

Forests

The Roots of Sustainable Prosperity in Nova Scotia

A PANEL OF EXPERTISE REPORT ON FORESTS TO THE STEERING PANEL
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FORESTS PANEL OF EXPERTISE

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EXECUTIVE SUMMARY

The history and culture of Nova Scotia have long been closely linked to the forests and forest industry. A wide range of input during the Phase I citizen engagement and the Phase II technical expertise/stakeholder engagement processes confirmed that forests provide multiple values and are extremely important to many Nova Scotians. Nova Scotians agree that they want healthy forests and a healthy forest industry, and that change is needed.

In order to achieve this, we need to deliver a wide range of values, while at the same time maintaining the traditional values, such as forest products, jobs, and wealth creation.

This change should be gradual and it will require a strong economic foundation throughout.

It will also require the support of private land owners, who own the majority of forest lands in Nova Scotia.

There is a need for information and education for land owners, operators, and the general public. Rather than take a “command-and-control” approach, the province needs to promote, demonstrate, stimulate, and reward excellent forest management with a focus on desired outcomes. The emphasis should be on building the culture of stewardship amongst land owners through the adoption of best-management practices and on achieving compliance with regulations.

The five key values of sustainability, diversity, collaboration, transparency, and informed decision-making that were identified in the Phase I citizen engagement process have been taken into consideration, as well as the principles of the provincial *Environmental Goals and Sustainable Prosperity Act* (EGSPA 2007).

Five key recommendations are proposed to move us towards our vision of “A Nova Scotia where healthy forests support a healthy forest industry that is a cornerstone for our Sustainable Prosperity and where Nova Scotians understand the value of our forests and our forest industry.”

- Complete and implement the Code of Forest Practices as a requirement on Crown lands. Crown lands should include protected, extensive-management, and intensive-management areas and should be certified to an internationally recognized forest certification system (Sustainable Forestry Initiative, Canadian Standards Association, or Forest Stewardship Council).
- Implement a comprehensive best-management practices approach to improving forest management on private lands, rather than a conventional command-and-control approach. Encourage the use of forest management plans.
- Support a range of management practices, including clearcutting and herbicide application. Improved forest management decisions will increase the use of alternative harvesting methods and will lead to a reduction in the proportion of clearcutting.
- Implement a greatly enhanced and expanded extension effort to support the best-management practices approach and to help private land owners understand their rights and responsibilities. Develop programs to increase Nova Scotians’ understanding of the many values of our forests.
- Improve compliance with existing regulations, particularly the *Wildlife Habitat and Watercourses Protection Regulations*, and complete a full review of the regulatory framework to support the new natural resources strategy.

1.0 INTRODUCTION

1.1 Forests and forestry in Nova Scotia

The history and culture of Nova Scotia have long been closely linked to the forests and forest industry (Voluntary Planning 2007).

The long history of forests in Nova Scotia has been well documented, including in a book by Ralph Johnson (Johnson 1986).

Forestry also has a long history in Nova Scotia. Forestry is the art (skill), practice, science, and business of managing forested landscapes to sustain a desired balance of values and environmental services from that landscape change (modified after Dunster and Dunster 1996).

In Nova Scotia the history of forestry has followed the same general pattern of development described by Kimmins (2002), from non-sustainable exploitation, through administrative forestry, followed by ecologically based forestry (focused on sustainable timber management), to social forestry, with a focus on sustainable forest management for multiple values.

The challenge as we fully adopt social forestry is to ensure we maintain traditional values such as forest products, jobs, and wealth creation, while adding a whole new range of values. It is clear from the Phase I citizen engagement process that change is needed. It must be the right change and we need to ensure that we maintain all the desired values into the future. Forestry takes place over long-time scales so change needs to be gradual. It will not be possible to sustain the values we want without a strong economic foundation to forestry (Kimmins 2002).

1.2 Vision

A Nova Scotia where healthy forests support a healthy forest industry that is a cornerstone for our sustainable prosperity and where Nova Scotians understand the value of our forests and our forest industry.

1.3 Introduction to themes

The wide range of input during the Phase I citizen engagement and the Phase II technical expertise/stakeholder engagement processes have confirmed that forests provide multiple values and are extremely important to many Nova Scotians. Substantially divergent and passionate views were expressed on some topics.

Strategic issues related to forests were considered under seven themes: Forest Management; Crown Land Management; Private Land Management; Support for Private Land Owners and Industry; Forest Protection; Stewardship and Education; and Legal Framework. Under each theme there is a rationale for why the theme is considered to be important, overall objectives, a discussion of key issues, and recommendations. Additional background information on clearcutting and biomass is included in the Research Addendum available at www.gov.ns.ca/natr/strategy2010/. There is clearly overlap between the seven themes, and comments are included where a topic is covered in detail under a different theme.

References are provided where appropriate and available, with preference for published, peer-reviewed work and for personal communications with recognized experts within the region, particularly within universities. An adaptive forest management approach is proposed to manage uncertainty, incorporate new knowledge, and continually improve management outcomes.

2.0 FOREST MANAGEMENT

Background/Rationale

Forest management is extremely important because it is the way we influence forest development to provide the goods and services we expect from the forest. Forest management practices, particularly harvesting, are what the public sees and often reacts to. In particular, the practice of clearcutting is clearly raised in the report “Our Common Ground” (Voluntary Planning 2007), which stated that “Many participants felt large clearcuts are neither ecologically nor economically sustainable and that their frequency of practice should be reduced. Others feel that under specific conditions it is a necessary and environmentally appropriate management tool.” In addition, the report stated that there was general consensus that Nova Scotians should “reduce their reliance on clearcutting as a dominant form of forest harvest.” The following recommendations are designed to improve forest management practices, including a more balanced range of harvesting practices.

Objectives

Forest management that is based on scientific principles and an adaptive management framework, and that allows land owners the flexibility to find the practices appropriate for their land and their objectives.

Continued improvement in forest management practices, particularly harvesting, both in terms of choosing an appropriate treatment and in making sure it is carried out correctly. Application of best-management practices will lead to a wider range of harvesting practices, with less reliance on clearcutting.

Issues and Discussion

2.1 General

Current forest stand conditions are the result of many factors, particularly past harvesting practices and fire. A plan to move to a different forest type that may better reflect the forest ecosystem classification can take many decades to implement. For example, the Forest

Stewardship Council (FSC) Maritimes’ Standards explains that, where there is a restoration objective, achieving forest restoration is a long-term process that can take more than one rotation to fully achieve (FSC 2008). Care must be taken in both finding the appropriate prescription, such as the harvesting method, and making sure it is carried out correctly on the ground.

Forest certification, using any of the internationally recognized forest certification systems (CSA, SFI, and FSC), can be used on Crown and private lands as a mechanism to improve performance and to achieve marketplace recognition. With only about 10 per cent of the world’s forests being certified, arguing over the relative merits of good (but different) certification systems distracts from the fundamental purpose of forest certification (SFI 2010). Certification systems typically use an adaptive management framework to incorporate new science and knowledge and should support continual improvement in forest management outcomes.

Recommendation

- Support all internationally recognized forest certification systems (SFI, FSC, CSA) and encourage their adoption on Crown and private land.

2.2 Planning

Forest management planning is a critical part of overall forest management. Some type of planning process, preferably including a forest management plan, should take place before a harvest. Unfortunately, on some private woodland, planning may not start until after the harvest has been completed. Planning is covered in more detail under Section 3.0, Crown Land Management and Section 4.0, Private Land Management.

Growth and yield models are key tools for long-term planning and are used by the Nova Scotia Department of Natural Resources to calculate an annual allowable cut for Crown lands. Individual private land owners can also calculate an annual allowable cut for their lands. In their 1997 strategy paper, the department acknowledged that it “has no role or responsibility in limiting, controlling or allocating the private land harvest” (NS DNR 1997). To do otherwise would seriously infringe on the rights of private land owners. The province does not calculate an annual

allowable cut for private lands but they do prepare sustainable wood supply projections for all private lands to compare with actual harvest levels. The province introduced the *Forest Sustainability Regulations* to ensure that appropriate levels of silviculture were carried out on private lands in proportion to the harvest to ensure harvest levels were sustainable.

Reliable and accurate information is essential for sustainable resource management. Periodic inventories covering all lands, including data from permanent sample plots and from photo interpretation, are required to keep forest information up to date. With the move to ecosystem-based management, additional information will need to be collected and analyzed.

Recommendations

- Growth and yield models should continue to be used to calculate an annual allowable cut for Crown lands and to calculate sustainable wood supply levels for private lands. Models will need to incorporate both even- and uneven-aged management. Collection and analysis of appropriate data is essential to support sustainable resource management.
- Private land owners must retain the fundamental right to decide when and where to harvest forest products on their lands according to their objectives.

2.3 Harvesting

There are a variety of harvesting methods suitable for use in Nova Scotia. A land owner can make a decision on an appropriate harvesting method for a forest stand based on a number of considerations, such as the Forest Ecosystem Classification (FEC), which would indicate recommended future vegetation types; current stand condition, including volume and species; risk factors, such as risk of blowdown; existing legal requirements, such as *Wildlife Habitat and Watercourses Protection Regulations*; as well as their overall land owner objectives.

Few other natural resource management activities result in as much public debate as forest harvesting by clearcutting. The practice of clearcutting is clearly raised in the report “Our Common Ground” (Voluntary Planning 2007). A more detailed discussion on clearcutting is included in the

Research Addendum available at www.gov.ns.ca/natr/strategy2010/, with key points summarized below.

According to the data in the National Forestry Database, clearcutting in Nova Scotia occurred on 92 per cent of the total area from which timber was harvested in 2007 (the latest year in the database). However, there is no process in place to collect the actual information on private and industrial lands, and the amounts reported (98 and 99 per cent, respectively) are believed to be significantly overestimated based on feedback from land managers (FPANS 2010).

