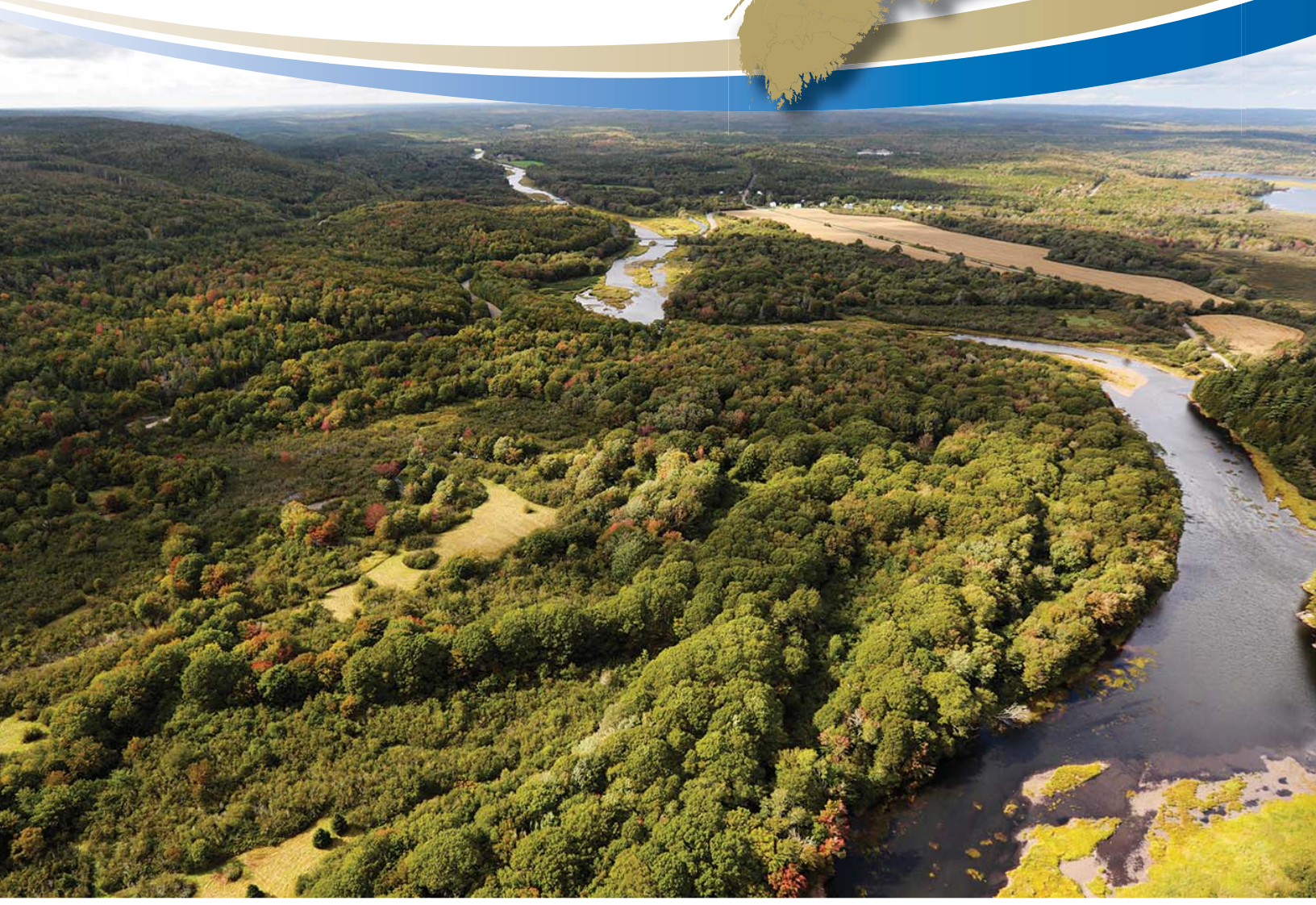
Department of Lands and Forestry

2019 Update

ECOLOGICAL LANDSCAPE ANALYSIS ST. MARYS RIVER ECODISTRICT 370

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



ELA 2019-370

NOVA SCOTIA

Ecological Landscape Analysis, Ecodistrict 370: St. Marys River
2019 Update for Part 1 and 2

Prepared by the Nova Scotia Department of Lands and Forestry
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This report, one of 38 for the province, provides updated figures and tables to supplement the original Ecological Landscape Analysis documents.

Information sources and statistics (benchmark dates) include:

- Crown Lands Forest Model landbase classification (2017v.1)

Note this geodatabase includes the latest Forest Inventory Databases (FID), forest disturbance information, forest harvesting information, crown land purchases and new protected area designations. Forest harvesting, silviculture, and fire disturbance (including satellite updates) are current as of end of 2015.

As revision and peer-reviewing of Natural Disturbance Regimes mapping in Nova Scotia becomes available, any major changes will be incorporated in future updates.

Selected updated Tables and Figures

This document provides recalculated values for the following:

Table 1 (Figures may vary slightly from 2015 ELA because of new Forest Inventory Databases and change in the base geodatabase)
Table 3 (Figures may vary slightly from 2015 ELA because of new Forest Inventory Databases and change in the base geodatabase)
Table 5a (Figures may vary slightly from 2015 ELA because of new Forest Inventory Databases and change in the base geodatabase)
Table 5b (Figures may vary slightly from 2015 ELA because of new Forest Inventory Databases and change in the base geodatabase)
Development Class Targets by Elements – Only major forest elements are reported in the update. Wetlands and Valley Corridors are not reported in this update.

Table 2 was not updated as Integrated Resource Management Land Use Categories have not been updated.
Table 4 was not updated because the land capability for individual polygons has not changed since the original report. Land generally still has that same capability rating now as it did previously, regardless of any management activities at the site.

