Department of Natural Resources

ECOLOGICAL LANDSCAPE ANALYSIS
VICTORIA LOWLANDS ECODISTRICT 220

PART 1: Overview of Ecodistrict
PART 2: Linking the Landscape to the Woodlot

ELA 2015-220

NOVA SCOTIA

Ecological Landscape Analysis, Ecodistrict 220: Victoria Lowlands

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

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

Information sources and statistics (benchmark dates) include:

- Forest Inventory (1997 to 1999) – stand volume, species composition
- Crown Lands Forest Model landbase classification (2006) – provides forest inventory update for harvesting and silviculture from satellite photography (2005), silviculture treatment records (2006), and forest age increment (2006)
- Roads and Utility network – Service Nova Scotia and Municipal Relations (2006)
- Significant Habitat and Species Database (2007)
- Atlantic Canada Data Conservation Centre (2013)

Conventions

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

A glossary of definitions is provided for words that are underlined.

REPORT FOR ELA 2015-220

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A NOVA SCOTIA DEPARTMENT OF NATURAL RESOURCES PUBLICATION

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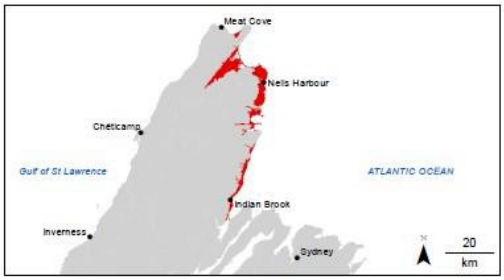


An objective of ecosystem-based management is to manage landscapes in as close to a natural state as possible. The intent of this approach is to promote biodiversity, sustain ecological processes, and support the long-term production of goods and services. Each of the province's 38 ecodistricts is an ecological landscape with distinctive patterns of physical features. (Definitions of underlined terms are included in the print and electronic glossary.)

This Ecological Landscape Analysis (ELA) provides detailed information on the forest and timber resources of the various landscape components of Victoria Lowlands Ecodistrict 220. The ELA also provides brief summaries of other land values, such as minerals, energy and geology, water resources, parks and protected areas, wildlife and wildlife habitat.

Victoria Lowlands, with an area of 18,457 hectares, is the second smallest ecodistrict in Nova Scotia and includes the gently rolling topography along the Atlantic coastline of eastern Cape Breton Island.

This ecodistrict contains most of the land suitable for farming in the northern part of Cape Breton Island. Where old fields and clearings have been abandoned, white spruce has reforested the sites. Coastal erosion is a concern for landowners.

The North, Middle and South Aspy Rivers flow into Aspy Bay near Dingwall in the Victoria Lowlands.

Much of the ecodistrict reflects a history of land clearing and harvesting. Much of this occurred on the gentle terrain adjacent to the coast and second growth forests tend to be dominated by balsam fir, white spruce, white birch, and red maple.

Barrier beach along St. Anns Bay near River Bennet.

On the hillier terrain with longer slopes, sugar maple, beech, and yellow birch prevail, along with scattered red oak, white ash, white birch, red maple, hemlock, and white pine. White pine and hemlock will be found in the ravines along the rivers and streams flowing off the plateau. Near Neils Harbour, there are rare stands of jack pine.

Private land ownership accounts for 56% of the total area, with federal lands representing 24%, provincial Crown lands 16%, and the remaining 4% for other uses.

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. These elements are described by their physical features – such as soil and landform – and ecological features – such as climax forest type. These characteristics help determine vegetation development.

Element descriptions promote an understanding of historical vegetation patterns and the effects of current disturbances. This landscape analysis identified and mapped seven key landscape elements – one dominant matrix element, five smaller patch elements, and a corridor element– in Victoria Lowlands.

Tolerant Hardwood Hills, representing about half of the ecodistrict, is the matrix element. This element naturally supports long-lived and shade-tolerant hardwood forests of sugar maple, yellow birch, and beech. Red maple is also common. Secondary forests of balsam fir and white spruce are abundant in this element and reflect a modification of the original vegetation following European settlement.

In **Spruce Fir Hills and Hummocks**, the largest patch element, the forests tend to be dominated by black spruce on the moister sites. Balsam fir and white spruce, with a component of white birch and red maple, are found on the better-drained soils that are usually associated with the lower and middle slopes and ravines.

The other patch elements, which are all quite small, are **Coastal Beach**, **Wetlands**, **Salt Marsh** (located within the Valley Corridors element), and **Floodplain**.

Valley Corridors is a linear element associated with the main watercourses in the ecodistrict.

Forest Ecosystem Management
For Victoria Lowlands Ecodistrict

The primary ecological goals of ecosystem-based management are to maintain and conserve ecosystem biodiversity, productivity, and resilience. Integration of economic, ecological, and social values within a single planning process provides opportunities for creative solutions to meet the challenges of sustainable resource management. By maintaining their integrity, ecosystems can better adapt to environmental stressors such as extended cycles of climate change, atmospheric pollution, and changes in land use and vegetation cover.

This ELA provides detailed information on the resources and descriptions of various components of the landscape for Victoria Lowlands Ecodistrict 220. Resources and their components include the natural elements that make up the landscape and may affect functions like connectivity – how a landscape enables or impedes movement of resources, such as water and animals – as well as conditions of forest composition, road density, and land use intensity.

Only brief summaries are presented for other land values, including minerals, energy and geology, water resources, parks and protected areas, wildlife and wildlife habitat. These summaries are included in the document to present the range of land values that must be balanced during the design stage of the land management process and are not intended to be exhaustive treatments of the respective land values. Where possible, the reader will be referred to additional sources for detailed information.

Application

The data in this ELA does not represent current inventory, but instead provides baseline conditions for the time when the report was researched, which in the case of the Victoria Lowlands Ecodistrict was up to 2006. These baseline measurements can be used to assess trends through comparison with present and future inventories.

The ELA supports an approach to maintaining healthy ecosystems by mimicking natural conditions. The report describes the inherent natural structure and condition of landscapes based on enduring physical features, such as elements. It goes on to show how this structure may influence ecosystem functions, such as wildlife movement and connectivity. The ELA summarizes conditions of ecosystems such as forest composition, land use intensity, and road density at the time the report was written.

Finally, the relationship between inherent structure and existing conditions is used to guide future direction. The ELA is part of an ecosystem approach that will expand to encompass other initiatives of the Department of Natural Resources (DNR), such as The Path We Share: A Natural Resources Strategy for Nova Scotia 2011 – 2020
(see http://novascotia.ca/natr/strategy/pdf/Strategy_Strategy.pdf).

The intention is to describe important ecological characteristics to consider during resource planning – the ELA is not a plan in itself.

Part 1: An Overview of Victoria Lowlands – *Learning About What Makes This Ecodistrict Distinctive*

This first part of the report provides an overview of the ecodistrict for a broad readership. By reviewing several key topics, the reader will have a better understanding of the features that help give the area its character and set it apart as a distinct and unique ecodistrict.

Ecodistrict Characteristics

The total area of Victoria Lowlands is 185 square kilometres. Private land ownership accounts for 56% of the total area, with federal lands representing 24%, provincial Crown lands 16%, and the remaining 4% for other uses.

