

A photograph of a forest with large, mature trees. A person wearing a red and black plaid shirt, a black vest, and a hood is standing on the left, touching the trunk of a large tree. The forest floor is covered in fallen leaves, and the trees have green and yellow foliage. The image is framed with a blue header at the top and a grey footer at the bottom.

An Old-Growth Forest Policy for Nova Scotia

Table of Contents

1.0	Introduction and Rationale	3	6.0	Old-Growth Conservation on Private Land	11
1.1	Provincial Policy Context	4	7.0	Recreational and Learning Opportunities.	11
2.0	Purpose and Objectives	5	8.0	Accountability	12
2.1	Purpose	5	9.0	Monitoring, Reporting, and Policy Renewal	13
2.2	Objectives	5	9.1	Monitoring and Reporting	13
3.0	Definition of Old-Growth Forest	6	9.2	Policy Renewal	13
4.0	Application	8	10.0	Supporting Documents	13
5.0	Implementation Directives on Crown Land	8	11.0	References	14
5.1	Protection of Old-Growth Forest Areas and Old-Growth Restoration Opportunity Areas on Crown Land	8	Appendix A	15	
5.2	Removal of Protection of Old-Growth Forest and Old-Growth Forest Restoration Opportunity Areas on Crown Land	9	Appendix B	16	
5.3	Permitted Activities on Crown Lands Protected under this Policy	10	Appendix C	16	

COVER PHOTO: Tolerant hardwood old-growth forest at Lone Shieling hiking trail in Cape Breton Highlands National Park

PHOTO: DNRR (Emily Woudstra)

Natural Resources and Renewables
Old-Growth Forest Policy



DEPUTY MINISTER APPROVAL

Approved by: Original signed by Karen Gatien

Effective date: August 15, 2022

1.0 Introduction and Rationale

Across the world, policies and programs have been developed by numerous national and sub-national jurisdictions to protect forests dominated by old trees. These actions are taken to conserve the diverse ecological and social (and sometimes economic) values that older forest ecosystems provide (see Moyer et al., 2008; Owen et al., 2009; Pesklevits et al., 2011). Such conservation efforts reflect the recognition that, once lost, old forest ecosystems cannot be easily replaced. Moreover, they continue to be under threat.

The landscape in Nova Scotia is heavily forested and Nova Scotians derive many benefits from the woods. Old-growth forest conditions were a more prevalent feature of Nova Scotia's forest landscape prior to European settlement in the 17th century. From that time to the present, forests with old-growth attributes have declined, largely due to a combination of human-caused forest fires (Loo and Ives, 2003), timber harvesting, and agricultural and urban development. Scientific research has made it clear that old-growth forests are indispensable for supporting biodiversity as well as ecosystem services and functions at multiple levels (e.g., carbon storage, waterflow amelioration, soil conservation, and many others).

Maintaining and restoring old-growth forests across the province is important for future generations. They are not only supportive of biodiversity but also diverse Mi'kmaq cultural values and practices such as teaching grounds, ceremonial sites, and medicine harvest. Embracing Netukulimk in forestry means respecting the capacities and capabilities of the heterogeneous landscapes that nurture our old-growth forests.

By way of this Policy, the Government of Nova Scotia takes a leadership role in and responsibility for protecting and restoring old-growth forests on Crown land and supporting the conservation of old-growth forests on private land. In 1999, the Government of Nova Scotia published an **"Interim Old Forest Policy"** (NSDNR, 1999) followed by an update entitled **"Nova Scotia's Old Forest Policy"** in 2012 (NSDNR, 2012). These policies aimed to "maintain old forest and associated biodiversity in the forested landscape" and committed the province to identify a minimum area of 8% that included old-growth forest and old-growth restoration opportunities on publicly owned land in each ecodistrict (see Neily et al. (2017) for descriptions

of ecodistricts). In early 2020, the 8% minimum target by ecodistrict under the 2012 Old Forest Policy was reached. The identified forest area includes both legally protected (i.e., inside protected areas) and policy-protected (i.e., on Crown land) lands where forests in both cases are set aside for long-term protection from human activities, including timber harvesting. The protocols for the identification of appropriate areas under these initial policies started with all known old-growth forest areas and old-growth restoration opportunities in legally protected areas. Additional forest areas were given policy protection on Crown land to fill gaps in the representation among the different ecodistricts to provide a diversity of future old-growth forests across the different climate and physiographic areas of the province.

Including both old-growth forest areas and old-growth restoration opportunity areas across the province, there are currently over 280,000 hectares identified in legally protected areas and just over 30,000 hectares on Crown land. This represents over 18.7% of the total area of provincial and federal forested land in Nova Scotia (i.e., 1.7 million hectares). Further, it represents 7.6% of the total forest area of Nova Scotia which is about 4.2 million hectares.

The 2012 Old Forest Policy provided the province with a scientific foundation and approach for the conservation of old-growth forest. A new policy will strengthen the Government's commitment, under an ecological forestry approach (see Lahey, 2018), to prioritize the protection of biodiversity and enhancement of old-growth forest ecosystems. It incorporates the Department's recent tools and scientific research and reconsiders definitions of old-growth forest by implementing a range of ages for specific forest groups and types. These strengthened efforts to conserve, restore, and promote old-growth forests in Nova Scotia merits the new name, **An Old-Growth Forest Policy for Nova Scotia**.