Table of Contents – Parts 1 and 2

Tables

A NOVA SCOTIA DEPARTMENT OF NATURAL RESOURCES PUBLICATION

Ecodistrict Profile

Ecological Landscape Analysis Summary
Ecodistrict 370: **St. Marys River**

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 St. Marys River Ecodistrict 370. 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.

This ecodistrict, with a total area of 85,121 hectares, is named for the St. Marys River and bounded in part to the north by the east branch of the river and to the south by its west branch. The West River St. Marys gathers its headwaters near Trafalgar and flows east along the St. Marys Fault to Melrose to the confluence of the two rivers, which then flow south to the Atlantic Ocean.

Both major branches and the smaller north branch, as well as several of the tributaries, provide important spawning and rearing habitat for Atlantic salmon, with East River St. Marys being the more productive. All branches have benefited from several salmon fishing enhancement and habitat restoration projects.

Lakes and wetlands punctuate the dominant black spruce-pine forest of the St. Mary's ecodistrict.

The physical boundaries of this ecodistrict are easily recognized, both on the ground and from aerial photography, due to the prominence of the two parallel faults that resulted in a graben – a downfaulted block lying between two faults – and the subsequent escarpments that delineate the ecodistrict. The East River St. Marys parallels the Chedabucto Fault from Eden Lake to Melrose.

The shallow coarse soils, for the most part, support forests of black spruce and white pine. The better forests of red spruce and tolerant hardwoods will be found on the drumlins and upper slopes of the hills.

Natural fires have resulted in significant barrens in the ecodistrict, such as Eden Barrens and the Barren Brook area. Repeated post-settlement fires on these shallow, sandy soils have further worsened the inherent low fertility and their ability to produce better quality forests, contributing to the abundance of fire species, such as the black spruce.

The two branches of the St. Mary's River are home to one of the largest concentrations of wood turtles, a species at risk in Nova Scotia.

Stands of medium-sized red oak and large white pine are found in the Indian Man Lake Nature Reserve.

Provincial Crown land accounts for 62% of the St. Marys River Ecodistrict. Private land totals 33% of the area with the remainder in other ownership.

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 six key landscape elements – one dominant matrix element, and five smaller patch elements – in St. Marys River.

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

Tolerant Hardwood Hills and **Tolerant Hardwood Drumlins and Hummocks** are the two largest patch elements, representing a combined 40% of the area. Sugar maple and yellow birch are the dominant species. Red maple and red spruce are also common. White spruce is often found on abandoned fields. The other patch elements, in order of size, are **Spruce Pine Flats**, **Wetlands,** and **Floodplain**.

Forest Ecosystem Management
For St. Marys River 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 St. Marys Ecodistrict 370. 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 represent inventory based off the Forest Inventory Database (FID) current as of the end of 2015 and the Crown Land Forest Model (CLFM) current as of 2017. The update provides a reference to compare to the baseline conditions provided in the ELA 2015, which in the case of the St. Marys River 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 Department of Lands and Forestry, such as The Path We Share: A Natural Resources Strategy for Nova Scotia 2011-2020 (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 St. Marys River – *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 St. Marys River Ecodistrict is one of eight ecodistricts in the Nova Scotia Uplands Ecoregion. This ecodistrict, with a total area of approximately 851 square kilometres, or 9% of the ecoregion, runs from Salmon River Lake to Trafalgar and is bounded on the north by the Cobequid-Chedabucto Fault and on the south by the West River St. Marys Fault.

The east branch of the St. Marys River follows the Cobequid-Chedabucto Fault, with the west branch flowing along the West River St. Marys Fault. The topography is relatively flat. Overall, the ecodistrict has a gradual decrease in elevation to the south and west.

Undulating terrain has helped develop an extensive network of north-to-south flowing watercourses that feed West River St. Marys.

Fresh water totals 4% of the ecodistrict.

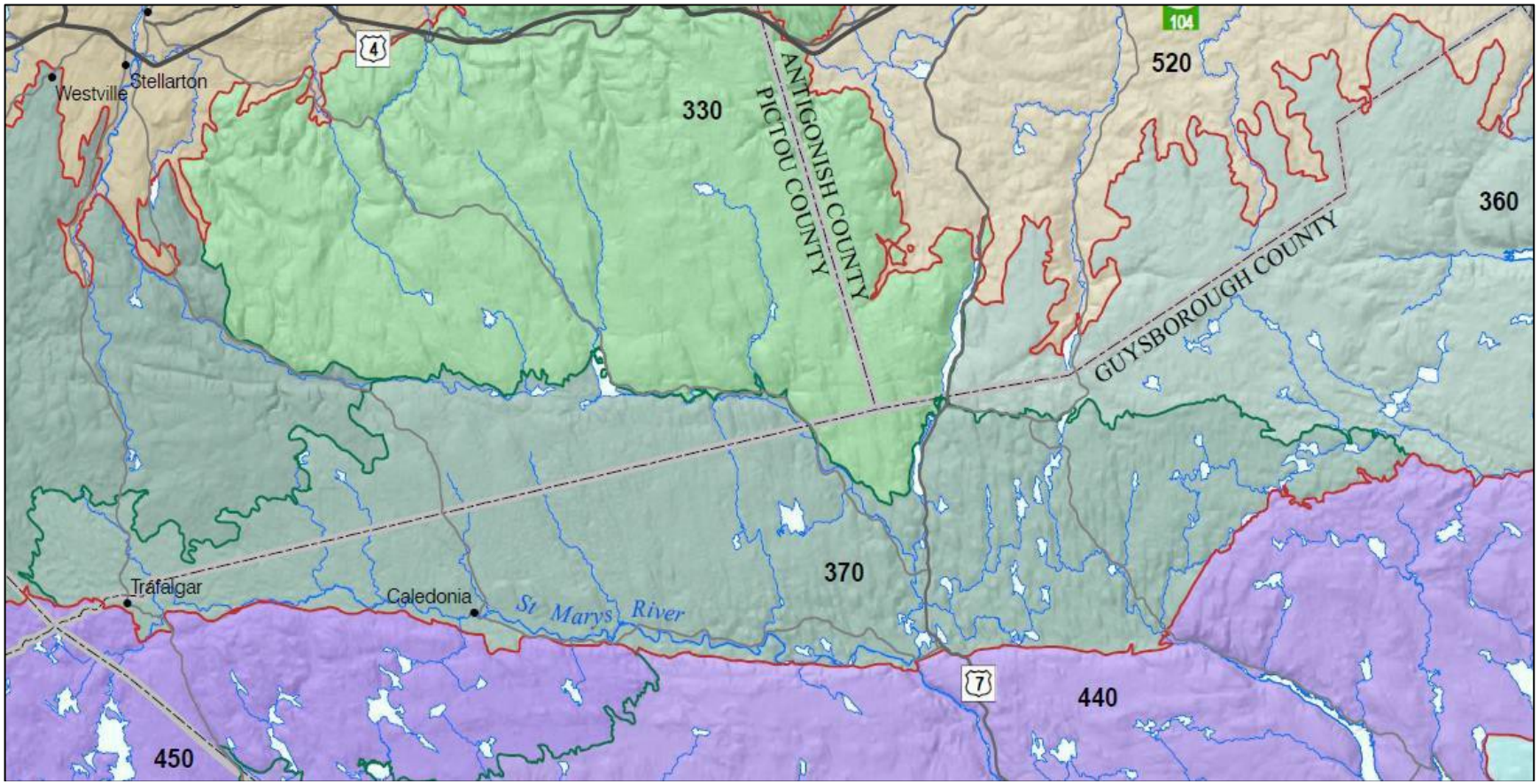
The ecodistrict is underlain by siltstones and sandstones of the Horton Group. The topographic pattern of the ecodistrict is mainly hummocky. Wetlands are associated with level terrain. Most of the soils are well-drained, stony to gravelly sandy loams developed on till veneers of the Horton sandstones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

