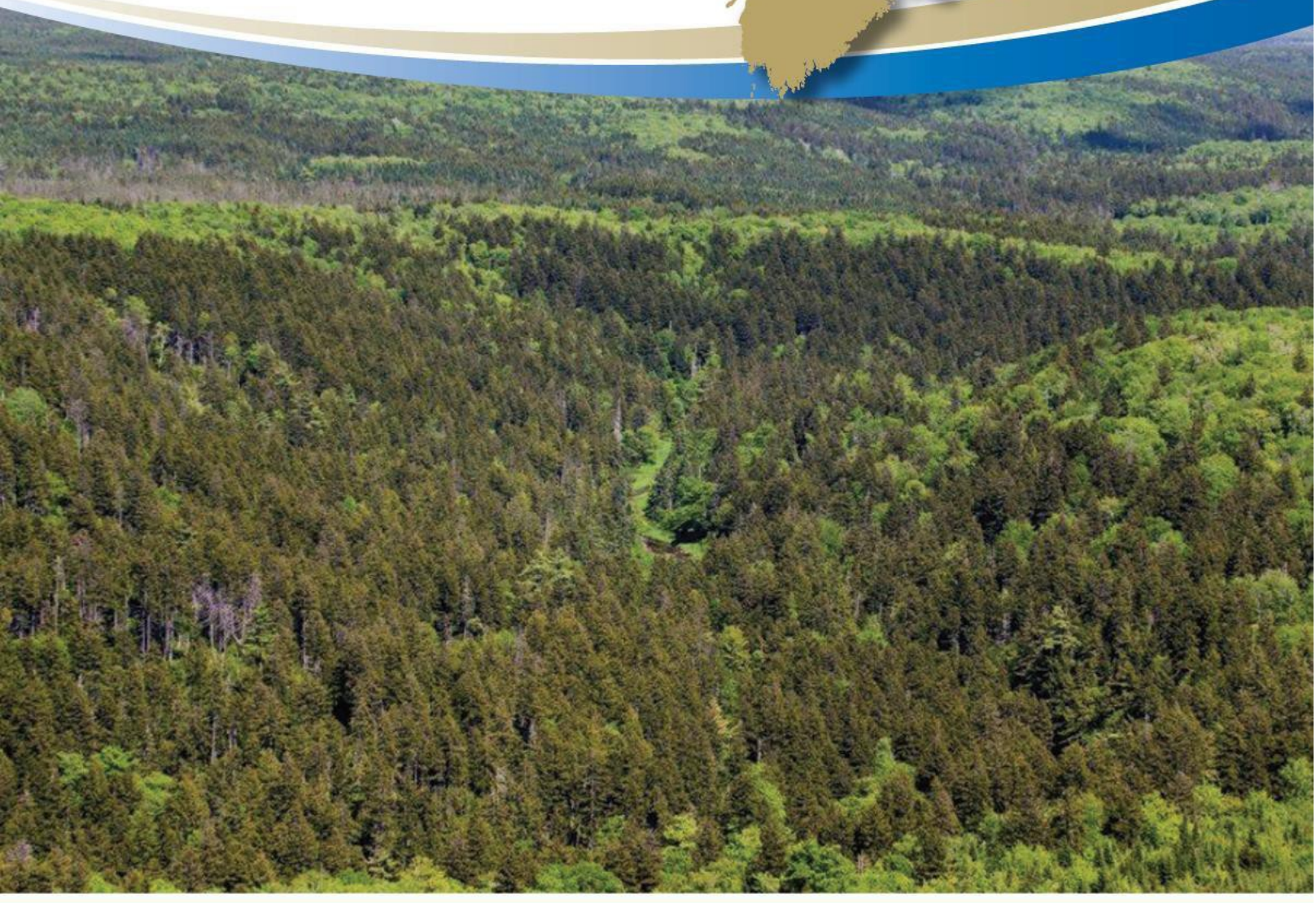
Department of Natural Resources

ECOLOGICAL LANDSCAPE ANALYSIS CENTRAL UPLANDS ECODISTRICT 380

PART 3: Landscape Analysis for Forest Ecosystem Planners



ELA 2014-380

NOVA SCOTIA

Ecological Landscape Analysis, Ecodistrict 380: Central Uplands

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ISBN 978-1-55457-582-4

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

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

Information sources and statistics (benchmark dates) include:

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

Conventions

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

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Part 3: Landscape Analysis of Central Uplands – *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

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Understanding the Landscape as an Ecological System

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

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

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

Elements Within Landscapes (Map 2)

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

Spruce Hemlock Pine Hummocks and Hills is the matrix element, representing 47% of the ecodistrict. This is a softwood-dominated element with climax forests typical of the Acadian Forest, including red spruce, hemlock, and yellow birch.

The matrix, though still the dominant element, is less extensive than in the past, due primarily to harvesting, insect infestations, and human settlement.

More than 50% of the ecodistrict is in the establishment and young development classes, with the early and mid seral species of balsam fir, white spruce, red maple, and birch dominating.

Tolerant Mixedwood Hills, representing nearly one-third of the ecodistrict, is the largest patch element. As a mixedwood element that supports climax species of the Acadian Forest, common species include sugar maple, beech, yellow birch, red spruce, and hemlock.

Other patch elements, in order of size, are **Tolerant Hardwood Hills, Tolerant Hardwood Drumlins and Hummocks, Tolerant Mixedwood Drumlins, Tolerant Mixedwood Slopes, Wetlands,** and **Floodplain**.

Valley Corridors features strong linear river corridors that dissect the ecodistrict in several locations. Salmon River, Murray Brook, Pembroke River, Stewiacke River, Calvary River, West River, and branches of the East River are among the most prominent corridors.

These corridor systems provide linkages to the Cobequid Slopes, Central Lowlands, Cobequid Hills, Northumberland Lowlands, and the St. Marys River ecodistricts.

The forest within these corridors, most notably along the East River, Lorne area, and the upper reaches of the Salmon River and Greenfield Brook, have been significantly altered by human land use, settlement, urbanization, transportation and utility systems, and forestry.

The most notable land use change is found in the northeastern section of the ecodistrict, in the Lorne, Centredale, White Hill, and Springville areas.

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: deer, people, water, salmon, wood turtle, furbearers, and goshawk.

An example of this flow – element interaction is that deer use the Salmon River, Greenfield Brook, and Smithfield area as wintering areas. These mature softwoods and mixedwood areas have been altered by human intervention (forest harvesting, agriculture, and human settlement) and have changed to an early and young development class of red maple, grey birch, aspen, balsam fir, and white spruce.

One goal would be to reduce the early and mid seral species and favour or promote red and black spruce, hemlock, yellow birch, and sugar maple. Stand size could also be increased through management strategies, such as pre-commercial and commercial thinning that would also increase browse.

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.

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.

River corridors promote connectivity.

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.

A further examination of landscape connectivity and movement functions is included in Appendix 2a, which provides analysis and management connectivity recommendations related to the major elements within the ecodistrict.

Central Uplands is now dominated by a much changed structure that does not represent the inherent natural conditions that once characterized this landscape. Human land use, transportation systems and utility corridors have fragmented most of the element types, reducing the connective function of the corridors for some species and may also increase the barrier effect of the corridors for species that must move through the ecodistrict (Map 5).

An additional concern inherent in all ecological planning is the maintenance of connectivity among conservation areas (including wilderness, old growth, provincial parks, and ecological reserves) that are often not ecologically related.

At the landscape scale of planning, connectivity among these areas is supported by the dominant forest structure. Connectivity will be sustained by applying the natural disturbance regime (NDR) guidelines for landscape composition (Table 7) and recognizing natural linkage opportunities.

Management strategies to improve ecodistrict connectivity could include:

- Mitigating the potentially negative barrier effects of concentrated land use in the valley corridors by sustaining and restoring natural communities in key areas such as those identified during the landscape analysis.
- Enhancing connectivity among conservation areas by applying appropriate medium and high biodiversity emphasis standards when managing areas with natural linkage potential.
- Improving ecoregional connectivity by sustaining and restoring natural conditions at important linkage points among ecodistricts.

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

All of the landscape flows are identified with major linkages to adjacent areas or ecodistricts (Map 2).

The hydrological system provides the most obvious physical connection among the Central Uplands, Cobequid Hills, Northumberland Lowlands, Pictou Antigonish Highlands, St. Marys River, and Governor Lake ecodistricts. These river systems occur throughout the four watershed areas of the Salmon, East, Stewiacke, and St. Marys rivers.

Deer move out of the higher elevations in winter down through the Stewiacke watershed and into their wintering areas along the Stewiacke Valley.

People provide many linkages throughout the ecodistrict into all adjoining ecodistricts through their many activities of recreation, transportation, fishing, hunting, forest management, utilities development, and settlements.

Future land management activities should recognize the significant linkages to those neighbouring ecodistricts to enhance and sustain connectivity.

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

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

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

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

Human activities, such as forest harvesting, can shape the structure and composition of the forested landscape and should be planned to help support landscape composition goals.
At a landscape planning scale, the variety of habitats can be broadly described in terms of the composition of development classes, seral stages, and covertypes.

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

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

Seral stage indicators describe changes in species composition of forest communities as succession progresses from domination of early seral “pioneer” species following disturbance, toward late seral communities dominated by long-lived, shade-tolerant “climax” species. Seral

stage is dependent on the composition of tree species of a forest, irrespective of age. For landscape management purposes, three seral stages are recognized:

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

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

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

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

Target Ranges for Composition Indicators

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

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

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

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

Forest Vegetation Types for Seral Stages in Each Element

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

Table 8 – Forest Vegetation Types[1] Within Elements in Central Uplands

Element	Seral Stage					
	Early	% *	Middle	%	Late	%
Spruce Hemlock Pine Hummocks and Hills	IH1, IH4, IH6, SH8, SH9, SH10	26.0	IH7, MW4, MW5, SH5, SH6, SH7	26.0	MW2, **SH1, SH2, SH3, SH4**	21.0
Tolerant Hardwood Hills	IH3, IH5, IH6, OF1, OF2	35.0	IH7, OF4, TH7, TH8	24.0	**TH1, TH2**, TH3, TH4, TH5	15.0
Tolerant Hardwood Drumlins and Hummocks	IH3, IH4, IH5, IH6, OF1, OF2	30.0	IH7, OF4, TH7, TH8	18.0	**TH1, TH2**, TH3, TH4, TH5	22.0
Tolerant Mixedwood Drumlins	IH3, IH5, IH6, OF1, OF2, SH8	31.0	IH7, MW4, MW5, OF4, SH5, SH6	17.0	**MW1**, MW2, **MW3**, SH1, SH3	23.0
Tolerant Mixedwood Hills	IH3, IH4, IH5, IH6, OF1, OF2, SH8	17.0	IH7, MW4, MW5, OF4, SH5, SH6	23.0	**MW1**, MW2, **MW3**, SH1, SH3	29.0
Tolerant Mixedwood Slopes	IH4, IH5, IH6, SH8	5.0	IH7, MW4, MW5, SH5, SH6	30.0	**MW1**, MW2, **MW3**, SH1, SH2, SH3, SH4	44.0
Floodplain	FP6	28.0	FP3	26.0	**FP1**	35.0
Wetlands	FP3, WC1, WC2, WC5, WC6, WC7, WD1, WD2, WD3, 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 in each successional stage. Percentages may not total 100 due to unclassified lands (such as clearcuts and regenerating stands) not being included.

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

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

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

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

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

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

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

The 129,100 hectares in the Central Uplands Ecodistrict are inherently capable of supporting approximately 112,600 hectares of forest, with remaining lands being non-forested areas, such as wetlands, farmland, urban, and barrens.

The overall EEI for Central Uplands is 52 to 66 (Appendices 12a and 12b). This would suggest that overall intensity of land use for the ecodistrict is at a relatively changed state affecting both the structure and function to support habitat (for all species) and for biodiversity conservation.

About 57% falls in the extensive EEC. Lands in this category are managed for multiple values to conserve biodiversity and encourage natural ecosystem conditions and processes.

About 7% of the forest has been converted to other uses and altered by human settlement, farming, urban development, and transportation and utility corridors. These converted lands are predominately located around the major river corridors, villages, and towns. These lands are given 0 EEI in their present state but some locations, especially along the river corridors, show opportunity for restorative measures to the predicted climax stands of spruce, elm, sugar maple, and white ash.

The intensive EEI also stands at about 7%. Management may eliminate or reduce the duration of some development processes, particularly mature old forest stages and may result in non-natural succession, produce unnatural conditions such as exotic species, old field spruce, and monoculture plantations, or reduce structure and composition below ecologically desirable levels.

Only 1% is in the reserve class. There is opportunity to add additional lands to the reserve class under the Old Forest Policy by selecting community types that have insufficient representation or community types that are rare within the ecodistrict and/or ecoregion.

The remaining 28% is unclassified.

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

Road Index (Appendices 6, 7; Map 5)

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

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

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

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

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

Currently, Central Uplands has an overall RI value of 10 (Appendix 7, Table 3). This average falls within the Forest Resource Index range of 7 to 15 and may be described as moderately low. Only 11%, or 13,708 hectares, has a Remote RI of 0 to 6 (Appendix 7, Table 2). Seventy-six

percent of the ecodistrict area has road indices in the Forest Resource and the Mixed Rural categories.

