

**CERTIFICATION STANDARDS FOR BEST FORESTRY  
PRACTICES IN THE MARITIME FOREST REGION**

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**CANADIAN MARITIME REGIONAL INITIATIVE  
OF THE  
CANADIAN FSC WORKING GROUP**

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## TABLE OF CONTENTS

The Forest Stewardship Council International Principles And Criteria .....	2
Certification Standards For Best Forestry Practices In The Maritime Forest Region .....	3
Introduction .....	3
Principle #1: Compliance With Laws And Fsc Principles .....	4
Principle #2: Tenure And Use Rights And Responsibilities .....	5
Principle #3: Indigenous Peoples' Rights .....	6
Principle #4: Community Relations And Worker's Rights.....	7
Principle #5: Benefits From The Forest .....	9
Principle #6: Environmental Impact.....	13
Principle #7: Management Plan .....	20
Principle #8: Monitoring And Assessment .....	22
Principle #9: Maintenance Of High Conservation Value Forests .....	23
Principle #10: Plantations.....	24
Glossary.....	27
Appendix I - Natural Forests Of The Maritime Region.....	36
Introduction .....	36
Sugar Maple - Ash Zone .....	37
Sugar Maple - Hemlock - Pine Zone.....	38
Sugar Maple - Yellow Birch - Fir Zone .....	40
Appendix II -Full Cost/Full Benefit Accounting.....	43
Appendix III - Watercourse Buffer Zone Guidelines .....	46

## THE FOREST STEWARDSHIP COUNCIL INTERNATIONAL PRINCIPLES AND CRITERIA

### **Principle #1: compliance with laws and fsc principles**

Forest management shall respect all applicable laws of the country in which they occur, and international treaties and agreements to which the country is a signatory, and comply with all the FSC Principles and Criteria.

### **Principle #2: tenure and use rights and responsibilities**

Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.

### **Principle #3: indigenous peoples' rights**

The legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources shall be recognized and respected.

### **Principle #4: community relations and worker's rights**

Forest management operations shall maintain or enhance the long-term social and economic well-being of forest workers and local communities.

### **Principle #5: benefits from the forest**

Forest management operations shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits.

### **Principle #6: environmental impact**

Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.

### **Principle #7: management plan**

A management plan -- appropriate to the scale and intensity of the operations -- shall be written, implemented, and kept up to date. The long term objectives of management, and the means of achieving them, shall be clearly stated.

### **Principle #8: monitoring and assessment**

Monitoring shall be conducted -- appropriate to the scale and intensity of forest management -- to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.

### **Principle #9: maintenance of high conservation value forests**

Management activities in high conservation value forests shall maintain or enhance the attributes which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.

### **Principle #10: plantations**

Plantations shall be planned and managed in accordance with Principles and Criteria 1-9, and Principle 10 and its criteria. While plantations can provide an array of social and economic benefits, and can contribute to satisfying the world's need for forest products, they should complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests.

**Note:** each principle and criterion is described in detail in the following pages. Here is the explanation for the asterisks marking some of them:

- \*\* **Fatal Flaw.** If the applicant for certification fails at this level, the audit report must contain "preconditions" requiring remediation which will result in a passing mark before certification can be granted.
- \* **Major problem.** If the certification applicant fails at this level, conditions must require remediation within a reasonable time in order for the applicant to maintain certified status.

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**INTRODUCTION**

The Maritime Regional Committee (MRC) of the Forest Stewardship Council (FSC) and the FSC members in the region offer this document as the latest version of forestry standards which have been designed to move the region toward forest and forestry sustainability - ecologically, economically, and socially. The document will continue to evolve as our knowledge, understanding, and experience increase; official revisions will be made every two years.

These standards will be used by FSC accredited certification bodies to judge the performance of owners and managers of woodlands in the region who apply for certification by the FSC. This is a voluntary program open to anyone interested in the tangible and/or intangible benefits of certification.

Our vision for sustainable forestry in the Maritime Provinces is one in which the characteristics of the natural forest are protected where they exist, and restored where they have been degraded. It includes a sustainable harvest of forest products, both timber and non-timber, for the benefit of human society. At the same time, it recognizes that humans are but one of hundreds of thousands of species in this region, each of which is important in its own right and as an integral part of the entire ecological web.