Settlement within this ecodistrict has occurred largely along the branches of the St. Marys River, with much of the settled land now reverting back to forest.

Historical and recent land use patterns and fires in the 1970s have promoted early to mid-successional fragmented forests with relatively little softwood-dominated old forest. This ecodistrict supports climax species of black and red spruce, and white pine on the poorer soils. Sugar maple, yellow birch, and beech are found on the richer soils of drumlins and hilly topography.

Fire and wind are the dominant natural disturbance agents.

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



St. Marys River Ecodistrict 370 stretches across parts of Guysborough and Pictou counties in the interior of northern Nova Scotia.
(From Ecodistricts of Nova Scotia map 2007)

Land Area

Crown ownership amounts to 62% of the ecodistrict (Table 1), which is considerably higher than the overall provincial average. Private lands are for the most part limited to the perimeter of the ecodistrict along the branches of the St. Marys River.

Table 1 – Land Area by Ownership in the St. Marys River Ecodistrict*

Ownership	Area (hectares)	Percent of Total Area
Provincial Crown land	53,093	62.4
Private	28,411	33.4
Federal	0	0
Aboriginal	0	0
Other (Includes inland water bodies and transportation corridors)	3,616	4.2
Total	**85,121**	**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).

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	41,195	81.6
C2 – Multiple and Adaptive Use	9,095	18
C3 – Protected and Limited Use	186	0.4
Unclassified	3	<0.1
Total	**50,479**	**100**

In the St. Marys River Ecodistrict, the main land use is C1 at 82%, followed by C2 at 18%.

Forests

Within the St. Marys River Ecodistrict, 86% is forested, with the remaining 14% divided among other land uses (Table 3). Wetland is the largest non-forest category.

Softwood covertypes occupy 51% of the forested area, mixedwood accounts for 15%, hardwood accounts for 15% with the remaining 19% in unclassified.

Approximately 62% of the ecodistrict is in Crown ownership, most of which is located in the central portion of the ecodistrict, being land that was less productive for the earlier settlement of the area.

Table 3 – Area Distribution by Land Category for All Owners

Category	Hectares	Percent
Forested	73,373	86.2
Wetland	6,660	7.8
Agriculture	986	1.2
Barrens	178	0.2
Urban	641	0.8
Road, Trail, Utility	374	0.4
Other	2,909	3.4
Total	**85,121**	**100**

Forestry is the dominant resource use activity on both Crown and private land. The majority of the Crown land has been under a license and management agreement with NewPage Port Hawkesbury Ltd., formerly StoraEnso Port Hawkesbury Ltd. *The mill was purchased by a new buyer and re-opened in October 2012 as Port Hawkesbury Paper LP*. As a result of this agreement between the mill and the province, the company effectively acts as the province's forest management contractor for these Crown lands.

Wetland is the second largest land use category in the St. Marys River Ecodistrict.

Red pine plantations on the 1976 fire site are found in the Trafalgar area of the ecodistrict.

White pine is common in the Garden of Eden area in the northern part of the ecodistrict.

The average Land Capability (LC) of forested land in this ecodistrict is estimated to be 4.9 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	1,445	2
3	3,606	5
4	19,915	27.7
5	28,372	39.6
6	15,110	21.2
7 or more	3,146	4.4
Total	**71,594**	**100**

*Based on growth potential for softwood species.

Water Resources

From Trafalgar eastward to just beyond Highway 7, the majority of the drainage in the ecodistrict is toward the St. Marys River.

The East River St. Marys drains along the Cobequid-Chedabucto Fault receiving a considerable portion of its flowage from the adjoining Pictou Antigonish Highlands Ecodistrict. The western branch follows the West River St. Marys Fault, collecting drainage flowing south across the ecodistrict. These branches converge at Glenelg, forming the main river.

A floodplain of the West River St. Marys provides fertile farmland.

The headwaters of the East River in Pictou County extends slightly into the northwestern portion of the ecodistrict resulting in a small area draining toward the Northumberland Strait.