The Policy acknowledges that conservation of old-growth forest for ecological and societal values in Nova Scotia can be approached in three ways. One is through the continued protection of all old-growth forest from adverse human activities in all legally protected areas (e.g., wilderness areas, nature reserves, provincial parks, and national parks) as well as a system of policy-protected conservation forests identified on

Crown land. The system of policy-protected forest on Crown land provides opportunities to better represent diverse old-growth forest types across the province that are not adequately represented in legally protected areas. The second approach protects forest areas that have yet to develop into old-growth forest but are expected to do so with the passage of time, again in legally protected areas and through policy protection on Crown land. These forest areas are called old-growth restoration opportunities. The third approach is for Government to encourage and support the conservation and restoration of old-growth forest on private land through mechanisms such as conservation easements, education, and other means that recognize and support the efforts of private landowners. Private land accounts for 63% of Nova Scotia's forested landscape and provides important opportunities for unique and representative old-growth forests and old-growth restoration opportunities. Taken together, and given enough time, these approaches should contribute substantially to the conservation of old-growth forests, expand old-growth forest conditions, and enhance the associated biodiversity in these rare ecosystems (for examples, see Neily and Parsons, 2017).

1.1 Provincial Policy Context

This Policy was developed with recognition that it is influenced by other policies of the Government of Nova Scotia and it contributes to the achievement of yet other policies. Several such policies stand in close relation to the Old-Growth Forest Policy:

The Biodiversity Act (2021). The purpose of this Act is “to provide for the stewardship, conservation, sustainable use and governance of biodiversity in the province.” Old-growth forest is a rare forest ecosystem condition that supports a unique and ecologically important flora and fauna. As a result, implementation of the Old-Growth Forest Policy will support the attainment of some of the forest biodiversity goals outlined in the Act.

The Environmental Goals and Climate Change Reduction Act (2021). This Policy acknowledges provision 10(a) of the Environmental Goals and Climate Change Reduction Act which reads: “to conserve at least 20% of the total land and water mass of the province by 2030 as protected areas and other effective area-based conservation measures, including Indigenous Protected and Conserved Areas, in a manner consistent with national reporting criteria”. Since first passage of the Wilderness Areas Protection Act in 1998, more and

more Crown land has been incorporated into Wilderness Areas. Moreover, since that time, additional forest areas have been designated as Nature Reserves under the Special Places Protection Act. It is acknowledged that the mechanisms the province chooses for meeting the land protection goal of the Environmental Goals and Climate Change Reduction Act may well be expansions of and additions to Wilderness Areas and Nature Reserves. Those expansions and additions may include Crown-land areas now policy-protected under the Old-Growth Forest Policy.

Nova Scotia Silvicultural Guide for the Ecological Matrix.

This Policy does not deal with the development of old-growth attributes in Crown-land forest areas that are designated for the joint objectives of biodiversity conservation and timber production. That is the purview of the Nova Scotia Silvicultural Guide for the Ecological Matrix (McGrath et al., 2021). Thus, under this Policy, there is no intention of, and therefore no guidance on, using silvicultural interventions to direct forest areas to develop old-growth attributes. However, the role of silvicultural approaches that maintain and develop old-forest elements in working forests is recognized as an important aspect of supporting old-growth functions and connections among old-growth forests across the provincial land base.



Large, old trees serve as habitat for a diverse range of other species. PHOTO: DNRR (Peter Duinker)

2.0 Purpose and Objectives

2.1 Purpose

To provide for the conservation of forest biodiversity and associated ecosystem services through the protection and restoration of old-growth forests in Nova Scotia.

2.2 Objectives

1. To identify and protect all old-growth forest areas on Crown land, where old-growth forest is defined as per section 3.0.
2. To continue protection of the Crown-land forest area identified in the province's Old-Growth Forest Policy Layer, subject to provisions associated with Objective 3.
3. To provide procedures for potential additions of forest area to, and exceptional removals of forest area from, the Old-Growth Forest Policy Layer, and ensure no net loss of forest area from the Old-Growth Forest Policy Layer.
4. To identify recreational and learning opportunities associated with old-growth forests and encourage people to engage in such opportunities.
5. To foster increased conservation and restoration of old-growth forests on private lands through programs of support, education, and encouragement.
6. To work collaboratively with forest stakeholders, the Mi'kmaq, and the Nova Scotia Department of Environment and Climate Change to advance the purpose of the Policy.

Regeneration of red spruce in an old forest.

PHOTO: DNRR (Peter Duinker)



3.0 Definition of Old-Growth Forest

Old-growth forest is defined conceptually as late-successional forest ecosystems that evolve through long periods of forest development. This process involves fluctuating levels of low to moderate disturbances that allow understory trees to develop and grow into mature trees to create uneven-aged forests. Overall, old-growth forest optimally occurs when a relatively large forest area has experienced a significant period of ecological continuity (say, a period greater than the maximum longevity of the dominant tree species (Mosseler et al., (2003b) and displays interior forest character. Old-growth forests are not static; they are continually reshaped and maintained by dynamics of low-intensity forest development processes.

In Nova Scotia, there are two recognized forest regions: Acadian and Maritime boreal. The forest regions are characterized by their distinct climate, physiography, geology, and vegetation communities. Acadian old-growth forests can be characterized by attributes that include a patchy, multi-layered, multi-species canopy with trees of several age classes dominated by relatively large trees, occasional large snags, and the presence of abundant large woody material on the ground at different stages of decay. Shade-tolerant, long-lived

species of red spruce, eastern hemlock, white pine, yellow birch, sugar maple and American beech dominate forests located on climatic zonal sites, while red maple, black spruce, and red oak occupy more edaphic sites (see Mosseler et al. (2003a) for old-growth forest associations and Neily et al. (2013) for climatic and edaphic vegetation types). Maritime boreal old-growth forests can be characterized by attributes that include a patchy canopy with trees of two or more age classes, frequent snags, and the presence of abundant woody material at numerous stages of decay. Maritime boreal old-growth forest areas are dominated by late-successional, climatic species such as black spruce, balsam fir, and white spruce. These species have a naturally short longevity, typically less than 125 years, and are generally more susceptible to natural disturbances (e.g., wildfire, spruce budworm, windstorms).

