Department of Lands and Foresty

2019 Update

ECOLOGICAL LANDSCAPE ANALYSIS WESTERN BARRENS ECODISTRICT 770

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

ELA 2019-770

NOVA SCOTIA

Ecological Landscape Analysis, Ecodistrict 770: Western Barrens
2019 Update for Part 1 and 2

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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.

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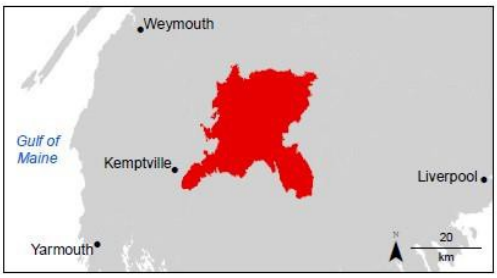


An objective of ecosystem-based management is to manage landscapes in as close to a natural state as possible. The intent of this approach is to promote biodiversity, sustain ecological processes, and support the long-term production of goods and services. Each of the province's 38 ecodistricts is an 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 Western Barrens Ecodistrict 770. 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.

The 79,595 hectare Western Barrens Ecodistrict has one of the highest percentages of provincial Crown land ownership in Nova Scotia. The province owns 92.8%, or 73,837 hectares. Only 1.9% is in private hands. The remainder of the ecodistrict is federal lands or other uses. The ecodistrict was never extensively settled.

The Tobeatic Wilderness Area covers most of the ecodistrict (59,275 hectares) and is the major contributor to a provincial designation of protected or limited use. The remaining Crown land allows for most uses but has a special management classification due to the existence of a small mainland moose population – an endangered species in Nova Scotia.

The location of the Western Barrens Ecodistrict in the interior of western Nova Scotia, away from the moderating influence of the ocean, means that summers are hotter and drier and winters are cooler than in adjacent ecodistricts.

Repeated fires in this ecodistrict have caused widespread barrens, which have been slow to regenerate tree species due to the frequency of the fires and the coarse, shallow, and infertile soils. Many of the soils have a hardpan layer that limits water movement and significantly restricts rooting depth.

A total of 3.7% of the ecodistrict has exposed bedrock. There is also a significant amount of boulders scattered across the landscape, giving the local name "flintstone theatre" to the area.

Large granite boulders are abundant throughout the ecodistrict and are very evident in the many small lakes.

The near absence of shade-tolerant species, such as red spruce, hemlock, sugar maple, and beech, attest to the poor growing conditions. Open woodlands of white pine, black spruce, red oak, and red maple are dominant. Much of the ecodistrict is carpeted with dense layers of heath-like vegetation, including huckleberry, rhodora, and lambkill on drier sites as well as leatherleaf and Labrador tea on the wetter sites.

The extensive root mat created by these shrubby, acid-loving plants severely restricts root depth and affects regeneration of softwood species. Sparse stands of white pine and black spruce occur, along with red maple and white birch.

Important aquatic and riparian habitat is provided by the major watercourses and their tributaries. The ecodistrict contains the headwaters of several rivers, such as the Tusket, Clyde, Shelburne and Roseway. These headwaters are extremely important in maintaining the health of lakes, rivers, and associated habitat throughout watersheds.

The Tusket River originates in the ecodistrict and provides an important travel corridor for many species of wildlife.

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 four key landscape elements – one dominant matrix element and three smaller patch elements– in Western Barrens.

In **Spruce Pine Barrens**, a matrix element that functions as basically a co-matrix, the two climax communities are black spruce-white pine and barrens.

In the **Pine Oak Barrens**, a large patch element, consists of areas of well-drained and coarse-textured soil that were historically thought to support two types of climax communities. The white pine-red oak-red pine species association occurred on about half of the element, while barrens occupied the remainder.

The other two patch elements are **Wetlands**, usually bogs and fens, and the small **Pine Oak Hills and Hummocks**.

Forest Ecosystem Management
For Western Barrens 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, changes in land use and vegetation cover.

This ELA provides detailed information on the resources and descriptions of various components of the landscape for Western Barrens Ecodistrict 770. 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 Western Barrens 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 Western Barrens – *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 Western Barrens Ecodistrict, part of the Western Ecoregion, lies in the interior of western Nova Scotia and occurs in parts of Yarmouth, Digby and Shelburne Counties. Western Barrens is 796 square kilometres in area and represents 4.7% of the ecoregion. The topography, geology and soils are similar to its northern and eastern neighbour, South Mountain Ecodistrict 720. Sable Ecodistrict 760 and Clare Ecodistrict 730 are located to the south and west respectively.

Western Barrens is underlain by a massive sheet of granite. The soils are coarse-textured, low in fertility, shallow and can be well or imperfectly drained. Exposed bedrock covers nearly 4% of the ecodistrict. Large boulders, strewn across the landscape, are a common feature and give rise to the local name “flintstone theatre.”

The general topography features a rough terrain characterized by an undulating, hummocky landform dissected by swamps, swales, bogs, and meandering slow-moving streams.