In spite of damaging land use practices in the past, some of which continue today, it is still possible to restore the ecological integrity of much of the region, and to move toward sustainability - ecologically, economically, and socially. A sustainable forestry will be an important part of the foundation for a sustainable society, and certification of "sustainably" managed woodlands will be a major step towards better forestry practices. These regional standards are an essential tool in the certification process.

Two principles are central to all aspects of this document: forest restoration and full cost/full benefit accounting. A primary objective of the movement toward sustainable forestry in the Maritime Region is the maintenance and restoration of the "naturally occurring forest type" for each site. While it is understood that determining the appropriate species composition and structure for any given site is an inexact science, ecological reasonability must prevail. Guidelines for determining the appropriate forest characteristics for any site/landform in the region are contained in Appendix I.

The second fundamental cornerstone of forest and forestry sustainability is the "full cost/full benefit accounting," which refers to three interconnected processes: 1) the valuation of non-market values in market terms, 2) the internalization of external costs, and 3) the replacement of fixed with variable costs. It is understood that thorough assessment of the full costs and full benefits of forestry and of full forestry activities is beyond our current capabilities, and that the implementation of what we do know requires societal initiatives that incorporate incentives and penalties into the taxation, pricing, and financial structures of society. Nonetheless, it is imperative that woodland owners and managers begin to move in this direction and monitor progress in 1), 2), and 3) above. These owner/managers will not want to be penalized for their movement toward sustainability, so they will insist that financial rewards should be in proportion to their restorative efforts. That, in turn, will push policy makers to respond to the new reality on the ground. It has to come from both directions. For a more thorough discussion of full cost/full benefit accounting, refer to Appendix II.

All aspects of this standards document should be interpreted within the context of these fundamental principles of natural forest restoration and full cost/full benefit accounting. In other words, where there is any ambiguity or inconsistency the reader should interpret the standards in ways consistent with these principles.

## **PRINCIPLE #1: \*\* COMPLIANCE WITH LAWS AND FSC PRINCIPLES**

**Forest management shall respect all applicable laws of the country in which they occur, and international treaties and agreements to which the country is a signatory, and comply with all the FSC Principles and Criteria.**

1.1 \* Forest management shall respect all national and local laws and administrative requirements (see “laws and administrative requirements” in the Glossary).

**Indicators:**

The operation complies with all federal, provincial, county, municipal, and local regulations.  
All staff members are aware of such regulations and their legal responsibilities regarding them.  
Up-to-date copies of such regulations are maintained and accessible to staff members.  
Compliance inspections are performed periodically and kept on record.  
Where non-compliances are identified, corrective actions are implemented.

1.2. \* All applicable and legally prescribed fees, royalties, taxes, and other taxes shall be paid.

**Indicators:**

Information regarding such charges is maintained up-to-date and accessible.  
There is evidence of payment of such charges.  
Provisions have been made to meet the costs of future charges.

1.3 In signatory countries, the provisions of all binding international agreements such as CITES, ILO Conventions, ITTA, and Convention on Biological Diversity, shall be respected.

**Indicators:**

A list of all binding international agreements is maintained (see “international agreements” in the glossary).  
The operation complies with all such binding international agreements.  
Staff members are aware of relevant agreements and their legal responsibilities regarding them.

1.4 Conflicts between laws, regulations, and the FSC Principles and Criteria shall be evaluated for the purposes of certification, on a case by case basis, by the certifiers and the involved or affected parties.

**Indicators:**

Any identified conflicts and actions taken to address them are documented.  
Involved and affected parties are consulted and kept informed.

1.5 Forest management areas should be protected from illegal harvesting, settlement, and other unauthorized activities.

**Indicators:**

Surveillance is performed periodically, and protective action is taken.

1.6 Forest managers shall demonstrate a long-term commitment to adhere to the FSC Principles and Criteria.

1.6.1 \* The management plan must clearly and succinctly state the owner’s endorsement of all the Principles and Criteria of the FSC, as well as the standards of the Maritime Forest Region.