For policy purposes, operational definitions are required. To address the various types of old-growth forest across the diverse forest regions and site conditions, the Policy uses the provincial forest ecosystem classification focusing on late-successional vegetation types (see Neily et al., 2013). The old-growth ages have been based on estimates of the minimum age-of-onset of old-growth attributes (see Appendix A). Because old-growth forest areas are best considered as characterized by relatively little recent human disturbance (Hunter and Schmiegelow, 2011), no forest areas that have received a silvicultural treatment since 1990 will be considered as old-growth forest areas, provided there is documentation of the treatment. An old-growth forest area, although ideally larger with interior forest, can be considered as small as 1.0 ha (the minimum mapped area in the provincial forest inventory).

An old-growth forest area is defined as an area where 20% or more of the basal area is in trees greater than or equal to the reference age for that forest type (Table 1).

Old-growth restoration opportunity areas are identified in both protected areas and on Crown land to ensure that there will be good representation of old-growth forest across all ecodistricts in the future. They are



Nova Scotia is home to diverse types of old-growth forest

PHOTO: Enviro Foto Inc.

Table 1: Old-Growth Forest Area Definitions

FEC Forest Group ^a	FEC Vegetation Types ^a	Old-Growth Minimum Tree Age ^b
Tolerant Hardwood	TH1, TH2, TH3, TH4, TH5, TH6, TH7, TH8	140
Spruce-Hemlock (red spruce dominant)	SH3, SH4, SH5, SH6, SH7	125
Spruce-Hemlock (hemlock dominant)	SH1, SH2	140
Mixedwood	MW1, MW2, MW3	125
Spruce-Pine	SP4, SP5, SP7, SP9	125
Wet Coniferous	WC1, WC2, WC5, WC8	100
Coastal (black spruce or balsam fir dominant)	CO1, CO4	100
Coastal (red spruce, white birch, or red maple dominant)	CO3, CO5, CO6	125
Highland (balsam fir or white spruce dominant)	HL1, HL2	100
Highland (yellow birch dominant)	HL3, HL4	140
Cedar ^c	CE1	100
Wet Deciduous	WD3, WD4, WD6, WD8	115
Floodplain	FP1, FP2, FP3	125
Karst	KA1, KA2	125

^a (Neily et al. 2013) Late-successional vegetation types listed

^b Minimum age- threshold based on published literature of old-forest community ages, published ages of the dominant tree species associated with the forest groups (and vegetation types) (see Appendix 9.2).

^c eastern white cedar is listed as vulnerable under the Endangered Species Act of Nova Scotia.

generally forest areas that meet the vegetation type criterion of old-growth forest areas (Table A.1) but are younger than the old-growth age-of-onset. Some Crown-land forest area within an old-growth restoration opportunity area, as identified in the Old-Growth Forest Policy Layer, may be mid- or even early successional forest but was included to create a larger protected forest area with a greater degree of interior forest conditions. Old-growth restoration opportunities areas may include some areas that have experienced recent light human activity but can still develop old-growth characteristics over time and thus have a strong chance to become old-growth forest area.

Under this Policy, old-growth restoration is deemed to be passive rather than active. Thus, no silvicultural treatments are planned in old-growth restoration

opportunity areas to try to hasten the development of old-growth characteristics in a forest area or to improve upon them. Only the passage of time and natural forest-development processes will operate to turn old-growth restoration opportunities into old-growth forest.

In legally protected areas, the identification of old-growth restoration opportunity areas, as per the inclusions in the Old-Growth Forest Policy Layer, was based on tree species in forest stands and on stand height. Stand age, unless measured during a site visit, is not reliably estimated in the provincial forest inventory, and stand height is used as a proxy. For both old-growth forest and old-growth restoration opportunities, in protected areas and on Crown land, the height criterion was a minimum of 12 metres (39 feet) for Acadian forest types and 9 metres (29.5 feet) for Boreal forest types.

4.0 Application

This Policy applies to the management of Crown land by the Department of Natural Resources and Renewables. It is administered by the Minister of Natural Resources and Renewables under the authority of the Crown Lands Act of 1989. Under the Crown Lands Act, Crown lands are all or any part of the land under the administration and control of the Minister of Natural Resources and Renewables. Under Section 24 (Special Areas) of the Crown Lands Act, “The Minister may set aside special areas on Crown lands for... (e) the protection, management, and conservation of wildlife and wildlife habitats; (f) such purposes as the Minister deems expedient”. The Old-Growth Forest Policy thus represents an instrument of implementation of Section 24. One implication of this legal authorization is that penalties for any party failing to abide by the protection provisions of the Policy are governed by the penalties provided for within the Crown Lands Act.

The Old-Growth Forest Policy contains both accounting provisions and protection provisions. The accounting provisions apply to all forested land in Nova Scotia held by Her Majesty in right of both the province and the Government of Canada including (a) Crown land, (b) forested lands administered by the Minister of Environment and Climate Change under the Wilderness

Areas Protection Act (wilderness areas) and the Special Places Protection Act (nature reserves), and (c) federal forested lands at the Kejimikujik and Cape Breton Highlands National Parks and the Fortress of Louisburg National Historic Site. Lands in categories (b) and (c) have their own legal provisions for protection under the authority of their respective jurisdictions, as do provincial parks under the Provincial Parks Act. The Old-Growth Forest Policy’s protection provisions apply to all other Crown land in Nova Scotia.