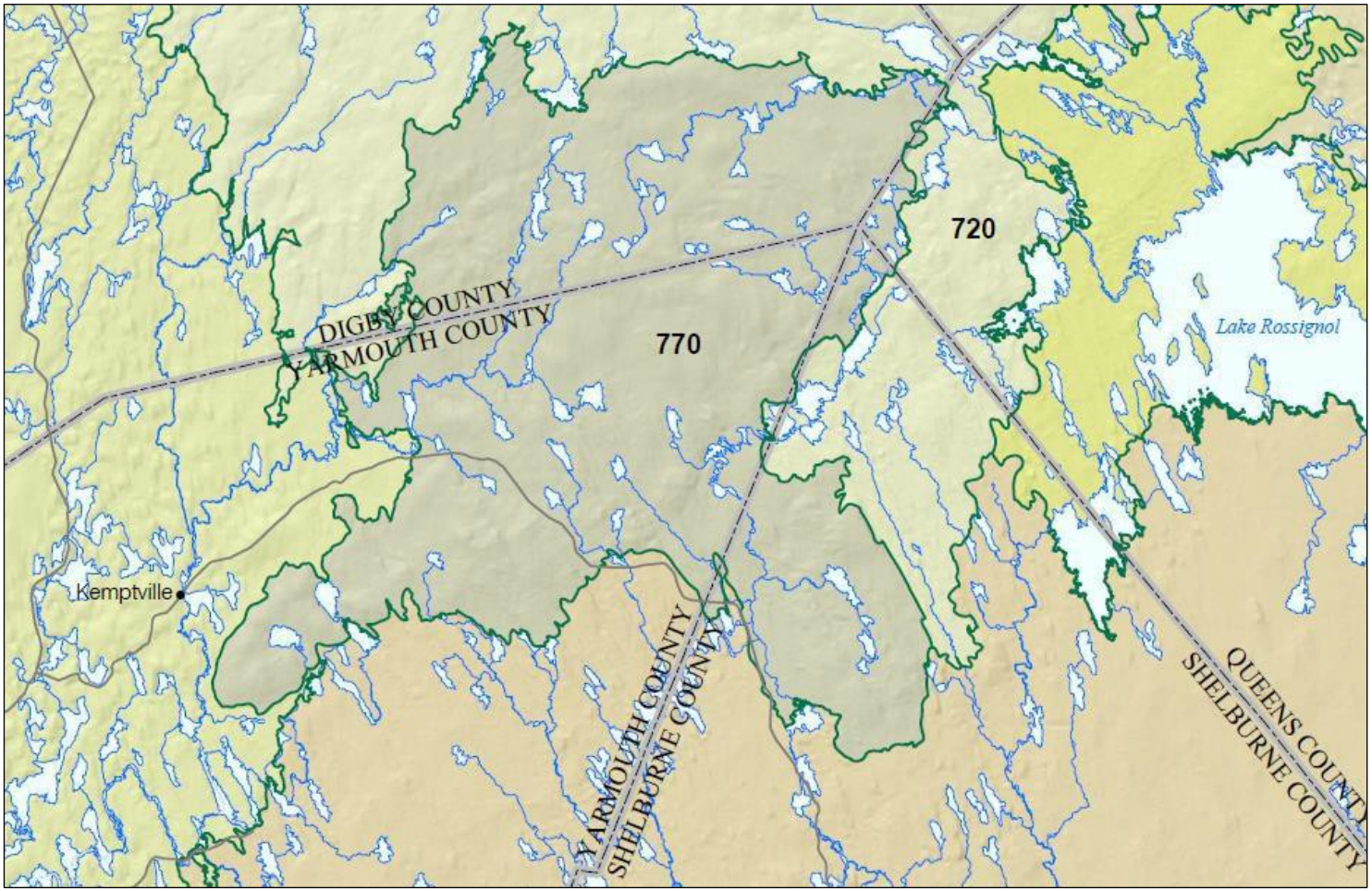
A root mat of heath-like vegetation is common and often extremely thick. The density and height of the shrubs often makes travel difficult except on established trails. Huckleberry, rhodora and lambkill are present on drier sites, and leatherleaf and Labrador tea in wetter areas.

It is difficult for tree species to become established in this root mat and often only sparse stands of white pine and black spruce are present. With time, many of the barrens have slowly begun to become re-stocked with trees. A sparse forest cover of species such as red maple, white birch, white pine, black spruce and scattered red oak can be found on many of these sites.

Fire has played an important role in this ecodistrict. Lightning-induced fire or manmade fires set to improve wildlife habitat have helped shape the current vegetation. In the absence of fire, some of the better sites can grow shade-tolerant hardwood and softwoods.

A researcher wrote that the land, with its complex network of streams, lakes, unusual terrain and vegetation, would make a good wilderness area. The Tobeatic Wilderness Area is just that.

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



Western Barrens Ecodistrict 770 covers parts of Yarmouth, Digby and Shelburne counties.
(From Ecodistricts of Nova Scotia map 2007)

Land Area

The Western Barrens is one of eight ecodistricts in the Western Ecoregion.

The majority of the land is held by the Crown (Table 1). Scattered private inholdings are concentrated in the southerly portion of the ecodistrict.

The area is remote. The closest village is at East Kemptville on the ecodistrict's southwestern boundary.

Table 1 – Land Area by Ownership in the Western Barrens Ecodistrict*

Ownership	Area (hectares)	Percent of Total Area
Provincial Crown land	73,837	92.8
Private	1,543	1.9
Federal	93	0.1
Aboriginal	0	0
Other (Includes inland water bodies and transportation corridors)	4,122	5.2
Total	**79,595**	**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 Crown Lands

The Integrated Resource Management (IRM) classification for Crown lands was developed through a public consultation process of 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).

The large percentage of C3 is because the Tobeatic Wilderness Area lies in part within Western Barrens.

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

IRM land use category	Hectares	Percent of Crown Lands
C1 – General Resource Use	0	0
C2 – Multiple and Adaptive Use	14,203	19.3
C3 – Protected and Limited Use	59,275	80.7
Unclassified	0	0
Total	**73,478**	**100**

The area designated C2 is the result of the presence of a moose population, a species that is endangered in Nova Scotia. There are no C1 uses as in other ecodistricts.

Forests

Within the Western Barrens Ecodistrict, approximately three-quarters is forested, and the rest is considered non-forested (Table 3).

Non-forested land consists mainly of barrens and wetlands. Barrens represent 12.6% of the area and wetlands account for 8.7%. None of the land is classified as agricultural, which is unusual compared with other ecodistricts.

The "Other" category includes areas of brush, alders, small shrubs and gravel pits. The current forests contain 35,488 hectares of softwood stands (>75% softwood) which account for 66% of the forest cover. Black spruce dominates on the imperfectly drained soils. Black spruce, balsam fir, and white pine grow on the drier softwood sites.

Mixedwood stands of spruce, white pine, red oak, larch, and balsam fir account for 25%. Hardwood stands (>75% hardwood composition) make up 9% of the forest cover, which consists mainly of red maple and red oak.