The highest road densities occur around the settlements, town and main transportation systems. An RI of 23 in these areas – the highest in the ecoregion – is in the Mixed Rural category. High RI values occur in numerous parts of the ecodistrict because of the number of river corridors and human settlement that contribute to habitat fragmentation.

Roads can contribute to habitat fragmentation and environmental degradation. Since 83% of land ownership in the ecodistrict is in private hands, efforts could be made to:

- Conserve the relatively low road densities within the matrix (RI of 11) through strategic scheduling of new access roads and decommissioning where possible. Private woodland owners may be able to decommission select roads and share access.
- Access systems must be scheduled for regular maintenance or decommissioning particularly where connectivity or additional reserves are to be established.
- Utilize old abandoned trails or logging roads for recreational trails before additional trails are established.
- Seek to improve the distribution and connectivity among the few low road density areas, especially near Riversdale, Burnside, Lansberg Siding, Elgin, and the North Nelson River to improve connectivity among natural areas and linkages to neighbouring ecodistricts.

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

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

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

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

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

The primary species data used in this report are from the Atlantic Canada Conservation Data Centre and DNR’s Significant Habitat Database. Efforts are made to ensure data are as accurate and up-to-date as possible. Lists and maps indicate what is currently known. Due diligence tied to

planning, management, and stewardship may require that surveys be carried out to update information or to fill gaps in our knowledge. Priority species may require special actions in terms of forest management and other activities that alter habitat and the landscape. If more information is required or if management specific to a priority species need to be developed, a regional biologist, Wildlife Division staff, or other species experts should be contacted.

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

Species at Risk

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

Species of Conservation Concern

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

Species Ranking and Coding Systems

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

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

A second system commonly used is NatureServe Conservation Data Centre system. This system uses numbers from one (extremely) to five (widespread, abundant) to denote the relative rarity and conservation concern for species. At the provincial scale numbers are prefixed with "S" to

indicate that this is a state/provincial level rank. Ranks at the National (N) and Global (G) levels are also available for all species. In Nova Scotia, the Atlantic Canada Conservation Data Centre (http://www.accdc.com/) works with partners to provide ranks and data on species' occurrence.

As of 2013 in the Central Uplands Ecodistrict, there are documented occurrences (under the NSESA) of the following number of formally listed species at risk: six endangered, four threatened, and three vulnerable. In addition to the listed species, the national General Status process also identifies 20 orange-status species, 40 yellow-status species, and 37 green-status species for a total of 97 other species of conservation concern in this ecodistrict.

Designated species at risk found within the ecodistrict include moose, Atlantic salmon, wood turtle, several bird species (e.g. olive-sided flycatcher, Canada warbler, rusty blackbird), and blue felt lichen.

Other species of conservation concern known for the Central Uplands Ecodistrict include northern goshawk and long-eared owl (birds); blue cohosh and wooly sedge (plants); bog elfin (insect); and triangle floater and eastern lampmussel (mollusks).

Old Forest

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

Birds

As of 2013, eight at-risk bird species have been found in the ecodistrict. All eight are listed under the NSESA: chimney swift, rusty blackbird, barn swallow, and Canada warbler as endangered, the olive-sided flycatcher and common nighthawk as threatened, and the eastern wood-pewee and bobolink as vulnerable. Nationally, five of the eight species are listed under SARA: chimney swift, common nighthawk, olive-sided flycatcher, and Canada warbler as threatened, and the rusty blackbird as special concern.

There has been a nationwide decline in aerial insectivores such as chimney swift, olive-sided flycatcher, eastern wood-pewee, barn swallow, and common nighthawk due to declines in insect food species. Availability of nesting and roosting habitat for barn swallow and chimney swifts is also thought to be a threat to these species as their namesake nesting habitats, old barns and chimneys, respectively, get sealed up, torn down, or collapse without replacement.

Habitat loss and land use practices, particularly on wintering grounds are thought to have contributed to the widespread decline of rusty blackbird, Canada warbler, olive-sided flycatcher, eastern wood-pewee, and bobolink. Bobolink, which nests in grasslands are also threatened by mortality in adults and nests through agricultural activities, such as haying, and habitat loss through the conversion of grasslands and forage crops to row crops.

Fish

The Central Uplands Ecodistrict contains a portion of the headwaters of several rivers historically or currently known to support Atlantic salmon. COSEWIC has assigned designatable units (DU) that refer to the populations of Atlantic salmon that should be assessed independently from one another.

The Salmon and Stewiacke/Shubenacadie rivers, which both drain to the Inner Bay of Fundy, support the Inner Bay of Fundy DU, which is listed under the federal SARA as endangered. The West, Middle, and East Pictou Rivers all drain to the Northumberland Strait and support the Gaspé-Southern Gulf of St. Lawrence DU, which is considered by COSEWIC as special concern; and the St. Marys River drains into the Atlantic Ocean and supports the Nova Scotia Southern Upland DU, which is considered by COSEWIC as endangered. Neither the Gaspé-Southern Gulf of St. Lawrence DU nor the Nova Scotia Southern Upland DU are listed under either the provincial or federal species at risk legislation.

Barriers to dispersal and acidification of many areas within these watersheds are thought to have drastically reduced the amount of freshwater habitat that may be used by Atlantic salmon for spawning and rearing. However, it is low returns from the marine environment that continues to be considered the most important factor in the decline of Atlantic salmon.

Insects

Monarch butterflies are designated by COSEWIC and listed under SARA as special concern but have no provincial designation. Adults may occasionally be observed after the breeding season in the Central Uplands Ecodistrict as they may in most other areas of the province. Areas with high concentrations of milkweed are used by breeding adults and larval development; there are no records of such areas in the ecodistrict.

Lichens

One lichen species at risk is found in the Central Uplands Ecodistrict. Blue felt lichen is designated by COSEWIC as special concern and has been listed as vulnerable under the NSESA. The species is known from 88 locations in Nova Scotia, which represents a considerable portion of the entire range known in North America. In Nova Scotia, blue felt lichen is generally found in mixed forests containing red maple that are in wet depressions or adjacent to streams, rivers, or lakes in coastal areas up to 300 metres in elevation. One occurrence of blue felt lichen was found in the Central Uplands Ecodistrict near Sheepherder's Junction in 2011, but the majority of occurrences have been recorded in the Sable and South Shore ecodistricts. It is unknown if increased search efforts in the Central Uplands Ecodistrict is likely to produce many additional observations of blue felt lichen.

Threats to blue felt lichen include atmospheric pollutants and acid precipitation, which change the chemistry of the bark on the trees on which the lichens grow, which can cause direct mortality or interfere with reproduction. Also, blue felt lichen habitat often overlaps with areas otherwise suitable for forest harvesting activities, which can serve as a threat to the species either by direct mortality or habitat loss.

Mammals

Moose on the mainland of Nova Scotia have been designated as endangered under the Nova Scotia Endangered Species Act. Mainland moose are genetically distinct from those on Cape Breton Island, where moose populations are healthy.

While not considered to be a stronghold of moose habitat on the mainland, moose are sighted from time to time in the Central Uplands Ecodistrict, a gap in the landscape between two known moose concentration areas, the Cobequid Hills Ecodistrict to the northwest and Pictou Antigonish Highlands Ecodistrict to the east, where recurrent observations of moose have been made over time.

Moose are commonly associated with forested landscape habitats that have been altered or disturbed by events such as fire, wind (i.e. blowdown), 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.

The high concentration of white-tailed deer in the ecodistrict does not favour moose using the area extensively during the winter or year-round. However, the ecodistrict is likely to provide important migration habitat during periods of high dispersal such as during mating season, or when moving among summer and winter habitats. The forested lake, river, and stream corridors of the ecodistrict mandated by the Wildlife Habitat Watercourse Protection regulations play an especially important role to moose to allow undetected travel, while ensuring temporary food, water, and shelter.

Nova Scotia's myotis bats (little brown myotis and northern myotis) typically hibernate in natural caves or abandoned mine workings. Bridgeville Iron Mines is one location in the ecodistrict where bat activity has been suspected in the past but not verified. The area consists of 20 or more abandoned mines, many with collapsed entrances. Whether any of the abandoned mines ever supported, or currently support, any of the cave bat species is unknown.

Since 2008, white-nose syndrome has affected cave bats in Nova Scotia and throughout Eastern North America, drastically reducing the number of individuals observed in the winter using known hibernacula in Nova Scotia up to 90%. White-nose syndrome is caused by a fungus (*Pseudogymnoascus destructans*) that thrives in cool, damp areas. The syndrome affects those species of bats that congregate in such areas and causes disruptions to the natural patterns and metabolic processes needed for efficient hibernation. Ultimately, infected bats usually die through the winter by some combination of dehydration, starvation, or freezing.

Plants

One plant species at risk is documented for the Central Uplands Ecodistrict. Black ash, a tree species, is very rare in the province with an estimated 1,000 individuals and only 12 known mature trees. The only known occurrence of black ash in the ecodistrict was identified in 2003 – a single small tree located along the East River of Pictou near Bridgeville. Black ash is designated as threatened under the NSESA but has no federal designation or listing status.

Reptiles

Wood turtle is listed as threatened under both the federal SARA and the NSESA. Wood turtle is uncommon province-wide, with the majority of observations occurring in a few main concentration areas. Both the East River of Pictou County and the Stewiacke River are known to support wood turtle. Portions of the uppermost reaches of each of these rivers occur in the ecodistrict, where several wood turtle observations have been made. The ecodistrict contains the uppermost portion of the St. Marys River as well, which is known as a wood turtle "hotspot," although no occurrences associated with the St. Marys River have been recorded from within the Central Uplands Ecodistrict.

Threats to wood turtles in Nova Scotia include alteration and destruction of river and stream habitats, nest predation, vehicle strikes, and translocations of turtles by people. Where forestry activities overlap with known wood turtle areas on Crown land, special management practices are required to mitigate detrimental effects of forestry on wood turtles and their habitat.

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

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

Landscape elements were identified by combining ecosections with similar characteristics. Table 9 provides explanations of ecosections and their relationship to elements.

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

Eleven of the sixteen ecosections, ICKK, ICSM, IMHO, IMSM, WCDM, WCRD, WFDM, WFKK, WMDM, WMKK, and WTLD, each comprise less than 2% of the ecodistrict (Map 7).

The sugar maple-yellow birch-beech community within the WMKK ecosection has the highest land use pressures within the eocoregion, with 57% converted to human settlement, farming, and other development activities.

The IMHO, WCHO, WCKK, and WCRD ecosections have relatively low conversions within this ecodistrict, but relatively high land use pressure with conversions that exceed 35% in the ecoregion. No ecosection is more than 70% converted. Old growth stands have been identified on 938 hectares, or approximately 5% of the Crown lands under the Old Forest Policy (Appendix 5).

Additional representation is required in a number of these community types. Present opportunities may be limited in the red spruce and red spruce-eastern hemlock because of Crown ownership or the high conversion in the sugar maple-yellow birch-beech community.

Table 9 – Elements, Ecosections, Disturbance Regimes andClimax Types

380 Central Uplands Ecodistrict			
Landscape Element and Type	**Ecosections***	**Dominant Natural Disturbance Regime**	**Dominant Climax Type**
Spruce Hemlock Pine Hummocks and Hills (Matrix)	IFKK IFHO IMHO WFHO	Infrequent	red Spruce (rS)
Tolerant Mixedwood Hills (Patch)	WMKK WMHO ICHO	Infrequent	rS, yellow Birch (yB), sugar Maple (sM), Beech (Be)
Tolerant Hardwood Hills (Patch)	WFKK	Gap	sM, yB, Be
Tolerant Hardwood Drummonds and Hummocks (Patch)	WCKK WCHO	Gap	sM, yB, Be
Tolerant Mixedwood Drumlins (Patch)	WMDM	Infrequent	rS, yB, sM, Be
Tolerant Mixedwood Slopes (Patch)	WCDS WFDS WMDS	Gap	rS, eastern Hemlock (eH), white Pine (wP), yB, sM
Wetlands (Patch)	WTLD	Open Seral (Frequent)	bS, red Maple (rM), tamarack (tL)
Floodplain (Patch)	ICSM IMSM	Gap	sM, white Ash (wA) American Elm (aE)
Valley Corridors (Corridor)	Various	Various	Various

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

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

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

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

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

- Designate uncommon forest species, for which genetic viability may be threatened as indicated by DNR's Endangered Species Rating System (yellow and red listed), for the ecodistrict.
- Apply fine filter management opportunities related to conservation of significant habitats.
- Recognize uncommon community conditions (e.g. old age, large live and dead trees, and species associations) and increase representivity in the uncommon old forest communities.
- Implement restorative measures in those community types, such as elm, sugar maple, and ash stands along the river corridors or the jack pine, black spruce, and white pine, where conversion to other species or uses is high.

Ecological Representivity (Appendices 4, 5)

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

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

The only lands that are under reserve status within the Central Uplands is old forest (938 ha) under the Old Forest Policy. There are no legal reserves in the ecodistrict.

Priority sites and strategies to improve representation in the ecodistrict could include:

- Conservation of uncommon or rare climax community types of sugar maple-yellow birch and beech in the Tolerant Mixedwood Hills patch element, representing 0.2% in the ecodistrict and 3.5% in the ecoregion.
- Recognition of additional old forest area in the black spruce-red spruce-eastern hemlock and sugar maple-yellow birch-beech communities.
- Improvement of connectivity among the wetlands and river corridors.