The diverse terrain in this ecodistrict includes hills, lowlands, outwash plains, alluvial terraces, and fans situated between the highland escarpment and the Atlantic Ocean. The famous Cabot Trail snakes along this narrow strip of coastal topography offering scenic views of the ocean from many vantage points including the cliff side ascent of Cape Smokey.

The underlying rocks are shale, limestone and sandstone characteristic of the carboniferous Bras d'Or Lake lowlands. Where gypsum occurs, there is karst topography with sinkholes. Extensive mining of the gypsum has occurred at Dingwall and South Harbour with small localized mining in other areas, including Plaster Shore.

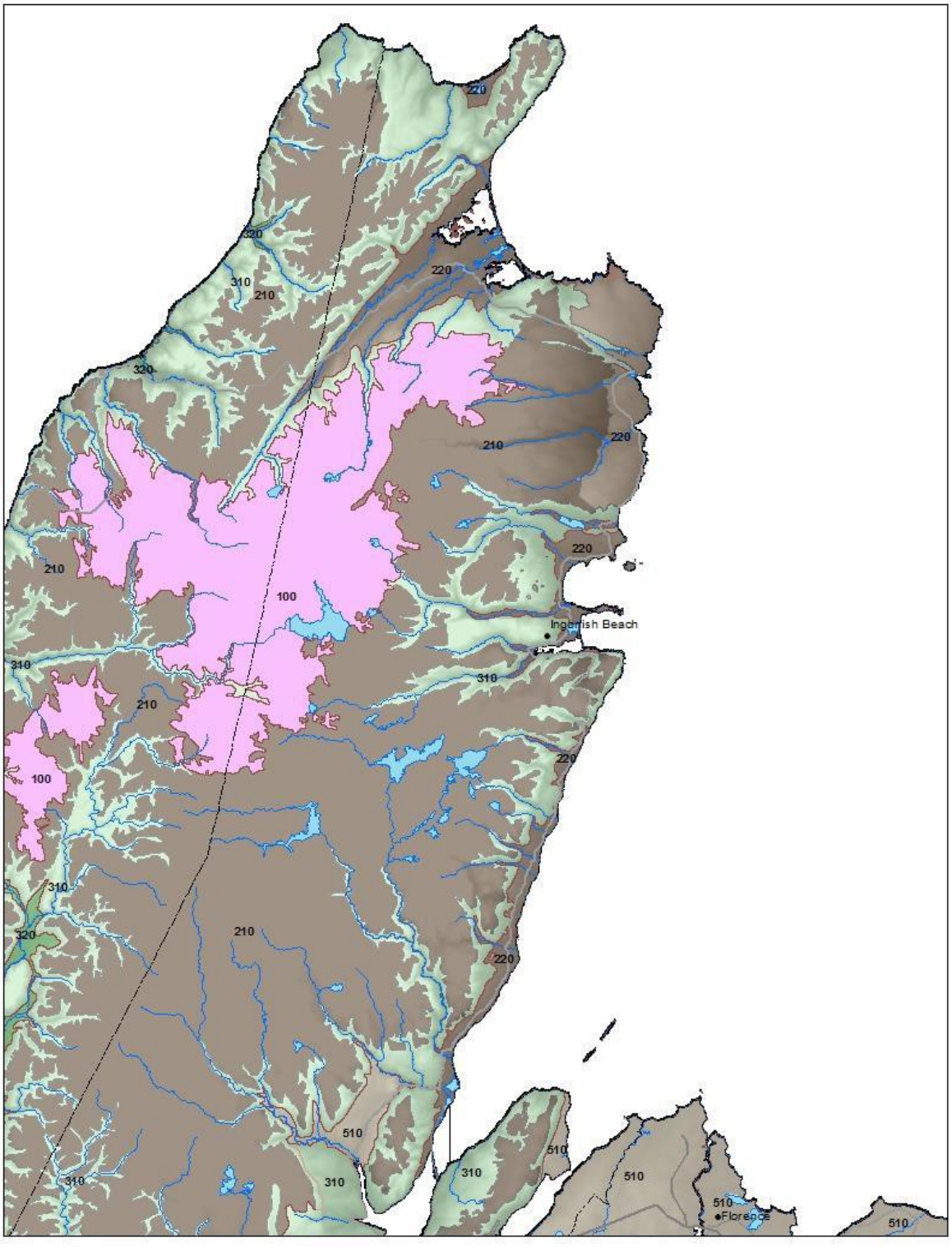
Descending from the Cape Breton Plateau are many fast flowing rivers that cross this narrow coastal plain before reaching the Atlantic. Most of these brooks and rivers have scenic waterfalls where they tumble off the escarpment.

The soils are primarily well-drained, moderately coarse-textured glacial tills. In areas where coarse sandy loams occur, drainage can be rapid. The dominant tolerant hardwood forest of sugar maple, yellow birch, and beech was extensively cleared for settlement and farming by the early Scottish immigrants in the 1800s. Much of this farmland has been abandoned and has reforested to white spruce and balsam fir. Second growth forests on these sites are dominated by red maple and white birch. Throughout the lowlands pockets of red oak, white ash, hemlock, and white pine can be found.

Located at the community of Ingonish is the headquarters of Cape Breton Highlands National Park. Administration, camping, trails, beaches, and other natural history features are found here.

This part of Cape Breton records annual precipitation that is about 10% higher than any other weather station in Nova Scotia and has also recorded some of the deepest snow accumulations.

See map on following page for overview of the Victoria Lowlands Ecodistrict, including adjacent ecodistricts, locations of area towns and villages, county boundaries, and major waterways.



Victoria Lowlands 220 is a small ecodistrict located mainly on the eastern side of northern Victoria County.
(From Ecodistricts of Nova Scotia map 2007 *Revised*)

Land Area

The ecodistrict is mainly rural with 56% of the area in private land ownership (Table 1).

Federal and provincial Crown lands account for 40% of the area with the remaining 4% owned by others.

Table 1 – Land Area by Ownership in the Victoria Lowlands Ecodistrict*

Ownership	Area (hectares)	Percent of Total Area
Provincial Crown land	2,910	15.8
Private	10,384	56.3
Federal	4,431	24.0
Aboriginal	0	0
Other (Includes inland water bodies and transportation corridors)	733	4.0
Total	**18,457**	**100**

*Note: Figures may vary slightly from table to table because of rounding, averaging, and overlapping of categories and other factors.

IRM Resource Classification for Provincial Crown Lands

The Integrated Resource Management (IRM) classification for Crown lands was developed through a public consultation process during the strategic phase of IRM completed in 2002.

Table 2 provides a summary of Crown lands designated as either C1, General Resource Use; C2, Multiple and Adaptive Use (allows most uses, but special management may be required); or C3, Protected and Limited Use (such as beaches and sites of cultural and historic significance).

In Victoria Lowlands, the area classified as C1 (48%) is the most common category, followed by C2 (42%) and C3 (10%).

