



Nova Scotia's

Old Forest Policy

August 2012

Report FOR 2012-4

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Nova Scotia Department of Natural Resources

Old Forest Policy 2012

1.0 Rational

This policy consolidates the Department's efforts to maintain old forests and associated biodiversity in the forested landscape. It builds upon the initiatives of the Interim Old Forest Policy of 1999. Old forests develop unique biological and social values as they evolve over long periods in the absence of major disturbance. Old growth within the Acadian Forest Region has declined significantly through several centuries of land use.

2.0 Policy Statement

The Old Forest Policy will conserve the remaining old growth forests on public land and ensure that a network of the best old forest restoration opportunities is established. This network will support, and be supported by, broader sustainable forest management initiatives that address maturity and community representation across ecological landscapes.

The policy focuses on public land and emphasizes lands currently under protection. It provides guidelines for selecting and evaluating old forests and establishes procedures within the Department's Integrated Resource Management (IRM) system to designate old forest as C2E. This designation will ensure that old forest values receive the highest priority during integrated resource management decisions affecting the identified areas.

3.0 Definitions of Forest Maturity

Climax Species

Species which typically dominate stand composition during the late stages of natural succession. These are usually the longest lived and most shade tolerant species characteristic of the climatic and site conditions within an ecosystem. On zonal Acadian Forest ecotypes they include Hemlock, Red Spruce, White Pine, Sugar Maple, Yellow Birch and American Beech; while on Maritime Boreal ecotypes and edaphically limited sites (e.g. bogs, fens, highlands, coastal) Balsam Fir, Red Maple and Black Spruce are more likely to form the climax forest. An indication of climax types can be obtained from the ecoregion mapping of the Ecological Land Classification for Nova Scotia (Neily et.al., 2003), as well as from the site based Forest Ecosystem Classification of Nova Scotia (Report DNR 2011), and Forest Ecotypes of Nova Scotia (Report DNR 2011).

Immature Climax

A forest stand where 70% or more of the basal area is in trees younger than 80 years old, at least half of the basal area is composed of climax species, and total crown closure is a minimum of 30%.

Mature Climax

A forest stand where 30% or more of the oldest basal area is in trees 80 - 125 years old, at least half of the basal area is composed of climax species, and total crown closure is a minimum of 30%.

Old Growth

A forest stand where 30% or more of the basal area is in trees 125 years or older, at least half of the basal area is composed of climax species, and total crown closure is a minimum of 30%.

Old growth forests are dynamic and represent the shifting mosaic phase of forest development, marked by mature canopy processes of gap formation and recruitment from a developed understory. Typical characteristics include a patchy, multi-layered, multi-species canopy with trees of several age classes dominated by large overstory trees, occasional dead topped stag trees and decadent wolf trees, and the presence of snags and fallen woody debris. Ideally this stage represents a long period of ecological continuity.

Old Forest

Any stand or collection of stands containing old growth and/or mature climax conditions.

Best Old Forest Restoration Opportunities

The largest, oldest, ecologically representative patches of climax-species-dominated forest on the landscape.

4.0 Policy Objectives

- Identify and conserve old growth forests and the best old forest restoration opportunities on public land.
- Establish and sustain an ecologically representative network of old forest.
- Provide social, recreational, and educational opportunities for public use of representative old forests.
- Provide direction and procedures for integrated resource management decisions involving old forest values.
- Establish a spatial database for storing and tracking old forest identified under the policy.

5.0 Application

- This policy applies to all public forest land owned by the Province of Nova Scotia, and includes an accounting of forest inventory in the federally owned National Parks of Kejimikujik, Cape Breton Highlands, and Louisbourg. Public forest land includes lands administered outside of the Department of Natural Resources, such as Wilderness Areas and Nature Reserves.
- This policy is administered by the Minister of Natural Resources under the authority of the Forests Act 1989, and Crown Lands Act 1989.

6.0 Policy Directives

6.1 Selection, designation and mapping of Old Forests

- DNR staff will identify old growth and the best old forest restoration opportunities on at least eight percent of publicly owned forest land in each of the province's 38 forested ecodistricts (Ecological Land Classification for Nova Scotia, Neily et. al., 2003), as outlined in the Policy Guidelines Section 7.0.
- Forest identified under the policy will be designated C2E class land under the Integrated Resource Management system.
- Forests identified under the policy are set aside for long term conservation with the priority on natural development of old growth forest conditions.
- The location and status of forests identified under the policy will be maintained as a spatial layer in the provincial Geographic Information System (GIS).