The average Land Capability (LC) of forested land in this ecodistrict is estimated to be 3.6 cubic metres per hectare per year (m^3/ha/yr), based on the ratings in Table 4. This is one of the lowest ratings in Nova Scotia. 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 3 – Area Distribution by Land Category for All Owners

Category	Hectares	Percent
Forested	58,726	73.8
Wetland	6,937	8.7
Agriculture	0	0
Barrens	10,030	12.6
Urban	10	0.01
Road, Trail, Utility	12	0.01
Other	3,887	4.9
Total	**79,595**	**100**

Table 4 – Area of Forested Land by Land Capability Rating

Land Capability (LC) Rating (m^3/ha/yr)*	Hectares	Percent
2 or less	7,406	13.6
3	26,315	48.4
4	8,539	15.7
5	5,185	9.5
6	5,275	9.8
7 or more	1,657	3
Total	**54,377**	**100**

*Based on growth rating for softwood species.

The majority of the forested land (about 62%) has an LC rating of 3 or less. These areas can grow fibre and are an important source of fibre, but they are not usually considered for forest management inputs, such as silviculture, because of the long return interval on investment.
A total of 20,719 ha, or 38.1% of the forested land, is LC 4 rating and greater (Table 4). This rating indicates the Western Barrens Ecodistrict has low potential for forest growth. Areas considered not suitable for growing fibre (LC <= 3) account for 61.9% of the forested area. These areas consist of poorly-drained soils as well as dry barren soils.

The landscape of Western Barrens includes a mix of forests and barrens.

Water Resources

Many streams and rivers flow among the ecodistrict's numerous lakes. The rivers have fast flowing, rocky sections emptying into rocky pools and long, slow moving, meandering sections.

The shorelines of lakes are extremely rocky, and granite boulders can often be observed in the lakes. Wetlands are present along some of the waterways. Water is generally yellowish in colour and acidic (pH<4.6) because of high tannin content due to

The rocky shoreline of North Bingay Lake is typical of the Western Barrens Ecodistrict.

ericaceous vegetation. The ecodistrict contains the headwaters of the following river systems: Shelburne, Clyde, Roseway and Tusket.

Minerals, Energy and Geology

The Western Barrens Ecodistrict is located at the southwestern end of the South Mountain Batholith. The area is dominated by the granites of the South Mountain Batholith that are about 400 million years old. Along the western edge and southeastern tip of the ecodistrict are the metamorphic sedimentary rocks of the Meguma Group which are about 500 million years old.

The South Mountain Batholith covers approximately 80% of the Western Barrens Ecodistrict and is the largest granitoid batholith in the Appalachian orogeny (the process of mountain making), spanning an area of approximately 7,300 square kilometres.

The unique mineralization associated with the granitic plutons of the South Mountain Batholith and the contact margins of the Meguma Group are excellent targets for future exploration and potential development. Mineralization associated with the batholith consists of polymetallic mineral deposits with tin, tungsten, uranium, molybdenum, arsenic, fluorite, copper and zinc associations.

The Meguma Group covers the remaining 20% of the bedrock in this ecodistrict and is divided into the Goldenville Formation and overlying Halifax Formation. The Goldenville Formation comprises varying amounts of metasandstone and metasiltstone and is where the many gold occurrences and deposits are found in Nova Scotia. The Halifax Formation comprises black to grey to rust-brown slate with thin beds and lenses of minor black metasiltstone.

This southwestern section of the ecodistrict is host to the Southwest Nova Scotia Tin Domain. One deposit within this domain, the East Kemptville Tin deposit, operated between 1985 and 1992. Rio Algom produced approximately 19 million tonnes (Mt) of tin ore over five years.

A large fault zone, the Tobeatic Shear zone, bisects the southern portion of the ecodistrict. Associated with this shear zone are high purity quartz and kaolin deposits. These deposits occur at the contact of the South Mountain Batholith with the Meguma Group and are up to 200 metres wide and extend along the shear zone for a distance in excess of 7 kilometres.

Current exploration activity within the ecodistrict is modest with the majority of activity centered around the tin domain. Past exploration in this ecodistrict was extensive and at one time, the entire ecodistrict was held under mineral exploration licenses for base metals and also for uranium.

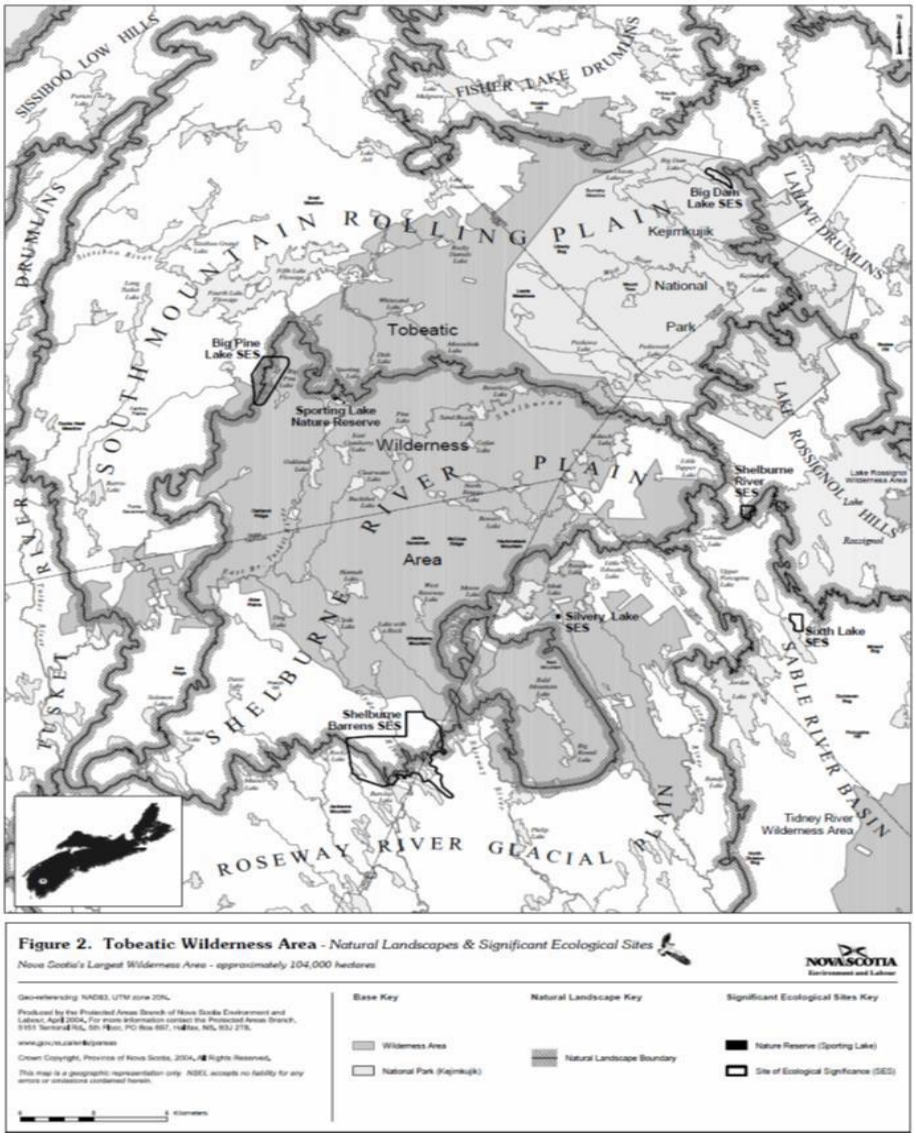
Potential geohazards, such as abandoned mine openings, potential karst areas, flood risk areas, sulphide-bearing slates and underground coal workings, can be viewed at the following web sites:
http://gis4.natr.gov.ns.ca/website/nsgeomap/viewer.htm
http://gis4.natr.gov.ns.ca/website/mrlu83/viewer.htm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