Table 2 – IRM Land Use Categories for Provincial Crown Lands in Ecodistrict

IRM Land Use Category	Hectares	Percent of Crown Lands
C1 – General Resource Use	1,400	48.1
C2 – Multiple and Adaptive Use	1,226	42.1
C3 – Protected and Limited Use	279	9.6
Unclassified	5	0.2
Total	**2,910**	**100**

Forests

Approximately three-quarters of the Victoria Lowlands is forested (Table 3) with a high percentage of the coverage made up of early successional forests dominated by white spruce on abandoned farmlands and second growth balsam fir, red maple, and white birch.

Among the different covertypes, softwoods make up 42%, mixedwoods at 28%, hardwoods at 26%, and unclassified lands at 4%.

The spruce budworm outbreak of the late 1970s caused extensive mortality in fir-dominated stands. Currently many of the old field white spruce stands are being attacked by spruce bark beetle causing stand-level mortality.

Most of the ecodistrict is in private ownership and small private holdings account for 56% of the landbase. Provincial Crown land makes up 16% of the area.

Table 3 – Area Distribution by Land Category for All Owners

Category	Hectares	Percent
Forested	14,323	77.6
Wetland	594	3.2
Agriculture	285	1.5
Barrens	492	2.7
Urban	987	5.4
Road, Trail, Utility	332	1.8
Other	1,445	1.8
Total	**18,457**	**100**

Stora Enso (*now Port Hawkesbury Paper*) is the major industrial manager and holds a license agreement on the Crown land. It is the contractor for the province on the licensed Crown land, under the supervision of the DNR.

The paper mill is the major buyer of forest products from private land as well and also facilitates most of the forest management activities on this ownership through a joint management program).

On the Crown land, forest harvesting and silviculture (planting, pre-commercial thinning etc.) has been ongoing since the late 1950s.

Much the same forestry activity has been taking place on private holdings as well and the private land has been a source of softwood pulp for the Port Hawkesbury Mill since its opening.

There are currently no registered small sawmills operating in the ecodistrict although at one time several were utilizing mostly private wood. The exporting of peeled pulpwood was once a market for private wood, but this option has also closed.

The average Land Capability (LC) of forested land in this ecodistrict is estimated to be 5.1 cubic metres per hectare per year (m^3/ha/yr), based on the ratings in Table 4. The average forest LC for the province is 4.9 m^3/ha/yr.

Some areas are not suitable for trees. These non-forested areas consist mainly of rock outcrops and barren lands.

Table 4 – Area of Forested Land by Land Capability Rating

Land Capability (LC) Rating (m^3/ha/yr)*	Hectares	Percent
2 or less	0	0
3	447	3.1
4	2,297	16
5	7,986	55.8
6	2,618	18.3
7 or more	975	6.8
Total	**14,323**	**100**

*Based on growth potential for softwood species.

Water Resources

The North, Middle and South Aspy rivers flow parallel to each other, draining into Aspy Bay. A tertiary watershed boundary separates the North Aspy channel from the other two. Tidal marshes and barachois ponds occur in the backwaters.

Numerous parallel tertiary watersheds drain first-order streams from river valleys … into North and South Bay Ingonish … There are large tidal marshes at the back of Ingonish Harbour. Section excerpts from *Natural History of Nova Scotia, Volume II: Theme Regions*.

Water is an important provincial resource that must be considered in the context of IRM in general, and specifically within individual ecosystems.

The Environmental Goals and Economic Prosperity Act, which was enacted in early 2007, has committed the province to prepare a comprehensive water strategy. This strategy will include a high-level evaluation of water resources. *Nova Scotia's water strategy can be found at http://www.novascotia.ca/nse/water.strategy/docs/WaterStrategy_Water.Resources.Management.Strategy.pdf*

Minerals, Energy and Geology

The Aspy Valley lies south of the escarpment of the Aspy Fault. From the bars across the harbour south to Sunrise, the valley is underlain by Windsor strata which form a broad level lowland.

Where gypsum underlies the surface, karst topography with sinkholes has formed. South of Sunrise, the Aspy Valley contains Horton strata which form hills below the escarpment.

At Ingonish, Windsor strata lie directly on top of basement rocks with no Horton strata present. They form a narrow lowland on the north side of Ingonish Bay.

The coastal margin from Cape Smokey to Indian Brook consists of a narrow band of Windsor and related strata. On the west side of St. Anns Bay are resistant Horton strata. At the southern end of St. Anns Harbour, a strip of Windsor strata lies between the plateau to the west and the parallel upland block to the east known as Kellys Mountain.

The extent of coastal erosion is indicated by the location of the Carboniferous deposits, which once covered a much wider area on the coastline.

– Section excerpts from *Natural History of Nova Scotia, Volume II: Theme Regions*.

Victoria Lowlands includes a range of hardwood, softwood, and mixedwood forests.

Potential geohazards, such as abandoned mine openings, potential karst areas, flood risk areas, sulphide-bearing slates and underground coal workings, can be viewed at the following web sites:
http://gis4.natr.gov.ns.ca/website/nsgeomap/viewer.htm
http://gis4.natr.gov.ns.ca/website/mrlu83/viewer.htm
Please report any additional geohazards found on Crown lands to your nearest Natural Resources office.

Parks and Recreation / Protected Areas

The scenery of the Cabot Trail and the hiking trails of the Cape Breton Highlands National Park attract tourism and encourage the use of this land for recreation.

- Section excerpts from *Natural History of Nova Scotia, Volume II: Theme Regions*.

The most current and up-to-date information for parks and protected areas in this ecodistrict can be found at: http://novascotia.ca/parksandprotectedareas/plan/interactive-map/.

Spectacular coastal scenery is one of the main tourist attractions of the Victoria Lowlands Ecodistrict.

Wildlife and Wildlife Habitat

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

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

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

Victoria Lowlands Ecodistrict 220 supports a diverse and healthy wildlife population. Although small in size, the area has more than its share of interesting wildlife species.

White-tailed deer were once very common throughout the area but numbers have been reduced. A period of long cold winters, reduction of winter cover and the arrival of coyotes have all contributed to the decline in deer numbers and are responsible in part in keep the recovery slower than in other parts of the province.

There are four deer wintering areas that are partly within the ecodistrict and the surrounding hills which form the boundary of the ecodistrict. These deer wintering areas are found at little River, French River, Wreck Cove, and North Ingonish. The special management practice (SMP) for deer wintering areas are in place to help maintain these areas of important deer cover.

Gulls are common along the coastal areas of the Victoria Lowlands Ecodistrict.

Black bear numbers have increased greatly over the last decade. Black bears are found throughout the ecodistrict. A sow with four cubs has been reported in the Dingwall area on several occasions in the past several years.

Canada lynx, a Nova Scotia endangered species, is normally found in the highland region of the island. However, when hare number are low in that region, lynx have been known to spread down to adjoining lowland areas in search of its favourite prey. Bobcat, coyote, and fox are also found throughout the ecodistrict. These mammals feed mainly on small rodents, squirrels, grouse, and snowshoe hare, which are common in the area.