East of Highway 7, the Country Harbour River is the dominate drainage, with a small area in the headwaters of the East River in Pictou County extending slightly into the northwestern portion of the ecodistrict, resulting in a small area draining toward the Northumberland Strait.

East of Highway 7, Country Harbour River is the dominant drainage, with a small area in the eastern most corner of the ecodistrict flowing to the Salmon River through one of its upper tributaries.

Surface water represents 4% of the ecodistrict area.

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 St. Marys River Ecodistrict occurs in a graben (downfolded block) bordered on the north by the Cobequid-Chedabucto Fault Zone, on the south by the West River St. Marys Fault, and on the east by the Guysborough Fault.

The Cobequid-Chedabucto Fault system is a continental scale feature, with a long history of large movements and mineralizing events. It is the boundary between two continental crustal fragments (terranes) that came together approximately 400 million years ago. This fault zone separates the Meguma terrane to the south and the Avalon terrane to the north. The scarp along the West River St. Marys Fault separates the Devonian and Carboniferous strata of the Horton Group, from the older metamorphosed sedimentary rocks of the Meguma Group.

Surface drainage is largely controlled by the structural geology of the graben. The West River St. Marys has extended its headwaters along the line of the St. Marys Fault and captured all the drainage flowing south across the graben in that area. Erosion by the river has exposed a fault scarp, which becomes increasingly prominent toward Melrose.

The drainage pattern in the watershed of the West River St. Marys and its tributaries is rectangular, probably reflecting the joint pattern in the coarse Horton sandstones. Eastward from Eden Lake, the East River St. Marys drains along the Chedabucto Fault, eroding crushed material from the fault zone before heading southward to Melrose.

The surficial geology of the St. Marys Ecodistrict consists predominantly of stony or silty glacial till 2 to 30 metres thick. Drumlins are common in the Moose Lake, Round Lake, and Upper Smithfield-Denver-Glenelg-Fisher Mills areas. Several locations, particularly in the vicinity of Taylor Lake, have areas of bedrock overlain by a thin discontinuous veneer of till.

Alluvial deposits of sand and gravel and to a lesser extent glaciofluvial deposits (kames and eskers and aggregate of varied quality) occur along the West River St. Marys and the East River St.
Marys. A fairly large glaciofluvial deposit occurs three to four kilometres north of Trafalgar. Unconsolidated aggregate resources have been extracted at several locations to supply local requirements. Surficial deposits make a major contribution to soil development and may be a source of aggregate. Several small organic deposits are scattered across the ecodistrict.

Vein and breccia – rock composed of mineral fragments – deposits of iron, copper-cobalt, nickel, barium, and gold are associated with the Cobequid-Chedabucto Fault Zone. Several mineral showings (gold, iron) occur within the ecodistrict. Mineral exploration dates back to the late 1800s. Shafts and adits – horizontal entrances to underground mines – were driven on several of the more promising showings.

The exact location and character of these old workings are often poorly recorded, and undocumented abandoned mine openings (AMOs) may exist. Some AMOs are difficult to find because they have become overgrown, and in some instances plugged at the surface with debris. Several exploration shafts were sunk on gold showings in the Lower Caledonia Gold District. A diotomite deposit occurs in the southern end of Eden Lake. Currently there are no active mines in the ecodistrict.

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.

Sedimentary rocks of Carboniferous Period are prime targets for oil and gas exploration as they provide both source and reservoir rocks for hydrocarbons. Historically, the oil and gas industry has shown little interest in the Horton Group rocks of the area because of the relatively high temperatures and pressures they were subjected to in their geological past. It was concluded that these conditions likely drove off conventional hydrocarbons. Recent advances in gas production techniques has kindled interest in the gas potential of shale units found within the St. Marys Graben, Horton Group.

Parks and Recreation / Protected Areas

For the parks and protected areas within your ecodistrict, please refer to the Park and Protected Areas website (http://novascotia.ca/parksandprotectedareas/plan/interactive-map/) and the Provincial Landscape Viewer, at the following url: https://nsgi.novascotia.ca/plv/..

Lochiel Lake Park

The Indian Man Lake Nature Reserve protects a mature, mixedwood forest featuring a stand of large red oaks mixed with white pine, red maple, and white birch. This forest type is rare in eastern mainland Nova Scotia

Wildlife and Wildlife Habitat

Wildlife in the St. Marys River 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 St. Marys River and other ecodistricts comes from a number of sources, including surveys, harvest statistics, hunter / trapper reports (abundance rankings), biological collections from harvested and road killed animals, and observations and reports from the public and Department of Lands and Forestry staff. Information on important sites is documented by Department of Lands and Forestry 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.

There are no wilderness areas designated within the St. Marys River Ecodistrict. However, the Indian Man Lake Nature Reserve is located in the ecodistrict. The area also contains the majority of the 500-hectare Sunnybrae Game Sanctuary.

Undulating terrain has helped to develop an extensive network of north-to-south flowing watercourses that feed the West River St. Marys. Both branches and the smaller north branch, as well as several of the tributaries, provide important staging, spawning, and rearing habitat for Atlantic salmon. The East River St. Marys is more productive than the West Branch.

Sea run brook trout are also an important recreational resource in this area. All branches have historically been the benefactors of several salmon fishing enhancement and habitat restoration projects.

In general, furbearers are common. Although fishers appear to be increasing, their overall population is low.

Black bear, coyotes, raccoons, and white-tailed deer are commonly seen feeding in agricultural areas that grow blueberries and corn. In recent years, Canada geese numbers have increased within the area.

Black bears are common in the ecodistrict.

Wood turtles are found throughout this area in both forested and non-forest landscapes but are frequently associated with watercourses that flow through or adjacent to agricultural land. Wood turtles have been federally designated as a threatened species under the Species at Risk Act (SARA) and provincially are listed as threatened under the Nova Scotia Endangered Species Act because of their vulnerability to human activities.

The mainland moose, a provincially designated endangered species, occurs within this ecodistrict, often in association with wetlands or floodplain habitats along the West River St. Marys.