Clearcutting has been overused in the past and continues to be used in forest stands where other harvesting methods would be considered more appropriate based on the department’s Forest Ecosystem Classification. However, clearcutting is still an appropriate harvest method for use in Nova Scotia. It is typically the most economical of all harvesting systems (Kimmins 1997, Erdle and Ward 2008), which can be extremely important for land owners to meet their management objectives. Financial assistance is available to woodlot owners for both even- and uneven-aged management through the *Forest Sustainability Regulations*; neither approach is being unfairly subsidized relative to the other. The key to changing the balance is through a best-management practices approach supported by extension services. The province has started this process by supporting an outreach program through the Association for Sustainable Forestry.

There have been some suggestions that clearcutting should be prohibited in Nova Scotia. However, rather than target a specific practice, we should focus on how to achieve the key desired outcome of improved forest management decisions. This will be covered under Section 3.0, Crown Land Management and Section 4.0, Private Land Management. The use of clearcutting as a proportion of the total harvest is already decreasing. Implementation of the Code of Forest Practice, increased forest certification, and a greatly enhanced extension program (discussed under Section 7.0, Stewardship and Education) will result in increases in other harvesting methods and uneven-aged management in general. Further reductions in clearcutting will occur as a consequence of improved forest management decisions through a focus on best-management practices.

Recommendations

- Collect accurate data on harvest methods by ownership type on a regular basis and include it in the department's State of the Forest report.
- Use a comprehensive best-management practices approach to drive continued improvement in harvesting and forest management in general on private lands. It should be supported by an extensive extension program and a number of tools such as management plans, forest certification, audits, etc. A full range of practices will continue to be used with a focus on appropriate practices for each situation. This will result in less reliance on clearcutting than in the past.
- Develop key performance indicators to track progress and include in the State of the Forest report. Some of these, such as harvest volume, silviculture treatments, and compliance with regulations, are already measured. Additional measures could include harvest methods, area under certification, and the application of best-management practices.

2.4 Biomass

There has been considerable public interest in biomass recently in Nova Scotia. A more detailed discussion on biomass is included in the Research Addendum available at www.gov.ns.ca/natr/strategy2010/, with key points summarized below.

For the purpose of this report, the term biomass will be used to describe the branches and tops that are normally left in a stemwood-only harvest, together with trees that are otherwise unmerchantable due to size, species, etc. Technically, it would be more appropriate to use the term "bioenergy feedstock" or "biofuel" (Smith 2010).

This section of the report only considers the impacts of biomass removal on the forest sites as part of ongoing forest management where the intent is to keep the land as forest land. The end use of the biomass product, such as the generation of electricity or production of fuels (solid or liquid) or chemicals, is an important, but separate, issue.

A review of scientific research clearly shows that the impacts of biomass removal on forests are site-specific and will vary regionally, according to local conditions and

practices. For example, results from the 17-year-long study at Weymouth Point in Maine indicate that there have been no nutrient depletions at this site in the Acadian Forest Region as a result of whole-tree harvesting (McLaughlin and Phillips 2006).

A blanket approach prohibiting forest biomass removal on all sites would not be appropriate for Nova Scotia. Biomass guidelines under the Code of Forest Practices would be mandatory on Crown lands and recommended for private lands. Site-specific tools will be available in 2010 to identify where biomass removal is not appropriate and could be incorporated under the Code of Forest Practice. Any biomass harvest is tracked through the Registry of Buyers system and needs to be incorporated into calculations of sustainable wood supply.

Recommendations

- Complete biomass guidelines under the Code of Forest Practices, building on the draft prepared by department staff in 2009, which included guidelines for the retention of fine and coarse woody debris. The guidelines should incorporate the University of New Brunswick biomass model, which will provide a site-specific tool to identify where biomass removal is not appropriate. These guidelines should be recommended as a best practice for private lands.
- Develop a handbook and arrange workshops for land owners, land managers, and contractors to explain the use of the biomass model at the woodlot level and how to incorporate retention levels into harvest plans.
- Emphasize the importance of retaining snags and coarse woody debris on all sites as required by the *Wildlife Habitat and Watercourses Protection Regulations*.
- Growth and yield models should incorporate biomass harvests.

2.5 Regeneration and stand tending

All harvested lands should be regenerated if they are being maintained as forest land. This can be achieved through natural regeneration, planting, or a combination. Planting will be necessary where there is inadequate natural regeneration of the appropriate species or where the land owner has a goal of intensive management. In most stands, the harvesting method will influence the quantity and quality of the natural regeneration so the regeneration method should be considered as part of a harvesting plan. This can lead to a reduced requirement for planting on some sites. Non-native tree species can play a role in intensive management but should be used with caution. Under the Code of Forest Practices they are excluded from extensive-management areas (NS DNR 2008a).

Stand tending activities are used to promote the survival and growth of regenerating forest stands, depending on the specific conditions and the land owner objectives. They tend to be carried out manually, including manual weeding and pre-commercial thinning, or by the use of herbicides, including weeding and conifer release. Concerns have been raised by the public about the use of forest herbicides and this is mentioned in the report "Our Common Ground" (Voluntary Planning 2007).

The most comprehensive and extensive literature review on the effects of herbicide in regenerating northern forests concluded that "herbicide treatments do not reduce, and may increase, stand- and landscape-level plant species richness" and they have "no direct effect on the general health (survival, growth, reproduction) of animals" (Lautenschlager and Sullivan 2002). Tatum (2004) confirmed that, when used according to label instructions, modern silvicultural herbicides (including glyphosate) pose little risk to wildlife. In addition, an examination of conifer release alternatives in Ontario found that when compared with alternatives, herbicide treatments consistently cost about one third less, are operationally safer, and control competition more effectively (Lautenschlager, Bell, Wagner, and Reynolds 1998). Drs. Thompson and Pitt of the Great Lakes Forestry Centre (Canadian Forestry Service) recently prepared an extensive Forest Herbicide Question and Answer document based on established scientific facts and findings from research (Thompson and Pitt 2009).

In 2008, Dr. Strang, Chief Public Health Officer for Nova Scotia, supported the position that there is no reason to believe that glyphosate poses a risk to human health if used in Nova Scotia (Strang 2008). This position is also

supported by reviews by a number of national and international organizations, including the World Health Organization.

In summary, forest herbicides available for use in Nova Scotia, both by ground and aerial application, are based on the active ingredient glyphosate and have been shown to be safe, effective, and economical when used according to the product label and permit.

Recommendations

- Sites that have been harvested should be regenerated by natural regeneration and/or planting. This should be a requirement on Crown lands and strongly supported through the proposed best-management practices approach on private lands. Natural regeneration should be facilitated where appropriate.
- Forest herbicides should continue to be available for use with both ground and aerial application.

2.6 Riparian zones

One of the purposes of the *Wildlife Habitat and Watercourses Protection Regulations* is to establish riparian-zone buffers to protect water quality. The current level of compliance with these regulations needs to be improved and will be mentioned under Section 8.0, Legal Framework.

A 2006 review by Mallik (2006) on the roles of riparian management areas in the Acadian Forest concluded that additional peer-reviewed research is required to develop meaningful best-management practices. The Manomet Center for Conservation Sciences has recently been carrying out research on riparian buffers in the Acadian Forest in Maine. They found that on streams with a 23-metre buffer (comparable to the 20-metre buffer required in Nova Scotia), there were no changes in stream temperature, water quality, or periphyton or macroinvertebrate communities. In addition they found that implementation of best-management practices protected biotic communities on streams harvested with or without very narrow buffers of about 11 metres (Wilkerson, Hagan, Siegel, and Whitman 2006; Wilkerson, Hagan, and Whitman 2010). By following the current regulations in Nova Scotia, including a 20-metre buffer, a land owner can expect to protect water quality parameters.

These regulations apply to forestry and should be extended to other land uses, such as agriculture and development, as discussed in section 9.0, Overarching Themes.

Wider buffers may be necessary in specific areas to maintain other components of biodiversity, but this would not justify a blanket increase in buffer widths on all watercourses across the province. Such buffers would represent a significant opportunity cost to private land owners (LeDoux and Wilkerson 2006). The Department of Natural Resources will be completing ecological landscape analyses on the overall landbase (including private lands) in all ecodistricts in the province. This will include consideration for connectivity issues. Requirements for wider buffers in specific areas could be identified as part of this analysis. Some form of compensation may be appropriate when a private land owner is requested to provide this ecological service. Increased extension services will help land owners understand the importance of riparian zones.

Recommendations

- Mandatory buffers under the *Wildlife Habitat and Watercourses Protection Regulations* should remain at 20 metres to protect water quality.
- Best-management practices should be used to explain specific situations where wider buffers (relative to the 20 metres required by regulation) could be considered. Where the department planning process identifies specific areas where a wider watercourse buffer would be beneficial, there will need to be tools to support private land owners, possibly including some form of compensation for ecological services.

The vulnerability of important tree species could be reduced by applying early adaptation measures, including using species and seed sources that are adapted to predicted future climates, managing for shorter rotations, adopting climate-sensitive best-management practices, and selecting for different traits in tree improvement programs (Johnston 2009).

The ongoing developments, involving carbon credits and the value of carbon sequestration, could have significant impacts on forest management strategies in the near future. Hennigar, MacLean, and Amos-Binks (2008) have demonstrated how forest management models can be adapted to develop strategies to maximize stored carbon, both in the forest and in wood products.

Recommendations

- Investigate approaches of early adaptation to reduce the vulnerability of important tree species in Nova Scotia, such as red spruce, to climate change.
- The Nova Scotia Tree Improvement Working Group, including the Department of Natural Resources, should build climate change early adaptation measures into existing tree improvement strategies.
- Investigate approaches to incorporating stored carbon in forest modeling.