American marten, a Nova Scotia endangered animal, is a small member of the mustelid family that was once common in the ecodistrict. Today its numbers are quite low. Marten require mature softwood or softwood-dominated mixedwood for their habitat. *In the period of 2007 to 2010, a number of marten from New Brunswick were released in this ecodistrict in an attempt to augment the population.*

Moose were an abundant and dominant animal in the region prior to the arrival of the first European settlers. By 1825, as a result of over-harvesting for commercial and subsistence purposes, the population was in serious decline. Moose appear to have disappeared from Cape Breton by the early 20th century. In 1947 and 1948, eight moose from Alberta were released in the Cape Breton National Park. This introduction was successful and has resulted in the present population, which numbers in the thousands. Currently, moose are now common in the ecodistrict around Cape North, Ingonish, and along the shore from Wreck Cove to Jersey Cove. Moose winter in many of these lower elevation areas and as a result a concentration of moose are greater in the winter months.

Eagles and osprey are found nesting along the hillsides in the Cape North area as well as the area around Jersey Cove. They prey on the abundant fish found in these areas. Special management practices and guidelines are in place to help protect their nesting habitat. Both species of birds are protected by the province's wildlife act and there are special management practices in place to protect eagle nesting sites from forest harvesting and development.

Eagles prey on the abundant fish in the coastal areas of the Victoria Lowlands Ecodistrict.

Colonies of gulls, cormorants, and kittiwakes are found nesting on the ocean-side cliffs and on Ingonish Island. Piping plover, which is listed as endangered by federal and provincial governments, nests on the beaches at Aspy Bay. Three beaches, North Harbour, Middle Harbour, and South Harbour, have been home to as many as six nesting pairs of these small shorebirds. Human activity, weather, and predators are the main threats to their survival.

Salmon and trout – both speckled and rainbow – can be found in the rivers of the ecodistrict. Salmon is endangered federally.

Dragonflies and damselflies have been surveyed in the area. Spot-winged glider, muskeg emerald, and black meadowhawk are several of the yellow ranked species that have been recorded. The Maritime Butterfly Atlas has added many records for species within the Victoria Lowlands Ecodistrict. Arctic fritillary, short-tailed swallowtail, and mustard white are species of conservation concern and all can be found at South Harbour.

There are several dozen plant species of conservation concern in the ecodistrict, including downy willowherb, pink crowberry, spiked woodrush, Canada anemone, and marsh lousewort from the Bay St. Lawrence area as well as long-bracted frog orchid and red bulrush from the Big Intervale Cape North area.

Three sites in the ecodistrict are listed as sites of ecological significance in the Atlas of Nova Scotia's Nature Reserves and Sites of Ecological Significance.

For more detailed and current information on species at risk and species of conservation concern in this ecodistrict, refer to Appendix 3 and Map 6 in a separate Part 3 of this document. These species are important components of the landscape and are given priority attention in planning, management, and stewardship activities.

With much of the ecodistrict privately owned, effective wildlife management will to a great extent rely on active, informed stewardship by the many landowners. The DNR can assist private land stewardship by providing knowledge and information on various management strategies. Legislation such as the Wildlife Habitat and Watercourse Protection Regulations, the Endangered Species Act, and the Environment Act's Activities Designation Regulations address species and habitat concerns within the forest and wetland ecosystems.

Part 2: Linking the Landscape to the Woodlot – *How Woodland Owners Can Apply Landscape Concepts to Their Woodland*

This second part of the report provides information on how landscape concepts can be applied at the woodlot level. The starting point is an introduction to natural disturbances and succession to provide a foundation for better understanding forest ecosystems. The focus then shifts to elements that make up each ecodistrict and the forest groups and vegetation types at the stand level. This allows woodland owners to move between elements and stands to see how their woodland fits in with the larger landscape.

Forest Disturbances and Succession

Forest Disturbances

A disturbance can be described as an event, either natural or human-induced, that causes a change in the existing condition of an ecological system.

Disturbance pattern controls forest development classes (establishment, young, mature, multi-aged / old forest) and their distribution over area and time.

Due to the coastal location of Nova Scotia and its Maritime climate, the extent, intensity, and frequency of natural disturbances is difficult, for the most part, to predict. Prior to European settlement, natural disturbances were only curtailed by natural barriers such as water, climate, topography, and vegetation change. After about 400 years of activity by European settlers, the frequency, intensity, and magnitude of these natural processes has been affected.

New disturbances have been introduced as a result of human activity and include:

- clearing of forests for agriculture
- timber harvesting
- urbanization and development
- introduction of exotic animals, plants, and insects
- disease-causing agents, such as viruses or bacteria
- fire suppression in the forest
- and changes in the chemical and physical characteristics of the atmosphere

Understanding how ecosystems respond to disturbances is critical to understanding how they function and how they can be managed. This will assist woodland owners and forest managers in:

i. assessing the potential for old forest stands and development class distributions
ii. determining appropriate patch sizes and species composition to emulate natural structures and processes

iii. prescribing the appropriate rotation age and development class structure across a forested landscape
iv. projecting future changes to the forest due to climate change and human disturbances
v. maintaining and conserving biodiversity

Natural disturbances are agents that abruptly change existing conditions and initiate secondary succession to create new ecological communities.

By adapting forest management practices to create the structures and processes that emulate natural disturbances, woodland owners and forest managers can help shape forest landscapes.

One approach that closely mimics nature is to allow ecosystems to naturally develop without active management. This approach is particularly effective on lands with long-lived tree species, such as red spruce, white pine, hemlock, sugar maple, yellow birch, and beech. One of the roles of protected areas is to allow this to occur and also provide a model to compare with managed forests.

Natural Succession

Succession refers to the changes in vegetation types (communities) following disturbance which, over time, often leads to a climax stage. Most changes follow a course of vegetation community development (seral stages) for a particular disturbance regime.

Climax vegetation refers to vegetation communities that are relatively long-lasting and self-replacing. Three types of climax vegetation can be described as follows:

Climatic climax – Vegetation types that are mainly a function of regional climate conditions; these occur on sites with average (mesic) moisture and nutrient conditions.

Disturbance climax – Vegetation types which, due to frequency of disturbance, do not progress to the climatic climax.

Edaphic climax – Vegetation types that are mainly a function of soil and site conditions (i.e. low or excess moisture, low or high fertility) which do not progress to the climatic climax.

Another Definition of Succession

Succession, as defined by Odum (1971), is an orderly process of community development that involves changes in species structure and community processes with time; it is reasonably directional and, therefore, predictable.

Successional development generally proceeds through a number of distinct seral stages (e.g. early, middle, late) that replace one another in a predictable sequence and which culminates in a relatively stable and self-perpetuating community condition called a climax.

– From *Part 1: Vegetation Types (2010) of Forest Ecosystem Classification for Nova Scotia* *http://www.gov.ns.ca/natr/forestry/veg-types*

Victoria Lowlands – Elements Defined

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. These elements

are described by their physical (e.g. soil, landform) and ecological features (e.g. climax forest type). These characteristics help determine vegetation development. Elements promote an understanding of historical vegetation patterns and present disturbances.