Federal lands outside the jurisdiction of Parks Canada (e.g., lands managed by the Department of Defence), privately owned lands, and municipal lands in Nova Scotia are not included in either the accounting or protection provisions of the Old-Growth Forest Policy. However, the Policy (see section 6.0) contains programming provisions for the Department to explore the potential roles of municipal and private land in supporting the conservation of old-growth forests in Nova Scotia. Should circumstances be such that municipal and private land supporting old-growth forest are or become effectively conserved in some way (e.g., conservation easement), then such lands may be accounted for in the Old-Growth Forest Policy Layer at the discretion of the landowner.

5.0 Implementation Directives on Crown Land

5.1 Protection of Old-Growth Forest Areas and Old-Growth Restoration Opportunity Areas on Crown Land

Regional Resource Managers, in consultation with the IRM Team and the Old-Growth Forest Coordinator, will seek approval of the Executive Director of Forestry and Wildlife for addition of old-growth forest areas and old-growth restoration opportunity areas to the Old-Growth Forest Policy Layer.

Under this Policy, except subject to the provisions of Section 5.2 below, all Crown land identified in the Old-Growth Forest Policy Layer will remain protected. This

applies to both old-growth forest areas and old-growth restoration opportunity areas. Moreover, all Crown land that meets the definition of old-growth forest (Section 3.0) but is not yet identified in the Old-Growth Forest Policy Layer is also protected under this Policy. This latter protection is conferred through the Department’s processes for permitting industrial, infrastructural, and commercial activities, including timber harvests, on Crown land. If the land in question is deemed to meet the definition of old-growth forest, approval to proceed with the proposed activity will not be granted.

Because old-growth forest areas are rare on Crown land, the Policy acknowledges the importance of recruiting

younger forest areas of appropriate vegetation types into old-growth forest. Considerations for adding old-growth restoration opportunity areas to the Old-Growth Forest Policy Layer, above and beyond areas already identified in the Layer, include representational issues in the ecodistrict, shortfalls of Crown land in the Layer due to application of the revised definition of old-growth forest, and Crown-land forest areas of special significance due to biodiversity, cultural, educational, and Mi'kmaq values. Recent human disturbance in otherwise favourable Crown lands for designation as old-growth restoration opportunities will not be used to reject such lands from designation.

5.2 Removal of Protection of Old-Growth Forest and Old-Growth Forest Restoration Opportunity Areas on Crown Land

5.2.1 Old-Growth Forest Areas

Under rare and exceptional circumstances, old-growth forest area that is protected under this Policy may be removed from such protection only if the Minister has declared the removal to be in the provincial public interest, either on account of a development project of necessary public function or a large natural disturbance has killed most or all of the trees. Prior to making a final decision, the Department will provide a 30-day period for written input from the public and stakeholders. Formal consultation with the Mi'kmaq will also be conducted.

In the case of a development project of necessary public function, the proponent must undertake a detailed assessment of the old-growth forest area and a description of the representation and ecological integrity of the old-growth forest in the ecodistrict, and then privately acquire, at its own expense, old-growth forest area elsewhere in the province. The proponent must then donate it to the Crown at an area rate of at least five times the removed old-growth forest area if the acquired land has old-growth attributes, as deemed by the Old-Growth Forest Coordinator, of comparable or better ecological quality than that removed, or up to ten times the removed area if the acquired land has old-growth attributes of lesser ecological quality. The Old-Growth Forest Coordinator will also consider representation, connectivity, and ecological integrity (e.g., interior forest habitat) in determining whether

the proposed replacement lands are acceptable. The Minister or designate has final authority on approval of such a land acquisition by the Crown for the purposes of old-growth forest conservation.

Under circumstances where a large natural disturbance has killed most or all of the trees in an old-growth forest area (regardless whether the agent of disturbance is considered natural in Nova Scotia (e.g., windthrow) or unnatural (e.g., hemlock woolly adelgid), the Minister may determine that removal of the old-growth forest area from policy protection is in the provincial public interest (e.g., to take action to reduce the risk of property-damaging wildfire or reduce the spread of invasive species). If the Minister chooses to remove policy protection of the area disturbed, the Regional Resource Manager, in consultation with the IRM Team and the Old-Growth Forest Coordinator, will search for and put under policy protection appropriate old-growth restoration opportunity areas, in the same ecodistrict, on Crown land at an area rate of at least one hectare for each hectare removed from policy protection.

5.2.2 Old-Growth Restoration Opportunity Areas

There are three circumstances under which Crown-land areas in the Old-Growth Forest Policy Layer that are designated as old-growth restoration opportunity areas may be removed by the Executive Director of Forestry and Wildlife from the Layer and thus from policy protection:

- (a) the Government has approved a development project on such lands and therefore the areas can no longer serve as old-growth restoration opportunities;
- (b) a significant natural disturbance has killed most or all of the trees; or
- (c) a forest plantation of tree species not identified as leading species in the forest vegetation types used to define old-growth forest in Section 3.0 (e.g., red pine or Norway spruce) was included in the initial selections of old-growth restoration opportunities in the Old-Growth Forest Policy Layer.