The surface geology in the ecodistrict includes large drumlins with silty to stony tills. The area has numerous peat and organic deposits, some of which are potential fuel-grade peat quality. There are also several glaciofluvial deposits (kames, eskers) which are typically excellent sources of sand and gravel. Numerous aggregate and slate deposits are active within the ecodistrict as well as a few quarry operations. These provide an important source of sand, gravel, slate and dimension stone to the local area and construction companies.

The Halifax Formation is susceptible to acid rock drainage due to the high iron and sulphide content within some units within the slates.

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/.



The Tobeatic Wilderness Area makes up about 75% of the Western Barrens Ecodistrict.

Wildlife and Wildlife Habitat

Wildlife in the Western Barrens 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 Western Barrens 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 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.

Wetlands, Aquatic Habitat and Wildlife

The Western Barrens Ecodistrict generally consists of low hills and ridges with coarse, poorly drained and infertile soils. There are a number of lakes, watercourses and wetlands within depressions and low lying areas. In some cases, wetlands combine with barrens to form extensive areas of open and partially treed habitat. However, wetlands are not as significant a feature of this ecodistrict as they are in the adjacent Clare and Sable ecodistricts.

In addition to providing important habitat, wetlands perform vital environmental functions such as flood and erosion control, groundwater recharge, water filtration and clean water. Given their abundance and potential for supporting rare species in southwest Nova Scotia, all wetlands in this ecodistrict are considered to be a significant component of the landscape.

Freshwater wetlands that have been identified in the Western Barrens are of several diverse types: bog, deep marsh, fen, lakeshore wetland, meadow, seasonally flooded flats, shallow marsh and shrub swamp. Wetlands make up about 8% of the ecodistrict's area.

Two wetland types are dominant in this ecodistrict: bogs (peat lands) and fens. Bogs make up 58% of total wetland area. Bogs are not directly connected to surface water by way of watercourses so their primary source of water is from rainfall only. Bogs, however, may connect hydrologically to other wetlands underground. The dominant vegetation community tends to be predominantly sphagnum / heath-like shrubs. Fens are the next most common type at a little over 40% of total wetland area. While fens can be similar in appearance to bogs, they occur along watercourses and therefore receive more nutrients from groundwater movement. The dominant vegetation community is sphagnum / sedge / grass.

Some of the wetlands in Western Barrens are significant in terms of size. The two largest in the ecodistrict are a 179 hectare bog southeast of Indian Fields and a 134 hectare fen northeast of Hannah Lake, along a tributary of West Roseway Brook.

The remaining wetland types are uncommon in the Western Barrens Ecodistrict, all of them combined accounting for only 1.5%. Wooded swamp, a common wetland type in Nova Scotia overall, appears to be under-represented because of difficulty in detecting wet sites through tree canopies on aerial photographs. Many of these swamps appear to be in the form of numerous tree-covered swales, a distinctive feature seen on the barrens in this ecodistrict.

Important aquatic and riparian habitat is also provided by the major watercourses and their tributaries. Being of higher elevation than surrounding lands toward the coast, this ecodistric contains the headwaters of several rivers, such as the Tusket, Clyde, Shelburne and Roseway which become more significant downstream in the adjoining Clare and Sable ecodistricts.

These headwaters have tremendous importance in maintaining the health of lakes, rivers and associated habitats throughout individual watersheds and the habitat for the numerous species at risk in these freshwater systems.

The Tusket River provides important aquatic and riparian wildlife habitat.

The riparian zone, the area where terrestrial vegetation meets a watercourse or wetland, is one of the most productive habitat zones on the planet and it promotes a diversity of wildlife species. The general infertility of the surrounding landscape in this ecodistrict magnifies the importance of this riparian habitat.

Riparian and aquatic habitat support limited populations of semi-aquatic mammal species, such as beaver and muskrat, and a few species of waterfowl, frogs, salamanders, snakes and turtles. Beaver colonies are uncommon, largely because inadequate numbers of hardwood trees occur along watercourses or wetlands.

Productivity in aquatic habitats is expected to be relatively low in the Western Barrens. Lake waters are generally acidic and infertile due to a lack of dissolved solids and staining from humic matter. As a result, solar radiation is screened, limiting primary productivity.