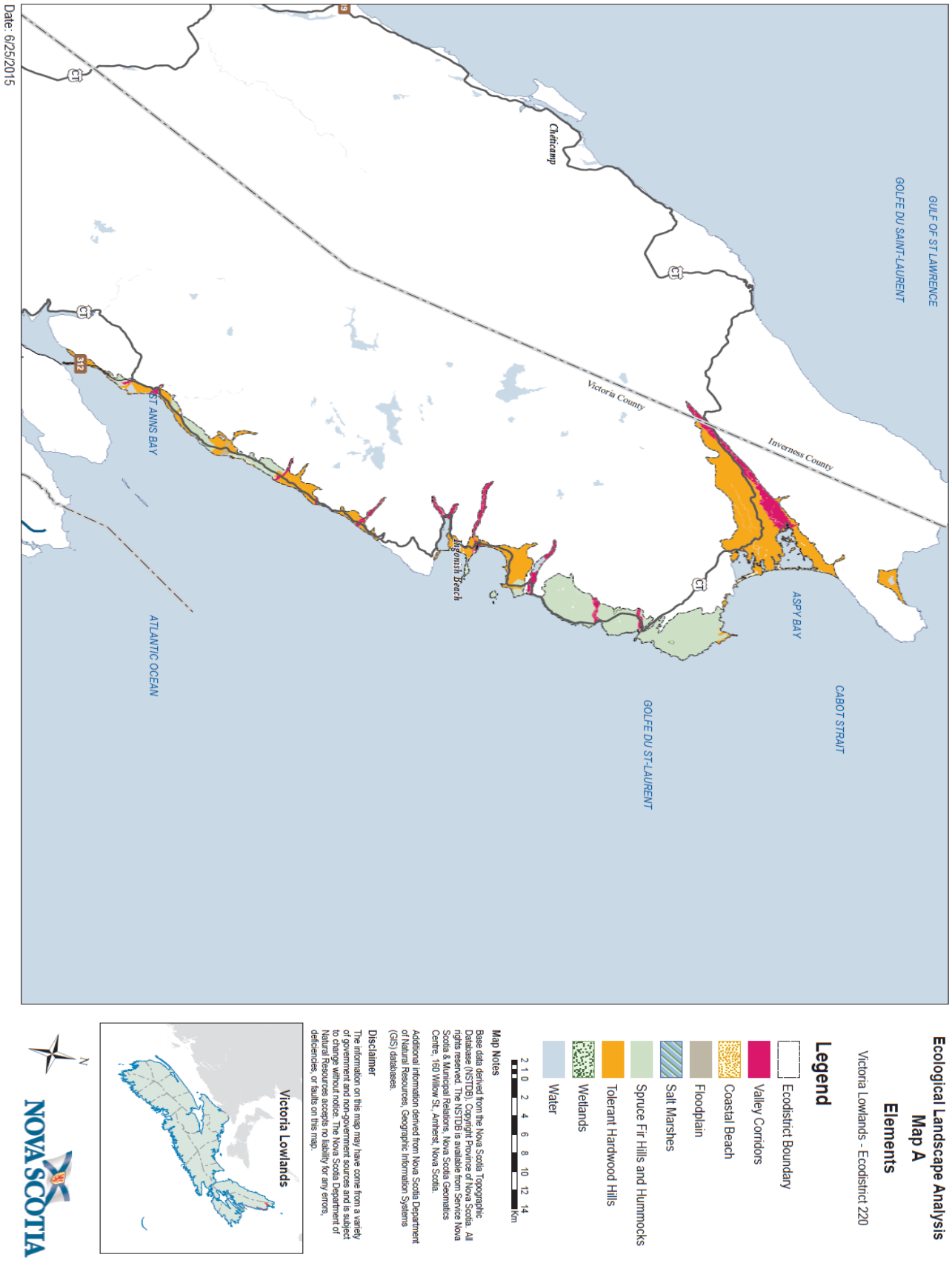
A landscape profile identified and mapped seven distinctive elements in the Victoria Lowlands Ecodistrict – one matrix, five patches, and a corridor (Table 5a). A matrix is the dominant community type. Patches are smaller yet still distinctive community types. Corridors are natural linear communities, such as river valleys, that link parts of the ecodistrict.

Tolerant Hardwood Hills, representing about half of the ecodistrict, is the matrix element. This element naturally supports long-lived and shade-tolerant hardwood forests of sugar maple, yellow birch, and beech. Red maple is also common. Secondary forests of balsam fir and white spruce are abundant in this element and reflect a modification of the original vegetation following European settlement.

In **Spruce Fir Hills and Hummocks**, the largest patch element, the forests tend to be dominated by black spruce on the moister sites. Balsam fir and white spruce, with a component of white birch and red maple, are found on the better-drained soils that are usually associated with the lower and middle slopes and ravines.

The other patch elements, which are all quite small, are **Coastal Beach**, **Wetlands**, **Salt Marsh** (located within the Valley Corridors element), and **Floodplain**. **Valley Corridors** is a linear element associated with the main watercourses in the ecodistrict.

Map of Elements in Ecodistrict



Forest Stands Within Elements

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.

Viewed online or available in print through DNR, woodland owners can learn about the characteristics of a particular forest community. Refer to Table 5a for descriptions of elements and Table 5b for forest vegetation types that are likely to be found within elements.

Hardwood species that like the sun, such as white birch and red maple, are common in the ecodistrict.

Table 5a – Elements Within Victoria Lowlands		
Element	**Size (Hectares)**	**Element Description**
Tolerant Hardwood Hills (Matrix)	8,635 48.1%	Secondary forests of balsam fir and white spruce are abundant in this element and reflect a modification of the original vegetation. With the start of European settlement in the early 1800s, much of the deciduous forest was cut, burned, and placed under cultivation and pasture. The typical forest of this element is shade-tolerant hardwoods of sugar maple, yellow birch, and beech with red maple often a frequent and prominent component. Balsam fir and white spruce are conspicuous. Hemlock is uncommon and usually associated with lower steep slopes along streams. White pine can occur where soils are rockier and shallow. Red oak is widely distributed and locally common. Tolerant Hardwood Hills occurs on hummocky to hilly topography. Soils are typically coarse to medium-textured loams and sandy loams but better-drained fine-textured soils also support this element on hilly terrain. Embedded within this element are scattered and locally prominent site conditions that support a different forest community. Talus slopes have early successional forests of white spruce and white pine. Karst (gypsum) outcrops support mid to late successional forests of yellow birch, red maple, sugar maple, white spruce, and hemlock. Along watercourses, steep ravines give rise to mixedwood forests often dominated by red maple, yellow birch, and hemlock. Floodplains occur on the Clyburn, French, and Barachois rivers and Indian Brook. At the start of the 1920s, many rural families left their farms to live and work in urban areas and when fields were abandoned they reforested to white spruce.
Spruce Fir Hills and Hummocks (Patch)	6,720 37.5%	This small to large patch landscape element occurs on well to imperfectly drained hummocky and hilly terrain underlain by coarse to medium-textured glacial tills. Spruce Fir Hills and Hummocks can also be found associated with steep slopes of streams and rivers flowing through the ecodistrict. The forests tend to be dominated by black spruce on the moister sites and balsam fir and white spruce with a component of white birch and red maple on the better-drained soils that are usually associated with the lower and middle slope positions and ravines. With progressively poorer drainage, black spruce, tamarack, and red maple dominate the forest vegetation and small wetlands are embedded throughout the element. Tolerant hardwood species occupy the crests and upper slopes. Near the Atlantic coastline, forests may experience coastal influence and have features of coastal vegetation types with examples of this condition at White Point and MacKinnons Cove. The presence of karst topography is scattered throughout the ecodistrict with extensive deposits at North Shore (Plaster Provincial Park), Dingwall, and South Harbour. Forests on karst include long-lived species such as sugar maple, yellow birch, beech, and hemlock. Many rare plants are also associated with these karst locales.