ELA Summary

Element Interpretation (All appendices and maps)

This upland extension of the St. Marys fault block has some of the most productive red spruce forests in Nova Scotia. Partially wedged between the Cobequid Hills Ecodistrict 340 to the north

and the Pictou Antigonish Highlands Ecodistrict 330 to the east, this ecodistrict occupies the gently rolling uplands of central Nova Scotia.

Sloping easterly upwards from the St. Marys River Ecodistrict 370, elevations average 300 metres above sea level.

This area contains the headwaters of several rivers including the Stewiacke and Calvary rivers, which eventually make their way to Cobequid Bay, the East, Middle, and West rivers of Pictou County which empty into the Northumberland Strait, and the Musquodoboit River, which flows to the Atlantic Ocean.

The geology is somewhat similar to that of the St. Marys River and Cobequid Slopes ecodistricts. Soils are predominantly well-drained to moderately well-drained with finer textured soils imperfectly drained.

First, second, and third order streams with a trellised drainage pattern and a few small shallow lakes cover only 0.8% of the ecodistrict.

Red spruce is the dominant forest species in the ecodistrict and occupies many of the moist sites, which in other ecodistricts would be covered by black spruce. Pure stands of tolerant hardwoods are present on the crests and upper slopes of hills and steeper hummocks.

Red spruce, yellow birch, and sugar maple will form mixed stands on the finer textured soils, but following harvesting may revert to stands of balsam fir and red spruce. Hemlock prefers the sheltered moist sites of lower slopes along streams and rivers and white pine is scattered on the better-drained, coarse-textured soils.

In Central Uplands, stand-initiating natural disturbances occur infrequently. Disturbance agents include hurricanes, fire, and insects. However, the infrequency of stand-level disturbances creates a climax Acadian Forest of tolerant hardwoods and softwoods occurring as pure and mixed associations. Many of these stands develop into old growth with gap dynamics providing breaks in the canopy and allowing the development of uneven-aged stands and older forests.

Historically, insect epidemics were unlikely to have caused extensive damage to the forests of the Central Uplands due to the mixedwood nature of the forest. Populations of spruce budworm and tussock moth have recently defoliated significant areas of the uplands – most notably in stands of balsam fir. The eastern spruce bark beetle has also caused damage in older stands of red spruce.

However, many ecologists would suggest that the recent defoliations by tussock moth, and to a certain extent the spruce budworm, have been exacerbated by forest harvesting that has increased the component of balsam fir.

Based on 40 years of fire records between 1959 and 1999, the occurrence of lightning-caused fires in the Central Uplands is one of the lowest in Nova Scotia. This is due in part to the moisture holding capacity of the soils – the summer soil moisture deficit is one of the lowest in the province.

The ecodistrict receives above average precipitation for the province with 1,373 millimetres annually. Central Uplands shares, with the Pictou Antigonish Highlands and St. Marys River ecodistricts, the lowest mean annual temperature at 5.4° C and the second coldest mean winter temperature of -5.9° C. The mean summer temperature is near average for the province at 16.5° C.

Spruce Hemlock Pine Hummocks and Hills
(Matrix) (IFKK, IFHO, IMHO and WFHO ecosections) (60,190 ha)

This is a mixedwood matrix element that comprises 47% of the ecodistrict. This element features an inherent mixedwood community of red and black spruce, hemlock, sugar maple, yellow birch, and beech that has undergone change toward a more early and mid seral species of grey birch, aspen, pin cherry, red maple, balsam fir, and white spruce.

Salvage operations have increased over the last few years as a result of damage caused by hurricanes and insects, such as the spruce bark beetle, balsam wooly aphid, or adaligid. Forty-two percent of the forest is in the early or establishment phase with only 37% in the mature class.

The EEI is 54 to 68 as a result of low representivity (<1%), 6% conversion and almost 26% of the forest being unclassified (Appendix 12a).

Flows

Deer (general range – summer and winter range – best when there is a mix of young and mature forest); people (timber heavily managed, heavy recreational use, such as ATV trails crossing ecodistrict among population centres); water (groundwater recharge, storage headwater source of major river systems, important for water quality, good buffering capacity); salmon (spawning and smolt-parr nursery); wood turtle (potential metapopulations interactive on small streams); furbearers (fisher, general habitat broadly accessible with few or no barriers along streams and ponds, though fishers are not very common); goshawk (moderate to low habitat).

Composition

Central Uplands Ecodistrict 380 (based on statistics up to 2006)
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
	43%	13%	44% (37 Mat + 7 OF)	7%
Seral Stage	Early	Mid	Late	Unclassified
	26%	26%	21%	27%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	63%	10%	20%	7%

Desired Condition

Late successional softwood and mixedwood stands with a variety of patch sizes and at least 60% of the forest communities in the mature development class.

Issues

- Approximately 52% of the element is in the early and mid-successional stages.
- About 43% of the element is in the establishment development class.
- There is a high percentage of the inherent hardwood patches that are now predominately softwood or softwood-dominated mixedwoods.
- There are no legal reserves within this matrix element. Approximately 5% of the Crown lands have been set aside under the Old Growth Policy. Additional area is required under the Old Growth Policy in the black spruce, red spruce, red spruce-eastern hemlock, as well as the sugar maple-yellow birch-beech communities.

Tolerant Mixedwood Hills

(Patch) (ICHO, WMKK and WMHO ecosections) (41,421 ha)

This is the largest patch element in the ecodistrict, dominating the central and eastern sections. This element is an inherent mixedwood community type of red and black spruce, white pine, sugar maple, yellow birch, and beech. Currently, this patch has a 53% softwood covertype, with 46% of the forest community in the establishment development class.

Only 35% of this patch type, which has an infrequent disturbance regime, is in the mature category. Less than 1% of this patch type is under reserve status. More than 30% of the forest is unclassified in terms of seral stage, which will decrease the present EEI of 54 to 70 if it is actually intensively managed.

Flows

Deer (cover and food with diverse ages); people (heavy timber management); water (feeder streams spawning/cooling headwater source/meeting place of major river systems - very important for water quality, good buffering capacity); salmon (spawning and young growth); wood turtle (potential metapopulations interactive on small streams); Furbearers (fisher, riparian, general habitat, broadly accessible with few or no barriers along streams and ponds); goshawk (most potential when in large patches of 25 or more hectares, mature patches with a moderate open mixedwood overstory – 200 metres undisturbed radius around nest sites).

Composition

Central Uplands Ecodistrict 380 (based on statistics up to 2006)
Composition of Tolerant Mixedwood Hills

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	46%	15%	39% (35 Mat + 4 OF)	4%
Seral Stage	Early	Mid	Late	Unclassified
	19%	23%	29%	29%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	53%	16%	22%	9%

Desired Condition

A mixedwood and hardwood community of red spruce, sugar maple, yellow birch, beech, and white ash with at least 60% of the community in mature, multi-aged, and old growth development classes.

Issues

- This patch type has been heavily harvested over the past few years resulting in a shift from a mixedwood and hardwood covertypes to a softwood-dominated element.
- Forty-six percent (46%) of the forest is now in the establishment class with only 39% of the forest in the mature and multi-aged class. This creates barriers between patches.
- Only 3% of the area has been converted to other uses but 31% of the forest is unclassified, resulting in an EEI of 54 to 70.
- There are only 240 hectares of this patch type in policy reserve status (Old Growth Policy).
- No area set aside under the legal reserves and there are deficiencies in the old growth communities that occur within the red spruce and black spruce communities.

Tolerant Hardwood Hills

(Patch) (WFKK ecosection) (10,812 ha)

This is an inherent hardwood patch type that is located in three general but distinct locations: Salmon River area, Springside, and a large area around Centredale, Hopewell, and White Hill. A small isolated parcel is located just north of Kemptown.

The covertype is currently dominated by softwood (54%) and mixedwood (26%), with only 13% hardwood. Forty-four percent of the forest is in the establishment development class while only 35% is in the mature class. Fifty-nine percent of the forest is in the early and mid seral stage. There is no area set aside in the reserve class and almost 20% has been converted to other uses.

The EEI is 43 to 55, the second lowest in the ecodistrict.

Flows

Deer (general habitat); people (exploration, timber); water (seeps and intermittent streams, small year-round brooks), furbearers (fisher, riparian, general habitat use of ponds and lakes, broadly accessible with few or no barriers along streams and ponds, fisher - moderate abundance and travel, large denning trees, mature forest for squirrels, interspersion of age class and seral stage with mature cores and connections); goshawk (most potential when in large patches of 25 hectares or more and more than 200-metre undisturbed radius around next sites).

Composition

Central Uplands Ecodistrict 380 (based on statistics up to 2006) **Composition of Tolerant Hardwood Hills**				
Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	44%	13%	43% (35 Mat + 8 OF)	8%
Seral Stage	Early	Mid	Late	Unclassified
	35%	24%	15%	26%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	54%	13%	26%	7%

Desired Condition

Late seral hardwood stands of sugar maple - yellow birch - and beech with inclusions of mixedwood of red spruce, sugar maple, yellow birch, and beech with a variety of development classes appropriate to the infrequent disturbance regime.

Issues

- This patch type, which is inherently 100% sugar maple, yellow birch, and beech, is currently 54% softwood and 26% mixedwood.
- Nearly 60% of the forest is in the early and mid seral stages, with only 15% in the late seral stage.
- This patch type, which has a gap disturbance regime, has the majority of most of the forest
  area in the establishment (44%) and young (13%) development classes.
- Twenty-four percent of the element is unclassified in terms of its EEC, with 14% intensively managed and no reserves, resulting in an EEI of 43 to 55.
- There are no legal or policy reserves in this element type. Opportunities to provide representation within this element and ecosection are very limited as the Crown ownership is presently only 113 hectares, or 1% of the Tolerant Hardwood Hills patch type.

Tolerant Hardwood Drumlins and Hummocks

(Patch) (WCKK and WCHO ecosections) (3,949 ha)

This is predominately a localized patch element occurring in the Lorne and White Hill areas of Pictou County. The gap disturbances associated with this patch produce a mixedwood and hardwood covertype naturally dominated by sugar maple, yellow birch, red spruce, elm, and white ash.

Hemlock and white pine can be found scattered throughout the patch. Current forest conditions indicate a change to 64% softwood and only 8% hardwood in the covertype. Fifty-one percent of the current forest is in the establishment class and only 30% in the mature class. Twenty-seven percent of the forest has been converted to other uses. This patch type has the lowest EEI of all the elements within the ecodistrict at 40 to 53.

Flows

Deer (cover and food with diverse ages); people (heavy timber management); water (feeder streams spawning/cooling headwater source/meeting place of major river systems - very important for water quality, good buffering capacity); salmon (potential metapopulations interactive on small streams); furbearers (fisher, riparian, general habitat use of ponds and lakes - general habitat that is broadly accessible with few or no barriers along waterways); goshawk (most potential when in large patches of more than 25 hectares – mature patches with a moderate open mixedwood overstory – 200 metres or more of undisturbed radius around nests).

Composition

Central Uplands Ecodistrict 380 (based on statistics up to 2006)
Composition of Tolerant Hardwood Drumlins and Hummocks

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	51%	13%	36% (30 Mat + 6 OF)	6%
Seral Stage	Early	Mid	Late	Unclassified
	30%	18%	22%	30%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	64%	8%	21%	7%

Desired Conditions

The desired condition of this patch type is a mixedwood covertype of late seral softwoods, red spruce-hemlock-white pine on the flats and lower elevations along with sugar maple-yellow birch
-red spruce on the well-drained upper slopes.

Issues

- There is a high percentage of conversion from the inherent covertype of 37% softwood to a current softwood covertype of 64%. Only 29% of the forest in this patch type is mixedwood and hardwood.
- Only 22% of the current forest is in a late seral stage.
- Fifty-one percent of the forest is in the establishment development class; gap disturbance areas should be 0 to 15% in this development class.
- There is no representation within these specific ecosections (WCKK and WCHO).

Tolerant Mixedwood Drumlins
(Patch) (WMDM ecosection) (1,053 ha)

This is a very small localized series of drumlins located in the Moose Lake area of Pictou County. Historically, this patch type has been 70% softwood covertype of red and black spruce and 30% sugar maple, yellow birch, and beech.

Current forest conditions indicate a shift to more of mixedwood and hardwood covertypes that are in the early and mid-successional stages. Sixty-two percent of the forest is in the establishment phase. The EEI is 53 to 72.

Flows

Deer (cover and food with diverse ages); people (timber, road construction, recreation); water (small wetlands, streams between drumlins); furbearers (fisher, riparian, general habitat); goshawk (low potential).

Composition

Central Uplands Ecodistrict 380 (based on statistics up to 2006)
Composition of Tolerant Mixedwood Drumlins

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	62%	5%	33% (30 Mat + 3 OF)	3%
Seral Stage	Early	Mid	Late	Unclassified
	31%	17%	23%	29%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	40%	21%	22%	17%

Desired Condition

Maintain the softwood climax communities of red and black spruce on the lower slopes and the sugar maple-yellow birch and beech on the upper slopes and ridges. The element type should also be in a variety of patch sizes, seral stages, and development classes applicable to the NDR.

Issues

- About 29% of the area is unclassified in terms of seral stages.
- About 62% of the forest is in the establishment class.
- Nearly 50% of the forest is in the early and mid seral stage and only 23% is in the late seral stage.
- About one-third of the forest is in the mature and multi-aged development classes.
- Approximately 5% of this patch type has been set aside as policy reserve under the Old Growth Policy. There are no legal reserves within the Tolerant Mixedwood Drumlins.