The north and east branches of the St. Marys River also contain populations of brook floater, a freshwater mussel that has been designated at the federal level as special concern for its low numbers and vulnerability to pollution and sedimentation. In Nova Scotia this mussel has been designated as threatened.

Other species of note occurring in this ecodistrict are slender blue flag, an iris thought to be at risk, and yellow Canada lily, and wood anemone. All three are found close to or in wet habitats often associated with flood plains and are sensitive to human activities or natural events. Scattered records of species sensitive to human activities, such as common loon and northern goshawk, also occur throughout the area.

A significant wildlife feature in this ecodistrict is one of the largest deer wintering areas in eastern mainland Nova Scotia. This wintering area extends from Lower Caledonia eastward to Aspen and north to Greens Brook, outside the ecodistrict. Each winter deer travel to this area to feed and shelter along the north shores of the West Branch and the eastern adjacent to the East Branch. Smaller wintering areas also can be found scattered throughout the ecodistrict.

The St. Marys River Ecodistrict has one of the largest deer wintering areas in eastern mainland Nova Scotia.

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 Department of Lands and Forestry 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

St. Marys River – Elements Defined

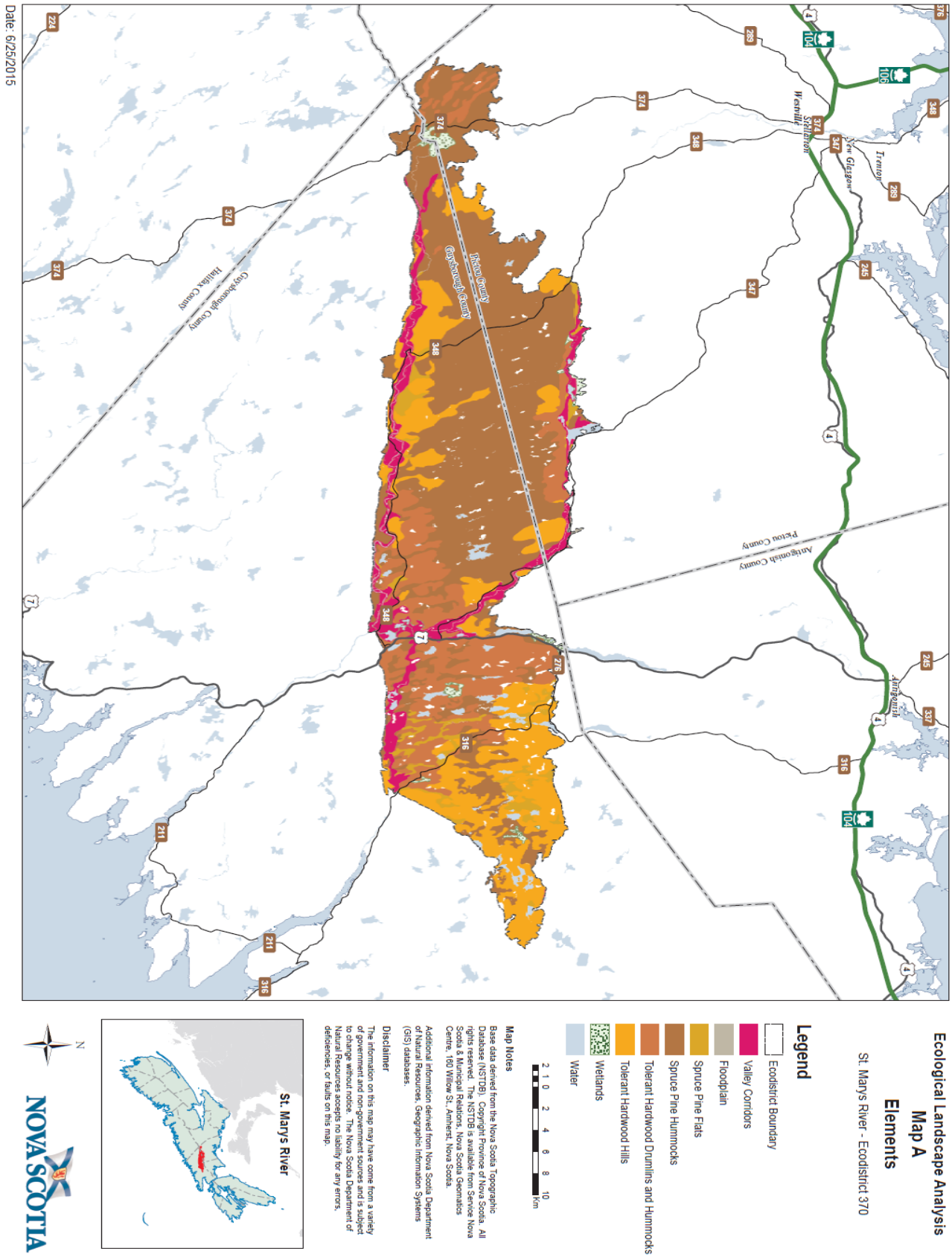
Landscapes are large areas that function as ecological systems and respond to a variety of influences. Landscapes are composed of smaller ecosystems, known as elements. These elements are described by their physical (e.g. soil, landform) and ecological features (e.g. climax forest type). These characteristics 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 St. Marys River 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.

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

Tolerant Hardwood Hills and **Tolerant Hardwood Drumlins and Hummocks** are the two largest patch elements, representing a combined 40% of the area. Sugar maple and yellow birch are the dominant species. Red maple and red spruce are also common. White spruce is often found on abandoned fields. The other patch elements, in order of size, are **Spruce Pine Flats**, **Wetlands**, and **Floodplain**.

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 Department of Lands and Forestry 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 Department of Lands and Forestry, 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.

Hardwoods are common in several of the patch elements in the St. Marys River Ecodistrict.

