B
		Green (Secure)	S1?B,S4S5M
DICOTS			
Silver Maple Hooked	*Acer saccharinum*	Orange (May Be At Risk)	S1
Agrimony Running	*Agrimonia gryposepala*	Green (Secure) Green	S3
Serviceberry	*Amelanchier stolonifera*	(Secure)	S3?
Canada Anemone	*Anemone canadensis*	Orange (May Be At Risk)	S2
a Pussytoes	*Antennaria parlinii*	Orange (May Be At Risk)	S1
Swamp Milkweed	*Asclepias incarnata ssp. pulchra*	Undetermined	S2S3
Five-angled Dodder	*Cuscuta pentagona*	Undetermined	S1
Wild Comfrey	*Cynoglossum virginianum var. boreale*	Orange (May Be At Risk)	S1
Canada Tick-Trefoil	*Desmodium canadense*	Orange (May Be At Risk)	S1
Large Tick-Trefoil	*Desmodium glutinosum*	Orange (May Be At Risk)	S1
Purple-veined Willowherb	*Epilobium coloratum*	Yellow (Sensitive)	S2?
Downy Willowherb	*Epilobium strictum*	Yellow (Sensitive)	S3
Common Bedstraw	*Galium aparine*	(Exotic)	S1
Blunt-leaved Bedstraw	*Galium obtusum*	Orange (May Be At Risk)	S1S2

Appendix 3: Special Occurrences (Ecodistrict 710)

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

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**AC CDC S-Rank***
Bicknell's Crane's-bill	*Geranium bicknellii*	Green (Secure) Yellow	S2BS5N
American False Pennyroyal	*Hedeoma pulegioides*	(Sensitive) Orange (May	S2S3
Round-lobed Hepatica	*Hepatica nobilis var. obtusa*	Be At Risk)	S1S2
Panicled Hawkweed	*Hieracium paniculatum Iva*	Green (Secure)	S3
Big-leaved Marsh-elder	*frutescens ssp. oraria Lactuca*	Yellow (Sensitive)	S2
Hairy Lettuce	*hirsuta var. sanguinea*	Yellow (Sensitive)	S2
Yellow-seeded False Pimperel	*Lindernia dubia*	Green (Secure)	S3S4
Narrow-leaved Evening Primrose	*Oenothera fruticosa ssp. glauca*	Undetermined	S2
Smooth Sweet Cicely	*Osmorhiza longistylis*	Orange (May Be At Risk)	S2
Racemed Milkwort	*Polygala polygama*	Undetermined	S1
Halberd-leaved Tearthumb	*Polygonum arifolium*	Yellow (Sensitive)	S2
Small's Knotweed	*Polygonum buxiforme*	Undetermined	S2S3
Pennsylvania Smartweed	*Polygonum pensylvanicum*	Green (Secure)	S3
Stout Smartweed	*Polygonum robustius*	Green (Secure)	S3S4
Climbing False Buckwheat	*Polygonum scandens*	Yellow (Sensitive)	S3
Northern Dewberry	*Rubus flagellaris*	Undetermined	S1?
Cut-Leaved Coneflower	*Rudbeckia laciniata*	Yellow (Sensitive)	S2
Cut-Leaved Coneflower	*Rudbeckia laciniata var. gaspereauensis*	Undetermined	S2
Triangular-valve Dock	*Rumex salicifolius var. mexicanus Scrophularia*	Yellow (Sensitive)	S2
Lance-leaved Figwort	*lanceolata*	Undetermined	S1
Wavy-leaved Aster	*Symphyotrichum undulatum*	Yellow (Sensitive)	S2
Canada Germander	*Teucrium canadense*	Yellow (Sensitive)	S3
Dwarf Bilberry	*Vaccinium caespitosum*	Yellow (Sensitive)	S2
Northern Bog Violet	*Viola nephrophylla*	Yellow (Sensitive)	S2
Arrow-Leaved Violet	*Viola sagittata var. ovata*	Green (Secure)	S3S4
FERNS AND THEIR ALLIES			
Northern Maidenhair Fern	*Adiantum pedatum*	Orange (May Be At Risk)	S1
Maidenhair Spleenwort	*Asplenium trichomanes*	Yellow (Sensitive) Yellow	S2
Lance-Leaf Grape-Fern	*Botrychium lanceolatum var. angustisegmentum*	(Sensitive)	S2S3
Least Moonwort Bulblet	*Botrychium simplex*	Yellow (Sensitive)	S2S3
Bladder Fern Common	*Cystopteris bulbifera*	Green (Secure)	S3S4
Scouring-rush	*Equisetum hyemale var. affine*	Green (Secure)	S3S$
Dwarf Scouring-Rush	*Equisetum scirpoides*	Green (Secure)	S3S4
Variegated Horsetail	*Equisetum variegatum*	Green (Secure)	S3
Northern Clubmoss	*Lycopodium complanatum*	Green (Secure)	S3S4
Sitka Clubmoss	*Lycopodium sitchense*	Green (Secure)	S3?

Appendix 3: Special Occurrences (Ecodistrict 710)