Tolerant Mixedwood Slopes

(Patch) (WCDS, WFDS and WMDS ecosections) (495 ha)

This is a very small fragmented patch type that is located in Millbrook area, Upper North River, and Walls Brook, Colchester County. The inherent climax community was red spruce, eastern hemlock, white pine, sugar maple, yellow birch, and beech. The patch is currently only 20% mixedwood, 53% softwood, and 26% hardwood. Sixty-one percent of the forest is classified as

mature but early and mid seral species comprise 35% of the area. This patch element has a relatively high EEI of 61 to 71, with 9% of the area in reserves, 1% intensively managed, and 7% converted to other uses.

Flows

Deer (travel, some browse but minor in these patch types); people (recreation, water supply for Truro, minimal timber, settlement); water (some large streams, Truro water supply); salmon (minimal); wood turtle (nil); furbearers (fisher, riparian, general habitat use of ponds and lakes); goshawk (some potential in the larger undisturbed patches).

Composition

Central Uplands Ecodistrict 380 (based on statistics up to 2006)
Composition of Tolerant Mixedwood Slopes

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	23%	9%	68% (61 Mat + 7 OF)	7%
Seral Stage	Early	Mid	Late	Unclassified
	5%	30%	44%	21%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	53%	26%	20%	1%

Desired Conditions

A mixedwood climax community of red spruce, hemlock, white pine, sugar maple, yellow birch, and beech with at least 60% of the forest communities in the mature development class.

Issues

- This patch type has reverted to more of a softwood covertype (53%) and hardwood (26%) compared to the inherent mixedwood (100%) covertype of red spruce, hemlock, white pine, sugar maple, yellow birch, and beech.
- The major portion of the forest (68%) is in the mature, multi-aged and old forest development classes, but only 44% is found in the late seral stages.
- There is approximately 9% of the area set aside that represents this element under the Old Forest Policy. There is no legal representation within this element type.

Wetlands
(Patch) (WTLD ecosection) (432 ha)

The wetlands element and wetland complexes account for less than 1% of the ecodistrict, though wetland in terms of land use represents 4% of the ecodistric. The small isolated parcels that comprise these wetlands are located at Dickey Lake, Upper Stewiacke, Jacks Meadow, and Cranberry Lake.

These wetlands have a high importance in water collection, filtering, and groundwater recharge. These wetlands are characterized by imperfect to poorly drained soils with stunted black spruce, balsam fir, intolerant hardwoods, and ericaceous vegetation.

Flows

People (rare plants, recreation); water (collection, filtering, storage).

Composition

Central Uplands Ecodistrict 380 (based on statistics up to 2006)
Composition of Wetlands

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	37%	12%	51% (37 Mat + 14 OF)	14%
Seral Stage	Early	Mid	Late	Unclassified
	9%	15%	52%	24%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	77%	10%	6%	7%

Desired Conditions

A series of wetlands and/or wetland complexes all interconnected to hydrological system.

Issues

- Wetlands represent less than 1% of this ecodistrict and it is extremely important to maintain the present areas and look at the feasibility to create new wetlands in strategic locations.
- Poor connectivity to hydrological system in some locations is a problem.
- Destruction of these ecosystems by ATVs is a concern.
- There is a good mixture of seral stages and development classes with a slight overabundance in the establishment class.
- There is approximately 10% representation under the Old Forest Policy but there is no area under legal reserves for this patch element.

Floodplain

(Patch) (ICSM and IMSM ecosections) (206 ha)

This is the smallest of the seven patch elements and is located in two general areas: Dickey Lake, Colchester County and Lorne, Pictou County. These areas are characterized by imperfectly drained soils of variable black spruce stock on the intervales, and elm, sugar maple, and white ash on the better-drained knolls.

This patch type is inherently 50% softwood and 50% hardwood. Currently, the patch is 85% softwood, 6% mixedwood, and 4% hardwood. Fifty-four percent of the forest is in the early and

mid-successional stages. There are no reserve lands representing this patch type within this ecodistrict. The EEI is 59 to 63.

Flows

Deer (winter yard - East River, West River, Stewiacke, Brookfield, critical habitat mature cover with young and hardwood and farmlands); people (moderate use of field white spruce in farms - trapping, fishing, canoeing); water (water supply from major rivers); salmon (spawning habitat - very important); wood turtle (prime habitat); furbearers (fisher, riparian, prime habitat for muskrat, beaver - moderate travel for and use by fisher - mature forest important and available); goshawk (good existing potential for nesting low disturbance/mature forest open structure).

Composition

Central Uplands Ecodistrict 380 (based on statistics up to 2006)
Composition of Floodplain

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	30%	25%	45% (37 Mat + 8 OF)	8%
Seral Stage	Early	Mid	Late	Unclassified
	28%	26%	35%	11%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	85%	4%	6%	5%

Desired Condition

A patch type with late seral black spruce on the lower imperfect to poorly drained areas and elm, sugar maple, and beech on the well-drained mid and upper slopes. A mixture of seral stages and development classes that are applicable to the disturbance regimes.

Issues

- The covertype is reverting to a softwood forest with only 4% of the present area under a hardwood covertype classification.
- Lack of representivity and lack of Crown ownership are concerns.
- There are no legal or policy reserves within this intervale patch type. The Crown does not own any land within this element type.

Valley Corridors

(Corridor) (ICHO, WMKK and WMHO ecosections) (9,790 ha)

These strong linear river corridors cross the ecodistrict in several locations: Salmon River, Murray Brook, Pembroke River, Stewiacke River, Calvary River, West River, and branches of the East River.

These corridors are historically associated with late successional spruce, hemlock, pine, sugar maple, yellow birch, beech, and elm found on the knolls and higher slopes. Mature, early, and mid-successional softwoods now dominate this element.

Only 1% of this element has been placed in reserve status. Approximately 18% has been converted to other uses. The EEI is 49 to 59.

Flows

Deer (no special value); people (trapping, fishing, camping, canoeing); water (water supply from major rivers); salmon (spawning); wood turtle (potential unknown); furbearers (fisher, riparian, major travel routes - moderate travel for and use by fisher - mature forest important and available); goshawk (good existing potential for nesting - low disturbance/mature forest/open structure).

Composition

Central Uplands Ecodistrict 380 (based on statistics up to 2006)
Composition of Valley Corridors

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	36%	12%	52% (43 Mat + 9 OF)	9%
Seral Stage	Early	Mid	Late	Unclassified
	30%	25%	20%	25%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	64%	11%	18%	7%

Desired Condition

A series of well-connected slopes and intervales across the ecodistrict that are in a natural forest condition.

Issues

- About 55% of the forest within this element is presently in the early and mid seral stages. Only 20% is in the late seral consisting of red/black spruce, white pine, sugar maple, and yellow birch. About 25% of the area is unclassified.
- Forests in the establishment and young development class account for 48% of the total.
- Only 11% of forest has a hardwood covertype compared to the inherent 28% sugar maple- yellow birch-beech-elm-yellow birch-ash community.
- There is a high conversion in this element to other uses, including along major waterways, resulting in narrow buffers.
- There is only 100 hectares, or 1% of this element type, in policy reserve under the Old Growth Policy.
- There are no legal reserves in the Valley Corridors.

Ecosystem Issues and Opportunities (All appendices and maps)

Management of the forest resource in the Central Uplands 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).

The Central Uplands is located in a relatively rural area that is heavily forested but it has a fairly high intensity of land use as indicated by the EEI of 52 to 66.

Issues

- Over 45% of the forests within the two largest elements (Spruce Hemlock Pine Hummocks and Hills and Tolerant Mixedwood Hills) is in the establishment development class.
- Low percentage of the forest in the mature and multi-aged elements that have gap and infrequent stand-initiating disturbances.
- There is a high percentage (32%) of the Tolerant Mixedwood Hills that are unclassified.
- The once dominant hardwood in the Tolerant Mixedwood Slopes is now 54% softwood.
- Early and mid seral species dominate most element types.
- Representation is only 1% of the total ecodistrict area.
- Crown ownership is 15% in the ecodistrict.
- Wetlands account for only 1% of the total area, or 432 hectares
- Some additional old growth area is required in some of the climax community types.
- There is no representation in Central Uplands under legal reserves.

Appendix 1: Flow - Element Interactions

Element	Deer	People	Water	Salmon	Wood Turtle	Furbearers	Goshawk
Spruce Hemlock Pine Hummocks and Hills Softwood - red spruce- black spruce and eastern hemlock - pockets of sM yB rS and scattered sM yB Be IFHO, IMHO, IFKK, WFHO, IFRD	General range - summer and winter - best value when there is a mix of young and mature forest (cutting)	- Prime timber - heavily managed - heavy recreational use - main snowmobile and ATV trails crossing ecodistrict between population centres.	Ground water recharge, storage - headwater source/meeting place of major river systems - very important for water quality, good buffering capacity	Spawning and smolt - parr nursery	- Potential meta-populations interactive on small streams	General habitat, broadly accessible with few or no barriers along streams and ponds. The fisher is not very common - could be the current young age/condition.	Moderate to low habitat
Floodplain IMSM, ICSM	- Winter yard - East River, West River, Stewiacke, Brookfield - critical habitat mature cover with young and hardwood and farmlands	Moderate use of old field white spruce in farms - Trapping, fishing, camping, and canoeing	- Water supply from major rivers	- Spawning habitat - very important	- Prime habitat	- Prime habitat for muskrat, otter, beaver - moderate travel for and use by the fisher - mature forest important and available	Good potential nesting - current habitat may not be available in the lower reaches.
Valley Corridors	no special value	Trapping, fishing, camping, and canoeing - not heavily used inaccessible	Water supply from major rivers	- Spawning	Potential unknown	- Major travel routes - moderate travel for and use by fisher - mature forest important and available	- Good existing potential for nesting - low disturbance/ mature forest, open structure
Tolerant Hardwood Drumlins and Hummocks Softwood-Dominated Mixedwood Patch WCKK, WCHO	- Cover and food with diverse ages	Heavy timber management	feeder streams spawning/cooling headwater source/meeting place of major river systems - very important for water quality, good buffering capacity	Spawning and young growth	Potential meta-populations interactive on small streams	General habitat use of ponds and lakes General habitat, broadly accessible with few or no barriers along streams and ponds	Most potential when in large patches (25+ ha) - mature patches with a moderate open mixedwood overstory - 200 metres undisturbed radius around nest sites
Tolerant Mixedwood Hills WMKK, WMHO, ICHO	- Cover and food with diverse ages	Heavy timber management	feeder streams spawning/cooling headwater source/meeting place of major river systems - very important for water quality, good buffering capacity	Spawning and young growth	Potential meta-populations interactive on small streams	General habitat, broadly accessible with few or no barriers along streams and ponds. The fisher are not very common - could be the current young age/condition.	Most potential when in large patches (25+ ha) - mature patches with a moderate open mixedwood overstory - 200 metres undisturbed radius around nest sites

Appendix 1: Flow - Element Interactions

Element	Deer	People	Water	Salmon	Wood Turtle	Furbearers	Goshawk
Tolerant Hardwood Hills WFKK	General habitat	Lots of exploitation and many converted to softwood Heavy to recreational motorized vehicles	Seeps and intermittent streams - small year round brooks			General habitat use of ponds and lakes General habitat, broadly accessible with few or no barriers along streams and ponds. - fisher - moderate abundance and travel. Large denning trees - mature forest for squirrels - interspersion of age class and seral stage with mature cores and connection	Most potential when in large patches (25+ ha) - mature patches with a moderate open mixedwood overstory - 200 metres undisturbed radius around nest sites
Tolerant Mixedwood Drumlins WMDM	- Cover and food with diverse ages	Timber, road construction, recreation.	Small wetlands, streams between drumlins			general habitat	Low potential
Tolerant Mixedwood Slopes WCDS, WFDS, WMDS	Travel - some browse but minor in these patch types	- recreation, water supply (Truro), minimal timber, settlement	- some larger streams - Truro water supply	minimal	nil	General habitat use of ponds and lakes	some potential in the larger undisturbed patches
Wetland Patch WTLD		Rare plants, recreation	collection, filtering, storage				
Converted / Farm (Not an element)	Spring/summer/ winter habitat (edge)	Associated woodlots - hunting - boy scout camps	farm along rivers/lower reaches with pasture flooding over farmland especially Stewiacke	area of spawning in gravel areas	major habitat active farming - machines big problem for the wood turtle	Muskrats thrive on lower reaches - stormy water - high nutrients - food production.	