Soils in this ecodistrict have a low capacity for buffering acid precipitation, and acid rain is believed to be the major cause of salmon and trout declines in the rivers of southwestern Nova Scotia and elsewhere in the province. Fish surveys of lakes in the Western Barrens have shown

little diversity, with yellow perch being the most abundant species. Other species include brown bullheads, white suckers and golden shiners.

In the spring, when waters are high, brook trout are present, but they retreat to cooler sites when a decrease in water level results in rising lake water temperatures. Yellow perch are known to have a high tolerance for acidic and warm temperature conditions. Smallmouth bass have been introduced into Clamshell and West Horseshoe lakes in Shelburne County, which are on the ecodistrict boundary. Fish availability is in turn a limiting factor for populations of fish predators, such as otters, common loons and osprey.

Chain pickerel and smallmouth bass are highly invasive introduced species that are spreading throughout the ecodistrict. The illegal introduction of these species has created a major threat to native salmon and trout populations, freshwater invertebrates and amphibians through predation and competition.

Terrestrial Habitat and Wildlife

Terrestrial wildlife habitat in the Western Barrens Ecodistrict is a mix of forest cover and low to high shrub barrens. Forested areas can be generally described as predominantly mid-succession softwood and mixedwood, with a lower proportion of late succession softwood. Associated with varying stand compositions is an extensive number of wildlife species that would be expected to occur in these habitats. Edges and open areas are abundant, most commonly associated with barrens and low productivity wetlands. Like bogs, barrens have a low diversity of wildlife species, but they tend to be used by small mammals, such as snowshoe hare and bobcat.

Considerable public interest in the province is centred on habitat for white-tailed deer and snowshoe hare, common but high-profile harvested species. In general, the ecodistrict provides less than ideal habitat for white-tailed deer, as it does not have the land richness and mix of habitat types seen in other ecodistricts. The preferred habitat of shoeshoe hare of early succession hardwood and mixedwood is in short supply in the ecodistrict.

The mix of forest, wetlands and barrens supports a scattered population of the endangered mainland moose. However, rather than showing a preference for

Western Barrens supports a scattered population of the endangered mainland moose.

these habitat types, it is more likely that moose are restricted to the area by other factors, the most notable being a parasite carried by white-tailed deer which can be fatal to moose. It is believed that in areas such as this where deer numbers are relatively low, moose have a lower chance of encountering the parasite.

Species at Risk

A number of species considered to be at risk can be found in the Western Barrens, including representatives of Atlantic Coastal Plain Flora and a population of southern twayblade, a small orchid found in damp woods, that occurs south of Flintstone Rock.

Animal species at risk include mainland moose and Blanding's turtle, both of which are listed as endangered provincially and nationally.

For more detailed and more 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.

Though most of the ecodistrict is owned by the province, effective wildlife management will still rely on active, informed stewardship by 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 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

Western Barrens – Elements Defined

Ecological 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.

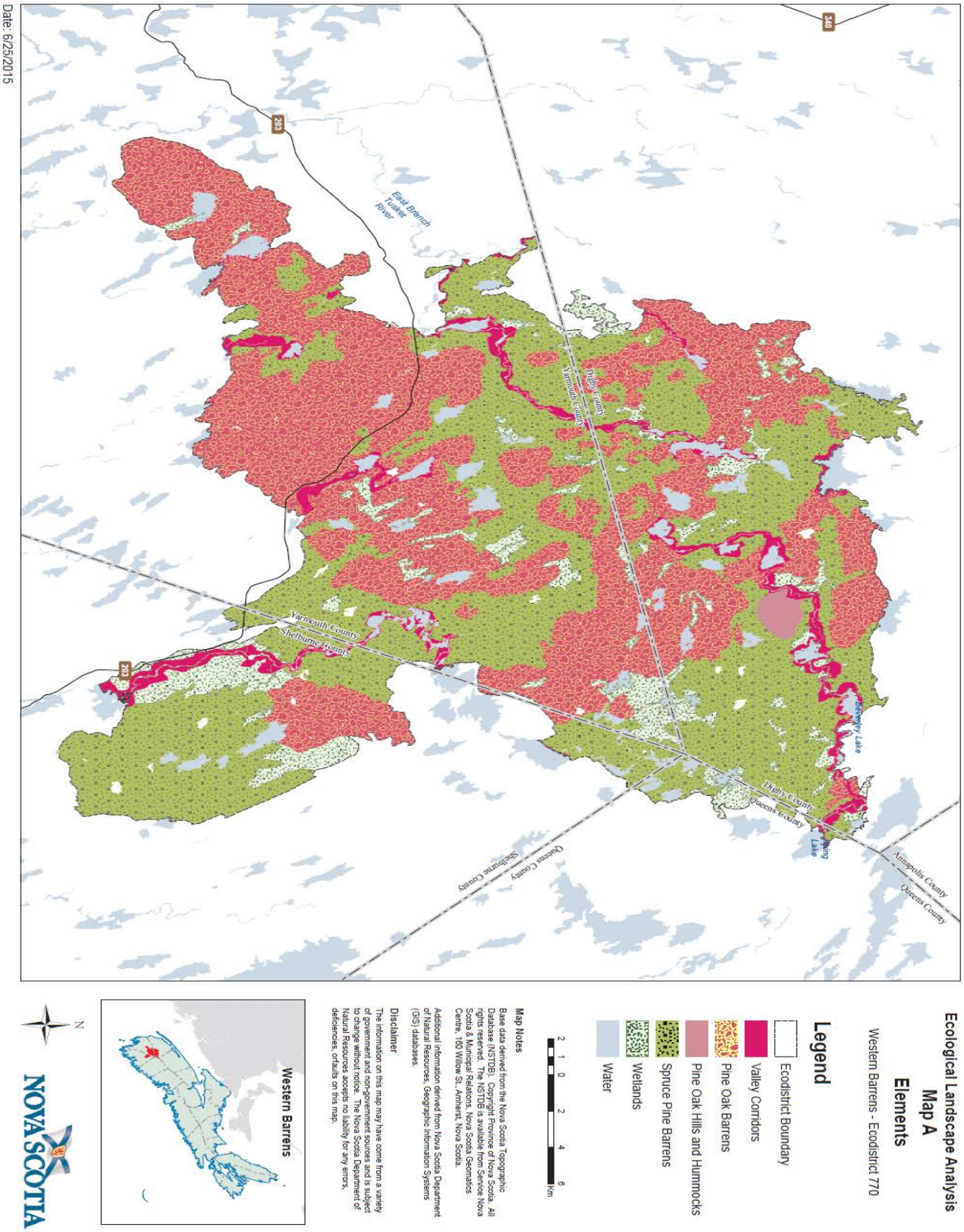
A landscape profile identified and mapped four distinctive landscape elements in the Western Barrens Ecodistrict – one matrix, and three patches (Table 5a). A matrix is the dominant community type. Patches are smaller yet still distinctive community types.