2.7 Climate change and carbon management

Climate change can be expected to have a significant impact on our forests, including regeneration success, forest health, productivity, natural disturbances, forest structure, and species composition (Johnston 2009). Impacts are likely to be different on different species, with improving habitat for some species, such as white pine and red oak, but deteriorating habitat for other species, such as yellow birch, balsam fir, and black spruce (Bourque, Hassan, and Swift 2010).

3.0 CROWN LAND MANAGEMENT

Rationale/Background

Crown land is a collective asset that belongs to all citizens of Nova Scotia (NS DNR 2010). It is clear from the Phase I citizen engagement that these lands are important to Nova Scotians for many values, including wilderness, recreation, wildlife, biodiversity, timber, and non-timber forest products. However, Nova Scotia has the 2nd-lowest proportion (24 per cent) of Crown land of any province in Canada. It can be challenging to balance all the values over this landbase.

Objectives

Crown lands are managed to a high standard following ecosystem-based management principles to provide a wide range of values for Nova Scotians.

Those lands being managed for forest products are certified to an internationally recognized standard (Sustainable Forestry Initiative, Canadian Standards Association, or Forest Stewardship Council) and include protected, extensively managed, and intensively managed areas.

They provide a sustainable supply of forest products that support the provincial economy.

Issues and Discussion

3.1 General

Existing commitments to forest products companies and tenure issues related to the allocation of wood on Crown lands will be reviewed under Section 8.0, Legal Framework.

Over one quarter of all Crown lands are already formally protected and this is expected to increase as the province moves to 12 per cent protected areas over the entire province by 2015 (EGSPA 2007). A TRIAD system of management (Seymour and Hunter 1999), which includes protected, extensively managed, and intensively managed areas, would allow Crown land to provide a wide range of values and include demonstration areas for a full range of

forest practices. A process similar to that carried out on Crown lands in New Brunswick by the Task Force on Forest Diversity and Wood Supply would help increase awareness of management alternatives and their consequences (Erdle and Ward 2008).

The Department of Natural Resources has developed some excellent procedures and tools that can support the move to ecosystem based management on Crown land. Many of these tools could also be recommended for use on private forest land.

Forest certification can play an important role in the continual improvement of forest management in Nova Scotia. Certification systems support the implementation of an adaptive forest management framework that can be used to manage uncertainty and continually improve management outcomes over time (SFI 2010 provides a recent comparison between Forest Stewardship Council and Sustainable Forestry Initiative in North America).

Recommendations

- A TRIAD approach with protected, extensive-management, and intensive-management areas should be considered for Crown lands, and should include explicit goals for an annual allowable cut. An analysis of realistic management alternatives and their likely consequences should be carried out for Crown lands, similar to the recent work in New Brunswick.
- Crown lands being managed for forest products should be certified to an internationally recognized forest certification system (including Sustainable Forestry Initiative, Canadian Standards Association, and Forest Stewardship Council).

3.2 Ecosystem-based integrated resource management

Ecosystem-based forest management suggests using natural disturbance regimes to guide appropriate management practices, including harvesting methods (Franklin 1993). The Department of Natural Resources prepared a draft report on “Forest Disturbance Ecology in Nova Scotia” (Neilly, Quigley, Stewart, and Keys 2007), but there have been a number of criticisms of the report, particularly with respect to the amount of land proposed as being subject to frequent stand-initiating disturbances. According to Forbes (2010), there is no consensus among ecologists at this time as to how much stand-initiating disturbance occurred in Nova Scotia or at what interval. A final report on natural disturbance regimes in Nova Scotia would help provide objectives at the landscape level.

It is important to recognize that as a result of climate change, disturbance regimes through the 21st century may not resemble disturbance regimes pre-settlement, so there may be risks to following the natural disturbance regime approach too closely (Duinker 2010).

The department has been developing a systematic approach to ecosystem-based Integrated Resource Management (IRM) since the early 1990s (Stewart and Neilly 2008). Key elements include the ecological land classification (ELC), natural disturbance regime, climax forest interpretations, a forest ecosystem classification, and a vegetation classification.

The department has also been developing an Integrated Resources Management process as a comprehensive inventory of Crown land, and as a tool to assist with planning and decision making. Although there were public concerns when it was initially announced, particularly around the adequacy of protected areas on Crown lands, the IRM process is a useful planning tool. Initial classifications have been completed for all Crown lands, and objectives, strategies, and indicators have been developed. A Crown lands forest model can be used to evaluate different management alternatives. Ecological Landscape Analyses are being completed at the ecodistrict level to be followed by Long Range Management Frameworks.

The Code of Forest Practice: A framework for the implementation of sustainable forest management (NS DNR 2004) is intended to guide the actual operational planning and activities on Crown land. It is also recommended as a best practice for private land owners. The principles and guidebooks have been completed together with a number of technical manuals to cover areas including pre-treatment assessments using the forest ecosystem classification and harvesting and silviculture prescriptions.

Recommendations

- Produce a final report on natural disturbance regimes in Nova Scotia that follows a scientific approach and that has been peer-reviewed. It should be used to provide ecological objectives at the provincial level.
- Complete the Code of Forest Practices and implement it on Crown lands. It should also be recommended as a best practice for private lands.
- Forest ecosystem classifications should be completed for the entire province.
- Ecological Landscape Analysis and the Long Range Management Framework should be finalized for each ecodistrict. These will provide high-level provincial goals at the ecodistrict level to guide planning and operational work on Crown land at field level.
- Complete key technical manuals and guidelines under the Code of Forest Practice.

3.3 Research

Research is crucial to improve our understanding of the forest ecosystem and to support the move to ecosystem-based forest management. This will lead to continual improvement of outcomes through an adaptive management approach that is a feature of forest certification systems.

The Nova Scotia Tree Improvement Working Group, a co-operative group including provincial and federal governments and industry, has guided tree improvement work in the province since 1978. Tree improvement of native tree species will continue to be important,

particularly as the climate changes. The province provides important expertise and support as a member of this working group.

Recommendations

- Develop a forest research plan based on identified research needs and assign appropriate financial and other resources.
- Continue to collaborate with universities and other organizations, including the Nova Forest Alliance, particularly those working in the Acadian Forest region.
- Continue to provide support and expertise to the Nova Scotia Tree Improvement Working Group, including continued monitoring of tree improvement test sites distributed throughout the province.

3.4 Recreation and other uses

Forest-based recreation is extremely important to Nova Scotians and tourists who visit our province. A wide range of experiences should be available on Crown lands. In some cases, recreation needs can be met through multi-use opportunities. However, in the case of certain activities, it may be more appropriate to identify specific areas of Crown land for restricted use.

Recommendation

- A wide range of recreation activities and other uses should be provided on Crown lands. Consider identifying specific areas of Crown land for restricted uses, such as motorized off-highway recreation.

4.0 PRIVATE LAND MANAGEMENT

Background/Rationale

Private lands represent about 70 per cent of total provincial forest lands in Nova Scotia and tend to be on the more productive sites. They are generally on more accessible sites and so are very much in the public eye. Private lands, both industrially and non-industrially owned, are a vital source of wood supply for the forest industry. The rights of private land owners to manage their lands to meet their own objectives are extremely important. There are also responsibilities of private ownership since activities on private lands can have a significant impact on the overall forest ecosystem. These lands have the potential to supply values in some regions that are not available from Crown land.

Objectives

Private lands are well managed, using a full range of management practices and providing a wide range of values, including economic, social, and ecological, that meet the land owners' objectives.

Private land owners are recognized as good stewards of their lands and are encouraged and supported to maintain their lands as forest land. Forest operators who clearly will not follow legal requirements are no longer tolerated.

Issues and Discussion

4.1 General

There are over 30,000 private forest land owners in Nova Scotia, ranging from individuals who own a small woodlot to companies with large holdings who own manufacturing facilities. There are a number of medium-to-large land owners who do not operate manufacturing facilities. When considering private land management, the full range of owners' objectives needs to be taken into account.

Improvements in forest management on private lands can best be achieved by focusing on outcomes rather than on specific practices. There is a significant role for support, education, and enforcement, which will be covered under Section 7.0, Stewardship and Education, and Section 8.0, Legal Framework.

It is essential that there is legislation and regulation to ensure key environmental values are protected. Such requirements are largely already in place or under development, including, but not limited to, the *Forestry Act and Regulations* (particularly the *Wildlife Habitat and Watercourses Protection Regulations*), *Environment Act and Regulations*, *Endangered Species Act and Regulations*, *Wildlife Act and Regulations*, *Off-highway Vehicles Act*, *Wilderness Areas Protection Act*, and federal *Fisheries Act*. Compliance with regulations is clearly an important issue and will be covered under Section 8.0, Legal Framework.

If land owners are saddled with additional regulations that restrict their freedom to manage their woodlands according to their own objectives, which can include a combination of economic, social, or ecological values, many of them will indeed call for compensation.

Private land owners are allowed to harvest the trees on their property in any manner when they are converting to another land use, such as agriculture or residential/commercial/industrial development. Private land owners should continue to be able to change the use of their land, but land owners who keep their forest land as forest land should be encouraged, possibly even rewarded, for good stewardship and not subjected to additional regulations that dictate or restrict management practices. This will be covered under Section 7.0, Stewardship and Education.

Recommendations

- Land owners should continue to use both extensive- and intensive-forest management approaches and have access to a full range of practices as discussed under Section 2.0 Forest Management. This will allow them to make the right choices based on their objectives and the forest conditions.
- There needs to be a concerted effort to stop operators who do not follow regulations. This requires a co-operative effort between government, land owners, and industry.

4.2 Planning

A formal and structured approach to ecosystem-based management, such as is being developed for Crown lands, may not be applicable or acceptable to most private land owners (Perkey 1997). Most private land owners want to be good stewards of their land and should be supported through best-management practices. A number of the elements of ecosystem-based management, particularly those focused at the forest stand level (such as retaining snags, coarse woody debris, and old trees), could be incorporated into private land owner plans.