**Indicators:**

Adherence and commitment of the operation to FSC P&C's and to the Maritime Regional Standards is documented, communicated to all staff members, and made publicly available. The endorsement can be a one-page statement of adherence and commitment.

1.6.2 \* An owner/ manager must have all its owned and managed lands certified, or be actively engaged in moving all lands within the region towards certification and must be following FSC regional standards on all lands.

**Indicators:**

There is a written plan/strategy for moving all lands toward FSC certification.  
If all lands are not already certified, all staff members are aware of aims in moving all lands towards certification.  
If all lands are not already certified, present forestry activities reflect aims in doing so in the future.  
There is no evidence of contravention of the standards on any owned/managed lands within the region.

1.6.3 Owners/managers must demonstrate that land is committed to long-term forest management.

**Indicators:**

Management planning is based on ecological time frames or at least 100 years.

## **PRINCIPLE #2: \*\* TENURE AND USE RIGHTS AND RESPONSIBILITIES**

Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented, and legally established.

**2.1** Clear evidence of long term forest use rights to the land (e.g. land title, customary rights, or lease agreements) shall be demonstrated.

***Indicators:***

There is documentation showing the legal status of all land and forest that demonstrates legal, long-term (or renewable) rights to manage the land and/or utilize forest resources.

The extent of any First Nations' claims or other claims to forest lands (mining, trapline, water permits, easements, etc.) are documented.

There is evidence of due diligence in establishing clear title.

**2.2** Local communities with legal or customary tenure or use rights shall maintain control, to the extent necessary to protect their rights or resources, over forest operations unless they delegate control with free and informed consent to other agencies.

***Indicators:***

First Nations (see Principle 3), local communities, or other stakeholders, who have recognized legal or customary tenure, or traditional use rights, have been identified (e.g. treaty lands, municipal boundaries, water licenses and permits, community watersheds, traplines, traditional hunting or gathering etc.).

The impacts of proposed forest management operations (including access management) on such uses are evaluated.

All holders of such rights have access to information about current and proposed management activities that may affect their use rights.

There is evidence that free and informed consent to forest management activities affecting legal, customary, or traditional use rights has been given by affected groups and individuals and that their interests have been accommodated.

**2.3** Appropriate mechanisms shall be employed to resolve disputes over tenure claims and use rights. The circumstances and status of any outstanding disputes will be explicitly considered in the certification evaluation. Disputes of substantial magnitude involving a significant number of interests will normally disqualify an operation from being certified.

***Indicators:***

There are records of all previous and on-going disputes over aboriginal title (see Principle 3), land use, or tenure and use rights.

There is documented evidence of commitment to the resolution of on-going disputes.

### **PRINCIPLE #3: \*\* INDIGENOUS PEOPLES' RIGHTS**

**The legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources shall be recognized and respected.**

**3.1** \* Indigenous peoples shall control forest management on their lands and territories unless they delegate control with free and informed consent to other agencies.

**3.1.1** First nations have a special relationship with Canada based on history and interests in lands. First Nation's experience, knowledge, practices, and insights are to be fairly considered in planning and operations. Rights of First Nations shall be formally recognized and given fair accommodation.

**Indicators:**

There is documented evidence that efforts have been made to get First Nation participation in forest management decision-making process.

The owner/manager has a program/procedure for consulting with local First Nations.

Decision-making incorporates and respects the traditional knowledge of First Nations.

Local First Nations have not challenged the management plan in court.

**3.1.2** Where the extent of the rights are in dispute, an appropriate, explicit, and documented process for addressing and resolving grievances is in place and is being followed.

**Indicators:**

Where conflicts are likely to occur, the owner/manager has developed a mechanism to resolve grievances.

**3.2** \* Forest management shall not threaten or diminish, either directly or indirectly, the resources or tenure rights of indigenous peoples.

**Indicators:**

Forest planning and management processes consider and meet obligations with respect to duly established Aboriginal and treaty rights.

Local First Nations are involved in forest management processes.

First Nations have jobs in forest-based businesses on their lands, territories, and resources.

**3.3** Sites of special cultural, ecological, economic or religious significance to indigenous peoples shall be clearly identified in cooperation with such peoples, and recognized and protected by forest managers.