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

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**AC CDC S-Rank***
Appalachian Polypody	*Polypodium appalachianum*	Undetermined	S3?
INSECTS			
Common Roadside-Skipper	*Amblyscirtes vialis*	Green (Secure)	S2
Eastern Pine Elfin	*Callophrys niphon*	Green (Secure)	S2
Vesper Bluet	*Enallagma vesperum*	Yellow (Sensitive)	S2S3
Juvenal's Duskywing	*Erynnis juvenalis*	Green (Secure)	S2S3
Harvester	*Feniseca tarquinius*	Green (Secure)	S3S4
Northern Pearly-Eye	*Lethe anthedon*	Green (Secure)	S3
Riffle Snaketail	*Ophiogomphus carolus*	Green (Secure)	S3
Mustard White	*Pieris oleracea*	Yellow (Sensitive)	S2
Question Mark	*Polygonia interrogationis*	Green (Secure)	S3B
Grey Comma	*Polygonia progne*	Green (Secure)	S3S4
Striped Hairstreak	*Satyrium liparops*	Undetermined	S3
Aphrodite Fritillary	*Speyeria aphrodite*	Green (Secure)	S3S4
LICHENS			
Green Starburst Lichen	*Parmeliopsis ambigua*	Yellow (Sensitive)	S2S3
Eyed Mossthorns	*Polychidium muscicola*	Orange (May Be At Risk)	S1S2
Woollybear Lichen			
Petalled Rocktripe Lichen	*Umbilicaria polyphylla*	Yellow (Sensitive)	S2S3
MAMMALS			
Fisher	*Pekania pennanti*	Yellow (Sensitive)	S2
Cougar - Eastern population	*Puma concolor pop. 1*	Undetermined	SH
Maritime Shrew	*Sorex maritimensis*	Green (Secure)	S3
MONOCOTS			
Silvery-flowered Sedge	*Carex argyrantha*	Green (Secure)	S3S4
Atlantic Sedge	*Carex atlantica ssp. capillacea*	Undetermined	S2
Porcupine Sedge	*Carex hystericina*	Orange (May Be At Risk)	S2
Hop Sedge	*Carex lupulina*	Green (Secure) Yellow	S3
Swan's Sedge	*Carex swanii*	(Sensitive) Yellow	S2S3
Tender Sedge	*Carex tenera*	(Sensitive) Green	S1S2
Blunt Broom Sedge	*Carex tribuloides*	(Secure)	S3?
Long-bracted Frog Orchid	*Coeloglossum viride var. virescens*	Orange (May Be At Risk)	S2S3
Early Coralroot	*Corallorhiza trifida*	Green (Secure)	S3
Yellow Lady's-slipper	*Cypripedium parviflorum*	Yellow (Sensitive)	S2S3
Small Yellow Lady's-Slipper	*Cypripedium parviflorum var. makasin*	Yellow (Sensitive)	S2

Appendix 3: Special Occurrences (Ecodistrict 710)

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

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**AC CDC S-Rank***
Deer-tongue Panic Grass	*Dichanthelium clandestinum*	Green (Secure)	S3
Narrow-leaved Panic Grass	*Dichanthelium linearifolium*	Yellow (Sensitive)	S2?
Quill Spikerush	*Eleocharis nitida*	Green (Secure)	S3
Slender Cottongrass	*Eriophorum gracile*	Yellow (Sensitive)	S2
Downy Rattlesnake-Plantain	*Goodyera pubescens*	Orange (May Be At Risk)	S2
Lesser Rattlesnake-plantain	*Goodyera repens*	Yellow (Sensitive)	S3
Sharp-Fruit Rush	*Juncus acuminatus*	Yellow (Sensitive) Yellow	S3S4
Grassleaf Rush	*Juncus marginatus*	(Sensitive) Orange (May	S3
Southern Twayblade	*Listera australis*	Be At Risk) Green	S2
Pale Green Orchid	*Platanthera flava var. herbiola*	(Secure)	S1S2
Large Purple Fringed Orchid	*Platanthera grandiflora*	Green (Secure)	S3
Hooker's Orchid	*Platanthera hookeri*	Green (Secure)	S3
White-stemmed Pondweed	*Potamogeton praelongus*	Yellow (Sensitive)	S3?
Narrow-leaved Blue-eyed-grass	*Sisyrinchium angustifolium*	Green (Secure) Orange	S3S4
Coastal Plain Blue-eyed-grass	*Sisyrinchium fuscatum*	(May Be At Risk)	S1
Case's Ladies'-Tresses	*Spiranthes casei var. novaescotiae*	Yellow (Sensitive)	S2
Shining Ladies'-Tresses	*Spiranthes lucida*	Orange (May Be At Risk)	S2
Yellow Ladies'-tresses	*Spiranthes ochroleuca*	Yellow (Sensitive)	S2S3

*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 710)
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	Nova Scotia Environment Act Nova Scotia Forests Act (subsection: *Wildlife Habitat and Watercourses Protection Regulations*)
Eagle Nests	Bird Habitat	Significant Habitats of Nova Scotia Database	Nova Scotia Wildlife Act (NSWA)
Osprey Nests	Bird Habitat	Significant Habitats of Nova Scotia Database	Nova Scotia Wildlife Act
Migratory Shorebird Roosts	Bird Habitat	Local knowledge	Nova Scotia Wildlife Act
Southern Flying Squirrel Habitat	Species	Significant Habitats of Nova Scotia Database	
Wilderness Areas – Cloud Lake	Ecosystems/ Recreation	DNR Restricted Land Use Database	Nova Scotia Wilderness Areas Protection Act
Provincial Park – Smiths Cove Look Off; Upper Clements; Lumsden Pond.	Ecosystems/ Recreation	DNR Restricted Land Use Database	Nova Scotia Parks Act
Operational Non-designated Parks and Reserve – Upper Clements Wildlife		DNR Restricted Land Use Database	Nova Scotia Wildlife Act
Provincial Game Sanctuary – Upper Clements Game Sanctuary		DNR Restricted Land Use Database	Nova Scotia Wildlife Act

Appendix 3: Special Occurrences (Ecodistrict 710)
Table 1c – Other Conservation Features

Feature	Type	Information Source	Legislation or Status Ranking System
Designated Water Supply – Cornwallis; Kentville; Falmouth	Ecosystems	DNR Restricted Land Use Database	Nova Scotia Environment Act
Natural Watershed Municipal Surface Water Supply – Cornwallis (Potter Lake); Lawrencetown (Eel Weir Lake); Annapolis Royal; Wolfville (Gaspereau Mountain); Kentville; Falmouth; Hantsport	Ecosystems	DNR Restricted Land Use Database	
Site of Ecological Significance – Southern Bight of Minas Basin (Ramsar Site)	Ecosystems	DNR Restricted Land Use Database	Ramsar Convention
Eastern Habitat Joint Venture Lands – Western Brooklyn (Bluff Road); Atkins Marsh.	Ecosystems	DNR Restricted Land Use Database	Nova Scotia Wildlife Act
Old Forest – Cloud Lake Wilderness Area; Paradise.	Ecosystems	DNR Restricted Land Use Database	