Many private land owners do not have a forest management plan. A management plan is a valuable tool to help guide long-term management and help land owners achieve objectives. This will be covered under Section 7.0, Stewardship and Education.

Recommendations

- Develop mechanisms to assist private woodlot owners to have management plans prepared for their woodlots by licensed forestry professionals, including through forest certification programs.
- Drive continual improvement in practices through the use of management plans, best-management practices, and by ensuring compliance with existing regulations. Focus on both the planning (prescribing the appropriate practices) and the implementation (carrying out practice on the ground).

4.3 Recreation and other uses

Private lands provide opportunities for a variety of recreation activities. However, many land owners are concerned with liability issues associated with recreational uses and also with individuals and groups who use their lands without permission, particularly for motorized recreation. The public needs to understand that if vehicular access is allowed, this should be considered a privilege and that private land should be treated with respect.

Recommendations

- Review legislation associated with recreational use on private lands to reduce liability concerns for land owners who wish to encourage recreational activities on their lands. Require written permission for off-highway vehicle use on private lands (*Off-highway Vehicles Act*).
- Best-management practices should include issues that are important to recreational users, such as the maintenance of traditional canoe portages.

5.0 SUPPORT FOR PRIVATE LAND OWNERS AND INDUSTRY

Background/Rationale

Nova Scotians want private forest land to be well managed, so it is appropriate that support be provided to facilitate this.

The forest products industry has been a cornerstone of the Nova Scotia economy for decades. With support from various levels of government, a diverse forest products industry can be the foundation for our sustainable prosperity well into the future.

Objectives

Well-managed private woodlots will meet the objectives of the woodlot owners and also provide benefits for society as a whole.

Nova Scotia will have a world-class, sustainable, and competitive forest industry, composed of both large and small businesses, making a variety of products based on sustainably managed forests.

Issues and Discussion

5.1 General

There is a need for a comprehensive review of the whole regulatory situation impacting the Nova Scotia forest products sector. This should lead to improvements for land owners and the industry and will be covered under Section 8.0, Legal Framework.

5.2 Private land owners

Private forest land owners can be encouraged to keep land as forest land and to manage their lands using appropriate practices if they are supported with information, education, incentives, and recognition. There is an urgent need for a greatly enhanced extension program in Nova Scotia, which will be covered under Section 7.0, Stewardship and Education.

If private forest lands are required to provide additional ecological goods and services, a program of incentives, which could include direct compensation, will need to be developed as discussed under Section 7.0, Stewardship and Education.

Recommendation

- Identify appropriate incentive mechanisms to encourage woodlot owners to invest in their woodlot and to keep their private lands as forest lands.

5.3 Industry

A co-ordinated approach between industry and both provincial and federal governments would support a world-class, integrated forest products industry in Nova Scotia. As an example of what can be done at a national level, Yakabuski (2008) outlined how Finland became a world leader in the forest product business through: government economic policies that promote specific sectors, a commitment to education, and joint research and development involving companies, government, and universities.

A recent report on “Transforming Canada’s Forest Products Industry” (FPAC 2010) presents a case for integrating Canada’s forest products industry with the emerging bio-economy through bioenergy production and bioproduct creation. In 2008 the Atlantica Bioenergy task force outlined opportunities to integrate biotechnologies across the Atlantica region of Maine, New Brunswick, and Nova Scotia to help build a sustainable future for the forest industry (Atlantica Bioenergy 2008). Partnerships that include various levels of government will be necessary to realize such opportunities.

The provincial government could support the forest products industry and meet key environmental goals by encouraging the use of wood and wood-based products, rather than those made from non-renewable raw materials. This can be achieved through various initiatives including provincial procurement policies and changes to the building code. For example, in 2009, the province of British Columbia changed the building code to increase the maximum height for wood-framed residential construction from four to six storeys (BC Building and Safety Standards 2009). Provincial support should include the promotion of

value-added products, as was highlighted during Phase I. Value-added wood products businesses can expect to face international competition and should function as part of an integrated forest products industry in Nova Scotia.

A number of important action items have already been identified by the Joint Industry/Government Task Force under the Nova Scotia Forestry Transition Program (NS DNR 2008c). These are grouped under transportation, cost competitiveness, energy, labour, sustainable forest management, market development, effective regulation, and forest pests. For example, there are significant issues associated with provincial transportation rules and regulations that have a major impact on the movement of forest products and need to be addressed. These include road designations, permitted configurations, and weight limits.

In their 2004 report on the labour force in the Nova Scotia forest industry, the Atlantic Provinces Economic Council highlighted the “*dwindling supply of labour*” that is even more acute than in other parts of the country (APEC 2004). Large and small companies are finding it increasingly difficult to recruit new workers, including lower-skilled workers (APEC 2007). This is a critical issue that is not well understood. Support for practices that are safe and less labour intensive, such as mechanical harvesting and release with herbicides, is an important part of the solution. A well-trained, educated workforce is essential for a viable industry. There are existing training organizations, such as the Forestry Safety Society of Nova Scotia, and programs, such as the Atlantic Master Logger, that should be supported. A comprehensive and co-ordinated approach between industry and governments will be needed to tackle the overall labour force issues.

Recommendations

- A co-ordinated effort between industry and governments is required to ensure an integrated, competitive, and sustainable forest products industry in Nova Scotia producing a range of products.
- The provincial government should implement procurement policies that give preference to forest products and promote wood-based products in general, particularly those that can be manufactured in Nova Scotia. All internationally recognized forest certification should be treated equally in any procurement policies.

- The provincial government should look at modifications to the building code that would increase the use of lumber, particularly in commercial construction.
- Support should be available for value-added opportunities that can compete internationally and can integrate into the existing industry.
- Co-operative efforts between industry and governments are needed to develop and retain a well-trained, educated workforce that is essential for a viable industry. Training for forest operators should be supported through training organizations such as the Forestry Safety Society of Nova Scotia and through programs such as the Atlantic Master Logger.
- A co-operative approach is needed between the departments of Natural Resources and Agriculture to provide research and development support to the Christmas tree industry, including consideration for Christmas trees as an eligible commodity.
- Complete the action plan developed by the Joint Industry/Government Task Force under the Nova Scotia Forestry Transition Program.

6.0 FOREST PROTECTION

Background/Rationale

The forests of Nova Scotia provide a wide range of values for society in general. Protection from various threats is needed to maintain those values. In addition, significant investments are being made in forest management to provide future benefits and those investments need to be protected.

Objectives

Nova Scotia's forests are more resilient to disturbances, particularly in the face of climate change. A wide range of management tools and services, including integrated pest management, fire detection and suppression, herbicides, and pesticides, will be used, as appropriate, to protect our forests.

Issues and Discussion

6.1 Forest fires

Forest fire fighting is the responsibility of the Department of Natural Resources with first response normally shared between the department and rural volunteer fire departments.

Recommendations

- Maintain the excellent provincial system for fire detection and suppression, including the network of fire towers and aircraft.
- Provide increased support to rural volunteer fire departments to ensure that membership, equipment, and training is adequate.

6.2 Forest pests (insects and diseases)

Infestations of native insects and diseases can cause significant losses to forests and this could increase with climate change. Non-native pests pose an even greater threat as they are unlikely to have any natural controlling mechanisms (such as pathogens).

Recommendations

- Continue to implement an integrated pest management program, which includes the option of using pesticides when necessary.
- Expand the pest detection and monitoring programs to ensure rapid detection of non-native pests and infestations of native pests. Continue to improve ability to predict fire and pest outbreaks. Develop an overall strategy for invasive exotic species, with a focus on early eradication.
- Work with private land owners to co-ordinate monitoring efforts that will help minimize losses to forest pests.
- In co-operation with federal agencies, develop strategies for preventing pest outbreaks in protected areas, including national parks, from spreading to the surrounding forest lands.

6.3 Competition

As discussed under Section 2.5 in Forest Management, the use of federally registered herbicides, both from the ground and aerially, is a vital management tool to allow young softwood stands to be protected from competition.

Recommendation

- Forest herbicides should continue to be available for use with both ground and aerial application.

7.0 STEWARDSHIP AND EDUCATION

Background/Rationale

This theme will focus on private lands, particularly non-industrial private lands or woodlots. Non-industrial private lands represent about 51 per cent of total provincial forest lands in Nova Scotia and tend to be on the more productive sites. They are generally on more accessible sites and so are very much in the public eye. These lands are an important source of wood supply for the forest industry. Activities on these lands can have a significant impact on the overall forest ecosystem. They also have the potential to supply values in some regions that are not available from other forest lands.

Objective

Nova Scotia will have well-managed private woodlots that meet the objectives of the woodlot owners and also provide benefits for society as a whole. Innovative approaches and programs will encourage and support the woodlot owners.

Issues and Discussion

7.1 Stewardship and education

Many private woodlot owners are excellent stewards of their lands, which, in some instances, have been in their family for several generations. However, there are also examples of poor practices on private lands. These could be the result of a range of situations, including an owner who did not understand the consequences of a certain practice, or a contractor who did a poor job.

A significant proportion of private land owners do not manage their land at all. This can be for a wide variety of reasons, including tax issues, lack of information, concerns with current harvesting practices, etc. There are many benefits to land owners and to the province from increasing the number of well-managed woodlots. There is a wide range of management approaches that are possible to meet the land owner's objectives from intensive management (with a focus on forest products) to extensive management (with a focus on conservation). There are tools available, such as working forest conservation

easements, which could fit the objectives of some woodlot owners and encourage them to manage their lands.

A management plan is a valuable tool to help guide long-term management and achieve land owners' objectives. In many cases, the woodlot owner carries elements of the plan in his or her head. If the woodlot is to be transferred to a family member, formalizing the plan can be particularly useful in transferring knowledge to the next generation. It also has tax advantages. This will be discussed further under Section 8.0, Legal Framework.