Table 5a – Elements Within Victoria Lowlands		
Element	**Size (Hectares)**	**Element Description**
Coastal Beach (Patch)	268 1.5%	Coastal beaches are wave-dominated deposits composed of a mixture of sand, gravel, cobbles, and other sizes of sediments and occur under a variety of circumstances leading to several types of beach landforms. These can be barrier beaches, spits, tombolos, or pocket beaches. In this ecodistrict, spits are common with examples at South Harbour and Englishtown. Spits are beaches where sediment is moved along the shoreline by waves and when there is an abrupt change of shoreline orientation or the currents diminish, sediment is deposited. Barrier beaches, for example at Ingonish and Breton Cove, are sand bars above high tide and parallel to the coastline and separated from it by a lagoon or lake, usually with brackish water.
Floodplain (Patch)	54 0.3%	Floodplains in this ecodistrict are associated with smooth, level, terrain along the major rivers such as the Aspy and Ingonish rivers. However, they are also embedded in other elements associated with the Clyburn Brook, French and Little rivers and some smaller brooks. These are linear areas that receive annual deposits of sediments due to flooding. Soils are coarse sandy loams, often gravelly, deposited over gravel and cobble. The climax forest is dominated by white ash and at one time also included elm, although this species has been almost eliminated due to the Dutch elm disease.
Wetlands (Patch)	36 0.2%	The few freshwater wetlands in the Victoria Lowlands are associated with small lakes and streams with a few depressional swamps and bogs aligned with the karst topography. Vegetation can vary depending on how wetlands are drained but typical hydrophytic vegetation includes sedges, rushes, sphagnum moss, horsetails, sensitive and cinnamon ferns, cranberry, and Labrador tea. Smaller wetlands are embedded within the other elements of the ecodistrict, especially the Floodplains and Spruce Fir Hills and Hummocks elements. Wetlands are generally treeless or sparsely forested woodlands of black spruce, tamarack, and red maple.
Salt Marsh (Patch)	*(91)* *(<1%)*	*Along the coast there are areas that are periodically flooded by the tide and are mapped as salt marshes. The most prominent of these are the brackish water marshes developed at the mouths of major streams and rivers with examples at Indian Brook and Ingonish. Saltwater marshes are best exemplified at South Pond where an unusual feature is the presence of white pine stumps, which may have established on an extension of the spit which was later eroded away. (Salt Marsh area is included in Valley Corridors element.)*
Valley Corridors (Corridor)	2,228 12.4%	In this element, the most evident linear features are faults or folds and associated watercourses. Corridors have significant levels of land use, such as settlements, agricultural fields, power lines, roads, and railways. These land use changes reduce the connective function of the corridor for some species and may increase the barrier effect for species that must move across or through them.
Total	**17,941***	*Area is not the same as in Table 1 because water has not been included.

Table 5b – Forest Vegetation Types[1] Within Elements in Victoria Lowlands

Element	Seral Stage					
	Early	% *	Middle	%	Late	%
Spruce Fir Hills and Hummocks	IH6, MW5	10	MW4, SP4a, SP6, SP7	14	**SP5**, **SH8, SH10,** KA2	69
Tolerant Hardwood Hills	OF1, OF2, OF4, IH6, MW5	1	IH7, MW4, TH6, TH7, TH8, SH8, SH10	9	**TH1, TH2**, TH3, TH4, **TH5,** SH1, SH2	87
Floodplain	FP4, FP6			0	**FP1**	85
Wetlands	WC1, WC2, WC6, WD6					
Salt Marsh	Grasslands of *Spartina spp.*					
Coastal Beach	CO7, Beach grass, Bayberry, Rose spp., White spruce					

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.

Photos Illustrating Vegetation Types in Elements

The following photos show some of the vegetation types expected to be found within their respective elements.

Balsam fir – White spruce / Evergreen wood fern – Wood aster (OF4) is an early successional vegetation type found in the Tolerant Hardwood Hills matrix element.

White birch – Red maple / Sarsaparilla – Bracken (IH6) is an early successional vegetation type found in the Spruce Fir Hills and Hummocks and Hills element.

Sugar maple – White ash – Wood goldenrod (FP1) is a late successional vegetation type sometimes found in the Floodplain patch element.

Balsam fir / Cinnamon fern – Three seeded sedge / Sphagnum (WC6) is a vegetation type found in the Wetlands patch element.

Landscape Composition and Objectives

Landscapes contribute to the maintenance and conservation of native biodiversity. 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. DNR is developing a number of additional approaches and planning tools which will be integrated with objectives defined in the ELA protocol.

Human activities, such as forest harvesting, can have a significant impact on the structure and composition of the forested landscape. Well-planned harvesting can provide a tool to achieve landscape composition goals.

Natural Disturbance Regimes

Three natural disturbance regimes dominate natural forests:

Frequent Stand Initiating – Disturbances usually occur more frequently than the average life span of the dominant species and are of sufficient intensity to kill most of the existing mature trees, thereby promoting the establishment of a new forest within a relatively short period. Some unharmed trees often survive the disturbance in pockets and/or as scattered individuals.

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.

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 the replacement of a small group of trees.

The gap disturbance regime, the major regime in the ecodistrict, is a feature of a tolerant hardwood climax covertype. This regime favours the development of an uneven-aged structure, shade-tolerant species, and formation of old growth conditions. Mortality is commonly by animal or insect predation, disease, lightning, blowdown, or old age, where individual trees or small groups of trees across the landscape succumb to mortality. Regeneration occurs under openings (gaps) where mortality has occurred. Usually shade-tolerant species regenerate in the openings and gaps in the canopy and share growing space with the surviving old growth trees. Major stand-initiating events do no occur under this regime.

Frequent disturbance regimes are less common in Victoria Lowlands. The interval between stand-initiating events is shorter than the longevity of the climax species. This disturbance is intense enough that there is rapid mortality and a new even-aged forest becomes established. Another disturbance takes place before the stand becomes uneven-aged. Fire and wind are the usual disturbances.

Open seral regimes take place where site conditions restrict or limit tree growth, creating sparse forest cover.

Forest Composition

Forest disturbances lead to forest renewal and the development of young forest habitats with characteristic successional patterns. Management of landscapes to conserve biodiversity requires sustaining ecologically adequate representation of natural habitat diversity, among a number of other measures and planning approaches.

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 Classes 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)

Within this simplified description there is considerable variation in the processes and structures that evolve in particular stands. When the current forest inventory is used to classify development classes, the height criterion is used. When forecasting future conditions using the Forest Model, the age criterion is preferred.

Harvesting and silviculture activities, such as planting and thinning, have been ongoing on Crown land since the 1940s.

Seral Stages 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
- mid
- late

Early successional species are those that do well in direct sunlight and include white and grey birch, aspen, poplar, white spruce, tamarack, pin cherry, jack pine, and red pine. These species grow quickly, but are usually short-lived.