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
Watershed Meeting interaction	Valley Corridors (including Corridor (Intervales and Slopes))	Very High Ecodistrict/ Central Region	Stewiacke and Salmon (Fundy) East, Middle, West (Northumber-land) St Mary's (Atlantic)	Landscape scale. Well-defined valleys across watersheds	Infrequent and Gap	Intervales (sM, wA, aE, yB, Cherry, Aspen, wS, rS Farmland sA) Slopes (eH, rS) Mixedwood - yB, sM	Generally forest types	- Road systems and converted areas heavily associated - Lack of mature intact forest along major waterways (mostly along Northumberland watersheds) - Narrow buffer - Nature of a meeting of headwaters	1) Special Management Zones along major "valley" feature 2) Species and age class issues in matrix at headwaters High quality water (nutrient buffering)	1) Define effective riparian Special Management Zones 2) increase climax and maturity in key areas of matrix 3) communication of this key function to private and municipal planners Collaboration with varied ownerships and stakeholder agencies (Agriculture, Environment, etc.) Best management practices to conserve soil/site
Tolerant Mixedwood Hills	Matrix and patch component	Prominent distribution across ED	- Drumlins, Ellen Brown, - Dickie Lake /Lansdowne - Riversdale-Walls Brook	Landscape broad distribution in small and large patches	Gap	TH, rM/yb	Patches occur within the rS and bS matrix	- Conversion of hardwood and mixedwood to softwood - Removal of hardwood from softwood matrix - Too much young forest creates barriers between patches - reducing patch size	- Pressure to reduce old forest - structure issues (age, coarse woody debris/snags/ wolf) - Preference to even-aged techniques - Diverse ownership	- Sustain appropriate species on site - maintain adequate age distribution and stand structure

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
Mixedwood Hummocks and Flats	Matrix	High	Most prominent in west/central portion; more mixed with hardwood in eastern portion	Landscape percolation	Infrequent	rS rS/yB bF/bS/rM	_____	- lack of old forest features/ - reduced species diversity through management (e.g. Herbicide reduces yB - increase in bF (early seral too much) - large wP, yb, eH cavity trees)	- preference to even-aged techniques - diverse ownership - conversion to exotics	Manage to infrequent NDR - longer rotation - thinnings - promote advanced regeneration
Tolerant Mixedwood Slopes	Patch elements - small patch occurrence in matrix	Low	- North and west of Riversdale	mid landscape and local	Frequent	bS ericaceous	rS	_____	bS/wP removal of fire disturbance	_____
Wetlands	Patch	High	North Nelson River (Pictou county) Castley Brook (Pictou County)	Local	Open Seral	bS bF poorly drained	rS bS scattered sM yB	connectivity	conversion few wetlands present	reduce wetland conversion
Tolerant Hardwood Drumlins and Hummocks	Patch	Moderate	Concord White Hill	local	Infrequent to gap	sM yB Be rS eH rS eH wP	hardwood rS bF	- lack of mature forest - increased softwood component - early and mid seral dominate	conversion	improve tolerant species composition - reduce early seral species

Appendix 2a: Landscape Connectivity Worksheet

Feature	Structure Type (corridor, matrix, patch, island)	Importance in Ecodistrict (high, moderate, low)	Significant Cases (species, ecosections, specific rivers)	Scale and Pattern of Operation (local, landscape)	Associated Natural Disturbance Regime	Characteristic Community	Characteristic Neighbour(s)	Barriers - Impediments to Functionality	Significant Issues	Management Strategy
Tolerant Hardwood Hills	Patch	High	Centredale Hopewell Marshdale Springside	mid landscape and local	Infrequent	sM yB Be	rS sM yB rS eH	lack of mature late seral structure	conversion to softwood	improve tolerant hardwood component reduce conversion
Lakes	Patch	Uncommon feature Individually very important (Deyarmont, Grant, Forbes)	Local functions	_____	_____	fen/marsh shallow at edges/lily's stillwaters	flat poorly drained bS, ericaceous	- reduced Special Management Zones or absent - sediment from construction - low number of lakes and small size - poor stream crossings interrupted hydrologic connections - exotic introductions	_____	- expand Special Management Zones - limit road access
Old Forest	Patch - sub landscape	Moderate	1 Calvary Brook 2 Walls Brook 3 West Branch Lake 4 Drug Brook	mid landscape - and local	_____	1 and 3 rS, eH, wP 2 and 4 sM, yB, Be, rS, eH	_____	- size of patches - distance between - lack of mature forest structure over landscape	additional restoration opportunities limited	- extend influence of old forest around patches - increase old forest related structure in matrix extensive

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 380)

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

SPECIES		DESIGNATION		
Common Name	**Scientific Name**	**Provincial**	**Federal**	**COSEWIC**
BIRDS	-			
Chimney Swift	*Chaetura pelagica*	Endangered	Threatened	Threatened
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Threatened
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened	Threatened
Eastern Wood-Pewee	*Contopus virens*	Vulnerable	N/A	Special Concern
Bobolink	*Dolichonyx oryzivorus*	Vulnerable	N/A	Threatened
Rusty Blackbird	*Euphagus carolinus*	Endangered	Special Concern	Special Concern
Barn Swallow	*Hirundo rustica*	Endangered	N/A	Threatened
Canada Warbler	*Wilsonia canadensis*	Endangered	Threatened	Threatened
DICOTS				
Black Ash	*Fraxinus nigra*	Threatened	N/A	N/A
FISH				
Atlantic Salmon - Inner Bay of Fundy	*Salmo salar*	N/A	Endangered	Endangered
INSECTS				
Monarch	*Danaus plexippus*	N/A	Special Concern	Special Concern
LICHENS				
Blue Felt Lichen	*Degelia plumbea*	Vulnerable	Special Concern	Special Concern
MAMMALS				
Moose	*Alces alces*	Endangered	N/A	N/A
Little Brown Myotis	*Myotis lucifugus*	Endangered	N/A	Endangered
REPTILES				
Wood Turtle	*Glyptemys insculpta*	Threatened	Threatened	Threatened

Appendix 3: Special Occurrences (Ecodistrict 380)

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

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
BIRDS	-		
Northern Goshawk	*Accipiter gentilis*	Secure (Green)	S3S4
Long-eared Owl	*Asio otus*	May Be At Risk (Orange)	S2
Pine Siskin	*Carduelis pinus*	Sensitive (Yellow)	S3S4B,S5N
Killdeer	*Charadrius vociferus*	Sensitive (Yellow)	S3S4B S3?B
Black-billed Cuckoo	*Coccyzus erythropthalmus*	May Be At Risk (Orange)	S3S4B
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Sensitive (Yellow)	S3S4B
Wilson's Snipe	*Gallinago delicata*	Sensitive (Yellow)	S3B,S4N
Common Loon	*Gavia immer Perisoreus*	May Be At Risk (Orange)	S3S4
Gray Jay	*canadensis Petrochelidon*	Sensitive (Yellow)	S3B
Cliff Swallow	*pyrrhonota Pheucticus*	May Be At Risk (Orange)	S3S4B
Rose-breasted Grosbeak	*ludovicianus Poecile*	Sensitive (Yellow)	S3
Boreal Chickadee	*hudsonica*	Sensitive (Yellow)	S3B
Eastern Bluebird	*Sialia sialis*	Sensitive (Yellow)	S3B,S5M
Greater Yellowlegs	*Tringa melanoleuca*	Sensitive (Yellow)	S3S4B
Tennessee Warbler	*Vermivora peregrina*	Sensitive (Yellow)	
DICOTS			
Hooked Agrimony	*Agrimonia gryposepala*	Secure (Green)	S3
Wood Anemone	*Anemone quinquefolia*	Sensitive (Yellow)	S2
Virginia Anemone	*Anemone virginiana*	May Be At Risk	S2
Drummond's Rockcress	*Arabis drummondii*	(Orange) Sensitive	S2
Swamp Milkweed	*Asclepias incarnata*	(Yellow) Secure (Green)	S3
Marsh Bellflower	*Campanula aparinoides*	Sensitive (Yellow)	S3
Blue Cohosh Canada	*Caulophyllum thalictroides*	May Be At Risk (Orange)	S2
Tick-trefoil Labrador	*Desmodium canadense*	May Be At Risk (Orange)	S1
Bedstraw Robinson's	*Galium labradoricum*	Sensitive (Yellow)	S2
Hawkweed Canada	*Hieracium robinsonii*	Sensitive (Yellow)	S2
Wood Nettle Water	*Laportea canadensis*	Sensitive (Yellow)	S3
Beggarticks Farwell's	*Megalodonta beckii*	Sensitive (Yellow)	S3
Water Milfoil Smooth	*Myriophyllum farwellii*	Sensitive (Yellow)	S2
Sweet Cicely Balsam	*Osmorhiza longistylis*	May Be At Risk (Orange)	S2
Groundsel Dwarf	*Packera paupercula*	Secure (Green)	S3
Clearweed	*Pilea pumila*	May Be At Risk (Orange)	S1
Pennsylvania Smartweed	*Polygonum pensylvanicum*	Secure (Green)	S3
Stout Smartweed	*Polygonum robustius*	Secure (Green)	S3S4
Climbing False Buckwheat	*Polygonum scandens*	Sensitive (Yellow)	S3
Mistassini Primrose	*Primula mistassinica*	Sensitive (Yellow)	S2

Appendix 3: Special Occurrences (Ecodistrict 380)

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

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
Marsh Mermaidweed	*Proserpinaca palustris*	Secure (Green)	S3
Pink Pyrola	*Pyrola asarifolia*	Secure (Green)	S3
Swamp Rose	*Rosa palustris*	Secure (Green)	S3
Cut-Leaved Coneflower	*Rudbeckia laciniata*	Sensitive (Yellow)	S2
Bog Willow	*Salix pedicellaris*	Sensitive (Yellow)	S2
Meadow Willow	*Salix petiolaris*	Secure (Green)	S3
Bloodroot	*Sanguinaria canadensis*	Secure (Green)	S3S4
Long-leaved Starwort	*Stellaria longifolia*	Sensitive (Yellow)	S3
Heart-leaved Foamflower	*Tiarella cordifolia*	Sensitive (Yellow)	S2
Orange-fruited Tinker's Weed	*Triosteum aurantiacum*	Sensitive (Yellow)	S2
Dwarf Bilberry	*Vaccinium caespitosum*	Sensitive (Yellow)	S2
Blue Vervain	*Verbena hastata*	Secure (Green)	S3
Northern Bog Violet	*Viola nephrophylla*	Sensitive (Yellow)	S2
Golden Alexanders	*Zizia aurea*	May Be At Risk (Orange)	S1
FERNS AND THEIR ALLIES			
Cut-leaved Moonwort	*Botrychium dissectum*	Secure (Green)	S3
Bulblet Bladder Fern	*Cystopteris bulbifera*	Secure (Green)	S3S4
Common Scouring-rush	*Equisetum hyemale var.*	Secure (Green)	S3S4
Meadow Horsetail	*affine Equisetum pratense*	Sensitive (Yellow)	S2
Dwarf Scouring-Rush	*Equisetum scirpoides*	Secure (Green)	S3S4
Southern Bog Clubmoss	*Lycopodiella appressa*	Secure (Green)	S3S4
Northern Clubmoss	*Lycopodium complanatum*	Secure (Green)	S3S4
INSECTS			
Lance-Tipped Darner	*Aeshna constricta*	Secure (Green)	S3
Common Roadside-Skipper	*Amblyscirtes vialis*	Secure (Green)	S2
Eastern Red Damsel	*Amphiagrion saucium*	Secure (Green)	S3
Bog Elfin	*Callophrys lanoraieensis*	May Be At Risk (Orange)	S1S2
Baltimore Checkerspot	*Euphydryas phaeton*	Secure (Green)	S3
Harvester	*Feniseca tarquinius*	Secure (Green)	S3S4
Northern Pearly-Eye	*Lethe anthedon*	Secure (Green)	S3
Compton Tortoiseshell	*Nymphalis l-album*	Secure (Green)	S1S2
Riffle Snaketail	*Ophiogomphus carolus*	Secure (Green)	S3
Mustard White	*Pieris oleracea*	Sensitive (Yellow)	S2
Green Comma	*Polygonia faunus*	Secure (Green)	S3
Hoary Comma	*Polygonia gracilis*	Sensitive (Yellow)	S1
Question Mark	*Polygonia interrogationis*	Secure (Green)	S3B
Grey Comma	*Polygonia progne*	Secure (Green)	S3S4
Aphrodite Fritillary	*Speyeria aphrodite*	Secure (Green)	S3S4

Appendix 3: Special Occurrences (Ecodistrict 380)

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

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
LICHENS			
Beaded Jellyskin Lichen	*Leptogium teretiusculum*	Sensitive (Yellow)	S2S3
Naked Kidney Lichen	*Nephroma bellum*	Sensitive (Yellow)	S3?
MAMMALS			
Cougar - Eastern population	*Puma concolor pop. 1*	Undetermined	SH
MOLLUSKS			
Triangle Floater	*Alasmidonta undulata*	Secure (Green)	S2S3
Eastern Lampmussel	*Lampsilis radiata*	Sensitive (Yellow)	S2
MONOCOTS			
Wild Leek	*Allium tricoccum*	May Be At Risk (Orange)	S1
Lesser Brown Sedge	*Carex adusta*	Sensitive (Yellow)	S2S3
Bebb's Sedge	*Carex bebbii*	May Be At Risk (Orange)	S1S2
Garber's Sedge	*Carex garberi*	May Be At Risk (Orange)	S1
Pubescent Sedge	*Carex hirtifolia*	Sensitive (Yellow)	S2S3
Hop Sedge	*Carex lupulina*	Secure (Green)	S3
Woolly Sedge	*Carex pellita*	May Be At Risk (Orange)	S1
Plantain-Leaved Sedge	*Carex plantaginea*	May Be At Risk (Orange)	S1
Rosy Sedge	*Carex rosea*	Secure (Green)	S3
Early Coralroot	*Corallorhiza trifida*	Secure (Green)	S3
Narrow-leaved Panic Grass	*Dichanthelium linearifolium*	Sensitive (Yellow)	S2?
Spreading Wild Rye	*Elymus hystrix var. bigeloviana*	May Be At Risk (Orange)	S1
Wiegand's Wild Rye	*Elymus wiegandii*	May Be At Risk (Orange)	S1
Dudley's Rush	*Juncus dudleyi*	Sensitive (Yellow)	S2?
Vasey Rush	*Juncus vaseyi*	May Be At Risk	S1
Canada Lily	*Lilium canadense*	(Orange) Sensitive	S2S3
Southern Rein-Orchid	*Platanthera flava*	(Yellow) Sensitive	S2
Large Purple Fringed Orchid	*Platanthera grandiflora*	(Yellow) Secure (Green)	S3
White-stemmed Pondweed	*Potamogeton praelongus*	Sensitive (Yellow)	S3?
Narrow-leaved Blue-eyed-grass	*Sisyrinchium angustifolium*	Secure (Green)	S3S4
Shining Ladies'-Tresses	*Spiranthes lucida*	May Be At Risk (Orange)	S2
Narrow False Oats	*Trisetum spicatum*	Secure (Green)	S3S4