Governments may use regulations to protect specific values on private lands and these have typically followed a command-and-control approach. A recent review by Gregersen and Contreras (2010) concludes that *"A continued reliance on conventional command-and-control approaches that sets uniform standards for guiding forest management decisions has proven to be mostly ineffective and inefficient."* They also found that *"command-and-control regulations tend to provide few incentives to innovation and also include no motivation to exceed regulatory performance standards."*

Problems resulting from a command-and-control approach to the issue of clearcutting in Maine are summarized in the Research Addendum available at www.gov.ns.ca/natr/strategy2010/. In addition, an example is provided where an education and evaluation approach to forest water quality protection has been shown to be superior to a complex regulatory approach. According to Floyd (2010) governments have used incentives and the provision of technical assistance to manage environmental issues because a stringent, regulatory approach is expensive to administer.

Gregersen and Contreras (2010) provide examples of promising approaches to encouraging sustainable forest management, including several that may be applicable to Nova Scotia, such as:

- **Independent certification programs and independent monitoring by non-governmental organizations.** Forest certification systems have been adopted for a number of years in Nova Scotia, mainly by large forest managers. However, recent government-supported programs are introducing forest certification to woodlot owners. The availability of satellite imagery and the tools to analyze forest change have already resulted in independent monitoring in Nova Scotia.

- **Payments for environmental services.** Innovative schemes are being implemented in other areas to create mechanisms to ensure that those who benefit from environmental services of forests pay the producers for such services.
- **Improving stakeholder information and communications.** This is absolutely essential and needs to be covered in part by a greatly enhanced extension effort in Nova Scotia. Information and communication is not only required for land owners but also for the general public.
- **Best-management practices.** A best-management practices manual has been developed for Nova Scotia and has been adopted by the Forest Products Association of Nova Scotia (NFA 2004). It is used for training under various forest certification systems and continues to be updated.
- **Corporate codes of conduct.** Many organizations are voluntarily adopting standards that impact forestry practices.

Gregersen and Contreras (2010) also provide an example of a successful best-management practices program in the State of Montana, which relies on education and outreach programs to provide guidance to harvesting, reforestation, and other activities to reduce negative environmental impacts and ensure sustainability of both wood production and environmental services. It includes a requirement to notify the state before any harvesting commences, not for approval but so that timely information and technical assistance can be provided to the land owner. The program has been in place since 1987 and audits in 2004 showed that best-management practices have been applied in 97 per cent of all cases and that they were effective in protecting soil and water in 98 per cent of audited cases. The program is focused on outcomes on the ground and the land owner is able to choose practices they consider the most appropriate to comply with the standard. This type of approach could work in Nova Scotia and, in combination with the effective enforcement of existing regulations, is more likely to be effective and efficient than additional command-and-control regulation. A licensing system for contractors could be considered to help improve the adoption of best-management practices.

Phase I has clearly shown that the province's forests are extremely important to Nova Scotians. As described in the report *"Our Common Ground"* (Voluntary Planning 2007) many participants felt that the general public was not well informed about modern forest management practices and they supported the concept of educating Nova Scotians

about forests and the forest industry. This is a critical issue if we are to meet the vision of sustainable prosperity supported by healthy forests and a healthy forest industry.

Recommendations

- Implement a comprehensive best-management practices approach to improving forest management outcomes on private lands, rather than additional command-and-control regulation. This should be developed through a multi-stakeholder approach, using good examples from other jurisdictions. Regulatory changes may be needed to support this approach, such as requiring licensing of contractors, if that is to be implemented. Performance indicators should be developed to track progress. Private land that is meeting required outcomes under a recognized forest certification program could be exempted from certain requirements.
- Implement a greatly enhanced and expanded extension effort to support a best-management practices approach and help woodlot owners understand their rights and responsibilities; their options for management, including harvesting practices; and the value of forest management plans. The primary lead for this effort should be the Department of Natural Resources, with participation from woodlot owner organizations, industry, and other appropriate groups.
- Develop and implement programs to increase the public understanding of the many values of forests, both public and private, and of the importance of a forest products industry to our sustainable prosperity. Forests and forestry issues should be incorporated into the education system. Programs for teachers, such as the Atlantic Teachers Tours, should be supported.
- Investigate innovative schemes, such as those in use in other areas, to create mechanisms to ensure that those who benefit from environmental services of forests pay the producers of such services.

8.0 LEGAL FRAMEWORK

Background/Rationale

There is a significant regulatory burden today and there were some suggestions from the Phase I citizen engagement that regulations need to be simplified so they can be implemented more efficiently. In addition, compliance with some existing regulations is inadequate and needs to be improved. It will be important for government to review existing legislation to ensure it supports the new natural resources strategy.

Objectives

Nova Scotia will take a best-management practices approach to improving forest management supported by an optimized regulatory framework with regulations that are fair, clear, and enforceable and not overreaching. There will be compliance with these regulations.

Nova Scotia will create a level playing field by requiring other land uses to follow the same high standards as forest lands.

Issues and Discussion

8.1 Legal framework

Gregersen and Contreras (2010) proposed that *“A fair, clear, and enforceable legislative framework is important in any forest policy reform process.”* They went on to suggest principles of a good legislative framework for private forest practices. This framework would:

- avoid legislative overreaching
- avoid unnecessary, superfluous, or cumbersome licensing and approval requirements
- increase the effectiveness of direct law enforcement mechanisms set forth in forestry legislation

The report *“Our Common Ground”* (Voluntary Planning 2007) proposes that regulations should be S.M.A.R.T. (Specific, Measurable, Attainable, Realistic, Timely) and easily enforceable. Consideration should be given to a streamlined, outcome-based approach for any operations being carried out under a recognized forest certification system.

Under the Nova Scotia Forestry Transition Program, the Forest Products Association of Nova Scotia initiated a program aimed at optimizing the regulatory environment for the Nova Scotia forest products sector. This is being carried out by Bill Lahey and Peter Duinker, both of Dalhousie University. Concerns have already been identified with specific regulations as well as the way they are being interpreted and applied in the field. The final report is due in 2011 and will be an excellent opportunity to improve regulations in support of the new natural resources strategy.

The 2007 report on compliance with *Wildlife Habitat and Watercourses Protection Regulations* indicates that less than 30 per cent of sites visited were in full compliance with respect to protection of watercourses and legacy tree clumps (NS DNR 2007). This is not acceptable. The report recommends an intensive program of land owner and forest operator contact to increase awareness and knowledge of the regulations. In addition, some of the requirements of these regulations do not meet the S.M.A.R.T. standard, particularly with respect to being measurable and attainable.

As discussed previously, management plans by licensed forestry professionals should be encouraged on private woodlots. One approach would be to fund them through the Registered Buyers programs, which would require changes to the *Forest Sustainability Regulations*. The current programs introducing forest certification to private woodlots will also result in management plans being prepared.

The forest industry in Nova Scotia is required under the provincial *Forest Sustainability Regulations* to fund silviculture treatments on private lands in proportion to industry's wood purchases. These regulations were introduced to ensure the wood supply from small private woodlots was sustainable (NS DNR 1997), and they have achieved 100 per cent compliance (NS DNR 2008b). There have been suggestions through Phases I and II related to these regulations, including what they should cover and how they should be funded more equitably. There have also been some suggestions during Phases I and II that certain treatments are being subsidized at the expense of others. This is not the case. A full range of treatments is covered by the regulations, including both even- and uneven-aged management approaches. To date, the reported amount of selection harvest (Category 7) on private woodlots has been low (NSDNR 2009) although much of the actual selection management that is taking

place in Nova Scotia is not reported under the registry. There has been additional interest in recent years in selection management as a result of a targeted program through the Association for Sustainable Forestry, which includes an outreach component.

The *Forest Sustainability Regulations* place the financial responsibility on the buyer (industry) with the province providing some level of assistance on an annual basis. Although well intended, these regulations have put industry in Nova Scotia at a competitive disadvantage relative to other jurisdictions. More equitable, long-term funding arrangements are required. The existing regulations were designed to support the wood supply from private lands and were never intended to carry out all silvicultural treatments requested by all woodlot owners in Nova Scotia. If additional amounts and types of treatments are to be carried out as suggested by some participants in Phase I, the cost of these additional treatments should not be borne by the Registered Buyers.

The majority of wood from Crown land is supplied to the forest industry through two types of tenure-of-supply agreements. These are two long-term license and management agreements, established through specific provincial acts. In addition, there are a number of volume-based forest utilization agreements under the *Crown Lands Act*. A small amount of Crown land wood is allocated via tender sales. Crown wood allocations are important for stability and predictability of supply. An independent review of the tenure-of-supply arrangements was last carried out in 2000 (AGFOR 2000). This review recommended changes to the overall tenure system for Crown land, including replacing multiple short-term volume-based agreements with more long-term area-based management agreements. The recommended changes have not been fully implemented.

Recommendations

- A full review of the regulatory framework will be necessary to support the new natural resources strategy, including key legislation, such as the *Forests Act*, *Crown Lands Act*, *Wildlife Act*, and *Environment Act*, and associated regulations. The report being prepared for the Forest Products Association of Nova Scotia should be a key component of this review. The review should result in reduced red tape, regulations that meet the S.M.A.R.T. standard, and requirements that are outcome-based with more consistent interpretation

and application. Overall, they should be designed to support the best-management practices approach and enhanced extension program and should minimize a command-and-control approach.