If any of these circumstances prevails, the Regional Resource Manager and the IRM Team, in consultation with the Old-Growth Forest Coordinator, will search and seek protection for suitable replacement areas within the same ecodistrict at an area rate equal to or

greater than the area where protection was removed. The Regional Resource Manager will consider representation, connectivity, and ecological integrity (e.g., interior forest habitat) in determining whether the proposed replacement lands are acceptable.

5.3 Permitted Activities on Crown Lands Protected under this Policy

Recreational and learning activities such as hunting, fishing, hiking, or wilderness camping have a relatively small footprint in forest ecosystems so their occurrence in old-growth forest areas and old-growth restoration opportunity areas are generally not restricted under this Policy.

Except for Crown lands subject to Section 5.2, commercial, industrial, and infrastructure-building activities (e.g., timber harvests, new road building, powerline construction, mine construction) are not permitted in old-growth forest areas or old-growth forest restoration areas.

Continued use of existing infrastructure (e.g., grading, brushing, or widening of roads or powerlines) or their planned closure may be approved after a review by the Regional IRM Team (i.e., biologists, foresters, other professionals) and the Old-Growth Forest Coordinator in old-growth forest areas or old-growth restoration opportunity areas.

When activities are proposed to take place near identified old-growth forest areas, a Regional IRM Team, together with the Old-Growth Forest Coordinator, will apply professional judgement and knowledge of local ecological circumstances to assess the expected consequences of the proposed activity on the Crown-land ecosystems in question. The nearer an activity is proposed to take place to an old-growth forest area, particularly within 100 metres of its edge, the greater the level of scrutiny given by the IRM Team to potential significant adverse effects on the old-growth forest area. The IRM Team will ensure that recommendations for approvals of activities near old-growth forest areas are consistent with sustaining their ecological integrity.



Old red maple swamp near Cloud Lake

PHOTO: DNRR (John Brazner)

6.0 Old-Growth Conservation on Private Land

Private ownership of forest land in Nova Scotia, at about 63% of the total, far exceeds the amount of public forest land held by the Crown. The Department recognizes that old-growth forests on private land in Nova Scotia provide important social, ecological, and economic values to the province beyond those provided by old-growth forest areas on Crown lands. In addition, private land may contain ecological values not available on Crown lands. Private landowners can contribute to old-growth forest conservation by voluntarily conserving the portions of their forest property that meet the definition of old-growth forest (Section 3.0) in Nova Scotia.

To further the conservation of private old-growth forest in Nova Scotia, the Department will:

- (a) work with private landowners to explore mechanisms of support and encouragement for the conservation of old-growth forest on private land;
- (b) work collaboratively with land trusts to increase the area of legally protected old-growth forest and old-forest restoration opportunities;
- (c) include old-growth forest as a priority criterion in its private-land purchase and conservation-easement programs;
- (d) provide informative documentation and offer field-based workshops where landowners can learn to recognize old-growth forest and support its conservation and restoration, and provide information on funding programs and legislation that encourage landowners to participate;
- (e) in reporting on old-growth forest area by ecodistrict across the province, account for old-growth forest areas on private land that are under recognized forest conservation programs, but only with the landowner's permission;
- (f) share data (e.g., LiDAR data, predictive tools, and assessment data) with all organizations to support old-growth forest conservation;
- (g) develop a framework and criteria for accounting for effective conservation and stewardship of old-growth forest areas on private land.

7.0 Recreational and Learning Opportunities

Many Nova Scotians have a deep connection to old-growth forests. Thus, it is important for the Department to develop broad and inclusive recreational and learning opportunities to build appreciation and awareness of the many benefits these ecosystems provide.

The Department, in consultation with the Department of Education and Early Childhood Development, will develop educational resources about old-growth forests that are linked to various curricula, and engage in training of teachers to enable them to lead activities about Nova Scotia's old-growth forests. Resources and training will include materials for teaching

both indoors and outdoors. Resources will include interpretations based on *Netukulimk* and *Two-Eyed Seeing (Etuaptmumk)*.

The Old-Growth Forest Coordinator will identify specific, readily accessible areas of old-growth forest across Nova Scotia and develop descriptive materials and interactive online tools (e.g., story maps, printable posters, stewardship guides) for use by members of the public who might wish to visit such areas for recreational and learning opportunities.

8.0 Accountability

The **Minister of Natural Resources and Renewables** (or designate) is responsible for:

- (a) approval decisions for all removals of old-growth forest areas from the Old-Growth Forest Policy Layer;
- (b) initiating the review of this Policy.

The **Executive Director of Forestry and Wildlife** (or designate) is responsible for:

- (a) appointing an Old-Growth Forest Coordinator within the Forestry and Wildlife Branch and ensuring that the Coordinator's duties are properly discharged;
- (b) ensuring that the Old-Growth Forest Policy Layer and old-growth assessment data are maintained and up-to-date and available to the public;
- (c) monitoring the achievement of the objectives outlined in Section 2.2 and compliance with the provisions of this Policy;
- (d) approval decisions for all additions and removals of old-growth forest restoration areas to Old-Growth Forest Policy Layer.

The **Director of Wildlife Division:**

- (a) In consultation with the Old-Growth Forest Coordinator, the Director of Wildlife Division is responsible for ensuring that potential impacts of proposed developments on old-growth forest areas for projects subject to Environmental Assessment, are considered within the EA registration and approval process.