*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 380)
Table 1c – Other Conservation Features

Feature	Type	Information Source	Legislation or Status Ranking System
Potential Bat Hibernaculum (Bridgeville)	Habitat	NS Significant Species & Habitats	NS Endangered Species Act, Special Places Protection Act
Abandoned (Iron) Mines (Bridgeville)	Ecosystem	Provincial Database	
Loon Nesting Sites	Habitat	NS Significant Species & Habitats	Canadian Migratory Bird Convention Act, Wildlife Act
Deer Wintering Areas	Habitat	NS Significant Species & Habitats	Wildlife Act
Goshawk Nests (Burnside)	Habitat	NS Significant Species & Habitats	Wildlife Act
Flood Plain Species	Community	NS Significant Species & Habitats	
Drumlins	Ecosystem	Provincial Database	
Wood Turtle Rivers (Stewiacke, East River of Pictou, St. Mary's)	Habitat	NS Significant Species & Habitats	Wildlife Act, NS Endangered Species Act
Atlantic Salmon Rivers (Salmon, Stewiacke, East, Middle, and West Pictou)	Habitat	NS Significant Species & Habitats	Species at Risk Act, Fisheries Act
Manganese Mines	Ecosystem	Provincial Database	Wildlife Act
Head-waters (Salmon, Stewiacke, East, Middle, and West Pictou, St. Mary's)	Ecosystem	NS Significant Species & Habitats	NS Environment Act, Forestry Act, Fisheries Act
Deyarmont Lake - Wetland Stewardship	Habitat	NS Significant Species & Habitats	NS Environment Act
Calvary River Nature Reserve	Ecosystem	Provincial Database	Special Places Protection Act
Upper Stewiacke Wilderness Area	Ecosystem	Provincial Database	NS Wildlife Act
Drug Brook Nature Reserve	Ecosystem	Provincial Database	Special Places Protection Act

Appendix 3: Special Occurrences

Table 2: Comparison of Ecological Emphasis Classification Index by Ecosection (Within Ecodistrict and Ecoregion) Ecosections that form 2% or less of the ecodistrict and/or ecoregion area or are more than 75% converted are highlighted. The table provides a sense of how unique or uncommon an ecosection and its associated climax communities are within the ecodistrict and across the ecoregion. The EEC Index value conveys an indication of relative land use pressure on the ecosection.

Ecosection	Climax Type	Ecodistrict Occurrence						Ecoregion Occurrence					
		Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted	Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted
		Ha	%	Ha	%			Ha	%	Ha	%		
ICHO	bS wP	32,362	17.5	25,534	13.8	68 to 74	4.3	270,098	16.0	419,644	24.9	75 to 79	1.4
ICKK	bS wP	1,848	1.0	25,534	13.8	63 to 72	9.5	2,313	0.1	419,644	24.9	67 to 74	7.6
ICRD	bS wP	5,008	2.7	25,534	13.8	59 to 72	3.3	7,277	0.4	419,644	24.9	63 to 72	3.4
ICSM	bS	3,370	1.8	4,783	2.6	69 to 73	2.6	37,858	2.2	75,102	4.5	76 to 79	2.5
IMHO	rS eH wP	1,509	0.8	128,796	69.7	72 to 74	1.3	222,050	13.2	616,727	36.6	70 to 73	3.0
IMSM	bS	2,174	1.2	4,783	2.6	70 to 74	2.0	92,050	5.5	75,102	4.5	71 to 74	3.7
WCDM	rS eH wP sM yB Be	3,434	1.9	8,024	4.3	76 to 78	1.2	10,837	0.6	187,322	11.1	71 to 76	0.9
WCHO	rS eH wP	37,131	20.1	128,796	69.7	64 to 70	7.4	187,670	11.1	616,727	36.6	73 to 77	3.9
WCKK	rS eH wP	69,955	37.9	128,796	69.7	62 to 71	5.4	152,022	9.0	616,727	36.6	66 to 73	3.5
WCRD	rS eH wP	758	0.4	128,796	69.7	56 to 68	8.7	2,880	0.2	616,727	36.6	70 to 75	5.2
WFDM	rS eH wP sM yB Be	2,037	1.1	8,024	4.3	60 to 61	23.6	37,395	2.2	187,322	11.1	53 to 60	17.7
WFKK	rS eH wP sM yB Be	350	0.2	8,024	4.3	62 to 73	2.0	28,197	1.7	187,322	11.1	47 to 51	25.5
WMDM	rS eH wP sM yB Be	2,203	1.2	8,024	4.3	35 to 42	37.2	132,982	7.9	187,322	11.1	59 to 64	13.5

*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	%		
WMHO	rS eH wP	5,759	3.1	128,796	69.7	45 to 51	29.3	154,580	9.2	616,727	36.6	64 to 69	7.5
WMKK	sM yB Be	325	0.2	325	0.2	29 to 31	57.2	17,018	1.0	59,619	3.5	61 to 66	9.9
WTLD	wetlands	2,798	1.5	0	0.0	71 to 75	0.5	87,241	5.2	0	0.0	77 to 78	3.0

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

Appendix 4: Ecological Representivity Worksheet

Ecosystem			Crown Responsibility	Legal Reserves		Policy Reserves (including unproclaimed legal reserve proposals)		Ecological Emphasis Classification "Reserve Class"					
Ecosection	Climax Type	Area (ha)	Percent of Area on Crown (%)	Crown Area (ha)	Private Area (ha)	Crown Area (ha)	Private Area (ha)	Crown		Private		Total Reserve	
								ha	% (EcoS)	ha	% (EcoS)	ha	% (EcoS)
IMHO	rS	31,320	21	0	0	188	0	188	0.6	0	0.0	188	0.6
WMKK	sM yB rS	23,447	19	0	0	219	0	219	0.9	0	0.0	219	0.9
WMHO	sM yB Be	19,750	19	0	0	38	0	38	0.2	0	0.0	38	0.2
IFKK	rS eH yB	16,964	12	0	0	275	0	275	1.6	0	0.0	275	1.6
WFKK	sM yB Be	11,311	1	0	0	0	0	0	0.0	0	0.0	0	0.0
IFHO	rS eH yB	10,653	9	0	0	54	0	54	0.5	0	0.0	54	0.5
WFHO	rS	3,234	6	0	0	0	0	0	0.0	0	0.0	0	0.0
WCKK	sM yB rS	3,038	4	0	0	0	0	0	0.0	0	0.0	0	0.0
WCHO	rS eH wP	2,674	8	0	0	8	0	8	0.3	0	0.0	8	0.3
ICHO	bS wP	1,672	1	0	0	0	0	0	0.0	0	0.0	0	0.0
ICSM	aE sM wA	1,057	2	0	0	0	0	0	0.0	0	0.0	0	0.0
WMDM	rS	1,054	28	0	0	45	0	45	4.3	0	0.0	45	4.3
XXWA	NONE	991	1	0	0	0	0	0	0.0	0	0.0	0	0.0
IMSM	aE sM wA	606	36	0	0	28	0	28	4.6	0	0.0	28	4.6
WTLD	wetlands	491	11	0	0	4	0	4	0.9	0	0.0	4	0.9
WCDS	rS eH wP sM yB Be	384	7	0	0	0	0	0	0.0	0	0.0	0	0.0
IMSI	aE sM wA	207	0	0	0	0	0	0	0.0	0	0.0	0	0.0
WFDS	rS eH wP sM yB Be	123	51	0	0	44	0	44	36.0	0	0.0	44	36.0
IFSM	rS eH wP	82	0	0	0	0	0	0	0.0	0	0.0	0	0.0
WMDS	rS eH wP sM yB Be	58	100	0	0	35	0	35	60.4	0	0.0	35	60.4
Total		**129,116**	**15**	**0**	**0**	**938**	**0**	**938**	**4.8**	**0**	**0.0**	**938**	**4.8**

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)
			Old Forest	938	0

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

Appendix 6: Description of Road Density Index

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

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

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

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

Main Concepts

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

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

density of the transportation network and the specific distance to the transportation features.

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

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

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

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

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

Appendix 7: Road Density Index Worksheets

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

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

Road Type	Road Index Weighting	Length (km)
Trails, tracks, abandoned roads, and railways	1	1,275
Utility corridors	3	151
Gravel Roads and active railways	6	946
Paved streets and roads collectors	10	190
Highways	15	3

Table 2: Distribution of Road Index Classes

Road Index Value		Area of Ecodistrict Affected	
Indication	Range	Hectares	Percent
Remote	0 to 6	13,708	11
Forest Resource	7 to 15	50,952	39
Mixed Rural	16 to 24	47,773	37
Agriculture Suburban	25 to 39	14,783	11
Urban	40 to 100	1,874	2
Total		**129,092**	**100**

Table 3: Road Index Values for Each Landscape Element Type

Landscape Element	Area (ha)	Road Index
Valley Corridors	9,800	23
Spruce Hemlock Pine Hummocks and Hills	60,183	8
Tolerant Mixedwood Hills	41,401	7
Tolerant Hardwood Hills	10,812	14
Floodplain	206	12
Tolerant Mixedwood Slopes	496	13
Tolerant Mixedwood Drumlins	1,053	7
Tolerant Hardwood Drumlins and Hummocks	3,944	16
Wetlands	432	9
Total	**128,327**	**10**

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

Appendix 8: Development Classes and Seral Stages

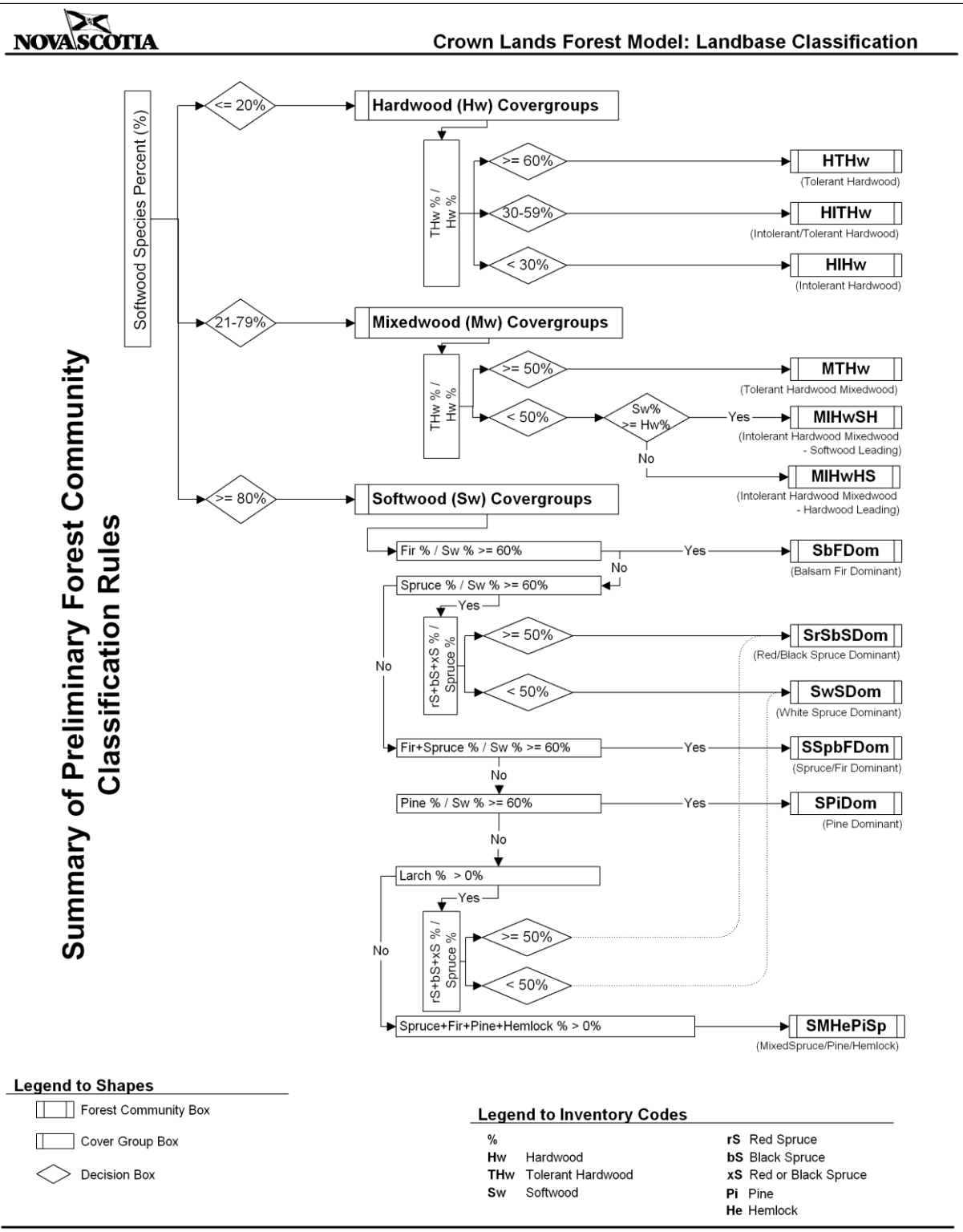
Development Class	Seral Stage
1. Forest Establishment (Height 0 to 6 m) • establishment of new growth following a stand-initiating disturbance • high diversity of forbs, shrubs, and tree regeneration, many of which are short-live shade-intolerant "pioneer" species • peak seed production by forbs and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