6.2 Data Management

Geographic Information System

- The definitive mapping and database of the old forests managed under the policy will be maintained by Forestry Division in the GIS and identified as "the old forest layer".
- Working copies of the old forest layer will be maintained by Regional Services as a component of the IRM system, and identified as C2E designated old forest lands.
- Regional Services will provide updates to the Forestry Division whenever changes to the old forest layer are finalized. Updates will consist of revised mapping including additions to the datafile identifying "change in status" and "reason for change" for all affected stands.

Old Forest Scoring

- The Old Forest Scoresheet (Appendix II) will be used to quantitatively evaluate old forest conditions and provide a basis for stand selection. It provides a structured approach to assess and rank stand characteristics. The score has three parts:
Part One identifies the stage of forest development as either old growth (1),

mature climax (2), immature climax (3) or other (4).

Part Two scores stands based on the structural attributes that typically develop as stands evolve into old growth - age, primal forest value, tree diameter, quantity of dead woody material, canopy structure, and understory development. This part of the scoring system allows comparison between stands of similar community types to help determine which has the best old forest qualities.

Part Three ranks the collective patch size of adjacent old forest stands. Stands within 100 m of each other are considered adjacent, and thus part of the same patch. All stands in a patch have the same Part Three score.

- Scoring data will be entered by the field cruiser in the “old forest scoring program” and the program’s data files will be forwarded to the Provincial Old Forest Coordinator, along with copies of the field scoresheet and increment cores when available.
- Old forest scoring data will be reviewed by the Provincial Old Forest Coordinator and appended to the old forest scoring database maintained in Forestry Division’s GIS.

6.3 Integrated Resource Management (IRM) Procedures Respecting C2E Designated Old Forest

- Proposals to conduct activities that impact old forest values, such as road and trail construction, parcel exchange, or de-designation of C2E designated old forest will be subject to an IRM Review from the full regional IRM team with participation of the provincial Old Forest Coordinator.
- Exchange or replacement of old forest will adhere to the Procedures and Guidelines for Selecting Old Forest Section 7.1, and be neutral or improve conservation of old forests and their associated ecological processes and biodiversity.
- A proposal to de-designate old forest identified under the policy must be supported by a significant Integrated Resource Management imperative, such as loss through natural disturbance, changes in the Crown or protected area landbase, or opportunities to acquire stands exhibiting better characteristics.
- An IRM Review will include an assessment report outlining the following attributes (Appendix I):
 - ecological representation using the Ecological Land Classification to summarize the distribution of old forest by ecosection within the ecodistrict;
 - summary of forest vegetation types as per the Forest Ecosystem Classification;
 - stage of development as per Part I of the Old Forest Scoresheet (Appendix II);
 - stand quality as per Part II of the Old Forest Scoresheet;
 - patch size class as per Part III of the Old Forest Scoresheet.
- The regional IRM Review will consider and recommend actions based on assessment of old forest values associated with C2E designation. Consideration of social and economic trade offs, if necessary, will occur at the next stage of the IRM review process.
- When changes occur the regional old forest layer will be updated and forwarded to the Forestry Division.
- At periodic intervals, and following large landscape scale disturbances or major

changes to the Crown landbase, a GIS based assessment of the old forest layer will be conducted to evaluate changes.

6.4 Communication

- DNR staff will identify and advertise a selection of old forest examples to support public education, recreation, social values, and research.

6.5 Provincial Old Forest Coordinator

A provincial Old Forest Coordinator will be designated from within the Renewable Resources Branch to oversee and coordinate implementation of the old forest policy, including:

- Participate on Regional IRM reviews involving C2E designated Old Forest.
- Represent DNR's interests and expertise in old forest to external agencies.
- Coordinate the promotion of old forest conservation.
- Oversee website development.
- Supervise old forest mapping, data management, and old forest scoring system.
- Coordinate research and monitoring (health, status) in support of the policy.