- Compliance with the *Wildlife Habitat and Watercourses Protection Regulations* must be improved. The key focus should be on achieving compliance through the proposed best-management practices approach and enhanced extension program, rather than simply increasing enforcement.
- Silviculture treatment programs for non-industrial land owners need to be delivered through an effective and efficient mechanism. It is recommended that the basic program structure under the *Forest Sustainability Regulations* should remain as is, with a mechanism added for funding of forest management plans and with a more equitable long-term funding arrangement. This would require changes to the regulations. The restrictions on land owners over 2,000 hectares should be removed. Both uneven- and even-aged management should continue to be supported. If the program is expanded to carry out additional amounts and types of treatments, it is not appropriate that the cost of these treatments be borne by Registered Buyers. Consideration could also be given, after an appropriate phase-in period, to making a management plan a requirement for funding of silvicultural treatments on properties above a certain minimum size (as it may not be cost effective to require a management plan on extremely small woodlots).
- The Association for Sustainable Forestry should continue to deliver a selection management (Category 7) program.
- Conduct a review on the valuation, allocation, and sale of Crown Timber Resources. This review should result in recommendations for improvements to tenure-of-supply arrangements in support of the new natural resources strategy while also respecting existing commitments. There are models in other jurisdictions that could be considered, including the New Brunswick example that is mentioned in the AGFOR report (AGFOR 2000).

9.0 OVERARCHING THEMES AND RELATIONSHIPS WITH OTHER STRATEGIES

Issues and Discussion

The process used to develop the natural resources strategy is a very different approach than has been used in the past and could be used for future processes. Mechanisms should be developed for monitoring progress through Key Performance Indicators, renewal, and ongoing public engagement. The natural resources strategy should become a cornerstone of the provincial Economic Growth Strategy (“Opportunities for Sustainable Prosperity 2006”).

There should be strong linkages between the four component areas of the natural resources strategies. The biodiversity area will provide overall guidance for the balanced conservation and management of natural resources in Nova Scotia. The forests, minerals, and parks areas will have a number of common components such as land use planning, education, and awareness. All strategies will reflect the five key values of sustainability, diversity, collaboration, transparency and informed decision-making.

A need for greater co-operation between provincial government departments and with other levels of government was identified in the report “Our Common Ground” (Voluntary Planning 2007). The expertise within the Department of Natural Resources is not always recognized within the provincial government. Retaining and growing the expertise within the department is essential.

There are a number of responsibilities of, and activities carried out by, the Department of Natural Resources that do not readily fit under one of the identified “themes” but are still very important as part of their overall role in ensuring the sustainability of the forests of Nova Scotia. These include such items as tree nursery operations, tree improvement, wildlife management, endangered species, collection and analysis of data, reporting, enforcement, and scaling.

There are environmental protection requirements, such as special management zones on watercourses under the *Wildlife Habitat and Watercourses Protection Regulations*, which are not currently applied to non-forestry land uses.

Recommendations

- Address issues related to land claims by First Nations through the Made in Nova Scotia process. Develop mechanisms with First Nations to incorporate traditional aboriginal knowledge.
- Ensure provincial government departments work in co-operation with each other and with other levels of government in support of the natural resources strategy and other government initiatives. The Deputy Ministers Forum on Sustainable Competitiveness is one model that could be followed.
- The Department of Natural Resources should remain the lead agency with respect to key responsibilities, including sustainable forest management in Nova Scotia, the management of all Crown lands, forest research and monitoring, and enforcement. The organizational structure of the department should be reviewed to ensure alignment with the new natural resources strategy. To maintain an efficient organization in a relatively small province, it is likely that some type of multi-functional model, such as the current approach in Regional Services, will be required. A mechanism for incorporating the best external scientific advice should be developed.
- Ensure environmental protection requirements, such as special management zones on watercourses that are required in forest management under the *Wildlife Habitat and Watercourse Protection Regulations*, are also applied to other land uses.

10.0 FORESTS PANEL OF EXPERTISE RECOMMENDATIONS – J. PORTER

1. Support all internationally recognized forest certification systems (Sustainable Forestry Initiative, Forest Stewardship Council, Canadian Standards Association) and encourage their adoption on Crown and private land.
2. Growth and yield models should continue to be used to calculate an annual allowable cut for Crown lands and to calculate sustainable wood supply levels for private lands. Models will need to incorporate both even- and uneven-aged management. Collection and analysis of appropriate data is essential to support sustainable resource management.
3. Private land owners must retain the fundamental right to decide when and where to harvest forest products on their lands according to their objectives.
4. Collect accurate data on harvest methods by ownership type on a regular basis and include it in the department's State of the Forest report.
5. Use a comprehensive best-management practices approach to drive continued improvement in harvesting and forest management in general on private lands. It should be supported by an extensive extension program and a number of tools such as management plans, forest certification, audits, etc. A full range of practices will continue to be used with a focus on appropriate practices for each situation. This will result in less reliance on clearcutting than in the past.
6. Develop key performance indicators to track progress and include in the State of the Forest report. Some of these, such as harvest volume, silviculture treatments, and compliance with regulations, are already measured. Additional measures could include harvest methods, area under certification, and the application of best-management practices.
7. Complete biomass guidelines under the Code of Forest Practices, building on the draft prepared by department staff in 2009, which included guidelines for the retention of fine and coarse woody debris. The

- guidelines should incorporate the University of New Brunswick biomass model, which will provide a site-specific tool to identify where biomass removal is not appropriate. These guidelines should be recommended as a best practice for private lands.
8. Develop a handbook and arrange workshops for land owners, land managers, and contractors to explain the use of the biomass model at the woodlot level and how to incorporate retention levels into harvest plans.
 9. Emphasize the importance of retaining snags and coarse woody debris on all sites as required by the *Wildlife Habitat and Watercourses Protection Regulations*.
 10. Growth and yield models should incorporate biomass harvests.
 11. Sites that have been harvested should be regenerated by natural regeneration and/or planting. This should be a requirement on Crown lands and strongly supported through the proposed best-management practices approach on private lands. Natural regeneration should be facilitated where appropriate.
 12. Forest herbicides should continue to be available for use with both ground and aerial application.
 13. Mandatory buffers under the *Wildlife Habitat and Watercourses Protection Regulations* should remain at 20 metres to protect water quality.
 14. Best-management practices should be used to explain specific situations where wider buffers (relative to the 20 metres required by regulation) could be considered. Where the department planning process identifies specific areas where a wider watercourse buffer would be beneficial, there will need to be tools to support private land owners, possibly including some form of compensation for ecological services.
 15. Investigate approaches of early adaptation to reduce the vulnerability of important tree species in Nova Scotia, such as red spruce, to climate change.
 16. The Nova Scotia Tree Improvement Working Group, including the Department of Natural Resources, should build climate change early adaptation measures into existing tree improvement strategies.
 17. Investigate approaches to incorporating stored carbon in forest modeling.
 18. A TRIAD approach with protected, extensive-management, and intensive-management areas should be considered for Crown lands, and should include explicit goals for an annual allowable cut. An analysis of realistic management alternatives and their likely consequences should be carried out for Crown lands, similar to the recent work in New Brunswick.
 19. Crown lands being managed for forest products should be certified to an internationally recognized forest certification system (including Sustainable Forestry Initiative, Canadian Standards Association, and Forest Stewardship Council).
 20. Produce a final report on natural disturbance regimes in Nova Scotia that follows a scientific approach and that has been peer-reviewed. It should be used to provide ecological objectives at the provincial level.
 21. Complete the Code of Forest Practices and implement it on Crown lands. It should also be recommended as a best practice for private lands.
 22. Forest ecosystem classifications should be completed for the entire province.
 23. Ecological Landscape Analysis and the Long Range Management Framework should be finalized for each ecodistrict. These will provide high-level provincial goals at the ecodistrict level to guide planning and operational work on Crown land at field level.
 24. Complete key technical manuals and guidelines under the Code of Forest Practice.
 25. Develop a forest research plan based on identified research needs and assign appropriate financial and other resources.
 26. Continue to collaborate with universities and other organizations, including the Nova Forest Alliance, particularly those working in the Acadian Forest region.
 27. Continue to provide support and expertise to the Nova Scotia Tree Improvement Working Group including continued monitoring of tree improvement test sites distributed throughout the province.
 28. A wide range of recreation activities and other uses should be provided on Crown lands. Consider identifying specific areas of Crown land for restricted uses, such as motorized off-highway recreation.

29. Land owners should continue to use both extensive- and intensive-forest management approaches and have access to a full range of practices. This will allow them to make the right choices based on their objectives and the forest conditions.
30. There needs to be a concerted effort to stop operators who do not follow regulations. This requires a co-operative effort between government, land owners, and industry.
31. Develop mechanisms to assist private woodlot owners to have management plans prepared for their woodlots by licensed forestry professionals, including through forest certification programs.
32. Drive continual improvement in practices through the use of management plans, best-management practices, and by ensuring compliance with existing regulations. Focus on both the planning (prescribing the appropriate practices) and the implementation (carrying out practice on the ground).
33. Review legislation associated with recreational use on private lands to reduce liability concerns for land owners who wish to encourage recreational activities on their lands. Require written permission for off-highway vehicle use on private lands (*Off-highway Vehicles Act*).
34. Best-management practices should include issues that are important to recreational users, such as the maintenance of traditional canoe portages.
35. Identify appropriate incentive mechanisms to encourage woodlot owners to invest in their woodlot and to keep their private lands as forest lands.
36. A co-ordinated effort between industry and governments is required to ensure an integrated, competitive, and sustainable forest products industry in Nova Scotia producing a range of products.
37. The provincial government should implement procurement policies that give preference to forest products and promote wood-based products in general, particularly those that can be manufactured in Nova Scotia. All internationally recognized forest certification should be treated equally in any procurement policies.
38. The provincial government should look at modifications to the building code that would increase the use of lumber, particularly in commercial construction.
39. Support should be available for value-added opportunities that can compete internationally and can integrate into the existing industry.
40. Co-operative efforts between industry and governments are needed to develop and retain a well-trained, educated workforce that is essential for a viable industry. Training for forest operators should be supported through training organizations such as the Forestry Safety Society of Nova Scotia and through programs such as the Atlantic Master Logger.
41. A co-operative approach is needed between the departments of Natural Resources and of Agriculture to provide research and development support to the Christmas tree industry, including consideration for Christmas trees as an eligible commodity.
42. Complete the action plan developed by the Joint Industry/Government Task Force under the Nova Scotia Forestry Transition Program.
43. Maintain the excellent provincial system for fire detection and suppression, including the network of fire towers and aircraft.
44. Provide increased support to rural volunteer fire departments to ensure that membership, equipment, and training is adequate.
45. Continue to implement an integrated pest management program, which includes the option of using pesticides when necessary.
46. Expand the pest detection and monitoring programs to ensure rapid detection of exotic pests and infestations of native pests. Continue to improve ability to predict fire and pest outbreaks. Develop an overall strategy for invasive exotic species, with a focus on early eradication.
47. Work with private land owners to co-ordinate monitoring efforts that will help minimize losses to forest pests.