Table 5a – Elements Within St. Marys River		
Element	**Size (Hectares)**	Element Description
Spruce Pine Hummocks (Matrix)	41,770 51.2%	The matrix element dominates the western two-thirds of the ecodistrict. The element occurs on hummocky terrain underlain by well and imperfectly drained medium-textured soils derived from sandstones. The inherent low soil fertility of these sandy loams leads to a forest of black spruce and white pine with a significant understory of woody ericaceous shrubs. Red oak and red pine are components of some stands. The dominant natural disturbance is fire, due to the fuel nature of pine and spruce litter and the ericaceous vegetation associated with this element. Soils can become quite dry in the summer months, which increases the fire hazard. The frequent disturbance of this element results in even-aged forests of black spruce which, as the time increases between stand-level disturbances, can develop an overstory of white pine. Early successional forests include red maple, white birch, grey birch, and pin cherry. A significant portion of this element was planted to red pine and other softwood species following the fires of the 1950s on the Garden of Eden barrens and the latest fire near Trafalgar in 1976.
Tolerant Hardwood Hills (Patch)	18,060 22.1%	Throughout the eastern portion of the ecodistrict this large patch-level element occurs primarily on hilly terrain underlain by well-drained medium-textured soils. Sugar maple, red maple, and yellow birch are the dominant species in the overstory. An area of well-drained fine-textured soils on hummocky and drumlinized terrain occurs south of Giants Lake and supports a similar forest on the crests and upper slopes with increasing red spruce in a mixedwood situation on lower slopes. Much of the element has been converted to other uses, primarily agriculture and settlement. When fields are abandoned white spruce is quick to reforest the sites but blueberries can be enhanced with management either before the sites reforest or following clearcutting of the white spruce. Early successional species following stand-level disturbances include red maple and white birch as well as balsam fir which can be enhanced with management to create a softwood-dominated condition. Stands can develop into uneven-aged forests with old forest characteristics.
Tolerant Hardwood Drumlins and Hummocks (Patch)	14,897 18.2%	This large patch-level element occurs in two separate drumlin fields, the largest extending from Smithfield to Cross Roads Country Harbour and the other along the south end of Eden Lake. The well-drained medium-textured soils create the conditions for shade-tolerant forests of red spruce, maple, and yellow birch. The crests and upper slopes are dominated by yellow birch and red maple with lesser amounts of sugar maple. Further downslope forests grade into mixedwoods and eventually softwood forests of red spruce. The dominant natural disturbance in this forest complex is infrequent stand-level renewal caused by insects, disease, windthrow, or storm breakage. Small gaps and patches created in the canopy between disturbance events create the opportunity for uneven-aged forests and eventually old growth. Forest harvesting creates conditions for early successional species such as white birch, red maple, aspens, and balsam fir. A portion of this element has been converted to other uses, primarily agriculture and settlement. When fields are abandoned white spruce are quick to reforest the sites.

Table 5a – Elements Within St. Marys River		
Element	**Size (Hectares)**	**Element Description**
Spruce Pine Flats (Patch)	4,456 5.5%	This small patch element occurs on level and sometimes hummocky terrain and is dominated by wet forests of black spruce and shrubby wetlands. It occurs on imperfectly to poorly drained medium to fine-textured soils associated with small streams and wetland complexes. Forests of black spruce and tamarack are typical with the wetter sites dominated by red maple. Shrubs such as alders, false holly, and winterberry are common. Along a few of the major streams in this Element, floodplain forests occur where annual and periodic flooding enriches the site with sediment. Sugar maple, white ash, and maybe elm can be expected along with red maple and black cherry.
Wetlands (Patch)	1,454 1.8%	The Wetlands element is a small patch ecosystem comprising freshwater bogs, fens, swamps, and poorly drained areas. In this ecodistrict, the element primarily occurs as a wetland complex associated with the East River St. Marys and with large wetlands between Aspen and Glenelg. Embedded in other elements, wetlands can be narrow linear communities associated with flow accumulations and small streams. Wetlands are generally treeless or sparsely forested woodlands of black spruce, tamarack, and red maple. The wetlands at Glenelg are shrub-dominated with alders, false holly, willows, meadow sweet, and highbush cranberry. This element plays a critical role in water collection, filtering, and groundwater recharge.
Floodplain (Patch)	979 1.2%	The east and west branches of the St. Marys River comprise this riparian element. Where annual or periodic flooding along these watercourses has deposited alluvial sediments, the terrain is generally smooth and level. These are linear, small patch elements with soils that can be quite gravelly and coarse-textured and most often are moderately well to imperfectly drained. The climax forest for this element occurring on the better-drained alluvial soils is the shade-tolerant hardwood forest of sugar maple and white ash, and elm. The poorly drained soils support a forest comprised of black spruce that is subjected to frequent stand-level disturbances such as flooding and windthrow. As the soils get progressively wetter, tamarack, red maple, willows, and alders become more abundant. Portions of this floodplain element have been removed from the annual or periodic flooding because of the movement of the watercourse over time. These areas now have begun soil development processes and forests here are now more typical of upland communities and include species such as red spruce, hemlock, balsam fir, and yellow birch.
Total	**81,658***	*Area is not the same as in Table 1 because water has not been included.

Table 5b – Forest Vegetation Types[1] Within Elements in St. Mary's River						
Element	**Seral**					
	Early	**% ***	**Middle**	**%**	**Late**	**%**
Spruce Pine Flats	OW2, SP8	35.6	SP6	14.9	**SP7**	16.2
Spruce Pine Hummocks	IH6, OW2, OW5, SP8	26.3	IH2, SH9, SP6	12.1	SP4, **SP5,** SP9	33.6
Tolerant Hardwood Hills	OF1, OF2, OF4, IH6	43.7	MW2, SH5, SH6, SH8, SH10, TH7	16.1	MW1, MW3, SH3, **TH1, TH2**, TH3, TH4, TH5, **TH8**	16.9
Tolerant Hardwood Drumlins and Hummocks	OF1, OF2, OF4, IH6	41.2	MW2, SH5, SH6, SH8, SH10, TH7	17.1	MW1, MW3, SH3, **TH1, TH2**, **TH8**	19.2
Floodplain	FP5, FP6	20.6	FP3	13.4	**FP1**	2.6
Wetlands	WC1, WC2, WC5, WC6, WC7, WD1, WD2, WD3, WD6, WD7, WD8					

View forest groups and vegetation types at
http://novascotia.ca/natr/forestry/veg-types/veg-navigation.asp
To help with identification of vegetation types, the 14 forest groups in Nova Scotia designated by Department of Lands and Forestry 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.