7.0 Policy Guidelines

7.1 Procedures and Guidelines for Selecting Old Forests

- Forests conserved under this policy should provide as full representation as possible of the climax forest types that are ecologically natural for the ecodistrict. The Ecological Land Classification for Nova Scotia includes an interpretation of potential climax forest types at the ecosection level, which provides the basis for evaluating potential climax forest representation.
- The criteria which guide decision making are; better stands have more basal area in climax species; older stands in later stages of succession are better; and larger stands, groups of stands or patches are better. These features are reflected in the old forest scoring system. Using these criteria the following steps outline the procedure for identifying the required number of hectares of old forest in each ecodistrict:

Step 1. All stands that meet the old growth criteria in part one of the Old Forest Scoresheet (Appendix II) inside protected areas on public land are included. Protected areas are national and provincial parks, wilderness areas, nature reserves and, for the purpose of this policy, also include Category A and B provincial park reserves and candidate nature reserves for which government has demonstrated a commitment to protect the long-term

- ecological integrity by legal or other suitable means.
- Step 2. If more land is required to meet the 8% goal, include stands that meet the old growth criteria in part one of the Old Forest Scoresheet on public land outside protected areas.
- Step 3. If more land is required to meet the 8% goal for an ecodistrict, include all forest land within protected areas that has a basal area of climax species \geq 50%, age \geq 40 and crown closure \geq 30%.
- Step 4. If more land is required to meet the 8% goal for an ecodistrict, add the best old forest restoration opportunities from public lands outside protected areas, considering their rank calculated from the second and third parts of the Old Forest Scoresheet (Appendix II), and contribution to ecological representivity.
- Step 5. Additional area may be added above 8% if staff feel the areas have regionally important features.
- Regional IRM teams, with guidance from the Old Forest Coordinator, will decide which areas to set aside based on their knowledge of the area and existing IRM objectives. Where ecodistricts span administrative regions, adjacent Regional Resource Managers will collaborate to meet objectives for each ecodistrict.
 - On an ongoing basis, improvement of the old forest layer by exchanging stands having better old forest characteristics is encouraged and should be evaluated following the procedures in section 6.3.
 - Selections must be large enough to be identified as a stand in the GIS. Narrow special management zones along watercourses do not have the qualities to be considered old growth or old forest stands under this policy.
 - Forests on steep slopes have different ecological characteristics than those on level ground, and both types of topography should be represented in proportion to percentages that are ecologically normal for the ecodistrict. Within this constraint, preference should be given to forests having the least value for commercial resource use, e.g. inaccessible sites.
 - Stands should be selected that will provide the best opportunities to establish large and well connected old forest systems. Clumping stands with a variety of old forest qualities i.e. mature climax and old growth stands with neighbouring immature climax stands is encouraged to create larger old forest patches with greater interior habitat and disturbance resilience.
 - Management activities in and around old forest should consider the integrity of the old forest, and should be designed to maintain old forest score and sustain interior forest conditions. For example, the use of buffers and modified harvesting for sites adjacent to old forest.
 - Ecological connectivity among the network of old forest patches should be fostered using ecosystem based landscape planning approaches, including links to wildlife corridors and special management zones, as well as provision of mature features within managed forests.

8.0 Accountability

Regional Resource Managers or their designates are responsible for selecting stands following the policy directives and guidelines, conducting IRM evaluations involving C2E designated old forests, administering data sharing requests at the regional level, and submitting updates to Forestry Division when changes to the old forest layer occur.

The Executive Director of Renewable Resources or designates are responsible for appointing an Old Forest Coordinator and ensuring that the old forest layer and scoring data are maintained within the Forestry Division Geographic Information System.

The Old Forest Coordinator is responsible for overseeing implementation of the old forest policy in consultation with Regional Services and Renewable Resources Directors or their designates. This includes participation in IRM reviews, oversight of data quality and management, coordination of data sharing requests at the provincial level, development of program initiatives, liaison with external stakeholders, promotion of old forest conservation within the province, and review of Policy.

9.0 Monitoring

The Renewable Resources Branch of the Department of Natural Resources is responsible for monitoring these procedures to ensure compliance with this policy.