48. In co-operation with federal agencies, develop strategies for preventing pest outbreaks in protected areas, including national parks, from spreading to the surrounding forest lands.
49. Forest herbicides should continue to be available for use with both ground and aerial application.
50. Implement a comprehensive best-management practices approach to improving forest management outcomes on private lands, rather than additional command-and-control regulation. This should be developed through a multi-stakeholder approach, using good examples from other jurisdictions. Regulatory changes may be needed to support this approach, such as requiring licensing of contractors, if that is to be implemented. Performance indicators should be developed to track progress. Private land that is meeting required outcomes under a recognized forest certification program could be exempted from certain requirements.
51. Implement a greatly enhanced and expanded extension effort to support a best-management practices approach and help woodlot owners understand their rights and responsibilities; their options for management, including harvesting practices; and the value of forest management plans. The primary lead for this effort should be the Department of Natural Resources, with participation from woodlot owner organizations, industry, and other appropriate groups.
52. Develop and implement programs to increase the public understanding of the many values of forests, both public and private, and of the importance of a forest products industry to our sustainable prosperity. Forests and forestry issues should be incorporated into the education system. Programs for teachers, such as the Atlantic Teachers Tours, should be supported.
53. Investigate innovative schemes, such as those in use in other areas, to create mechanisms to ensure that those who benefit from environmental services of forests pay the producers of such services.
54. A full review of the regulatory framework will be necessary to support the new natural resources strategy, including key legislation, such as the *Forests Act*, *Crown Lands Act*, *Wildlife Act*, and *Environment Act*, and associated regulations. The report being prepared for the Forest Products Association of Nova Scotia should be a key component of this review. The review should result in reduced red tape, regulations that meet the S.M.A.R.T. standard, requirements that are outcome-based with more consistent interpretation and application. Overall, they should be designed to support a best-management practices approach and enhanced extension program and should minimize a command-and-control approach.
55. Compliance with the *Wildlife Habitat and Watercourses Protection Regulations* must be improved. The key focus should be on achieving compliance through the proposed best-management practices approach and enhanced extension program, rather than simply increasing enforcement.
56. Silviculture treatment programs for non-industrial land owners need to be delivered through an effective and efficient mechanism. It is recommended that the basic program structure under the *Forest Sustainability Regulations* should remain as is, with a mechanism added for funding of forest management plans and with a more equitable long-term funding arrangement. This would require changes to the regulations. The restrictions on land owners over 2,000 hectares should be removed. Both uneven- and even-aged management should continue to be supported. If the program is expanded to carry out additional amounts and types of treatments, it is not appropriate that the cost of these treatments be borne by Registered Buyers. Consideration could also be given, after an appropriate phase-in period, to making a management plan a requirement for funding of silvicultural treatments on properties above a certain minimum size (as it may not be cost effective to require a management plan on extremely small woodlots).
57. The Association for Sustainable Forestry should continue to deliver a selection management (Category 7) program.
58. Conduct a review on the valuation, allocation, and sale of Crown Timber Resources. This review should result in recommendations for improvements to tenure-of-supply arrangements in support of the new natural resources strategy while also respecting existing commitments. There are models in other jurisdictions that could be considered, including the New Brunswick example that is mentioned in the Agribusiness/Forest Sector Consultants report (AGFOR 2000).

59. Address issues related to land claims by First Nations through the Made in Nova Scotia process. Develop mechanisms with First Nations to incorporate traditional aboriginal knowledge.
60. Ensure provincial government departments work in cooperation with each other and with other levels of government in support of the natural resources strategy and other government initiatives. The Deputy Ministers Forum on Sustainable Competitiveness is one model that could be followed.
61. The Department of Natural Resources should remain the lead agency with respect to key responsibilities, including sustainable forest management in Nova Scotia, the management of all Crown lands, forest research and monitoring, and enforcement. The organizational structure of the department should be reviewed to ensure alignment with the new natural resources strategy. To maintain an efficient organization in a relatively small province, it is likely that some type of multi-functional model, such as the current approach in Regional Services, will be required. A mechanism for incorporating the best external scientific advice should be developed.
62. Ensure environmental protection requirements, such as special management zones (riparian zones) on watercourses that are required in forest management under the *Wildlife Habitat and Watercourse Protection Regulations*, are also applied to other land uses.

11.0 GLOSSARY

Acadian forest region

The Acadian Forest Region stretches primarily from New York through New Hampshire, Vermont, and Maine and includes all the provinces of New Brunswick, Nova Scotia, and Prince Edward Island. Closely related to the Great Lakes-St. Lawrence and Boreal regions it is a transition forest that contains a diverse collection of trees, shrubs and other plants.

<http://botanicalgardens.acadiamu.ca/acadianForest.html>

Annual allowable cut (AAC)

The amount of timber that is permitted to be sustainably cut from a particular area. AAC is the basis that many provinces use to regulate levels to ensure a sustainable supply of timber.

<http://gov.ns.ca/natr/extension/education/sustain/glossary.htm>

Association for Sustainable Forestry (ASF)

The Association for Sustainable Forestry provides small private woodland owners with the financial means to implement forest improvement work on their properties. The association works with silviculture contractors, woodland owner groups, and individuals to allocate and monitor the silviculture funds available through the provisions of the *Nova Scotia Forests Act*.

http://www.asforestry.com/sus_forest_pg1.htm

Atlantica Bioenergy Task Force

The Atlantica BioEnergy Task Force was made up of regional government, industry, federal, and regional organizations and post-secondary institutions, supported by PricewaterhouseCoopers, working together to better understand what opportunities may exist for the forestry sector in the Atlantica region of Maine, New Brunswick, and Nova Scotia. The team systematically examined opportunities in the area of wood-based BioProducts while considering sustainable use of resources, current regional operations, maturity of new technologies, the current regulatory environment, and the economic impact.

<http://www.atlanticabioenergy.com/>

The task force included: Province of Nova Scotia, Province of New Brunswick, The State of Maine, Emera, NB Power, Colour, PricewaterhouseCoopers, JD Irving Ltd, AV Group, Groupe Savoie, AbitibiBowater, NewPage Corp, University of New Brunswick, Dalhousie University, University of Maine, FP Innovations, Maine Pulp and Paper Association, Maine Forest Products Council, Forest Products Association of Nova Scotia, New Brunswick Forest Products

Association, NSERC (Natural Sciences and Engineering Research Council of Canada), BioAtlantech, New Brunswick Innovation Foundation, Atlantic Canada Opportunities Agency, and Bangor Hydro.

Atlantic master logger

The Atlantic Master Logger Certification Program provides a third-party verification process for acknowledging the sustainable practices of harvesting contractors in Atlantic Canada. This volunteer, employer-driven program is based on a program template developed and initiated by loggers in the State of Maine. The program is not an education or training program, but a recognition program for all logging companies, be they sole proprietors or contractors with employees. The certification is held by the contractor's logging company.

<http://cwfc.org/aml.html>

Atlantic teachers tours

Run by the Canadian Woodlands Forum, these tours bring teachers out to the woods and local mills to see how forests are managed, harvested, and conserved, learn how the forest products we use every day are made, and explore career options within Canada's forest sector. The tours' focus is to foster an open and free exchange of information and ideas on the social, economic, and environmental importance of the region's forest industries.

<http://www.teacherstour.com>

Biodiversity

Also referred to as biological diversity, it is the variety and interconnectedness of life, including all species of plants, animals, and other organisms, the genes they contain, and the ecosystems and ecological processes of which they are a part.

Biomass

For the purpose of this paper, the term biomass is used to describe the branches and tops that are normally left in a stemwood-only harvest together with trees that are otherwise unmerchantable due to size, species, etc. Technically, it would be more appropriate to use the term "bioenergy feedstock" or "biofuel" (Smith 2010).

Biotic

Biotic means pertaining to living organisms and their ecological and physiological relations

<http://dictionaryofforestry.org/dict/>

Canadian Standards Association (CSA) forest certification

The CSA Sustainable Forest Management System (SFM) standard is the leading forest certification standard in Canada and the first national sustainable forest management standard in the world. First released in 1996, it is Canada's official national standard for sustainable forest management. CSA certified forests provide independent 3rd party assurance of meeting a set of biological, environmental and social criteria.

<http://www.csasfmforests.ca/home.htm>

Category 7 (Forest Quality Improvement)

One of the silviculture categories under the Nova Scotia *Forest Sustainability Regulations*. This category includes three sub categories; a) Crop Tree Release, b) Crop Tree Pruning, and c) Selection Management.

Clearcut

A clearcut is a stand in which essentially all trees have been removed in one operation. Depending on management objectives, a clearcut may or may not have reserve trees left to attain goals other than regeneration.