**3.3.1** Areas of cultural sensitivity must be identified and incorporated in forest management/operational plans.

**Indicators:**

Local First Nations have participated in the identification of Native values and in the production of native background information reports.

The protection of sites with unique or sign of First Nations social, cultural, or spiritual values are addressed in the planning process and within the management itself.

Areas of significant cultural sensitivity are delineated on maps and forest workers are aware of their location.

**3.3.2** \* Informed consent by First Nations to any operations on culturally significant areas must be granted.

**3.4** Indigenous peoples shall be compensated for the application of their traditional knowledge regarding the use of forest species or management systems in forest operations. This compensation shall be formally agreed upon with their free and informed consent before forest operations commence.

**Indicators:**

There is evidence that First Nation communities were informed and that compensation was provided as agreed.

## **PRINCIPLE #4: \*\* COMMUNITY RELATIONS AND WORKER'S RIGHTS**

**Forest management operations shall maintain or enhance the long-term social and economic well-being of forest workers and local communities.**

**4.1** The communities within, or adjacent to, the forest management area should be given opportunities for employment, training and other services.

**4.1.1** Traditional, non-timber, environmentally appropriate uses (those that do not threaten native plant or animal populations or ecological functions) of the forest by local people or the public that are well established (but not necessarily legal rights) are sustained on a permissive basis. These should include First Nations' rights to resource uses under treaties. User-fees may be charged by the forest manager/owner. Typical examples include:

- a. Fishing and Hunting
- b. Recreational use
- c. Wildcrafting (basketry, wreathes etc.)
- d. Wild food gathering
- e. Water

**Indicators:**

There is evidence that traditional, non-timber, environmentally appropriate uses of the forest are sustained.

**4.1.2** The landowner must provide evidence of support for the local community. Some examples include: supporting local processing and value-added manufacturers, supporting local businesses, supporting local hiring, education and training.

**Indicators:**

At a level appropriate to the scale of the forest operation, support is provided for local infrastructure, facilities, and social programs.

The employment process and the employee composition demonstrate the operations commitment to the local people.

Affiliations are made as local as possible, and justified where not local.

Local communities are made aware of the opportunity for active involvement in services provided by the operation.

**4.2 \*** Forest management should meet or exceed all applicable laws and/or regulations covering health and safety of employees and their families (see "laws and administrative requirements" in Glossary).

**Indicators:**

Staff members are aware of relevant regulations and their responsibility in implementing them.

**4.3 \*** The rights of workers to organize and voluntarily negotiate with their employers shall be guaranteed as outlined in Conventions 87 and 98 of the International Labour Organization (ILO).

**Indicators:**

All staff members are aware of such rights.

**4.3.1** Mechanisms should exist for the resolution of employee grievances.

**Indicators:**

Worker-employer disputes or conflicts, and action taken to resolve them, are documented and kept on record.

Explanation of the dispute resolution process is available to employees.

**4.4** Management and planning operations shall incorporate the results of evaluations of social impact. Consultations shall be maintained with people and groups directly affected by management operations.

**4.4.1** Employees must be given opportunities to participate in, and give feedback on, major management decisions and policy formulation.

**Indicators:**

All staff members are aware of such opportunities and encouraged to follow up on them.

**4.4.2** As appropriate to the size of the ownership and the circumstances of the local community, local communities and community organizations directly affected by forestry activities must be given an opportunity to participate in the setting of forest management goals and in forest management planning.

**Indicators:**

The operation publicizes its operational activities and objectives (i.e. through literature, mailings, workshops, and/or advertisements).

There is evidence that community feedback was considered in management planning.

**4.4.3** When operating within 500 metres of a boundary line, the owner(s) of the adjacent land(s) must be given a minimum of 60 days notice and their concerns considered prior to commencement of the activity.

**Indicators:**

There is evidence that such owners were given a minimum of 60 days notice.

There is evidence that concerns were considered prior to commencement of the activity.

**4.4.4** Owner/manager(s) must demonstrate their cooperation, support, or assistance to other sustainable management initiatives within the region.

**Indicators:**

A list of other sustainable management initiatives within the region is maintained.