Appendix 3: Special Occurrences (Ecodistrict 710)
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 – Gaspereau River; Grand Pré; Annapolis River	Cultural/Community Heritage	Aboriginal Traditional Knowledge Local Knowledge NSDNR Database
Abandoned Mines	Geological and Cultural Heritage	NS Abandoned Mines Database
First Nations Reserve Lands – Horton; Annapolis Valley; Bear River	Cultural	NSDNR Restricted Land Use Database
National Historic Site – Grand Pré; New England Planters (Grand Pré).	Cultural/Community Heritage	NSDNR Restricted Land Use Database
Historic Site – Horton Landing (Grand Pré).	Cultural/Community Heritage	Local Knowledge
Significant Geological Feature – Blue Beach (fossils)	Geological and Cultural Heritage	Local Knowledge

Appendix 3: Special Occurrences

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

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

Ecosection	Climax Type	Ecodistrict Occurrence						Ecoregion Occurrence					
		Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted	Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted
		Ha	%	Ha	%			Ha	%	Ha	%		
ICHO	rS eH wP	420	0.5	64,104	72.4	66 to 72	3.2	270,098	16.0	616,727	36.6	75 to 79	1.4
ICSM	bS	98	0.1	888	1.0	65 to 74	1.8	37,858	2.2	75,102	4.5	76 to 79	2.5
IFHO	rS eH wP	4,543	5.1	64,104	72.4	63 to 67	9.3	7,665	0.5	616,727	36.6	62 to 67	8.5
IFSM	bS	700	0.8	888	1.0	69 to 72	1.4	2,423	0.1	75,102	4.5	66 to 72	3.1
IMHO	rS eH wP	1,117	1.3	64,104	72.4	64 to 69	5.1	222,050	13.2	616,727	36.6	70 to 73	3.0
IMSM	rS eH wP	293	0.3	64,104	72.4	57 to 58	19.6	92,050	5.5	616,727	36.6	71 to 74	3.7
WCDS	rS eH wP sM yB Be	637	0.7	5,759	6.5	61 to 63	15.1	1,045	0.1	187,322	11.1	66 to 67	9.2
WCHO	rS eH wP	4,703	5.3	64,104	72.4	42 to 45	36.3	187,670	11.1	616,727	36.6	73 to 77	3.9
WCKK	sM yB Be	9,950	11.2	16,831	19.0	61 to 67	7.2	152,022	9.0	59,619	3.5	66 to 73	3.5
WCRD	rO wP rP	189	0.2	189	0.2	62 to 69	3.4	2,880	0.2	53,643	3.2	70 to 75	5.2
WFDS	rS eH wP sM yB Be	2,414	2.7	5,759	6.5	61 to 63	12.2	2,414	0.1	187,322	11.1	59 to 62	12.2
WFHO	rS eH wP	13,193	14.9	64,104	72.4	46 to 50	24.8	31,687	1.9	616,727	36.6	53 to 60	14.0
WFKK	rS eH wP	27,847	31.5	64,104	72.4	46 to 51	25.8	28,197	1.7	616,727	36.6	44 to 49	25.5

*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	%		
WFSM	sM yB Be	71	0.1	16,831	19.0	4 to 6	93.4	71	0.0	59,619	3.5	4 to 6	93.4
WMDS	rS eH wP sM yB Be	2,708	3.1	5,759	6.5	55 to 61	13.8	3,505	0.2	187,322	11.1	52 to 57	16.3
WMHO	rS eH wP	11,847	13.4	64,104	72.4	49 to 56	18.6	154,580	9.2	616,727	36.6	64 to 69	7.5
WMKK	sM yB Be	6,750	7.6	16,831	19.0	62 to 68	7.9	17,019	1.0	59,619	3.5	60 to 65	9.9
WMSM	rS eH wP	228	0.3	64,104	72.4	25	64.7	228	0.0	616,727	36.6	25	64.7
WTLD	wetlands	367	0.4	0	0.0	61 to 63	11.0	87,241	5.2	0	0.0	77 to 78	3.0
WFSM	sM yB Be	71	0.1	16,831	19.0	4 to 6	93.4	71	0.0	59,619	3.5	4 to 6	93.4

*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)
WFKK	rS eH wP	27,847	2.6	84	0.0	0	18.3	84	0.3	18	0.0	102	0.4
WFHO	rS eH wP	13,193	2.6	0	0.0	0	9.7	0	0.0	10	0.0	10	0.1
WMHO	rS eH wP	11,847	1.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
WCKK	sM yB Be	9,950	2.8	0	0.0	143	0.0	143	1.4	0	0.0	143	1.4
WMKK	sM yB Be	6,750	5.1	0	0.0	294	0.0	294	4.4	0	0.0	294	4.4
WCHO	rS eH wP	4,703	1.1	0	0.0	3	7.9	3	0.1	8	0.0	11	0.2
IFHO	rS eH wP	4,543	2.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
WMDS	rS eH wP sM yB Be	2,708	0.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
WFDS	rS eH wP sM yB Be	2,414	3.2	0	0.0	7	0.0	7	0.3	0	0.0	7	0.3
IMHO	rS eH wP	1,117	9.3	0	0.0	75	0.0	75	6.7	0	0.0	75	6.7
IFSM	bS	700	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
WCDS	rS eH wP sM yB Be	637	6.2	0	0.0	38	0.0	38	6.0	0	0.0	38	6.0
ICHO	rS eH wP	420	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
XXWA	NONE	414	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
WTLD	wetlands	367	1.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
IMSM	rS eH wP	293	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
WMSM	rS eH wP	228	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
WCRD	rO wP rP	189	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
ICSM	bS	98	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
WFSM	sM yB Be	71	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total		**88,490**		**84**		**560**		**606**		**36**		**680**	

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	78	0	Operational Non Designated Parks and Reserves	349	0
National Historic Sites and Parks	7	0	Old Forest	182	0
			Nova Scotia Nature Trust	0	33
			Designated Provincial Parks and Park Reserves	17	0

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

Appendix 6: Description of Road Density Index

Road, trail, and utility corridors provide the background structure for transporting people and goods and are integral components of human land use. However, transportation systems are expensive and have a wide range of negative environmental impacts including, 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, areas without roads and/or few roads are important for biodiversity conservation and should be considered during planning (USDA Forest Service 1999).