They are replaced by mid-successional species that can tolerate moderate amounts of shade, such as white ash and red oak.

Late successional species generally have a high shade tolerance and include hemlock, red spruce, sugar maple, and beech, as well as yellow birch and white pine. The species often develop slowly in shaded understories and can be long-lived and form old growth.

Covertypes descriptions 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%)

Forest Composition Objectives

Within ecodistricts, the forest composition should contain a range of conditions that sustain the inherent forest communities and dominant natural disturbance regimes. Table 6 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.

Woodland owners can use this guidance to assess how their holdings contribute to the overall ecodistrict structure by referring to the landscape element bar charts that illustrate where deficiencies exist. For example, landowners who have a large amount of mature forest in an element where this is in short supply can recognize the contribution of their holdings to the overall health of the landscape.

Four hundred years of European settlement in the Acadian region has left insufficient natural landscape structure to confirm these ranges. Facing similar challenges, a comprehensive modeling approach was used by the Ontario Ministry of Natural Resources to support "range of variation" targets for natural disturbance regimes in the Great Lakes St. Lawrence region (see http://www.ontario.ca/document/forest-management-great-lakes-and-st-lawrence-landscapes).

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 (see http://novascotia.ca/natr/library/forestry/reports/NDRreport3.pdf).

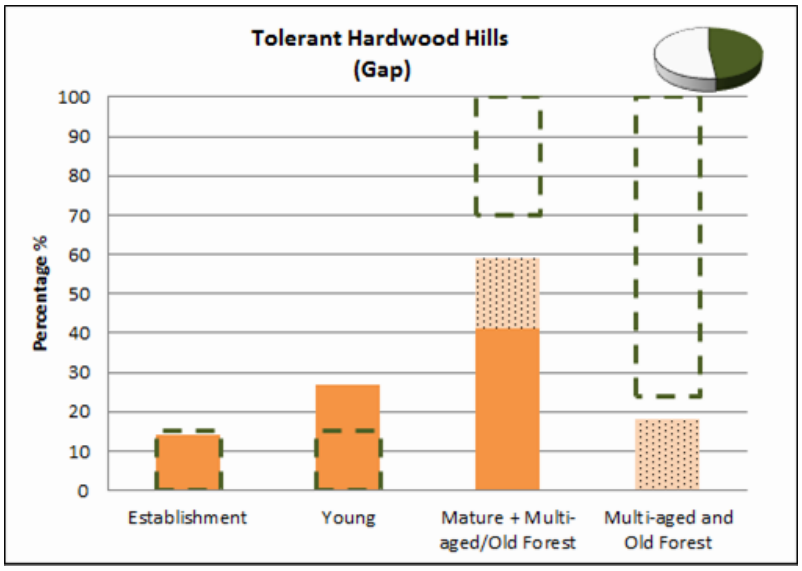
Table 6 - Landscape Composition Target Ranges (by Development Class / Disturbance Regime)				
Natural Disturbance Regime	**Development Class**			
	Forest Establishment	**Young Competing Forest**	**Mature Forest (including multi-aged and old forest)**	**Multi-aged and Old Forest**
Frequent Stand Initiating	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%

Table 6 indicates that for frequent stand-initiating disturbances, both establishment and young development class forests would typically comprise between 5 and 30% of area, while mature forest – which includes multi-aged and old forest – would cover more than 40%. Mature forest should consist of a relatively even balance of early, mid and late successional stands. At least 8% of the mature forest should be in the multi-aged and old forest class. The targets for the other disturbance regimes are shown in Table 6. Forest planning should strive to maintain composition within these targets, and identify corrective and mitigating measures when outside these ranges.

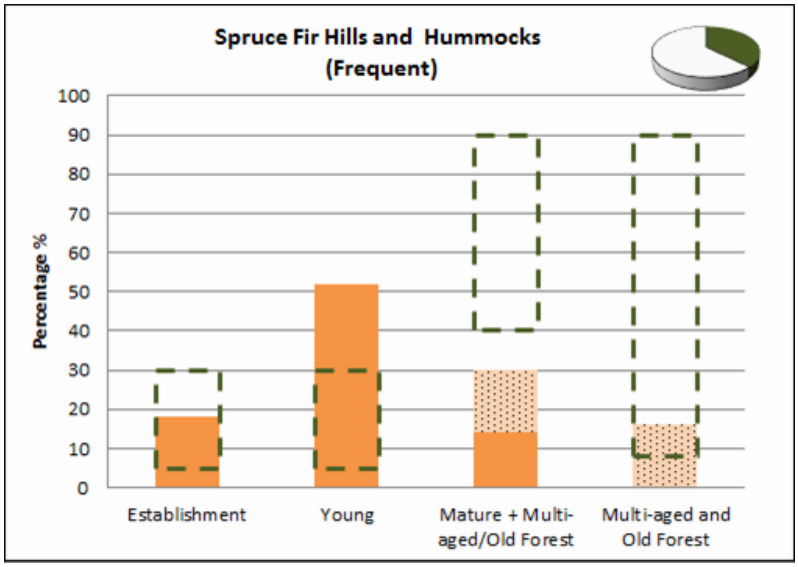
Development Class Targets by Element

The series of charts that follow combine data on development classes for each element with desired or target percentages, based on the type of natural disturbance regime. The target percentages (from Table 6) are represented by rectangles of broken green lines. The light brown bars show the percentage of each development class at the time the original data was gathered. The dotted area in the mature class shows the amount of multi-aged and old forest area included. The coloured portion of the small pie chart in the corner of the graphic shows the relative size of the element within the ecodistrict.

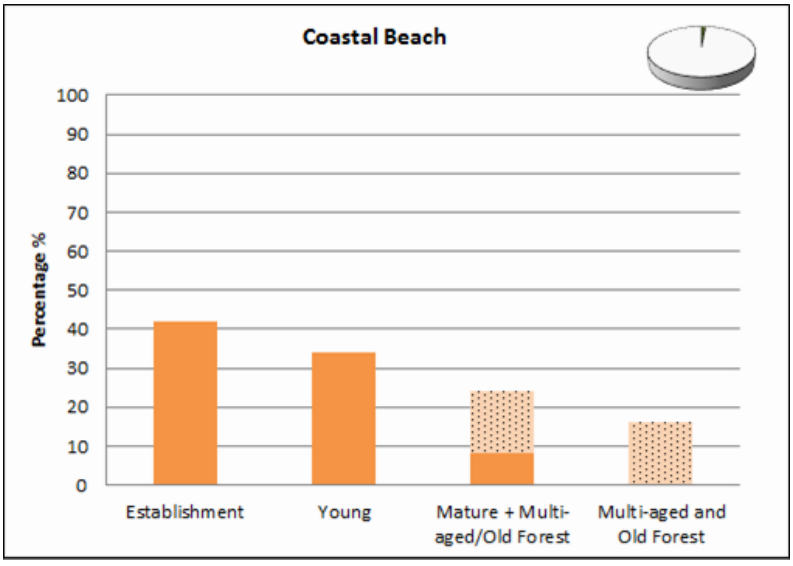
In the **Tolerant Hardwood Hills** element, early successional forests on abandoned farmlands will eventually give way to late successional species. Regeneration cutting is recommended in spruce fir and intolerant hardwood. Existing stands of tolerant hardwood can maintain mature and old forest features with partial harvesting.