The **Regional Resource Managers** (or designates) are responsible for:

- (a) ensuring that the review process undertaken in the issuance of authorities for activities on Crown lands (e.g., land disposals, easements, letters of authority, etc.) occurring in old-growth forest areas and old-growth restoration opportunity areas, or near old-growth forest areas includes an evaluation and recommendations to avoid, mitigate and/or compensate for impacts on old-growth forest values and ecological integrity;
- (b) ensuring that field assessments of forest areas that are potentially old growth but not yet identified as such in the Old-Growth Forest Policy Layer are completed by qualified individuals trained by the Old-Growth Forest Coordinator or designate;

- (c) initiating reviews of any proposed changes to the Old-Growth Forest Policy Layer with regional **Integrated Resource Management (IRM)** teams and the Old-Growth Forest Coordinator; and submitting findings and recommendations to the Minister (or designate) for removals of old-growth **forest areas**, or to the Executive Director of Forestry and Wildlife for additions or removal of old-growth forest **restoration areas**;
- (d) monitoring the occurrence of breaches of this Policy in relation to human activities taking place without appropriate authorization as per government regulations, in forest areas identified in the Old-Growth Forest Policy Layer on Crown lands.

The **Old-Growth Forest Coordinator** is responsible for:

- (a) overseeing the implementation of this Policy in consultation with Regional Services and Renewable Resources staff;
- (b) participating in IRM reviews with Regional Services staff;
- (c) overseeing information management (including the Old-Growth Forest Policy Layer) related to this Policy;
- (d) coordinating research and monitoring (e.g., forest attributes, conservation status) in support of this Policy;
- (e) acting as the departmental liaison with Nova Scotia Environment and Climate Change as well as other non-departmental stakeholders;
- (f) developing standardized procedures and training for evaluating and assessing old-growth forest areas;
- (g) ensuring that old-growth forest field assessment of forest areas covered under this Policy are completed by qualified and certified individual trained under the provisions of this Policy;
- (h) developing and promoting communications products for the public on the status of old-growth forest conservation in the province and the learning and recreational opportunities associated with old-growth forest;
- (i) promoting the conservation of old-growth forest within the province, including initiating and leading discussions with the private-land sector;
- (j) periodically reviewing progress in implementing this Policy and reporting the results to the Executive Director of Forestry and Wildlife.

9.0 Monitoring, Reporting, and Policy Renewal

9.1 Monitoring and Reporting

The Old-Growth Forest Coordinator will prepare a biennial report on implementation of this Policy. The report will be harmonized with the Department's program for state-of-the-forest reporting and made publicly available. In support of the reporting, monitoring programs and protocols will be developed, with stakeholder consultation, to detect levels of

compliance with the Policy as well as the evolving condition of old-growth forest areas identified in the Old-Growth Forest Policy Layer.

9.2 Policy Renewal

This Policy will be reviewed, revised if necessary, with public consultation, and reissued no later than five years from the month and year of the Policy's effective date.

10.0 Supporting Documents

The following documents will be developed/revised by the Department within one year of the approval of this Policy: old-growth forest assessment protocol; old-growth assessment PTA protocol; monitoring programs and protocols; and a list of mechanisms available to private-land owners to support old-growth forest conservation.



Ground-level view straight up into an old-growth canopy

PHOTO: DNRR (Peter Duinker)

11.0 References

Burns, RM., Honkala, BH (Tech. Coords.). 1990. Silvics of North America, Volume 1, Conifers.

Volume 2, Hardwoods. USDA Forest Service, Washington DC. Agriculture Handbook 654. Volume 1, 675 pp.; Volume 2, 877 pp. www.srs.fs.usda.gov/pubs/misc/ag_654/table_of_contents.htm

Cogbill, CV. 1996. Black growth and fiddlebutts: the nature of old-growth red spruce. In Eastern old-growth forests: prospects for rediscovery and recovery. Edited by M.B. Davis. Island Press, Washington, D.C. pp. 113–125.

Hunter, ML Jr., Shmiegelow, F. 2011. Wildlife, Forests and Forestry: Principles of Managing Forests for Biological Diversity, 2nd Edition. Pearson, New York, NY.

Lahey, W. 2018. An Independent Review of Forest Practices in Nova Scotia. Report to NS Department of Lands and Forestry, Halifax, NS. 70 pp.

Lahey, W. 2021. Independent Evaluation of Implementation of the Forest Practices Report for Nova Scotia. Report to NS Department of Natural Resources and Renewables, Halifax, NS. 73 pp.

Loehle, C. 1987. Tree life history strategies: the role of defenses. Canadian Journal of Forest Research 18:209-222.

Loo, J., Ives, N. 2003. The Acadian forest: historical condition and human impacts. The Forestry Chronicle 79(3):462-474.

McGrath, TM., Pulsifer, R., Seymour, L., Doucette, G., Forbes, R., McIntyre, R., Milton, L., Cogan, M., Retallack, and Crewe, T. 2021. Nova Scotia Silvicultural Guide for the Ecological Matrix. Department of Lands and Forestry, Halifax, NS.



A tall, conifer-dominated old forest.

PHOTO: DNR (Peter Duinker)

Minnesota DNR. 1989. Old Growth Forests in Minnesota: A Preliminary Report. Biological Report 5. Department of Natural Resources, St. Paul, MN.

Minnesota DNR. 2021. Characteristics of Old Growth. www.dnr.state.mn.us/forest_types/oldgrowth/characteristics.html Retrieved January 11, 2021

Mosseler, A., Lynds, JA., and Major, JE. 2003a. Old-growth forest of the Acadian Forest Region Environmental reviews (Suppl. 1): S47–S77.

Mosseler, A., Thompson I., Pendrel, BA. 2003b. Overview of old-growth forests in Canada from a science perspective. Environmental Reviews 11:S1–S7.