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

Main Concepts

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

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

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

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

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	1,079
Utility corridors	3	212
Gravel roads and active railways	6	711
Paved streets and roads collectors	10	512
Highways	15	69

Table 2: Distribution of Road Index Classes

Road Index Value		Area of Ecodistrict Affected	
Indication	Range	Hectares	Percent
Remote	0 - 6	2,611	3
Forest Resource	7 - 15	21,134	23.9
Mixed Rural	16 -24	26,034	29.4
Agriculture Suburban	25 - 39	30,073	34
Urban	40 - 100	8,637	9.8
Total		**88,489**	**100**

Table 3: Road Index Values for Each Landscape Element Type

Landscape Element	Area (ha)	Road Index
Valley Corridors	765	83
Spruce Hemlock Pine Hummocks and Hills	63,760	15
Spruce Pine Flats	768	14
Tolerant Hardwood Hills	16,680	13
Tolerant Mixedwood Slopes	5,419	25
Pine Oak Hills and Hummocks	190	9
Floodplain	*292*	*32*
Wetlands	360	30
Total	**88,234***	**17**

*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

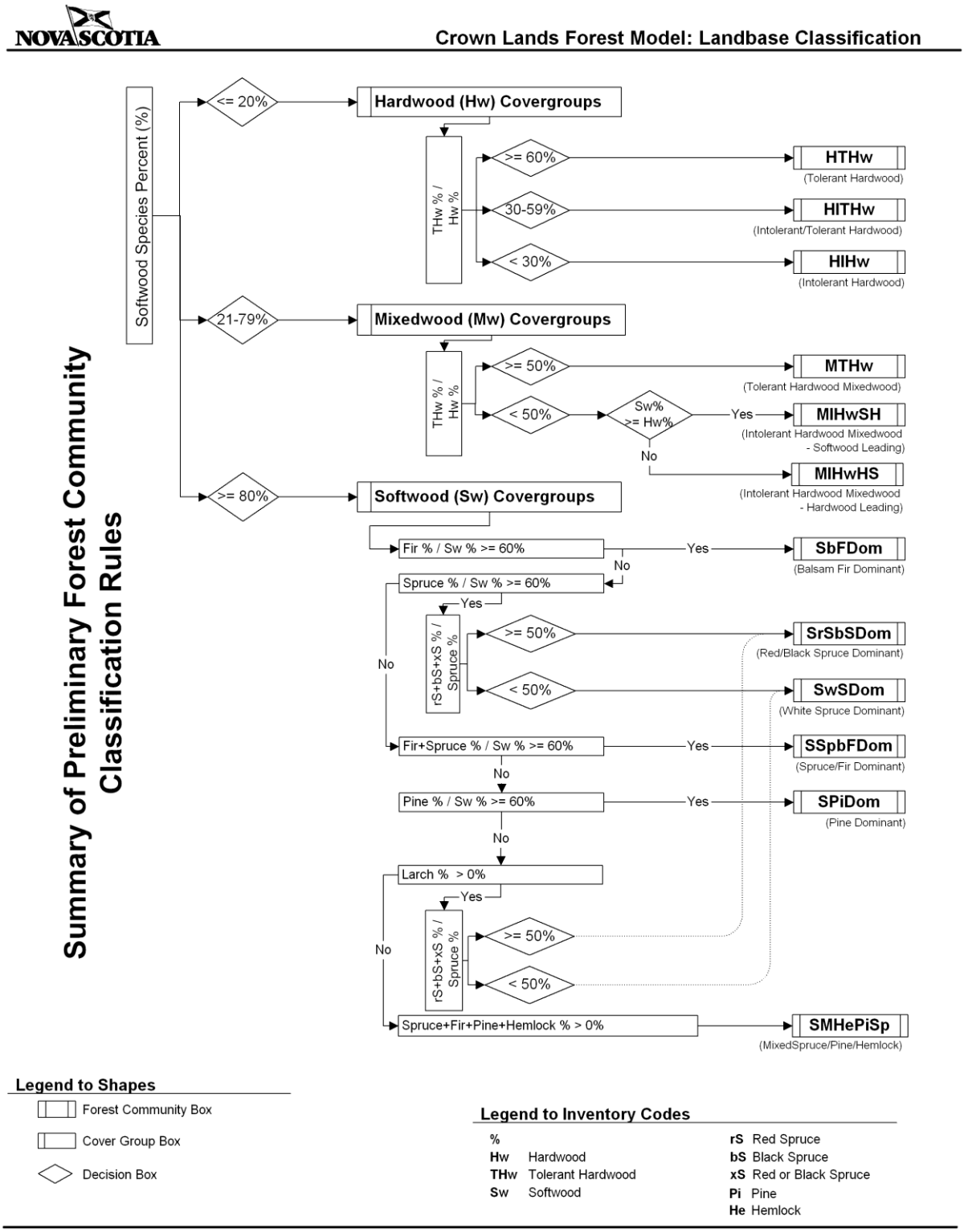
Development Class	Seral Stage
1. Forest Establishment (Height 0 to 6 m) • establishment of new growth following a stand-initiating disturbance • high diversity of forbs, shrubs, and tree regeneration, many of which are short-live shade-intolerant "pioneer" species • peak seed production by forbs and 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, 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	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
WE	white elm	2	2	4	2	4	2	2	2	2	2	2	2	2	2	2	2	4	4	4	2	2	2	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2
WP	white pine	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
WS	white spruce	4	4	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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 (Valley Slope 710)