Documentation of consultation and support provided.

**4.4.5** The presence of logging operations must not jeopardize the existence of nearby communities/community initiatives within their region.

**Indicators:**

Potential conflicts between logging operations and other community initiatives within the region have been analyzed, and alterations within the management plan have been made to avoid such conflicts.

Conflicts and actions taken to address them have been documented.

**4.4.6** Harvest operations and road designs must must consider impacts on visual and sound quality in the vicinity of high use areas.

**Indicators:**

Efforts have been made to use equipment with noise reduction features.

Efforts have been made to locate management activities away from trails and any other high residential and/or recreational use areas.

Efforts have been made to address community concerns.

**4.5** Appropriate mechanisms shall be employed for resolving grievances and for providing fair compensation in the case of loss or damage affecting the legal or customary rights, property, resources, or livelihoods of local people. Measures shall be taken to avoid such loss or damage.

**Indicators:**

Procedures are documented and employed for resolving such grievances.

Due diligence measures are taken to prevent such loss or damage.

## **PRINCIPLE #5: \*\* BENEFITS FROM THE FOREST**

**Forest management operations shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits.**

Practices must be tailored to regional landscape, stand and market conditions. Practices justified mainly by their economic expediency should be avoided.

Forest management activities must strive to ensure that the ownership's timber resource will achieve sustainable production levels, within ecological limits, in perpetuity. This means managing harvests, silvicultural treatments, and plantings, as well as business infrastructure and dealings, in accord with natural capacities of the land for sustained production. Present management must not remove so much timber from the forest that the available resource will decline in the future. In order to achieve this, the owner / manager must plan on ecological, rather than fiscal, time scales; take less timber than regeneration and annual growth increment promise to replace; and protect all functions of the ecosystems upon whose health the trees' health depends.

**5.1** Forest management should strive toward economic viability while taking into account the full environmental, social and operational costs of production, and ensuring investments necessary to maintain the ecological productivity of the forest.

***Indicators:***

The forest enterprise has adequate financial and human resources to implement the management plan(s).

The costs of forest management including environmental and social activities, are identified, estimated and included in current and future budgets.

The forest management enterprise demonstrates long term viability and stability and provides for reinvestment to maintain economic (company), social (community and workforce), and biological (forest) productivity.

Investments are made to maintain an optimal range of forest products.

**5.1.1** Investments in timber stand improvement, land resource information base and research of the local ecology must be sufficient to achieve management objectives of maintaining or restoring ecological integrity.

***Indicators:***

Results of timber stand improvements demonstrate achievement of management objectives concerning maintenance or restoration of ecological integrity.

Data are being collected to monitor achievement of these management objectives.

**5.1.2** An owner must demonstrate improving efficiency of fossil fuel use.

***Indicators:***

Evidence of improving the efficiency of fossil fuel use exists.

There is an active program in place to reduce use of fossil fuels.

**5.1.3** An owner/manager must demonstrate that acquisition of new equipment and maintenance of all equipment considers and reduces pollution and environmental degradation.

**5.1.4** Stumpage rates and roundwood prices being paid to landowners and governments by a landowner or mill seeking certification must be fair and equitable given logging conditions, timber quality, volume, and local experience with comparable log markets.

***Indicators:***

There is no evidence that prices paid are unfair or inequitable.

**5.1.5** The revenue derived from activities and operations on the forest unit must be sufficient to support the long term management strategy.

***Indicators:***

There is evidence that the management strategy is being implemented on the ground.

**5.1.6** There must be sufficient investment in forest management to ensure sustainability.

***Indicators:***

There is evidence of adequate investment into road maintenance, stand improvement and wildlife habitat improvement.

**5.1.7** Financial situation, investment objectives, and debt load must not place undue pressure on the operation or threaten long term objectives and sustainability.

**Indicators:**

There is clear evidence of intent of long-term management (over several rotations).

**5.2** Forest management and marketing operations should encourage the optimal use and local processing in the forest's diversity of products.

**Indicators:**

There is evidence that active efforts are made to develop markets for, and optimize local use, processing of, and added value to timber and non-timber products.