Western Barrens is a little unusual in that the matrix element, **Spruce Pine Barrens** (46%), is only a little more than 500 hectares larger than the largest patch element, **Pine Oak Barrens** (45%), which basically functions as a co-matrix. In the matrix, the climax community is black spruce-white pine. In the patch or co-matrix, the climax community is red oak-white pine-red pine.

In both cases, as reflected in the names, the barrens are thought to represent the naturally occurring climax condition on a large part of the ecodistrict.

The other two patch elements are **Wetlands**, usually bogs or fens, and the small **Pine Oak Hills and Hummocks**.

Map of Elements in Ecodistrict



Forest Stands Within Elements

Each element contains a number of stands which are forest ecosystems 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.

Elements in Western Barrens include climax communities of oaks, pines and spruce, along with barrens.

Viewed online or available in print through Department of Lands and Forestry, woodland owners can learn about the characteristics of a particular forest community. See Table 5a for descriptions of elements and Table 5b for forest stands that are likely to be found within elements, which in turn shape the landscape.

Table 5a – Elements Within Western Barrens		
Landscape Element	**Size (Hectares)**	**Element Description**
Spruce Pine Barrens (Patch)	34,446 45.6%	Moist, imperfectly to poorly-drained infertile coarse-textured soils derived from granite tills create a large patch-level ecosystem in the Western barrens. Forest communities are dominated by black spruce but wetter conditions favour red maple and tamarack. The understory is dominated by ericaceous woody shrubs including Labrador tea, rhodora, lambkill, and huckleberry with winterberry and false holly common. Regeneration to black spruce is usually vegetative by layering except where seedbeds of mineral soil can be provided through the reduction of the thick root mat by fire. On the better-drained upper slope position, white pine and mixedwoods of pine, oak, and red maple occur. Barrens and woodland forests continue to dominate this landscape although fire suppression has allowed a recovery on many sites.
Pine Oak Barrens (Matrix)	33,631 44.5%	Barrens and woodlands form a matrix-level ecosystem on dry, infertile, coarse-textured soils derived from granite tills. Often these soils are shallow to a cemented layer (hardpan) created either through geological processes or by soil chemistry features and possibly worsened by both pre- and post-settlement fires. The barrens tend to comprise ericaceous (health-like) vegetation, such as lambkill, rhodora, huckleberry, and blueberry. These species create thick root mats which restrict regeneration by black spruce. Where soils are deep (e.g. eskers and glaciofluvial deposits) forests of white pine, red oak, and red maple with black spruce are common. When soils are moist, as occurs in flow accumulation zones between barrens and hummocks, forests of the above species tend to be better developed and stands of balsam fir are possible. Fire suppression is now creating conditions that are allowing a recovery to forest conditions, although stocking is often low and growth slow.
Wetlands (Patch)	6,962 9.2%	The wetlands element is a patch-level ecosystem and is comprised of bogs, fens, swamps, and poorly-drained areas. It may occur as a large wetland complex associated with rivers and lakes, as narrow linear communities associated with flow accumulations and small streams, as a community of hydrophytic vegetation (sedges, sphagnum moss, poison ivy, false holly, and winterberry) associated with level terrain where drainage is impeded, or as a depression in the landscape where excess water remains year round. Smaller disjoint wetlands are often embedded within other elements, especially the Spruce Pine Barrens element. Wetlands are generally treeless or sparsely forested woodlands of black spruce, tamarack and red maple with the latter forming pure stands in fen-like conditions. Ribbon-like wetland forests of red maple, black spruce and tamarack are common along flow accumulations and streams leading to larger rivers. Sites are generally underlain by poorly-drained mineral soils derived from granite tills or organic soils derived from peat (sphagnum mosses) or sedges. On the higher ground, with better-drained soils, softwood and mixedwood forests of black spruce, white pine and red maple will occur. This element plays a critical role in water collection, filtering, and ground water recharge.