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 (Matrix)	WFKK (43.8%) WFHO (20.7%) WMHO (18.6%) WCHO (7.3%) IFHO (7.1%) IMHO (1.8%) ICHO (0.7%) WMSM (<1.0%)	Softwood	rS eH wP	Infrequent	63531; 99.6	Early	231	349	2,004	966	3,549	13,928; 29.8	EARLY	12,649; 27.1
						Mid	41	180	617	346	1,183			
						Late	182	570	4,315	1,280	6,348			
						Uncl	2,846	0	0	0	2,846			
		Mixedwood				Early	381	398	1,335	1,159	3,273	17,394; 36.6	MID	17,106; 36.6
						Mid	378	689	5,348	2,581	8,996			
						Late	78	252	2,557	965	3,852			
						Uncl	1,268	0	0	0	1,268			
		Hardwood				Early	565	535	3,742	8,21.3	4,843	14,890; 31.9	LATE	12,303; 26.3
						Mid	381	269	4,889	1,375	6,914			
						Late	42	54	1,773	229	2,097			
						Uncl	197	0	0	0	197			
		Unclassified				Early	153	2	1	0	156	537; 1.1	UNCL	4,691; 10.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	380	0	0	0	380			
Total					**63,760***	**# ha**	**7,123**	**3,299**	**26,581**	**8,901**	**45,902**			
						%	**15.5%**	**7.2%**	**57.9%**	**19.4%**	**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 1: Forest Landscape Composition Worksheet (Valley Slope 710)

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 Slopes (Patch)	WMDS (47.8%) WFDS (41.7%) WCDS (10.6%)	Softwood				Early	5	13	147	60	223	1,059; 23.3	EARLY	911; 20.1
						Mid	2	7	42	56	108			
						Late	17	32	431	83	563			
						Uncl	165	0	0	0	165			
		Mixedwood	rS eH wP sM yB Be	Gap	5419; 100.0	Early	19	20	90	74	203	1,720; 37.9	MID	1,773; 39.1
						Mid	13	26	588	240	867			
						Late	0	8	447	92	547			
						Uncl	103	0	0	0	103			
		Hardwood				Early	26	16	400	41	483	1,713; 37.8	LATE	1,524; 33.6
						Mid	0	13	628	157	798			
						Late	1	6	373	34	414			
						Uncl	17	0	0	0	17			
		Unclassified				Early	2	0	0	0	2	45; 1.0	UNCL	327; 7.2
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	43	0	0	0	43			
Total					**5419***	**# ha**	**413**	**141**	**3,146**	**836**	**4,536**			
						%	**9.1%**	**3.1%**	**69.4%**	**18.4%**	**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 1: Forest Landscape Composition Worksheet (Valley Slope 710)

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 rM tL		108; 30.0	Early	0	0	14	5	19	44; 26.5	EARLY	58; 34.9
						Mid	0	0	3	1	4			
						Late	0	1	13	0	15			
						Uncl	7	0	0	0	7			
		Mixedwood				Early	0	1	6	15	21	83; 49.4	MID	64; 38.4
						Mid	0	1	25	14	41			
						Late	0	0	3	11	13			
						Uncl	7	0	0	0	7			
		Hardwood				Early	8	1	4	5	18	40; 23.7	LATE	28; 16.9
						Mid	1	2	15	2	19			
						Late	0	0	0	0	0			
						Uncl	2	0	0	0	2			
		Unclassified				Early	0	0	0	0	0	0.8; 0.5	UNCL	17; 9.9
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	1	0	0	0	1			
Total					360*	**# ha**	**26**	**6**	**82**	**53**	**167**			
						%	**15.6%**	**3.7%**	**49.1%**	**31.7%**	**100.0%**			

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

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Valley Slope 710)

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)				
Pine Oak Hills and Hummocks (Patch)	WCRD (100.0%)	Softwood				Early	0	0	8	1	9	30; 17.4	EARLY	78; 45.5
						Mid	0	0	1	2	3			
						Late	0	3	15	0	17			
						Uncl	0	0	0	0	0			
		Mixedwood	rO wP rP	Infrequent	190; 100.0	Early	0	0	16	8	25	81; 47.1	MID	40; 23.2
						Mid	1	0	19	6	26			
						Late	0	0	23	7	30			
						Uncl	0	0	0	0	0			
		Hardwood				Early	0	2	32	11	44	61; 35.5	LATE	47; 27.5
						Mid	0	0	5	6	10			
						Late	0	0	0	0	0			
						Uncl	7	0	0	0	7			
		Unclassified				Early	0	0	0	0	0	0; 0.0	UNCL	7; 3.8
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	0	0	0	0	0			
Total					**190***	**# ha**	**8**	**4**	**120**	**39**	**171**			
						%	**4.7%**	**2.6%**	**69.9%**	**22.9%**	**100.0%**			

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

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Valley Slope 710)