10.0 References

- Nova Scotia Forest Act
- Nova Scotia Crown Lands Act
- Interim Old Forest Policy 1999
- Ecological Land Classification for Nova Scotia (Neily et.al., 2003)
- Forest Ecosystem Classification of Nova Scotia (Report DNR 2011)
- Forest Ecotypes of Nova Scotia (Report DNR 2011)
- Implementation of Nova Scotia Interim Old Forest Policy for Crown Land “A Status Report” (Stewart & Neily, 2008)

11.0 Inquiries

Old Forest Coordinator, Forestry Division (902) 893-5671

Regional Resource Managers:

Central Region Office (902) 893-6350

Eastern Region Office (902) 563-3370

Western Region Office (902) 634-7555

Appendix I

IRM Review of Proposals Impacting Old Forests

File name/number:

1. Issue description:

2. Ecological representation of affected ecosections occurring within the ecodistrict:

Stand or Feature	Ecosection	Predicted Climax Type(s)	Area of Crown in Ecosection (ha)	Area of Old Forest in Ecosection (ha)	Percent of Crown in Ecosection (%)	Percent of Crown in Climax type (%)

3. Forest Ecosystem Classification (field assessment)

Stand or Feature	Ecosite	Soil Type	Current VegType	Successional Stage	Expected climax VegType	Concerns/hazards

4. Old Forest Scoresheet (field assessment)

Stand or Feature	Part I		Part II	Part III		Comments/ Potential Impacts
	Class	Age	Score	Patch Size Class	Interior Forest (ha)	

5. Comments from field assessment, data summaries, IRM review discussion

6. Recommendations:

Potential short and long term effects on old forest values

Instructions

Mitigation measures

7. Supporting Documents (checklist):

- a. Project proposal, with map
- b. ELC map
- c. Aerial photography
- d. Old Forest Scoresheet
- e. FEC factsheet(s)
- f. Succession report from ELA - Table 1
- g. Old Forest Status Report: relevant section of Appendix II

APPENDIX II OLD FOREST SCORESHEET

PART ONE - SPECIES AND AGE CRITERIA

<p>> 30% crown closure, >50% of basal area in climax species typical of the landscape <i>and</i> > 30% of the basal area \geq 125 years old.</p>	<p>Old growth Class 1</p>
<p>> 30% crown closure, >50% of basal area in climax species typical of the landscape <i>and</i> the oldest 30% of basal area is 80 to 125 years old.</p>	<p>Mature Climax Class 2</p>
<p>> 30% crown closure, >50% of basal area in climax species typical of the landscape <i>and</i> > 70% of the basal area in trees < 80 years old.</p>	<p>Immature Climax Class 3</p>
<p><50% of basal area in climax species typical of the landscape</p>	<p>Non-Climax Class 4</p>

PART TWO - STAND COMPOSITION - Pick the highest score that applies in each category

1. Age of oldest 30% of the basal area

60 - 80 years	Score 5 _____
80 - 100 years	Score 10 _____
101 - 125 years	Score 20 _____
126 - 175 years	Score 30 _____
> 175 years	Score 40 _____

2. Primal Forest Value

Past human disturbance evident (e.g. logging)	Score 0 _____
Past human disturbance suspected to lightly evident	Score 5-15 _____
Past human disturbance unlikely	Score 20 _____

3. Diameter of Living Trees

>50 trees per hectare have a diameter \geq 40 cm.	Score 3 _____
>70 trees per hectare have a diameter \geq 40 cm.	Score 6 _____
>100 trees per hectare have a diameter \geq 40 cm.	Score 9 _____
>20 trees per hectare have a diameter \geq 50 cm.	Score 12 _____
> 5 trees per hectare have a diameter \geq 60 cm.	Score 15 _____

4. Total Boole Length of Standing and Fallen Dead Trees

400 metres per hectare with diameter \geq 20 cm	Score 3 _____
200 metres per hectare with diameter \geq 30 cm	Score 5 _____
200 metres per hectare with diameter \geq 40 cm	Score 10 _____
200 metres per hectare with diameter \geq 50 cm	Score 15 _____

5. Overstory Crown Closure

Uniform closure with little light penetration	Score 2 _____
Uniform closure with a few small canopy openings (hardwoods)	Score 5 _____
OR	
Mosaic of different densities (softwoods and mixedwoods)	Score 5 _____