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

Species		Ecodistrict																																							
Code	Name	100	210	220	310	320	330	340	350	360	370	380	410	420	430	440	450	510	520	530	540	550	560	610	620	630	710	720	730	740	750	760	770	780	810	820	830	840	910	920
AS	ash	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
BA	black ash	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
BC	black cherry	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
BE	beech	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
BF	balsam fir	5	5	5	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	5	1	1
BP	balsam poplar	1	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	3	1
BS	black spruce	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
EC	eastern cedar	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
EH	eastern hemlock	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	exotic species	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
GB	grey birch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IH	intolerant hardwood	3	2	4	2	2	2	2	2	4	2	2	2	2	2	2	2	2	2	2	2	4	3	2	2	2	2	2	2	2	2	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	2	3	2	3	3	2	2	2	2
RO	oak	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
RP	red pine	3	3	3	3	3	3	3	3	3	4	3	3	3	4	3	3	3	3	4	4	4	4	4	4	4	3	4	3	3	3	4	4	3	4	4	3	3	3	3
RS	red spruce	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
SM	sugar maple	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ST	striped maple	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
TA	aspen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TH	tolerant hardwood	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
TL	eastern larch	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
UC	unclassified	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
WA	white ash	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
WB	white birch	3	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
WE	white elm	2	2	4	2	4	2	2	2	2	2	2	2	2	2	2	4	4	4	2	2	2	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
WP	white pine	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
WS	white spruce	4	4	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	4	1	1
XS	red&black spruce	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
YB	yellow birch	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

A look-up table assigns each species in the forest inventory a value from 1 to 5 for its position on the successional scale. The look-up table may change by ecodistrict since climax on the coast or the Cape Breton Highlands differs from inland and lowland districts. This successional value is multiplied by the species' percent in the stand to give a stand successional score. Each stand may have up to four species, and the four percentages add to 10, so the stand successional scores range from 10 to 50. These scores are subdivided into three successional categories: 10 - 23 early, 24 - 37 mid and 38 - 50 late.

Appendix 9: Vegetation Community Classification – Forest Model



Note: 1) Exotic species (Norway Spruce, Japanese Larch, etc.) were grouped with similar native species where required.
2) Unclassified species were assigned based on supplementary information (i.e.: Wood Acquisition Program / Regional Services)

Preliminary Draft: November 14, 2006

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Central Uplands 380)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Valley Corridors	IMHO (17.0%) WCHO (16.0%) WMKK (15.0%) ICSM (11.0%) WMHO (8.0%) IFKK (7.0%) ICHO (7.0%) IMSM (6.0%) WFKK (5.0%) IFSM (4.0%)	Softwood	rS bS rS eH wP	Frequent to Infrequent	4,899; 50.0	Early	199	259	707	140	1,305	4,529; 64.0	EARLY	2,084; 30.0
						Mid	109	203	524	128	964			
						Late	141	160	618	75	994			
						Uncl	1,201	0	0	0	1,201			
		Mixedwood	sM yB rS	Infrequent to Gap	1,257; 13.0	Early	57	59	171	116	403	1,273; 18.0	MID	1,794; 25.0
						Mid	33	38	327	43	441			
						Late	10	6	150	15	181			
						Uncl	224	0	0	0	224			
		Hardwood	aE sM wA sM yB Be	Gap	2804; 29.0	Early	36	30	85	15	166	749; 11.0	LATE	1,405; 20.0
						Mid	19	35	230	51	335			
						Late	3	16	185	15	219			
						Uncl	28	0	0	0	28			
		Unclassified				Early	172	5	15	0	192	499; 7.0	UNCL	1,768; 25.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	308	0	0	0	308			
Total					**9,790***	**# ha**	**2,540**	**811**	**3,012**	**598**	**6,961**			
						%	**36.5%**	**11.7%**	**43.3%**	**8.9%**	**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.

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Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Tolerant Mixedwood Slopes	WCDS (75.0%) WFDS (25.0%) WMDS (0.2.0%)	Softwood				Early	3	3	11	3	20	243; 53.0	EARLY	24; 5.0
						Mid	0	14	59	5	78			
						Late	0	5	62	14	81			
						Uncl	64	0	0	0	64			
		Mixedwood	rS eH wP sM yB Be	Gap	493; 99.0	Early	1	0	1	0	2	94; 20.0	MID	137; 30.0
						Mid	2	2	25	7	36			
						Late	0	0	33	2	35			
						Uncl	20	0	0	0	20			
		Hardwood				Early	0	0	0	0	0	119; 26.0	LATE	202.7; 44.0
						Mid	1	15	9	0	25			
						Late	1	1	82	1	85			
						Uncl	10	0	0	0	10			
		Unclassified				Early	2	0	0	0	2	5; 1.0	UNCL	97.4; 21.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	3	0	0	0	3			
Total					**495***	**# ha**	**107**	**40**	**282**	**32**	**461**			
						%	**23.2%**	**8.7%**	**61.2%**	**6.9%**	**100.0%**			

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Appendix 10: Table 1: Forest Landscape Composition Worksheet (Central Uplands 380)

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	WFKK (100.0%)	Softwood				Early	510	515	704	168	1,897	4,641; 54.0	EARLY	3,054; 35.0
						Mid	342	177	323	80	922			
						Late	155	61	276	50	542			
						Uncl	1,280	0	0	0	1,280			
		Mixedwood				Early	150	138	209	122	619	2186; 26.0	MID	2,075; 24.0
						Mid	52	83	515	207	857			
						Late	8	7	245	32	292			
						Uncl	416	0	1	0	417			
		Hardwood	sM yB Be	Gap	10,785; 99.8	Early	63	53	155	21	292	1,136; 13.0	LATE	1,258; 15.0
						Mid	47	34	192	22	295			
						Late	23	19	375	5	422			
						Uncl	127	0	0	0	127			
		Unclassified				Early	215	10	23	0	248	612; 7.0	UNCL	2,189; 26.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	365	0	0	0	365			
Total					**10,812***	**# ha**	**3,752**	**1,097**	**3,018**	**707**	**8,575**			
						%	**43.8%**	**12.8%**	**35.2%**	**8.2%**	**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 (Central Uplands 380)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Wetlands	WTLD (100.0%)	Softwood	bS	Open Seral	216; 50.0	Early	10	6	1	2	19	188; 77.0	EARLY	21; 9.0
						Mid	10	1	10	6	27			
						Late	10	23	65	26	124			
						Uncl	19	0	0	0	19			
		Mixedwood				Early	0	0	2	0	2	14; 6.0	MID	38; 15.0
						Mid	0	0	4	0	4			
						Late	0	0	0	1	1			
						Uncl	7	0	0	0	7			
		Hardwood				Early	0	0	0	0	0	25; 10.0	LATE	128; 52.0
						Mid	0	0	7	0	7			
						Late	0	0	2	0	2			
						Uncl	17	0	0	0	17			
		Unclassified				Early	2	0	0	0	2	16; 7.0	UNCL	58; 24.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	15	0	0	0	15			
Total					**432***	**# ha**	**90**	**31**	**90**	**35**	**246**			
						%	**36.6%**	**12.2%**	**37.0%**	**14.2%**	**100.0%**			

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Appendix 10: Table 1: Forest Landscape Composition Worksheet (Central Uplands 380)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Tolerant Mixedwood Drumlins	WMDM (100%)	Softwood	rS bS	Infrequent	737; 70.0	Early	55	34	15	4	108	400; 40.0	EARLY	319; 31.0
						Mid	55	6	17	5	83			
						Late	30	7	108	14	159			
						Uncl	51	0	0	0	51			
		Mixedwood				Early	56	4	7	1	68	224; 22.0	MID	166; 17.0
						Mid	0	0	23	2	25			
						Late	0	0	26	2	28			
						Uncl	103	0	0	0	103			
		Hardwood	sM yB Be	Gap	316; 30.0	Early	34	0	8	0	42	209; 21.0	LATE	235; 23.0
						Mid	2	0	57	0	59			
						Late	0	0	45	4	49			
						Uncl	59	0	0	0	59			
		Unclassified				Early	100	0	0	0	100	174; 17.0	UNCL	287; 29.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	75	0	0	0	75			
Total					1,053*	# ha	620	51	306	32	1,009			
						%	61.4%	5.1%	30.3%	3.2%	100.0%			

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Appendix 10: Table 1: Forest Landscape Composition Worksheet (Central Uplands 380)

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 Hills	WMKK (53.0%) WMHO (44.0%) ICHO (3.0%)	Softwood	rS bS bS wP	Infrequent	11,367; 27.0	Early	1,428	1,396	858	152	3,834	20,749; 53.0	EARLY	7,319; 19.0
						Mid	1,585	1,702	1,433	331	5,051			
						Late	1,216	1,444	3,285	386	6,331			
						Uncl	5,529	4	0	0	5,533			
		Mixedwood	sM yB rS	Infrequent	15,332; 37.0	Early	373	224	398	83	1,078	8,522; 22.0	MID	8,952; 23.0
						Mid	303	337	1,677	289	2,606			
						Late	38	144	1,566	156	1,904			
						Uncl	2,933	0	0	0	2,933			
		Hardwood	sM yB Be aE sM wA	Gap	14,703; 36.0	Early	106	105	424	5	640	6,381; 16.0	LATE	11,542; 29.0
						Mid	95	136	1,008	56	1,295			
						Late	50	191	3,023	42	3,306			
						Uncl	1,141	0	0	0	1,141			
		Unclassified				Early	1,597	33	137	0	1,767	3,368; 9.0	UNCL	11,207; 29.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	1,601	0	0	0	1,601			
Total					**41,421***	**# ha**	**17,995**	**5,716**	**13,809**	**1,500**	**39,020**			
						%	**46.1%**	**14.6%**	**35.4%**	**3.8%**	**100.0%**			

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Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Spruce Hemlock Pine Hummocks and Hills	IMHO (50.0%) IFKK (27.0%) IFHO (17.0%) WFHO (5.0%)	Softwood	rS rS eH yB bS	Infrequent	51,693; 87.0	Early	1,758	2,028	3,425	649	7,860	33,120; 63.0	EARLY	13,545; 26.0
						Mid	1,871	1,641	3,532	1,063	8,107			
						Late	1,085	1,566	4,662	960	8,273			
						Uncl	8,866	0	0	0	8,866			
		Mixedwood	sM yB rS	Infrequent	6,962; 12.0	Early	687	485	1,476	322	2,970	10,824; 20.0	MID	13,875; 26.0
						Mid	391	481	2,420	693	3,985			
						Late	22	96	744	72	934			
						Uncl	2,931	0	0	0	2,931			
		Hardwood	sM yB Be	Infrequent	1,487; 3.0	Early	150	179	574	34	937	5,233; 10.0	LATE	11,279; 21.0
						Mid	256	330	1,142	51	1,779			
						Late	29	227	1,741	69	2,066			
						Uncl	433	0	18	0	451			
		Unclassified				Early	1,744	2	25	0	1,771	3,813; 7.0	UNCL	14,291; 27.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	2,038	0	0	0	2,038			
Total					**60,190***	**# ha**	**22,261**	**7,035**	**19,759**	**3,913**	**52,968**			
						%	**42.0%**	**13.3%**	**37.3%**	**7.4%**	**100.0%**			

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							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Tolerant Hardwood Drumlins and Hummocks	WCKK (76.0%) WCHO (24.0%)	Softwood	rS eH rS eH wP	Infrequent	1,467; 37.0	Early	185	185	253	33	656	1,959; 64.0	EARLY	940; 30.0
						Mid	167	73	74	11	325			
						Late	116	55	133	18	322			
						Uncl	656	0	0	0	656			
		Mixedwood	sM yB rS	Infrequent	2,106; 53.0	Early	35	27	41	18	121	665; 21.0	MID	551; 18.0
						Mid	9	11	126	23	169			
						Late	0	11	172	51	234			
						Uncl	140	0	0	0	140			
		Hardwood	aE sM wA	Gap	376; 10.0	Early	47	11	10	7	75	254; 8.0	LATE	677; 22.0
						Mid	2	16	24	15	57			
						Late	7	3	86	25	121			
						Uncl	2	0	0	0	2			
		Unclassified				Early	70	0	18	0	88	224; 7.0	UNCL	933; 30.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	135	0	0	0	135			
Total					**3,949***	**# ha**	**1,571**	**392**	**937**	**201**	**3,101**			
						%	**50.7%**	**12.6%**	**30.2%**	**6.5%**	**100.0%**			