White pine / Blueberry / Bracken (SP4) is a late successional vegetation type found in the Spruce

Pine Hummocks matrix element.

White birch – Red maple / Sarsaparilla – Bracken (IH6) is an early successional vegetation type found in the Tolerant Hardwood Hills patch element.

Red maple – Yellow birch / Striped maple (TH8) is a late successional vegetation type found in the Tolerant Hardwood Drumlins and Hummocks patch element.

Black spruce / False holly / Ladies' tresses sphagnum (SP7) is a late successional vegetation type found in the Spruce Pine Flats patch element.

Tamarack – Black spruce / Lambkill / Sphagnum (WC7) is a vegetation type found in the Wetlands element.

Red maple / Sensitive fern – Rough goldenrod (FP3) is a mid-successional vegetation type found in the Floodplain 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 Department of Lands and Forestry is employing to try and realize this objective. Department of Lands and Forestry 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.

Frequent and gap disturbance regimes are the most common in the St. Marys River Ecodistrict.

Frequent regimes are typical of black spruce communities. 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.

The gap disturbance regime 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 of shade-tolerant species occurs under openings in the stand canopy caused by individual tree or small patch morality. Major stand-initiating events do not usually occur under this regime.

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)

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 Department of Lands and Forestry 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 (Forest Management Guide for Great Lakes St. Lawrence Landscapes 2010).

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 Department of Lands and Forestry website (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%

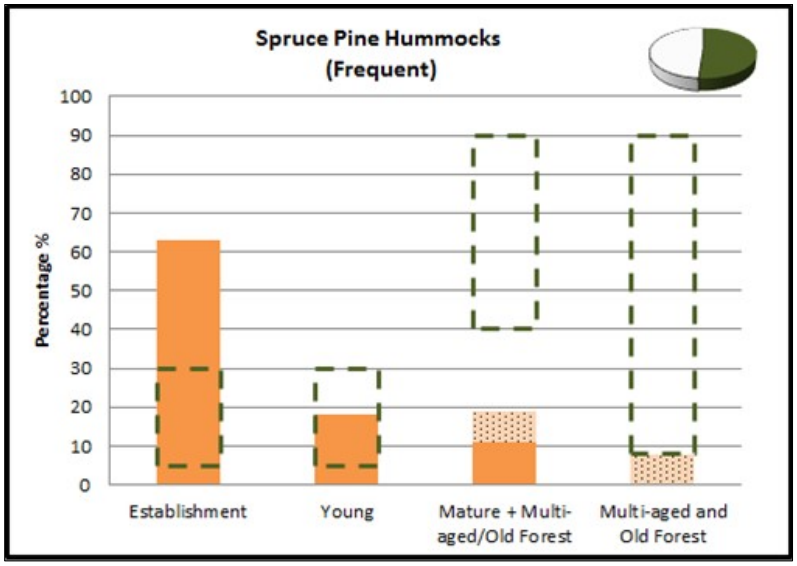
Table 6 indicates that for frequent stand initiating disturbances, both establishment and young development class forests would typically comprise between 5 and 30% of area, while mature forest – which includes multi-aged and old forest – would cover more than 40%. Mature forest should consist of a relatively 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

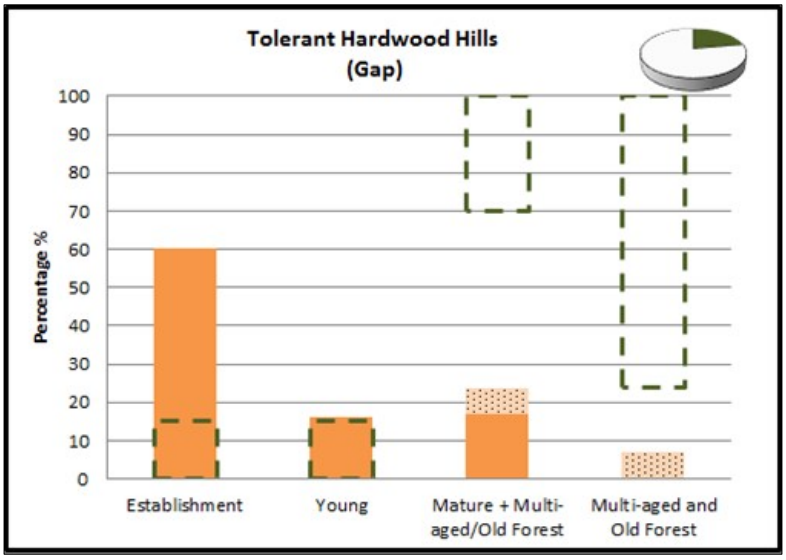
A series of charts that follow combine data on development classes for each element with desired or target percentages, based on the type of natural disturbance regime. The target percentages (from Table 6) are represented by rectangles of broken green lines. The light brown bars show the percentage 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.

All non-forest elements, (e.g. Rockland, Wetland, Beach, Urban, Marshes/Grasslands, Salt marsh) and the Valley corridor element have not been measured or included in the 2019 update.