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)	IFSM (87.2%) ICSM (12.8%)	Softwood	bS, wP	Frequent	749; 97.4	Early	0	1	11	5	16	254; 34.2	EARLY	102; 13.8
						Mid	0	0	16	0	16			
						Late	10	2	148	58	218			
						Uncl	4	0	0	0	4			
		Mixedwood				Early	0	2	10	2	13	327; 44.0	MID	268; 36.1
						Mid	1	1	176	19	197			
						Late	0	8	77	13	98			
						Uncl	19	0	0	0	19			
		Hardwood				Early	0	7	64	1	73	156; 21.0	LATE	331; 44.6
						Mid	2	2	51	1	56			
						Late	0	0	16	0	16			
						Uncl	12	0	0	0	12			
		Unclassified				Early	0	0	0	0	0	5.6; 0.8	UNCL	41; 5.5
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	6	0	0	0	6			
Total					**5419***	**# ha**	**54**	**22**	**568**	**98**	**743**			
						%	**7.3%**	**3.0%**	**76.5%**	**13.2%**	**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 (Valley Slope 710)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Tolerant Hardwood Hills (Patch)	WCKK (59%) WMKK (40.6%) WFSM (0.4%)	Softwood				Early	3	20	343	141	507	2,848; 18.9	EARLY	2,170; 14.4
						Mid	3	29	99	63	194			
						Late	73	124	939	289	1,425			
						Uncl	723	0	0	0	723			
		Mixedwood				Early	22	65	293	138	517	6,582; 43.6	MID	6,033; 39.9
						Mid	168	210	1,821	970	3,170			
						Late	65	234	1,518	575	2,392			
						Uncl	504	0	0	0	504			
		Hardwood	sM yB Be	Gap	16,608; 99.6	Early	142	63	800	82	1,086	5,515; 36.5	LATE	5,461; 36.2
						Mid	244	149	1,986	292	2,670			
						Late	28	55	1,302	260	1,645			
						Uncl	119	0	0	0	119			
		Unclassified				Early	38	0	21	0	59	152; 1.0	UNCL	1,438; 9.5
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	92	0	0	0	92			
Total					**16,680***	**# ha**	**2,223**	**949**	**9,121**	**2,809**	**15,102**			
						%	**14.7%**	**6.3%**	**60.4%**	**18.6%**	**100.0%**			

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

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Valley Slope 710)

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 (corridors)	WFDS (20.1%) WMDS (16.3%) WCKK (11.6%) WCDS (8.1%) WCHO (7.6%) WFHO (4.6%) IFSM (4.1%) WFKK (4.0%) WTLD (1.3%)	Softwood	rS eH wP bS	Infrequent Frequent	158; 20.6	Early	0	0	8	0	8	93; 19.9	EARLY	75; 16.2
						Mid	0	0	7	2	8			
						Late	1	4	58	10	74			
						Uncl	3	0	0	0	3			
		Mixedwood	rS eH wP sM yB Be	Gap	341; 44.5	Early	0	0	5	1	6	184; 39.5	MID	206; 44.4
						Mid	1	0	68	40	110			
						Late	0	1	47	14	62			
						Uncl	6	0	0	0	6			
		Hardwood	sM yB Be	Gap	89; 11.6	Early	0	0	49	12	61	188; 40.4	LATE	173; 37.1
						Mid	0	2	66	21	89			
						Late	0	1	30	7	37			
						Uncl	1	0	0	0	1			
		Unclassified				Early	0	0	0	0	0	0.9; 0.2	UNCL	11; 2.4
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	1	0	0	0	1			
Total					**5419***	**# ha**	**14**	**7**	**338**	**106**	**466**			
						%	**3.0%**	**1.6%**	**72.6%**	**22.9%**	**100.0%**			

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

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Valley Slope 710)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Floodplain (Patch)	*IMSM (100.0%)*	Softwood	*rS eH wP*	*Infrequent/ Gap*	*204; 70.0*	Early	4	2	5	2	12	*23; 10.7*	EARLY	*47; 21.7*
						Mid	1	0	0	0	1			
						Late	0	2	5	4	11			
						Uncl	0	0	0	0	0			
		Mixedwood				Early	0	0	1	0	1	*56; 25.9*	MID	*97; 44.7*
						Mid	3	0	19	22	44			
						Late	0	0	5	5	11			
						Uncl	1	0	0	0	1			
		Hardwood	*sM yB Be*		*58; 20.0*	Early	2	1	24	8	34	*136; 62.8*	LATE	*71; 32.8*
						Mid	2	2	28	22	53			
						Late	0	0	43	7	50			
						Uncl	0	0	0	0	0			
		Unclassified				Early	0	0	0	0	0	*1.1; 0.5*	UNCL	*2; 0.8*
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	1	0	0	0	1			
Total					***292****	**# ha**	**13**	**6**	**129**	**69**	**217**			
						%	**5.9**	**2.7**	**59.5**	**31.9**	**100.0**			

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

Appendix 10: Table 2: Composition of Forest Communities (in Valley Slope 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	ICHO IFHO IMHO WCHO WFHO WFKK WMHO WMSM	Infrequent Infrequent Infrequent Infrequent Infrequent Infrequent Infrequent Infrequent	rS eH wP rS eH wP rS eH wP rS eH wP rS eH wP rS eH wP rS eH wP rS eH wP	S	SrSbS Dom	6,833	15.0%	L	**Well-moist** Early - wB, rM, Aspen Mid - rS, bF, yB Late - rS, eH, wP, yB **Well-drained** Early - wB, rM, Aspen Mid - rM, yB Late - sM, yB, Be
				S	SwS Dom	4,805	10.0%	E	
				S	SSpbF Dom	827	2.0%	M	
				S	SbF Dom	719	2.0%	M	
				S	SPi Dom	418	1.0%	L	
				S	SMHePiSp	328	1.0%	L	
				M	MIHwSH	8,046	17.0%	E	
				M	MIHwHS	7,650	17.0%	E	
				M	MTHw	1,699	4.0%	L	
				H	HIHw	10,376	23.0%	E	
				H	HITHw	2,319	5.0%	M	
				H	HTHw	2,195	5.0%	L	
Total						**46,213**	**100.0%**		