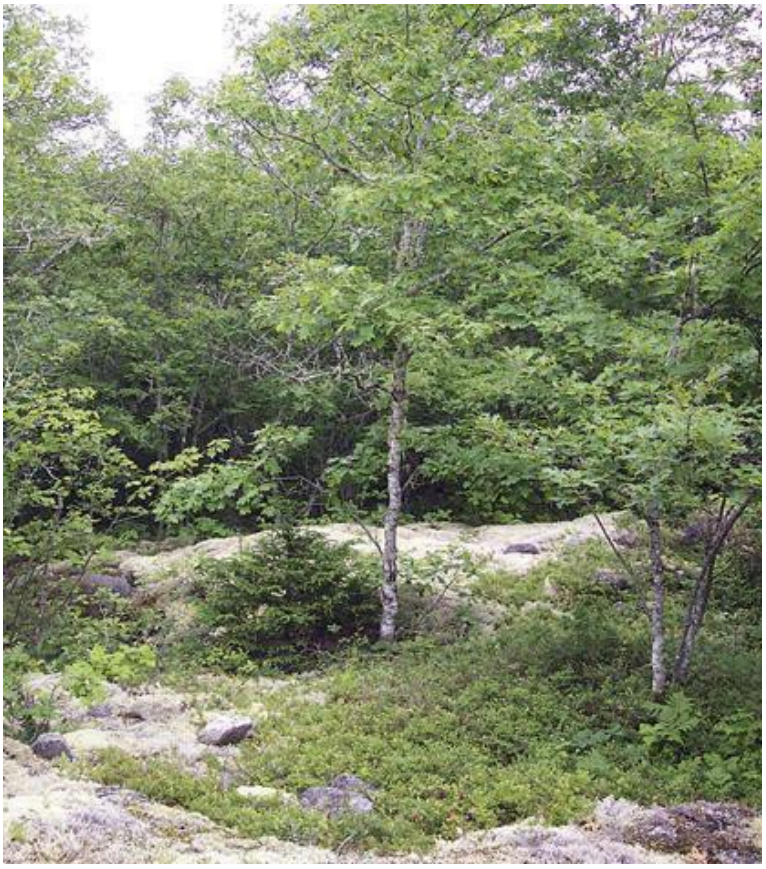
Table 5a – Landscape Elements Within Western Barrens		
Landscape Element	**Size (Hectares)**	**Element Description**
Pine Oak Hills and Hummocks (Patch)	422 0.6%	This isolated patch-level area rises above the average relief of the Western Barrens landscape near Sand Beach Lake. The soils are primarily well-drained and coarse-textured, derived from granite. The inherent soil fertility is poor and while the area is thought to have the potential to support a late successional white pine-red oak ecosystem, current forests are primarily black spruce and red maple, with a small component of white pine. Dense ericaceous vegetation is a significant component of the understory of these forests, creating both regeneration problems for tree species and a potential fire hazard. Stand level disturbances, usually fire, were historically frequent in this ecodistrict. Early successional forests may include red maple, white birch, large-tooth aspen and red oak. On lower slopes and on level terrain with progressively poorer drainage, black spruce, red maple and tamarack dominate. Forests of the above species tend to be better developed and stands of balsam fir are possible. Where soils are less fertile, shallow to bedrock, or on lands that have been impoverished by repeated wildfires, open black spruce woodlands with ericaceous vegetation and bracken fern are dominant.
Total	**75,499***	*Area is not the same as in Table 1 because water has not been included.

Table 5b – Forest Vegetation Types[1] Within Elements in Western Barrens						
Element	**Seral Stage**					
	Early	**% ***	**Middle**	**%**	**Late**	**%**
Pine Oak Barrens	OW2, OW4, OW5, IH4, MW5, SP2, SP8	0.7	IH2, IH6, MW4, SP3, SP4, SP6	30.8	SP5, **SP9**	42.7
Pine Oak Hills and Hummocks[2]	IH4, MW5, SP2, SP8	0	IH2, IH5, IH6, MW4, SH9, SP3, SP4, SP6	27.9	IH7, SP5, **SP9,** SH4	60.7
Spruce Pine Barrens[2]	IH4, OW2, OW4, SP2	0.3	IH6, SP3, SP6	22.3	**SP4, SP5**	63.4
Wetlands	FP3, WC1, WC2, WC4, WC6, WC7, WD2, WD3, WD4, WD6, SP7					

View forest groups and vegetation types at
http://novascotia.ca/natr/forestry/veg-types/veg-navigation.asp
To help with identification of vegetation types, the 14 forest groups in Nova Scotia designated by 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)
[2] Vegetation types with hemlock and red spruce may be found scattered near the boundaries of the ecodistrict.
*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.



The Red Oak / Huckleberry / Cow-wheat – Rice Grass / Reindeer lichen (OW5) vegetation type is sometimes found in the Pine Oak Barrens matrix element.

Black spruce – Red maple / Bracken – Sarsaparilla (SP6) is a mid-successional vegetation type found in the Spruce Pine Barrens patch element.

Red oak – White pine / Teaberry (SP9) is a late successional vegetation type found in the Pine Oak Hills and Hummocks patch element.

Black spruce / Cinnamon fern / Sphagnum (WC1) is a vegetation type, which can be expressed in a variety of successional stages, found in the Wetlands 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 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 older age groups of 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 dominant natural disturbance regime in Western Barrens is the frequent regime. This regime typically leads to generally even-aged forests, although there may be scattered pockets of the area that escape the disturbance. The main agent of natural disturbance in the ecodistrict is fire. Forests of white pine-red oak-red pine and black spruce-white pine are climax forests in this disturbance regime.

Open seral disturbance regimes also have a role to play in the Western Barrens, affecting both barren and wetland ecosystem vegetation communities. Some ecosystems (e.g. barrens) develop site limitations (loss of fertility, hardpan formation, and biochemical effect of ericaceous vegetation) for tree growth as a result of repeated fires. Sparse stocking and poor growth of trees may be a result. Similarly, in wetlands, factors such as soil moisture and ericaceous growth restrict forest development.

Fire in the Western Barrens

The location of Western Barrens in the interior of the province, removed from the ocean, results in comparatively hot, dry summers. The potential for lightning strikes is one of the highest in the province. As well, fires set by man have been part of the local culture dating back to the early 1800s when there were reports that burning was an annual occurrence in the Shelburne area.

Barrens, particularly in the south of the ecodistrict, were periodically burned to encourage blueberry growth. Blueberries were harvested for local consumption and for export to the United States. Burning also stimulated regrowth of plants as food for wildlife, such as moose and deer. A large deer population was reported in the area from the 1930s to 1950s. Local stories tell of being able to see for miles across the barrens during this era.

The last well-known fire in the area was the Indian Fields Fire, which burned about 4,000 hectares in 1960.