6. Stand Structure

One understory	Score 2 _____
Multiple layers in the understory	Score 5 _____

PART THREE - SIZE CLASS

< 15 hectares	Size Class 0 _____
15 - 50 hectares	Size Class 1 _____
51 - 100 hectares	Size Class 2 _____
101 - 200 hectares	Size Class 3 _____
201 - 500 hectares	Size Class 4 _____
501 - 1000 hectares	Size Class 5 _____
> 1000 hectares	Size Class 6 _____

Glossary of Terms

Acadian Forest Ecotypes	The dominant class of ecotypes in Nova Scotia, supporting mesic climatic climax vegetation. Described in the Forest Ecotypes of Nova Scotia (Report DNR 2011) and typical of the interior ecoregions.
Basal Area (of a stand)	Area of the cross section at breast height of all stems in a hectare of stand (m ² /ha). A standard forestry measurement closely linked to tree stocking and crown closure.
Best Old Forest Restoration Opportunities	The largest, oldest, ecologically representative patches of climax-species-dominated forest on the landscape.
C2E Designated Old Forest	Old forest land identified under this policy and administered under the Integrated Resource Management program.
Crown Closure	The percentage of available overstory space occupied by tree crowns. Closely related to tree stocking. A photo interpreted estimate is provided in the GIS inventory, and it can be estimated in the field by comparing measured basal area to that expect in fully stocked stands.
Climax Species	Species which typically dominate stand composition during the late stages of natural succession. These are usually the longest lived and most shade tolerant species characteristic of the climatic and site conditions within an ecosystem. On zonal Acadian Forest ecotypes they include Hemlock, Red Spruce, White Pine, Sugar Maple, Yellow Birch and American Beech; while on Maritime Boreal ecotypes and edaphically limited sites (e.g. bogs, fens, highlands, coastal) Balsam Fir, Red Maple and Black Spruce are more likely to form the climax forest. An indication of climax types can be obtained from the ecosection mapping of the Ecological Land Classification for Nova Scotia (Neily et.al., 2003), as well as from the site based Forest Ecosystem Classification of Nova Scotia (Report DNR 2011), and Forest Ecotypes of Nova Scotia (Report DNR 2011).
Ecological Connectivity	Refers to the ability of ecological components and processes to move about landscapes and interact. In this policy the reference is specific to old growth areas and their associated biology. Connectivity is influenced by distance between patches and the nature of the intervening habitat.
Ecological Land Classification for Nova Scotia (Neily et. al., 2003)	Hierarchical mapping of ecosystems at 5 scales with associated interpretations:
<u>Acadian Forest Ecozone</u> (1)	Continental forest region encompassing Nova Scotia, Prince Edward Island and much of New Brunswick and Maine.
<u>Ecoregion</u> (9)	Climatically defined regions within Nova Scotia, as expressed through soils and vegetation

<u>Ecodistrict</u> (38)	Physiographically defined subdivisions of ecoregions characterized by distinctive assemblages of relief, geology, landform, soils, and vegetation. Typically used to define ecological landscapes.
<u>Ecosection</u> (1000's)	A repeating pattern of landform/topography, soils, drainage, and vegetation throughout an ecodistrict. Includes interpretation of potential climax communities and dominant disturbance processes.
<u>Ecosite</u> (10,000's)	A uniformity of parent material, soils, vegetation, and hydrology as expressed by slope, position on slope, aspect, and exposure. Not yet mapped.
Ecological Landscapes	A large land unit used for planning and assessment and defined using the ecological land classification system. Ecodistrict mapping typically provides the ecological landscapes, although ecoregions may occasionally used.
Ecologically Representative	The degree to which ecological diversity is represented. This is assessed within each ecodistrict using the ecological land classification mapping of “potential climax forest types” associated with the ecosection level of mapping.
Ecosystem	The sum of the plants, animals, environmental influences and their interactions within a particular habitat. In this policy ecosystems are defined and mapped for management purposes using the ecological land classification.
Ecosystem Based Landscape Planning	Landuse planning at a broad, ecologically defined, landscape scale using an ecosystem framework as the fundamental basis for describing and understanding the parameters being managed. The old forest policy uses the hierarchical Ecological Land Classification for Nova Scotia to provide the ecosystem framework, from which the ecodistrict scale defines the “ecological landscapes”. Typically, ecosystem based planning (EBM) seeks to manage human activities using a comprehensive and integrated approach in which a key goal is to sustain ecosystems, their structure, function, and composition, at multiple spatial and temporal scales. At it’s least, EBM acknowledges ecological connections and seeks to describe how individual and cumulative actions may affect ecosystem parameters.
Edaphic	Sites in which soil conditions override climate to produce distinctive plant communities. Factors such as water content, acidity, aeration, and nutrients limit community composition by impeding development of species typical of mesic sites.
Forest Vegetation Types	A fine scaled classification of forest communities described in the Forest Ecosystem Classification of Nova Scotia (Neily, et. al., 2011)
Geographic Information System	Computer based system used by NSDNR to store, process, and display geographic information, including a continuously updated spatial forest inventory of the province - GIS.