<http://dictionaryofforestry.org/dict/>

Climax forest interpretations

The climax forest is an ecological community that represents the culminating stage of a natural forest succession for its locality

<http://dictionaryofforestry.org/dict/>

Coarse woody debris

Typically sound or rotting logs, stumps, or large branches that have fallen or been cut and left in the woods, or trees and branches that have died but remaining standing or leaning. (Dunster and Dunster 1996)

Code of Forest Practice

A framework for the implementation of sustainable forest management in Nova Scotia. Application of the code on Crown lands will occur within the framework of the Integrated Resource Management planning process at the strategic and local levels for each region of the province. Voluntary application of the code by private land owners will be encouraged by government through extension and education activities. (NS DNR 2004)

Conifer release

A manual or chemical treatment designed to free young conifer trees from undesirable, usually overtopping, competing vegetation.

<http://dictionaryofforestry.org/dict/>

Ecodistricts

There are 39 ecodistricts in Nova Scotia that are characterized by distinctive patterns of vegetation, landform, and ecological processes. These provide the landscape units used for tactical planning (Stewart and Neilly 2008).

Ecological Landscape Analysis (ELA)

These analyses are carried out for each of the province's 39 forested ecodistricts as part of the Integrated Resource Management planning system and provide a foundation for ecosystem-based planning in Nova Scotia. They consider the landscape as an ecological system, connectivity and fragmentation, special features, ecological representation, road ecology, landscape composition and ecological emphasis classification. (Stewart and Neilly 2008)

Ecological Land Classification (ELC)

The ELC for Nova Scotia provides an hierarchical mapping of the province's forest ecosystems. This includes interpretation of the dominant natural disturbance regimes and potential climax forests at the ecosection level of classification.

<http://www.gov.ns.ca/natr/forestry/programs/ecosystem-management.asp>

Even-aged management

A planned sequence of treatments designed to maintain and regenerate a forest stand with one age class. The range of tree ages is usually less than 20 per cent of the rotation. (Dunster and Dunster 1996)

Forest Ecosystem Classification (FEC)

Provides a site level description of ecosites, vegetation communities, and soil types designed for operational level planning.

Forestry Safety Society of Nova Scotia

A non-profit organization that develops and delivers training programs for the Forestry Industry of Nova Scotia.

Forest Stewardship Council (FSC)

FSC is an independent, non-governmental, not-for-profit organization established in 1993 as a response to concerns over global deforestation to promote the responsible management of the world's forests. FSC is a certification system that provides internationally recognized standard-setting, trademark assurance and accreditation services to companies, organizations, and communities interested in responsible forestry. FSC is nationally represented in more than 50 countries around the world.

www.fsc.org.

Forest Products Association of Nova Scotia

FPANS is the largest organization of forest interests in the province with a mission to promote sustainable management and viability of the forest industry and act as the official "voice" of the forest industry.

<http://www.fpans.ca/content/Mission.aspx>

Glyphosate

A broad-spectrum systemic herbicide that is used to control competing vegetation and moves throughout plants once it penetrates plant leaves or stems. It inhibits a very specific enzyme that is found in plants (and some microbial species) but not in higher animals. It is the dominant herbicide used in both forestry and agriculture internationally. Trade names sold in the forest market that are based on glyphosate include Vision, VisionMax, Forza and Vantage. (Thompson and Pitt 2009)

Great Lakes Forestry Centre

One of six Canadian Forest Service (CFS) centres in Canada.

<http://cfs.nrcan.gc.ca/regions/glfc>

Integrated Resource Management (IRM) process

Integrated Resource Management (IRM) is a planning and decision making process that co-ordinates resource use so that the long-term sustainable benefits are optimized and conflicts among users are minimized. IRM brings together all resource groups rather than each working in isolation to balance the economic, environmental, and social requirements of society. IRM includes planning for minerals, forests, recreation, wilderness, energy, wildlife, and parks.

<http://www.gov.ns.ca/natr/irm/introduction.html>

Long Range Management Framework

Long Range Management Frameworks will identify and describe current land values, natural features, and natural resources for the area, such as municipal watersheds, wildlife habitat, wetlands, and scenic views. They will also set objectives for the resources in 20 years time and determine the actions needed to achieve these targets.

<http://www.gov.ns.ca/natr/WILDLIFE/conserva/nr-crownlands.asp>

Macroinvertebrate

An invertebrate animal (without a backbone) large enough to be seen without magnification. (Dunster and Dunster 1996)

Made in Nova Scotia Process

The Made-in-Nova Scotia Process is the forum for the Mi'kmaq and governments to resolve issues related to Mi'kmaq treaty rights, aboriginal rights, including aboriginal title, and Mi'kmaq governance. The process involves the Mi'kmaq of Nova Scotia as represented by the Assembly of Nova Scotia Mi'kmaq Chiefs, and the provincial and federal governments.

www.gov.ns.ca/abor/officeofaboriginalaffairs/whatwedo/negotiations

Manomet Center for Conservation Sciences

Based in Manomet, Massachusetts. One of the nation's oldest independent environmental research organizations, Manomet is working to achieve a more sustainable future. Manomet convenes stakeholders and helps develop science-based, enduring solutions that work in the real world and improve conditions for wildlife, habitats, and people.

www.manomet.org/

Natural disturbance regimes

Natural disturbances in the temperate forests of North America can usually be divided into two types based on the amount of the overstorey removed. Those which remove or kill all the existing trees above the forest floor vegetation are referred to as major disturbances or stand-replacing disturbances. Those which leave some of the pre-disturbed trees alive are referred to as minor disturbances.

(Neilly, Quigley, Stewart and Keys 2007)

National Forestry Database

The Canadian Council of Forest Ministers created the National Forestry Database Program in 1990 with the following objectives; 1) to describe forest management and its impact on the forest resource, 2) to develop a public information program based on the database, and 3) to provide reliable, timely information to the provincial and federal policy processes.

http://nfdp.ccfm.org/about_us_e.php

Native pests

A pest is any organism or damaging agent designated as detrimental to forest resource management. A native pest is one that is known to have existed on a site prior to the influence of humans. (Dunster and Dunster 1996)

Nova Forest Alliance (NFA)

The Nova Forest Alliance (NFA) is a partnership of land owners, researchers, industry, First Nations communities, environmentalists, educational institutions, forest community areas, forest professionals, and government committed to finding sustainable solutions for forest communities in Nova Scotia and Prince Edward Island.

<http://www.novaforestalliance.com/default.asp?cmPageID=77>

Nova Scotia Forestry Transition program

A program introduced by the provincial government in 2007 to assist the forest industry in Nova Scotia.

<http://www.gov.ns.ca/news/details.asp?id=20071012007>

Nova Scotia Tree Improvement Working Group

An industrial-government group established in 1978 engaged in a co-operative program of tree breeding and seed orchard management.

<http://www.gov.ns.ca/natr/forestry/programs/renewal/>

Periphyton

The complex of plants and animals that grow or move about attached to the surfaces submerged in freshwater, such as rocks and plant stems. (Dunster and Dunster 1996)

Registry of Buyers

A registry of individuals and businesses who acquire primary forest products for processing into secondary products, export, sale as firewood, or production of energy. It is a Nova Scotia Government initiative delivered by the Department of Natural Resources under the authority of the *Forests Act*.

<http://www.gov.ns.ca/natr/forestry/registry/default.asp>

Riparian zones

The riparian zone is the land adjacent to a water body. (Mallik 2006)

Selection management

Annual or periodic cutting of trees chosen individually or by groups, in an uneven-aged stand, in order to recover the yield and develop a balanced uneven-aged stand structure, while providing the cultural measures required for tree growth and seedling establishment. The cuts are usually a mix of regeneration and improvement cuts.

Snag

Any standing dead, partially dead, or defective tree at least 3-metres tall. (Dunster and Dunster 1996)

Sustainable Forestry Initiative (SFI)

Launched in 1994, SFI Inc. is an independent, non-profit organization responsible for maintaining, overseeing and improving a sustainable forestry certification program that is internationally recognized and is the largest single forest standard in the world. The SFI 2010-2014 Standard is based on principles and measures that promote sustainable forest management and consider all forest values. It includes unique fibre sourcing requirements to promote responsible forest management on all forest lands in North America.

<http://www.sfiprogram.org/>

Tenure

The act of owning, using, and controlling land under certain terms and conditions.

<http://dictionaryofforestry.org/dict/>

TRIAD system

The TRIAD system refers to the allocation of a forest into reserves and intensive management, within a matrix of extensive management. (Ward, Beckley, MacLean and Erdle 2010)

Uneven-aged management

A combination of practices for a whole forest under sustained yield management that simultaneously maintains continuous tall forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter classes, or age classes with at least 10 to 20 years between them. (Dunster and Dunster 1996)

University of New Brunswick biomass model

Professor Arp, University of New Brunswick, has developed a model for New Brunswick that can be used to identify areas where biomass removal is not recommended, including where it could result in nutrient deficits or loss of soil quality (Arp 2009). He is currently developing a similar tool for the Province of Nova Scotia and a provincewide model will be presented by May 2010.

Variable retention harvest

An approach to harvesting based on the retention of structural elements or biological legacies (trees, snags, logs, etc.) from the harvested stand for integration into the new stand to achieve various ecological objectives. The major variables in the variable retention harvest system are types, densities, and spatial arrangement of retained structures. Aggregated retention is the retention of structures or biological legacies as (typically) small, intact forest patches within the harvest unit. Dispersed retention is the retention of structures or biological legacies in a dispersed or uniform pattern

<http://dictionaryofforestry.org/dict/>

Working forest conservation easements

A working forest conservation easement protects "working forests" by restricting development while allowing other uses, such as commercial forest management, compatible with the purposes of the easement.

http://www.forestguild.org/publications/research/2006/Forest_Conservation_Easements_Forest_Guild.pdf

Whole-tree harvesting

Extraction of the complete tree, including top and branches, from the stump to the landing. The top and branches are then removed at the landing and either piled and left to rot, or disposed of by chipping, burning, or other forms of redistribution back on the cutover area. (Dunster and Dunster 1996)

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