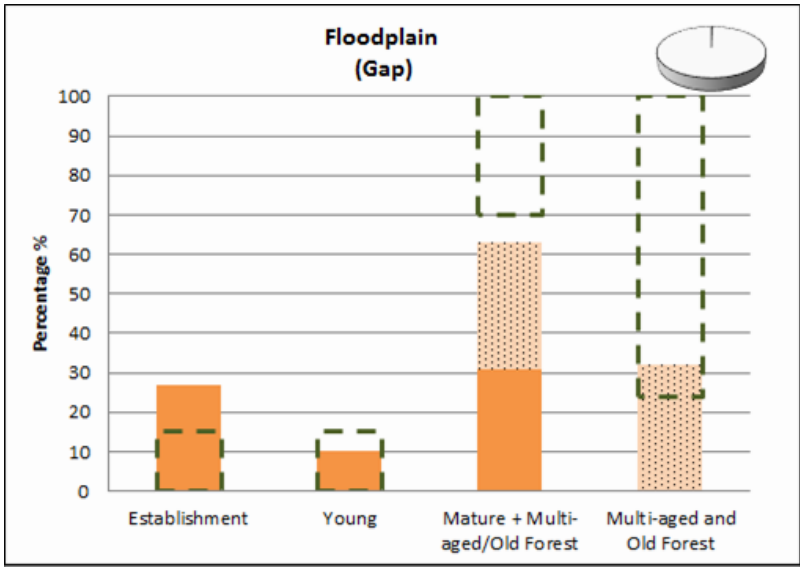
Spruce budworm mortality and harvesting of overmature forests in the **Spruce Fir Hills and Hummocks** element has exacerbated the levels of immature forest. Extending the rotation age of healthy spruce fir can maintain mature forest cover. Partial harvesting is limited to the well-drained sites due to windthrow where soils are imperfectly drained.



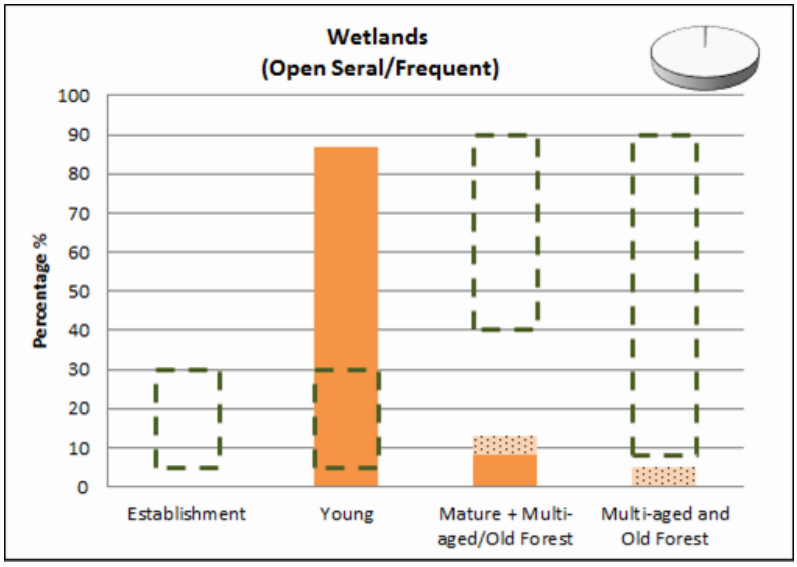
The small amount of forest associated with the **Coastal Beach** element in this has a range of development classes, with establishment and young forests being more common than mature and older forests. This uncommon habitat provides important interface to the coastal ecosystems. Forestry operations should employ special practices to protect sensitive sites.



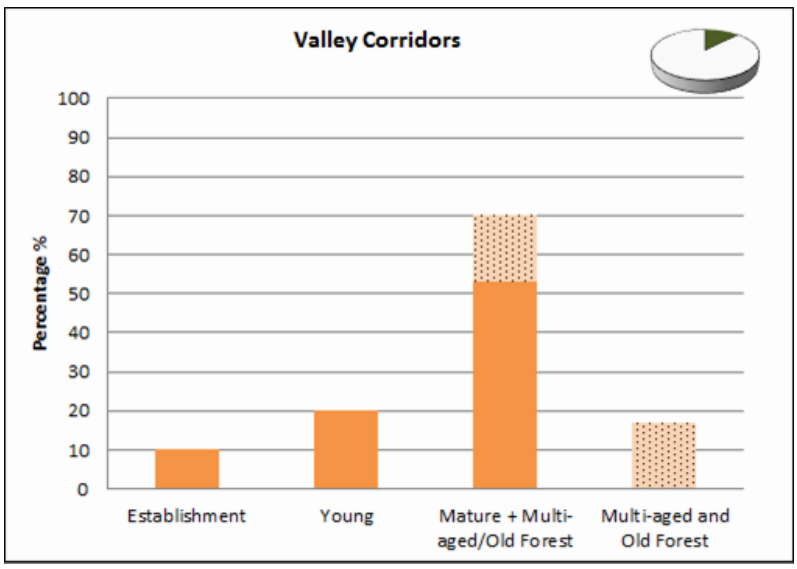
The **Floodplain** element is also found in the Valley Corridors element. Only partial harvesting is recommended as it provides continuous forest cover on the floodplains and allows a habitat interface with the watercourses. The extensive land use conversion on the floodplains makes any remaining forest sensitive to disturbance.



The **Wetlands** element is variably composed of forest, interspersed with woodlands and open wetlands. Disturbances are often patchy, reflecting the diverse structure. The high amount of young forest may reflect height growth limitations in poor sites, as well as past harvesting. Some thinning opportunities may exist, as well as potential for small patch harvesting following natural boundaries.



The **Valley Corridors** element includes parts of several elements and does not have a specific disturbance regime or composition target. The current dominance of mature conditions should enhance forest cohesion and support connectivity functions along this linear element feature.



Summary of Parts 1 and 2

This ends the first two parts of this report, which are available online to anyone who wants to view them. The intent was for the first part to provide a general overview of the ecodistrict for members of the public. The second part was designed for woodland owners to show how landscape ideas, such as elements, can be applied at the woodlot level.

The third part of the report, which includes more detailed information, maps, appendices, glossary, and literature citations, is designed for forest planners, managers, ecologists, analysts, and interested woodland owners.

Glossary A: Terms in Parts 1 and 2

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.
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 these Ecological Landscape Analysis reports 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.
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.
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.
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).
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.
Impact assessment	A study of the potential future effects of resource development on other resources and on social, economic, and/or environmental conditions.
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.
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.
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.
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.)
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.
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 that 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.
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.
Vulnerable species	A species of special concern due to characteristics that make it particularly sensitive to human or natural activities or natural events. May also be referred to as "species of special concern." A species declared vulnerable under the federal or Nova Scotia endangered species legislation (NS Endangered Species Act or federal SARA).
Wilderness area	A part of the provincial land base designated under the Wilderness Areas Protection Act (e.g. Canso Barrens).