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

Appendix 10: Table 2: Composition of Forest Communities (in Valley Slope 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	WCKK WMKK WFSM	Gap Gap	sM yB Be sM yB Be	S	SrSbSDom	1,328	9.0%	L	**Well-drained** Early - wB, rM, Aspen Mid - rM, yB Late - sM, yB, Be
				S	SwSDom	873	6.0%	E	
				S	SSpbFDom	295	2.0%	M	
				S	SMHePiSp	161	1.0%	L	
				S	SbFDom	103	1.0%	M	
				S	SPiDom	87	1.0%	L	
				M	MIHwHS	2,765	18.0%	E	
				M	MIHwSH	2,660	17.0%	E	
				M	MTHw	1,157	8.0%	L	
				H	HIHw	2,666	18.0%	E	
				H	HTHw	1,670	11.0%	L	
				H	HITHw	1,183	8.0%	M	
Total						**14,950**	**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 Valley Slope 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 Slopes	WCDS WFDS WMDS	Gap Gap Gap	rS eH wP sM yB Be rS eH wP sM yB Be rS eH wP sM yB Be	S	SrSbSDom	505	11.0%	L	**Well-drained** Early - rM, wB, Aspen Mid - rS, yB, bF, rM, wA Late - sM, yB, Be, rS, eH, wP
				S	SwSDom	267	6.0%	E	
				S	SMHePiSp	151	3.0%	L	
				S	SSpbFDom	54	1.0%	M	
				S	SPiDom	43	1.0%	L	
				S	SbFDom	39	1.0%	E	
				M	MIHwSH	690	15.0%	E	
				M	MIHwHS	658	15.0%	E	
				M	MTHw	372	8.0%	L	
				H	HIHw	893	20.0%	E	
				H	HITHw	410	9.0%	M	
				H	HTHw	410	9.0%	L	
Total						**4,491**	**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 Valley Slope 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 IFSM	Frequent Frequent	bS bS	S	SrSbSDom	115	16.0%	M	**Moist-wet** - bS, rM, wetlands **Well-moist** Early - rM, wB, Aspen Mid - wP, bS, rS Late - rS, wP
				S	SPiDom	64	9.0%	L	
				S	SbFDom	30	4.0%	M	
				S	SwSDom	22	3.0%	E	
				S	SSpbFDom	15	2.0%	M	
				S	SMHePiSp	9	1.0%	L	
				M	MIHwHS	170	23.0%	E	
				M	MIHwSH	123	17.0%	E	
				M	MTHw	33	4.0%	L	
				H	HIHw	132	18.0%	E	
				H	HITHw	13	2.0%	M	
				H	HTHw	11	2.0%	L	
Total						**737**	**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 Valley Slope Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Valley Corridors	IFHO IFSM IMHO WCDS WCHO WCKK WFDS WFHO WFKK WMDS WMHO WMKK	Infrequent Frequent Infrequent Gap Infrequent Gap Gap Infrequent Infrequent Gap Infrequent Gap	rS eH wP bS rS eH wP rS eH wP sM yB Be rS eH wP sM yB Be rS eH wP sM yB Be rS eH wP rS eH wP rS eH wP sM yB Be rS eH wP sM yB Be	S	SrSbSDom	48	10.0%	M	Corridors pass through many elements. See descriptions of ecosection successional types under the various elements.
				S	SMHePiSp	14	3.0%	L	
				S	SwSDom	12	3.0%	E	
				S	SPiDom	10	2.0%	L	
				S	SbFDom	7	1.0%	E	
				S	SSpbFDom	2	0.0%	M	
				M	MIHwHS	81	17.0%	E	
				M	MIHwSH	63	14.0%	E	
				M	MTHw	40	9.0%	L	
				H	HIHw	115	25.0%	E	
				H	HITHw	37	8.0%	M	
				H	HTHw	36	8.0%	L	
Total						**464**	**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 Valley Slope 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	Open Seral	bS, wetlands	S	SwSDom	22	13.0%	E	bS
				S	SSpbFDom	9	6.0%	L	
				S	SrSbSDom	6	4.0%	L	
				S	SbFDom	4	2.0%	M	
				S	SMHePiSp	2	1.0%	L	
				M	MIHwSH	41	25.0%	E	
				M	MIHeHS	34	20.0%	E	
				M	MTHw	8	5.0%	L	
				H	HIHw	36	22.0%	E	
				H	HITHw	3	2.0%	M	
Total						**165**	**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 Valley Slope 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
Pine Oak Hills and Hummocks	WCRD	Frequent	rO wP rP	S	SPiDom	10	6.0%	L	Early - rO, wB, rM Mid - rP, wP, bS, rO Late - wP, rO
				S	SwSDom	10	6.0%	E	
				S	SSpbFDom	5	3.0%	M	
				S	SbFDom	3	2.0%	M	
				S	SMHePiSp	1	1.0%	L	
				S	SrSbSDom	1	1.0%	M	
				M	MIHwHS	42	24.0%	E	
				M	MIHwSH	37	22.0%	E	
				M	MTHw	2	1.0%	L	
				H	HIHw	52	31.0%	E	
				H	HITHw	9	5.0%	M	
Total						**171**	**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	64,103.8	72.4%	616,727	36.6%
sM yB Be	16,830.5	19.0%	59,619	3.5%
rS eH wP sM yB Be	5758.8	6.5%	187,322	11.1%
bS	888.1	1.0%	75,102	4.5%
rO wP rP	189.3	0.2%	53,643	3.2%
Total	**87,771**	**99.1%***	**992,413**	**58.9%****

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

Appendix 11: Ecological Emphasis Classes and Index Values

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

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

Appendix 12a: Ecological Emphasis Index Worksheet – Elements

Landscape Element	Total Land Area (ha)	Ecological Emphasis Classes					Ecological Emphasis Index	
		Reserve Area (ha)	Extensive Forest Management Area (ha)	Intensive Forest Management Area (ha)	Conversion to Non-Forest Area (ha)	Unclassified Land Use Area (ha)	Effective Area Range (ha)	EEC Index Range
Spruce Hemlock Pine Hummocks and Hill (Matrix)	63,713	197	36,336	5,798	14,933	6,450	30,511 to 33,735	48 to 53
Tolerant Mixedwood Slopes	5,414	45	3,826	388	737	418	3,116 to 3,325	58 to 61
Wetlands	359	0	277	26	36	20	219 to 229	61 to 64
Valley Corridors	604	0	487	17	87	12	373 to 379	62 to 63
Tolerant Hardwood Hills	16,657	436	12,033	884	1,305	1,998	10,182 to 11,181	61 to 67
Floodplain	291	0	216	16	57	2	167	57
Spruce Pine Flats	768	0	676	33	12	47	527 to 551	69 to 72
Pine Oak Hills and Hummocks	188	0	143	12	6	27	117 to 130	62 to 68
Total	**87,994**	**679**	**53,995**	**7,174**	**17,173**	**8,973**	**45,212 to 49,698**	**51 to 56**