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 (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 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%

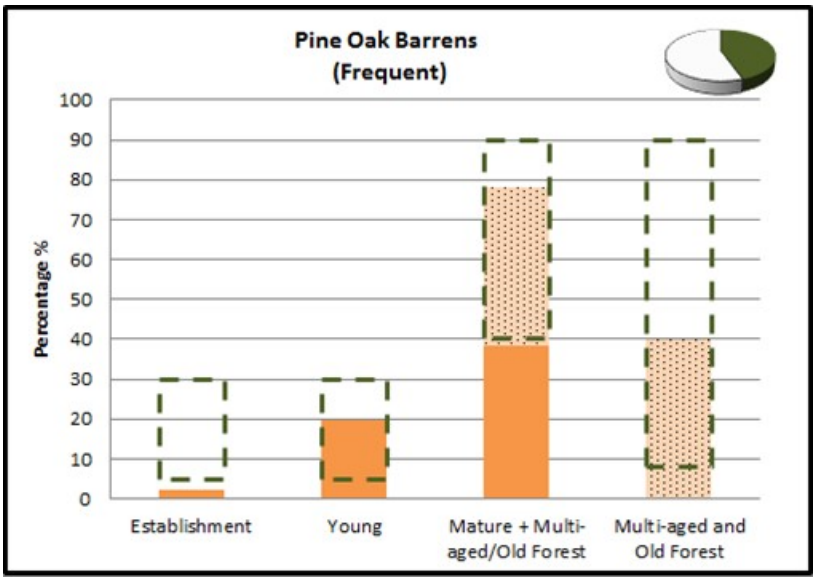
Table 6 indicates that for frequent stand-initiating disturbances, both establishment and young development class forests would typically comprise between 5 and 30% of area, while mature forest – which includes multi-aged and old forest – would cover more than 40%. Mature forest should consist of a relatively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

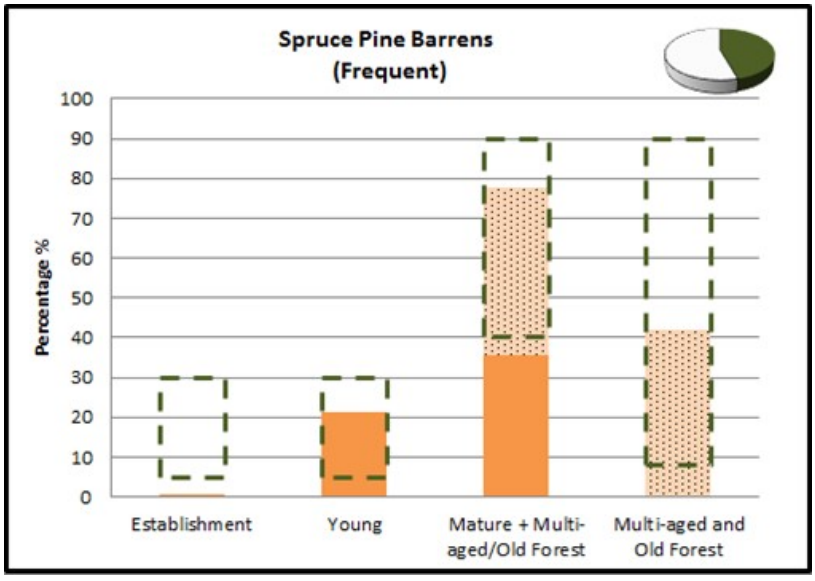
The series of charts that follow combine data on development classes for each element with desired or target percentages, based on the type of natural disturbance regime. The target percentages (from Table 6) are represented by rectangles of broken green lines. The light brown bars show the percentage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

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.

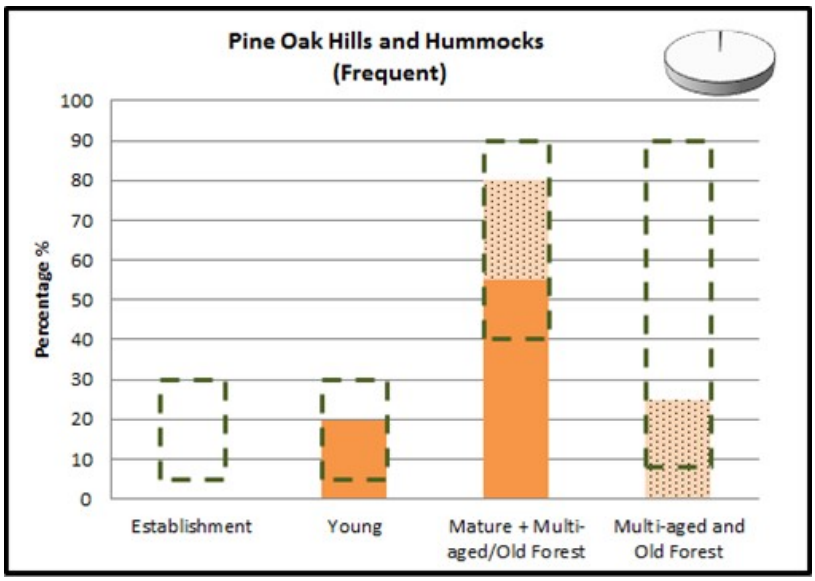
The matrix element **Pine Oak Barrens** only occurs in this ecodistrict. The low levels of establishment class suggest an absence of recent disturbance. Pine-oak is naturally long-lived and adapted to forest fires for regeneration and maintenance. Fire disturbances typically prepare seedbeds for natural regeneration and retain abundant surviving seed trees which provide mature structure in developing stands. Long periods without disturbance favour black spruce succession.



Spruce Pine Barrens is the largest patch element and only slightly smaller than the matrix. It has an almost identical pattern of development classes and this element is similarly adapted to fire disturbances, which were relatively frequent prior to this current fire suppression era.



The small **Pine Oak Hills and Hummocks** element is regionally uncommon and only occurs at one location in the ecodistrict. This limited distribution makes its composition sensitive to local level disturbance events. The current low level of establishment class suggests an absence of recent disturbance. Pine-oak is adapted to forest fires for regeneration and maintenance and may succeed to black spruce after long periods without fire.



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 ELA reports.
Ecological land classification	A classification of lands from an ecological perspective based on factors such as climate, physiography and site conditions. The Ecological Land Classification for Nova Scotia Volume 1 delineates ecosystems at five hierarchical scales: ecozone, ecoregion, ecodistrict, ecosection and ecosite.
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 typicallytaller 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 landbase designated under the Wilderness Areas Protection Act (e.g. Canso Barrens).