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Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Floodplain	IMSM (58.0%) ICSM (42.0%)	Softwood	bS	Frequent	103; 50.0	Early	7	20	6	2	35	120; 85.0	EARLY	39; 28.0
						Mid	7	8	5	9	29			
						Late	8	4	34	0	46			
						Uncl	11	0	0	0	11			
		Mixedwood				Early	0	0	1	0	1	8; 6.0	MID	37; 26.0
						Mid	0	0	5	0	5			
						Late	2	0	0	0	2			
						Uncl	0	0	0	0	0			
		Hardwood	aE sM wA	Gap	103; 50.0	Early	0	2	0	0	2	5; 4.0	LATE	48; 35.0
						Mid	0	0	3	0	3			
						Late	0	0	0	0	0			
						Uncl	0	0	0	0	0			
		Unclassified				Early	3	0	0	0	3	7; 5.0	UNCL	16; 11.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	5	0	0	0	5			
Total					**206***	**# ha**	**43**	**34**	**54**	**11**	**142**			
						%	**30.3%**	**23.9%**	**38.0%**	**7.7%**	**100.0%**			

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Appendix 10: Table 2: Composition of Forest Communities (in Central Uplands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Valley Corridors	ICHO ICSM IFHO IFKK IMHO IMSM WCDS WCHO WCKK WFDS WFHO WFKK WMDS WMHO WMKK	FREQ GAP INFREQ INFREQ INFREQ GAP GAP INFREQ GAP GAP INFREQ INFREQ GAP INFREQ GAP	bS wP aE sM wA rS eH yB rS eH yB rS aE sM wA rS eH wP sM yB Be rS eH wP sM yB rS rS eH wP sM yB Be rS sM yB Be rS eH wP sM yB Be sM yB Be sM yB rS	S	SrSbSDom	1,722	26.7%	L	All
				S	SbFDom	1,204	18.6%	E	
				S	SwSDom	857	13.3%	E	
				S	SSpbFDom	628	9.7%	E/M	
				S	SPiDom	31	0.5%	L	
				S	SMHePiSp	22	0.3%	L	
				M	MIHwSH	518	8.0%	E/M	
				M	MTHw	396	6.1%	L	
				M	MIHwHS	336	5.2%	E/M	
				H	HTHw	315	4.9%	L	
				H	HIHw	279	4.3%	E/M	
				H	HITHw	153	2.4%	M/L	
Total						**6,460**	**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 Central Uplands 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	eH wP sM yB rS eH wP sM yB rS eH wP sM yB	S	SrSbSDom	156	34.4%	L	**Well-drained:** Early: bF rM, wood sorrel Mid: rS bF, Schreber's moss, stairstep moss Late: rS eH, starflower/ wild lily-of-the -valley
				S	SSpbFDom	36	7.9%	E/M	
				S	SbFDom	40	8.8%	E	
				S	SwSDom	9	2.0%	E	
				M	MTHw	55	12.1%	L	
				M	MIHwSH	28	6.2%	E/M	
				M	MIHwHS	11	2.4%	E/M	
				H	HTHw	95	20.9%	L	
				H	HITHw	10	2.2%	M/L	
				H	HIHw	14	3.1%	E/M	
Total						**454**	**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 Central Uplands 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	WFKK	Infrequent	sM yB Be	S	SwSDom	1,527	19.2%	E	**Well-drained**: Mid VT: rM, hay scented fern, wood sorrel Late: Maple, - yB, New York fern, - sM, wA, Christmas fern - sM, yB, hay scented fern **Well-drained to imperfectly drained**: Early: bF, rM, wood sorrel Mid: rS, bF Schreber's moss -rS, bF, stairstep moss Late: rS, eH,starflower -eH, rS, wild lily-of- the-valley -yB, rS, wood fern
				S	SbFDom	1,270	16.0%	E	
				S	SrSbSDom	1,140	14.3%	L	
				S	SSpbFDom	567	7.1%	E/M	
				S	SMHePiSp	88	1.1%	L	
				S	SPiDom	49	0.6%	L	
				M	MIHwSH	975	12.2%	E/M	
				M	MTHw	750	9.4%	L	
				M	MIHwHS	461	5.8%	E/M	
				H	HIHw	514	6.5%	E/M	
				H	HTHw	475	6.0%	L	
				H	HITHw	147	1.8%	M/L	
Total						**7,963**	**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 Central Uplands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Wetlands	WTLD	None		S	SrSbSDom	148	64.7%	L	**Wet**: bS Cinnamon fern sphagnum
				S	SbFDom	22	9.6%	E	
				S	SSpbFDom	15	6.6%	E/M	
				S	SwSDom	3	1.4%	E	
				M	MTHw	10	4.3%	L	
				M	MIHwSH	3	1.3%	E/M	
				M	MIHwHS	2	1.0%	E/M	
				H	HTHw	18	7.8%	L	
				H	HITHw	4	1.7%	E/M	
				H	HIHw	4	1.6%	M/L	
Total						**228**	**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 Central Uplands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Tolerant Mixedwood Drumlins	WMDM	Infrequent	rS	S	SrSbSDom	234	28.1%	L	**Well-drained**: Early to mid: rM, hay scented fern, woodsorrel Late: sM yB New York fern, sM wA Christmas fern, sM yB hay scented fern **Moist**: Early: bF rM, wood sorrel Mid: rS bF, Schreber's moss, stairstep moss Late: eH rS wild lily-of-the-valley, yB rS wood sorrel **Wet**: bS cinnamon fern-sphagnum/false holly, wild raisin, rS cinnamon fern sphagnum, rM bF sensitive fern
				S	SbFDom	149	17.9%	E	
				S	SSpbFDom	16	1.9%	E/M	
				M	SPiDom	1	0.1%	L	
				M	MTHw	96	11.5%	L	
				M	MIHwSH	75	9.0%	E/M	
				H	MIHwHS	53	6.4%	E/M	
				H	HTHw	107	12.8%	L	
				H	HIHw	63	7.6%	E/M	
				H	IHTH	39	4.7%	M/L	
Total						**832**	**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 Central Uplands 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 Hills	WMHO WMKK ICHO	Infrequent	sM yB Be	S	SrSbSDom	11,292	31.7%	L	**Well-drained:** Early to mid: rM,hay scented fern,wood sorrel Late: sM yB New York fern, sM wA Christmas fern, sM yB hay scented fern **Moist**: Early: bF rM, wood sorrel Mid: rS bF, Schreber's moss, stairstep moss Late: rS eH, starflower/ wild lily-of-the –valley **Wet**: bS cinnamon fern-sphagnum/false holly, wild raisin, rS cinnamon fern sphagnum, rM bF sensitive fern
				S	SbFDom	4,374	12.3%	E	
				S	SSpbFDom	3,013	8.5%	E/M	
				S	SwSDom	1,527	4.3%	E	
				S	SPiDom	514	1.4%	L	
				S	SMHePiSp	30	0.1%	L	
				M	MTHw	4,619	13.0%	L	
				M	MIHwSH	2,752	7.7%	E/M	
				M	MIHwHS	1,152	3.2%	E/M	
				H	HTHw	4,203	11.8%	L	
				H	HIHw	1,502	4.2%	E/M	
				H	HITHw	676	1.9%	M/L	
Total						**35,653**	**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 Central Uplands 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	IMHO IFKK IFHO WFHO	Infrequent Infrequent Infrequent Infrequent	rS rS eH yB rS rS	S	SrSbSDom	15,846	32.2%	L	**Well-drained**: Mid VT: rM, hay scented fern, wood sorrel Late: Maple, -yB, New York fern, -sM, wA, Christmas fern - sM, yB, hay scented fern **Well-drained to imperfectly drained**: Early: bF, rM, wood sorrel Mid: rS, bF Schreber's moss -rS, bF, stairstep moss Late: rS, eH, starflower -eH, rS, wild lily-of-the-valley -yB, rS, wood fern
				S	SbFDom	10,049	20.4%	E	
				S	SSpbFDom	4,399	8.9%	E/M	
				S	SwSDom	1,997	4.1%	E	
				S	SPiDom	690	1.4%	L	
				S	SMHePiSp	126	0.3%	L	
				M	MIHwSH	5,508	11.2%	E/M	
				M	MTHw	3,039	6.2%	L	
				M	MIHwHS	2,273	4.6%	E/M	
				H	HTHw	2,479	5.0%	L	
				H	HIHw	1,634	3.3%	E/M	
				H	HITHw	1,119	2.3%	M/L	
Total						**49,157**	**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 Central Uplands 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 Drumlins and Hummocks	WCHO WCKK	Infrequent Gap	rS eH wP sM yB rS	S	SwSDom	869	30.2%	E	**Well-drained**: Early to mid: rM, hay scented fern, wood sorrel Late: sM yB New York fern, sM wA Christmas fern, sM yB hay scented fern **Moist**: Early: bF rM, wood sorrel Mid: rS bF, Schreber's moss, stairstep moss Late: eH rS wild lily-of-the-valley, yB rS wood sorrel
				S	SrSbSDom	703	24.4%	L	
				S	SbFDom	241	8.4%	E	
				S	SSpbFDom	92	3.2%	E/M	
				S	SPiDom	44	1.5%	L	
				S	SMHePiSp	12	0.4%	L	
				M	MTHw	454	15.8%	L	
				M	MIHwSH	153	5.3%	E/M	
				M	MIHwHS	58	2.0%	E/M	
				H	HTHw	144	5.0%	L	
				H	HIHw	86	3.0%	E/M	
				H	HITHw	24	0.8%	M/L	
Total						**2,878**	**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 Central Uplands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Floodplain	ICSM IMSM	Gap Gap	aE sM wA	S	SrSbSDom	61	45.5%	L	
				S	SbFDom	35	26.0%	E	
				S	SwSDom	20	15.2%	E	
				S	SSpbFDom	5	3.5%	E/M	
				M	MIHwSH	7	4.9%	E/M	
				M	MTHw	1	1.1%	L	
				H	HITHw	3	2.2%	M/L	
				H	HIHw	2	1.7%	E/M	
Total						**133**	**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	31,865	24.7	98,853	10.2
sM yB Be	28,397	22.0	394,228	40.6
sM yB rS	25,760	20.0	25,760	2.7
rS eH yB	19,332	15.0	19,332	2.0
bS	15,809	12.2	95,246	9.8
aE sM wA	2,216	1.7	11,097	1.1
rS eH wP	1,662	1.3	1,662	0.2
bS wP	1,337	1.0	43,237	4.5
rS eH	912	0.7	22,789	2.3
rS eH wP sM yB Be	565	0.4	6,220	0.6
Total	**127,855**	**99%**	**718,433**	**74%**

*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 Hills	60,157	508	35,995	3,451	3,801	16,402	32,468 to 40,669	54 to 68
Tolerant Mixedwood Hills	41,410	240	24,436	2,247	1,152	13,335	22,463 to 29,130	54 to 70
Tolerant Hardwood Hills	10,810	0	4,812	1,486	1,955	2,557	4,620 to 5,899	43 to 55
Valley Corridors	9,560	100	5,130	786	1,564	1,980	4,640 to 5,631	49 to 59
Tolerant Hardwood Drumlins and Hummocks	3,947	0	1,485	724	664	1,074	1,564 to 2,101	40 to 53
Tolerant Mixedwood Drumlins	1,052	44	537	53	16	402	561 to 762	53 to 72
Tolerant Mixedwood Slopes	495	44	311	7	33	100	304 to 354	61 to 72
Wetlands	433	0	356	13	4	60	285 to 315	66 to 73
Floodplain	205	0	147	22	18	18	120 to 129	59 to 63
Total	**128,069**	**936**	**73,209**	**8,789**	**9,207**	**35,928**	**67,048 to 85,016**	**52 to 66**

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	1,672	0	804	287	66	514	803 to 1061	48 to 63
ICSM	1,057	0	455	142	248	213	430 to 536	41 to 51
IFHO	10,653	54	6,463	602	1,399	2,136	5,586 to 6,653	52 to 62
IFKK	16,964	275	10,439	1,047	1,397	3,807	9,317 to 11,221	55 to 66
IFSM	82	0	47	3	31	0	36 to 37	44 to 45
IMHO	31,320	188	18,190	1,724	1,299	9,919	16,741 to 21,700	53 to 69
IMSI	207	0	148	23	18	18	121 to 130	58 to 63
IMSM	606	28	285	73	85	135	294 to 361	49 to 60
WCDS	384	0	270	7	6	101	229 to 280	60 to 73
WCHO	2,674	8	1,132	308	692	534	1,067 to 1,334	40 to 50
WCKK	3,039	0	1,123	612	411	893	1,218 to 1,665	40 to 55
WFDS	123	44	47	1	29	2	80 to 81	65 to 66
WFHO	3,234	0	2,026	211	200	798	1,772 to 2,171	55 to 67
WFKK	11,311	0	5,143	1,521	2,026	2,622	4,893 to 6,204	43 to 55
WMDM	1,054	45	538	53	16	402	562 to 763	53 to 72
WMDS	58	35	23	0	0	0	52	90
WMHO	19,750	38	11,826	636	538	6,711	10,744 to 14,100	54 to 71
WMKK	23,447	219	13,880	1,536	749	7,064	12,779 to 16,311	55 to 70
WTLD	491	5	401	13	4	69	326 to 360	66 to 73
TOTAL	**128,126**	**938**	**73,239**	**8,799**	**9,214**	**35,937**	**67,051 to 85,020**	**52 to 66**

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

Appendix 13:

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

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

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

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

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

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

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

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

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

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