Moyer, JM., Owen, RJ., Duinker, PN. 2008. Forest values: a framework for old-growth forest with implications for other forest conditions. The Open Forest Science Journal 1:27-36.

National Council for Air and Stream Improvement, Inc. (NCASI). 2005. *Defining old-growth in Canada and identifying wildlife habitat in old-growth boreal forest stands*. Technical Bulletin No. 909. Research Triangle Park, N.C.: National Council for Air and Stream Improvement, Inc.

Neily, P., Basquill, S., Quigley, E., Stewart, B., Keys, K. 2013. Forest Ecosystem Classification for Nova Scotia (2010). Part I: Vegetation Types, Part II: Soil Types, Part III: Ecosites. NS Department of Natural Resources, Renewable Resources Branch, Halifax, NS. Report FOR 2013-1. 452 pp. novascotia.ca/natr/forestry/veg-types/

Neily, P., Parsons, G. 2017. A Field Guide to Forest Biodiversity Stewardship. Report FOR 2017-1. NS Department of Natural Resources, Halifax, NS.

Neily, P., Basquill, S., Quigley, E., Keys, K. 2017. Ecological Land Classification for Nova Scotia. Report FOR 2017-13. NS Department of Natural Resources, Halifax, NS.

NSDNR. 1999. Interim Old Forest Policy. NS Department of Natural Resources, Halifax, NS.

NSDNR. 2012. Nova Scotia's Old Forest Policy. Report FOR 2012-4, NS Department of Natural Resources, Halifax, NS.

Owen, RJ., Duinker, PN., Beckley, TM. 2009. Capturing old-growth values for use in forest decision-making. Environmental Management 43:237-248.

Pesklevits, A., PN. Duinker, and PG. Bush. 2011. Old-growth forests: Anatomy of a wicked problem. Forests 2 343-356.

Uhlig, P., Harris, A., Craig, G., Bowling, C., Chambers, B., Naylor, B., Beemer, G. 2001. Old Growth Forest Definitions for Ontario. Ontario Ministry of Natural Resources, Toronto, ON. 53 pp.

Glossary of Terms

Age-of-onset — A stand-level estimate of the minimum age-of-onset for species/ecosite combinations to enter an old-growth condition (Uhlir et al., 2001). Tree age is measured by counting annual rings on stem cores taken at breast height (1.3 m).

Basal Area — “1. of a tree — The area in square metres of the cross section at breast height of the stem. 2. of a forest, stand, or forest type — The area in square metres per hectare of the cross section at breast height of all trees.” (Natural Resources Canada, 2020).

Ecological Continuity — The length of time during which forest ecosystems have experienced a relatively continuous set of ecological processes. Long and uninterrupted development in the absence of catastrophic disturbance fosters structural and species complexity, often marked by the presence of deep layers of humus or peat in the soil and a unique community of lichens and fungi that are sensitive to disturbance and require specialized microhabitats. Measures of ecological continuity are included in the forest assessment protocol.

Forest Stand — A community of trees possessing sufficient uniformity in composition, age, arrangement, or condition to be distinguishable from the forest or other vegetation on adjacent areas, thus forming a silvicultural or management entity. Stands are defined and mapped in the Department's forest inventory database.

Integrated Resource Management (IRM) — A planning and administration system used by the Department of Natural Resources and Renewables to integrate and balance the management of multiple resource values on Crown land.

Interior Forest — Forest area greater than 100 m from the forest edge. Many forest stands are too small to support species with large breeding territories such as birds like northern goshawks and blackburnian warblers. In addition, smaller forest areas with less interior do not provide the same environmental conditions as larger forest areas, such as higher humidity and complex vegetative structure. Moreover, small forest areas are more vulnerable to stand-initiating disturbances. Less structurally diverse and highly fragmented forests do not support the same diversity of plant and animal species that older forests with large interiors support.

Legally Protected Area — A clearly defined geographical space under long-term protection from all development and resource management through legal means (e.g., Blue Mountain Birch Cove Wilderness Area or Old Annapolis Road Nature Reserve)

Minister — Minister of Natural Resources and Renewables.

Natural Disturbance — a discrete event of sufficient intensity to significantly change forest structure and development and caused by nonhuman forces (e.g., fire, insects, wind, landslides).

Necessary Public Function — A service, utility, role, or capacity deemed essential to Nova Scotians. Such functions involve projects that provide public service on a provincial scale. They include public transportation projects, public infrastructure, linear pipeline or transportation corridors or electrical supply infrastructure, projects necessary for public safety and the protection of adjacent properties and infrastructure and land transactions authorized through an Order of Executive Council (Nova Scotia Wetland Conservation Policy, 2011 (rev. 2019)).

Netukulimk — A Mi'kmaq cultural concept that embraces Mi'kmaq sovereign laws and guides the collective behaviours and beliefs in resource management to ensure sustainability and prosperity for the ancestor, present, and future generations.

Old-Growth Conditions — The ecological state of a mid- to late-successional forest ecosystem which is expressing quality attributes of old growth. Such attributes include dominant tree species and their contribution to stand composition, structural diversity, coarse woody material, absence of signs of relatively recent human disturbance, and tree age.

Policy Protection — Long-term conservation of old-growth forest areas and old-growth restoration opportunity area and their associated functions, services, and values identified under the Policy.

Relatively Little Recent Human Disturbance — Forest stands with little or no recent human disturbance can be considered for classification as old-growth forest. Human disturbance includes forest management activities that have taken place since 1990.