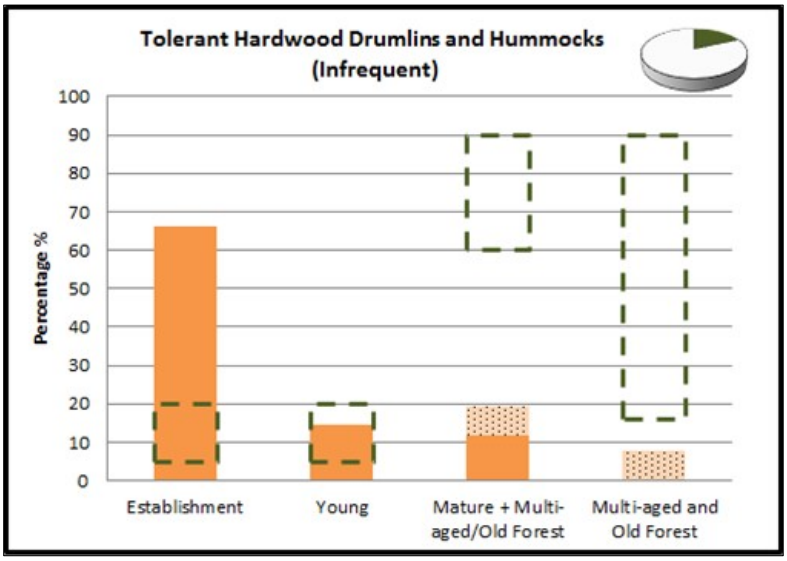
In the **Spruce Pine Hummocks** matrix element, almost 80% of the forest is in the younger development classes creating a deficit of mature forest. Forest practices that maintain overstory white pine can be used to help maintain partial mature cover, providing seed and contributing to stand structure diversity. Old forest conditions can be enhanced by extending rotation age. Older even-aged black spruce stands may offer limited opportunity due to declining stand health.



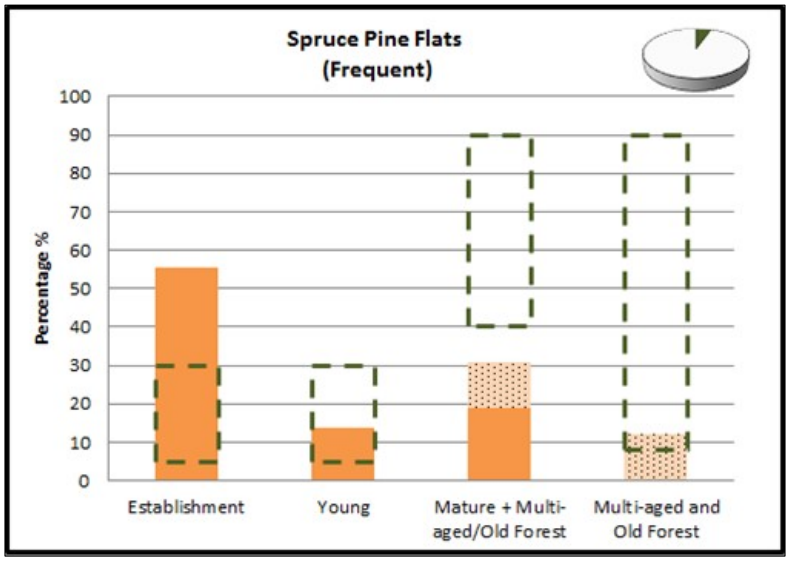
In the patch element **Tolerant Hardwood Hills,** mature and old forest classes have been significantly reduced below target levels and replaced with younger establishing forests. Forestry prescriptions that increase late successional species in young forests should be used to hasten older forest composition and conditions. Continuing harvest of mature forests can use partial harvesting techniques.



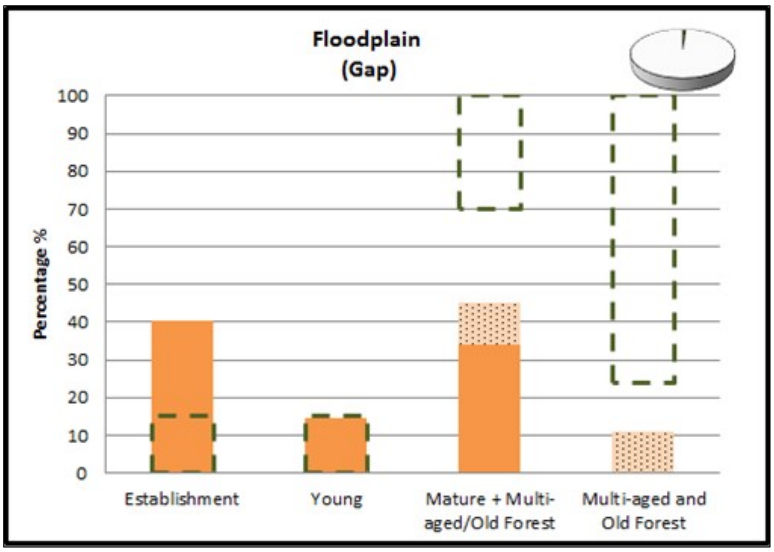
In **Tolerant Hardwood Drumlins and Hummocks,** mature forests are significantly below target levels. Forestry prescriptions that increase late successional species in young forests should be used to hasten older forest composition and conditions. Continuing harvest of mature forests can use partial harvesting techniques to maintain mature cover and species composition. Isolation of drumlin forests by harvesting the adjacent matrix element may create wildlife habitat issues.



In the **Spruce Pine Flats** patch element, there is an over-abundance of establishment forest. Pre-commercial thinning may hasten diameter growth and help restore mature forest attributes and habitat. Due to the shallow rooting of trees, especially on moist to wet soils, mature stands are vulnerable to blowdown, particularly if thinned. Potential for old growth is low.



The small **Floodplain** patch element is often associated with the Valley Corridors and the Wetlands elements and provides a habitat interface with the hydrological system. Late successional forests are rare as most mature forests currently reflect re-establishment of early successional forests on abandoned farmland. The small size, linear shape, and limited distribution of this element make its composition sensitive to local- level disturbance.



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 Department of Lands and Forestry 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 forest. Mature forests include multi-aged and old forest. 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 forest.
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).