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	420	0	355	3	13	49	279 to 304	66 to 72
ICSM	98	0	79	0	2	17	63 to 72	65 to 74
IFHO	4,543	0	3,637	80	424	402	2848 to 3050	63 to 67
IFSM	700	0	627	33	10	30	486 to 501	69 to 72
IMHO	1,117	75	779	89	57	117	711 to 769	64 to 69
IMSM	293	0	218	16	58	2	168 to 169	57 to 58
WCDS	637	38	445	34	96	23	386 to 398	61 to 63
WCHO	4,703	11	2,471	281	1,708	231	1993 to 2108	42 to 45
WCKK	9,950	143	7,256	537	715	1,300	6044 to 6694	61 to 67
WCRD	189	0	144	12	6	27	118 to 131	62 to 69
WFDS	2,414	7	1,854	141	294	118	1462 to 1521	61 to 63
WFHO	13,193	10	7,111	1,620	3,269	1,184	6044 to 6635	46 to 50
WFKK	27,847	102	15,343	2,539	7,173	2,691	12917 to 14262	46 to 51
WFSM	71	0	4	0	66	1	3 to 4	4 to 6
WMDS	2,708	0	1,830	219	374	286	1498 to 1641	55 to 61
WMHO	11,847	0	6,684	1,189	2,198	1,775	5755 to 6642	49 to 56
WMKK	6,750	294	4,866	355	533	703	4208 to 4559	62 to 68
WMSM	228	0	73	4	147	4	57 to 58	25
WTLD	367	0	281	26	40	19	222 to 232	61 to 63
Total	**88,076**	**680**	**54,056**	**7,178**	**17,184**	**8,979**	**45,261 to 49,750**	**51 to 56**

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

Appendix 13:

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

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

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

Literature Referenced

Bruce, J. and B. Stewart. 2005. Development of a "road index" for landscape level assessment of linear transportation features using density, distance, and class measures. Unpublished report.

Diaz, N. and D. Apostol. 1992. Forest landscape analysis and design: a process for developing and implementing land management objectives for landscape patterns. R6 ECO-TP-043-92. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region.

Duke, T. and L. Benjamin. 2005. Forest / wildlife habitat and management guide, 560 – Chignecto Ridges. Department of Natural Resources, Kentville. Internal report. 15pp.

Dunster, J. and K., Dunster. 1996. Dictionary of natural resource management. UBC Press. 363 pp.

Fenow, B.E. 1912. Forest Conditions of Nova Scotia. 93 pp.

Forman, R.T.T. 2004. Road ecology's promise: what's around the bend? Environment 46(4):8-21.

Forman, R.T.T. and R.D. Deblinger. 2000. The ecological road-effect zone of a Massachusetts (USA) suburban highway. Conservation Biology 14: 36-46.

Forman, R.T.T. 1999. Spatial models as an emerging foundation of road system ecology, and a handle for transportation planning and policy. In Proceeding of the Third International Conference on Wildlife Ecology and Transportation, edited by G.L.Evink, P.Garrett, and D.Zeigler, 118-123. Tallahassee, Florida: Florida DOT.

Lindenmayer, D. B. and J. F. Franklin. 2002. Conserving forest biodiversity: a comprehensive multi-scaled approach. Island Press. ISBN 1-55963-935-0. 351 pp.

Methven, I. and M. Kendrick. 1995. A Disturbance History Analysis of the Fundy Model Forest Area. 16pp.

Mailman, G. E. 1975. Tobeatic Resource Management Area Land Inventory. Nova Scotia Department of Natural Resources.

Neily, P. and E. Quigley. 2005. Natural disturbance ecology in the forests of Nova Scotia. Ecosystem Management Group, Department of Natural Resources, Truro. Unpublished report.

Neily, P., E. Quigley, L. Benjamin, B. Stewart, and T. Duke. 2003. Ecological land classification for Nova Scotia. Vol. 1 - mapping Nova Scotia's terrestrial ecosystems. Nova Scotia Dept. of Natural Resources, Forestry Division, Truro. 83 pp.

Nova Scotia Department of Natural Resources. 2006. Guidelines for the development of long range management frameworks. Nova Scotia Department of Natural Resources, Regional Services, Halifax. 33 pp.

Nova Scotia Department of Natural Resources. 2013. Species at risk overview. Retrieved from http://novascotia.ca/natr/wildlife/biodiversity/at-risk-overview.asp

Nova Scotia Department of Natural Resources. 2002. Wildlife Habitat and Watercourses Protection Regulations. Section 40 of the Forests Act R.S.N.S. 1989, c. 179 O.I.C. 2001-528 (November 15, 2001, effective January 14, 2002), N.S. Reg. 138/2001 as amended by O.I.C. 2002-609 (December 20, 2002), N.S. Reg. 166/2002 http://www.gov.ns.ca/natr/wildlife/habitats/protection/

Reed, R.A., J.Johnson-Barnard, and W.L. Baker. 1996. Contribution of roads to forest fragmentation in the Rocky Mountains. Conservation Biology 10:1098-1106.

Seymour, R. S. and M. L. Hunter, Jr. 1999. Principles of Forest Ecology. Chapter 2. In: M.L. Hunter Jr. Ed. Maintaining Biodiversity in Forest Ecosystems. 698 pp.

Spellerberg, I.F. 1998. Ecological effects of roads and traffic: a literature review. Global Ecology & Biogeography Letters 7, 317-333.

Stewart, B. and P. Neily. 2008. A procedural guide for ecological landscape analysis. Department of Natural Resources, Truro. Report for 2008-2.

Strang, R. M. 1972. Ecology and land use of barrens of Western Nova Scotia. Canadian Journal of Forest Resources. 2(3): 276-290. U.S.

USDA Forest Service. 1999. Roads analysis: informing decisions about managing the national forest transportation system. Misc. Rep FS-643. Washington, D.C.: Department of Agriculture, Forest Service. 222 p.