Representation — The degree to which the range of natural ecosystem diversity is sustained in a naturally functioning, unmanaged state. The concept was originally introduced as a strategic component of protected areas planning where the aim was to secure the range of ecosystem diversity within protected ecosystems. The overall goal is biodiversity conservation through protection of natural habitat diversity. It is employed as a coarse-scale ecosystem planning concept. Representation in this Policy is primarily assessed based on the amount of forest area in the Old-Growth Forest Policy Layer compared to Crown-land forest cover for old-growth vegetation types and Nova Scotia's Ecological Land Classification.

Snag — A standing dead tree, often missing a top and most of the smaller branches. Snags serve as habitat for many wildlife species.

Vegetation Types — Recurring and identifiable forest plant communities that reflect differences in site conditions and disturbance regimes as detailed in the Forest Ecosystem Classification Guide (Neily et al., 2013).

The Old-Growth Forest Policy Layer

The Old-Growth Forest Policy Layer is a geospatial database created and managed by the Forestry Division of the Department. It delineates all the forest areas on publicly owned land within the province (see Section 3.1) that were accounted for as old-growth forest areas and old-growth restoration opportunities. The primary source of information used to identify the areas accounted for under the 2012 Old Forest Policy was the province's forest inventory database. Additional data such as field surveys have been used, where possible, to identify specific additional areas to add to the Old-Growth Forest Policy Layer and to improve the quality of information on specific areas already identified

using the forest inventory database. The Old-Growth Forest Policy Layer is managed as a geospatial database independent of the forest inventory database. This acknowledges that the boundaries of old-growth forest areas and old-growth restoration opportunities may not align perfectly with the stand boundaries of the forest inventory database on account of additional data collected in the field as well as re-interpretations of stand boundaries as the forest inventory database is updated.

Old-Growth Forest Reference Ages

Old-growth forest age is assigned for each forest group (and associated FEC vegetation types) based on an estimate of the minimum age-of-onset of old-growth conditions for Nova Scotia. Cogbill (1996) and Mosseler et al. (2003b) suggested that forest areas with average ages of about half that of the maximum longevity of the dominant tree species can be considered old-growth forests. To determine the minimum such age-of-onset,

the Department considered published literature (e.g., Mosseler et al. 2003a; Villeneuve and Brisson 2003; NCASI 2005), other jurisdictions' old-growth policies and minimum forest ages (Table C.1), published ages of the dominant tree species for Nova Scotia's late -successional forest types, their associated 50% maximum longevity, and known tree ages in Nova Scotia (Table C.2).

Abundant large deadwood is a key component of old-growth forest. PHOTO: DNRR (Peter Duinker)



Table C.1 Old-Growth Forest Community Comparisons from Other Jurisdictions

Nova Scotia FEC Forest Group	Nova Scotia FEC Vegetation Types	Nova Scotia Old Growth Age-of-Onset (years)	ON ^a General Species Association	ON ^a Old Growth Age-of-Onset (years)	Minnesota ^b Old-Growth Forest Types	Minnesota ^b Old Growth Age-of-Onset (years)
Tolerant Hardwood	TH1, TH2, TH3, TH4, TH5, TH6, TH7, TH8	140	Hard Maple Yellow Birch Red Oak	120-140 150-160 110-120	Northern Hardwood Forests	120
Spruce-Hemlock	SH3, SH4, SH5, SH6, SH7	125	White Spruce	110-130	White Spruce Forests	90
Spruce-Hemlock	SH1, SH2	140	Hemlock	140-180	n/a	
Mixedwood	MW1, MW2, MW3	125	Yellow Birch Soft Maple Hemlock	150-160 80-120 140-180	Oak Forests	120
Spruce-Pine	SP4, SP5, SP7, SP9	125	White Pine Black Spruce	130-150 90-150	Red and White Pine Forests ^c	
Cedar	CE1	100	White Cedar	100-150	Upland White Cedar Forests	120
Wet Coniferous	WC1, WC2, WC5, WC8	100	Black Spruce	90-150	n/a	
Coastal	CO1, CO4	100	Black Spruce Balsam Fir	90-150 70-80	n/a	
Coastal	CO3, CO5, CO6	125	White Birch Soft Maple	90-110 80-120	n/a	
Highland	HL1, HL2	100	n/a		n/a	
Highland	HL3, HL4	140	Yellow Birch	150-160	n/a	
Wet Deciduous	WD3, WD4, WD6, WD8	115	Soft Maple	80-120	Lowland Hardwood Forests	120
Floodplain	FP1, FP2, FP3	125	Hard Maple Soft Maple Red Oak	120-140 80-120 110-120	Lowland Hardwood Forests	120
Karst	KA1, KA2	125	Hemlock	140-180	n/a	

a – Uhlig et al. (2001)

b – Minnesota DNR (2021)

c – Minnesota DNR (1989)

Table C.2 Maximum longevity for dominant tree species associated with the forest groups (and vegetation types) included in Nova Scotia's old-growth forest definition

Tree Species	Literature Max age ^{ab}	Literature Max age – 50%	L&F database Max age ^{cde}
Eastern Hemlock	800	400	520
Red Spruce	400	200	335
White Pine	450	225	288
Black Spruce	250	125	277
Black Spruce Coastal	250	125	150
Balsam Fir	200	100	160
Sugar Maple	400	200	276
Yellow Birch	366	183	370
Red Oak	400	200	205
Red Maple	300	150	188

a – Burns and Honkala (1990).

b – Loehle (1987).

c – Natural Resources and Renewables Permanent Sample Plot Database

d – Natural Resources and Renewables Forest Ecosystem Classification Plot Database

e – Natural Resources and Renewables Old-Forest Research Plot Database