Immature Climax	A forest stand where 70% or more of the basal area is in trees younger than 80 years old, at least half of the basal area is composed of climax species, and total crown closure is a minimum of 30%.
Increment Core	Part of the cross section of a tree extracted by an increment borer. Used to determine tree age and growth pattern through observation of tree rings.
Integrated Resource Management	A planning and administration system used by NSDNR to integrate and balance the management of multiple resource values on crown land.
Interior forest	The area within a forest sheltered from edge effects. The old forest scoresheet used an edge effect distance of 200 meters to help define Patch Size Class 0 (<15ha) as an area incapable of supporting interior forest. In reality, interior forest is dependant on the condition being measured and the nature of the edge interface.
Maritime Boreal Ecotypes	A class of ecotypes characterized by cool moist climatic conditions supporting predominately boreal type vegetation. Described in the Forest Ecotypes of Nova Scotia (Report DNR 2011) and typically found along the Atlantic Coast and Cape Breton Highlands.
Mature Climax	A forest stand where 30% or more of the oldest basal area is in trees 80 - 125 years old, at least half of the basal area is composed of climax species, and total crown closure is a minimum of 30%.
Mesic	The average site condition for a climatic region, thereby supporting plant communities typical for the climate.
Natural Disturbance	A disruption to the forest ecosystem caused by the action of natural forces (e.g. fire, insects, wind, landslides) occurring in a discrete event of sufficient intensity to significantly change stand structure and development.
Natural Succession	The gradual supplanting of one community of plants by another, often leading to a climax condition.
Old Forest	Any stand or collection of stands containing old growth and/or mature climax conditions.
Old Forest Values	Values arising from, and dependant upon, old forest conditions.
Old Forest Scoring System	A method of measuring forests to quantitatively assess the occurrence of conditions associated with old growth development. The system consists of: 1) a scoresheet (Appendix II) for evaluation, 2) a field sampling method and tally sheet, 3) an old forest scoring program to enter and compile field data 4) and an old forest scoring database to store data entered into the scoring program.
Old Growth	A forest stand where 30% or more of the basal area is in trees 125 years or older, at least

half of the basal area is composed of climax species, and total crown closure is a minimum of 30%.

Old growth forests are dynamic and represent the shifting mosaic phase of forest development, marked by mature canopy processes of gap formation and recruitment from a developed multi-layered understory. Typical characteristics include a patchy, multi-layered, multi-species canopy with trees of several age classes dominated by large overstory trees, sometimes decadent with broken tops and other indications of old conditions; and the presence of snags and fallen woody debris. Ideally this stage represents a long period of ecological continuity.

Old Forest Layer

The definitive mapping and database of the old forests managed under this policy.

Potential Climax Forest Type

An interpretation associated with the ecosection level of the ecological land classification, and indicating the community type that typically dominates the late stage of natural succession.

Regional IRM Teams

The multi-disciplinary team of resource professionals that administers the integrated resource management planning system (IRM) within the Regional Services Branch of the Department of Natural Resources

Representative Old Forests

A selected subset of old forest designated under the old forest policy.

Stand

A community of trees possessing sufficient uniformity to be distinguishable from the forest on adjoining areas. Defined and mapped in NSDNR's forest resource inventory this forms the basic management unit for assessing old forest conditions, and selecting land for the old forest layer.