**5.2.1** Forestry operations should seek the "highest and best use" for individual trees, including habitat use.

**Indicators:**

Forest manager demonstrates working knowledge of forest product markets.

Products are sorted for highest economic value.

Value-adding markets are given preference for sale of products.

Forest workers have been trained to identify trees with high biodiversity/habitat values.

There is evidence that trees with high biodiversity/habitat value have been retained.

**5.3** Forest management should minimize waste associated with harvesting and on site processing operations and avoid damage to other forest resources.

**Indicators:**

There is evidence that harvest and processing operations are designed to optimize value and avoid log damage and breakage.

There is evidence that log specifications and harvest procedures are designed to optimize values and avoid waste.

There is evidence that coarse woody debris is left on site to maintain site productivity and biodiversity values.

Wood waste is not burned on site.

Harvested wood and/or products processed on-site are transported promptly.

Post-harvest monitoring assesses waste left on site and results are used in management planning.

**5.3.1** Harvesting methods must minimize damage to trees left standing (e.g. "skinned" trees or broken tops).

**Indicators:**

There are credible targets established and monitored with respect to residual tree damage on all harvesting operations.

Fallers are competent with directional falling.

Directional falling is used to avoid damage to residual trees and regeneration.

Performance incentives are used to minimize residual stand damage.

Timber sales agreements include measures designed to minimize residual stand damage.

Road and skid-trail layout is designed to minimize residual stand damage.

**5.3.2** Logs and lumber must be handled so as to minimize potential loss in value from degradation, exposure, and saprophytes.

**Indicators:**

Management is knowledgeable of the risks of degradation, exposure, and saprophytes.

Active measures are taken to prevent loss in value.

**5.4** Forest management should strive to strengthen and diversify the local economy, avoiding dependence on a single forest product.

**Indicators:**

There is evidence that rational and sustainable use of non-timber forest products is encouraged and over-exploitation is controlled.

**5.4.1** Non-timber forest product opportunities must be assessed.

**Indicators:**

Management is aware of NTFP opportunities.

Potential for NTFP's is included in the management plan.

Assessment of NTFP opportunities is included in the management plan.

**5.4.2** Efforts must be made to diversify product types and promote the use of under-utilized species that form a large portion of naturally composed forests, without compromising natural forest integrity.

**Indicators:**

Under-utilized species are identified in forest inventories.

Markets are sought for under-utilized species.

Harvest of under-utilized species does not compromise natural forest integrity.

**5.4.3** Recreational activities must be environmentally appropriate (those that do not threaten native plant or animal populations or ecological functions) and must not compromise other criteria.

**Indicators:**

Recreational activities are identified, monitored, and controlled to minimize environmental damage.

Hiking and/or ATV trails do not contribute to erosion or degradation of riparian areas.

**5.5 \*** Forest management operations shall recognize, maintain and, where appropriate, enhance the forest services and resources such as watersheds and fisheries.

**Indicators:**

Range of forest services are recognized and described (see Appendix II for examples)

The potential impacts of forest management activities on these services are recognized and described.

Forest management practices are planned and implemented so as to avoid or mitigate unacceptable impacts on forest services and non-timber forest products.

**5.5.1** Foresters managing and working in woodlands must be aware of and apply the most appropriate practices, based on scientific and local-historical findings. These practices must be reviewed and revised regularly as new information becomes available.

**Indicators:**

Foresters can demonstrate use of scientific and local-historical findings in management practices.

Foresters incorporate adaptive learning in management planning.

**5.5.2** Management must demonstrate a good understanding of local ecology, including, for example, competing vegetation, wildfire, windthrow, herbivory, disease, and the role and values of dead wood.

**Indicators:**

Management plans clearly indicate an understanding of local ecology.

Forest manager is knowledgeable of various aspects of the local ecology.

**5.5.3** Owner/manager must demonstrate commitment, efforts, and practices, reflected in the management plan, to improve, or at least maintain, the full range of non-timber benefits (e.g. climate regulation, water supply, erosion control and sediment retention, nutrient cycling, waste treatment, biological control, recreation, aesthetics, cultural values, etc. – see Appendix II part A for further examples).

**5.5.4** Owner/manager must demonstrate commitment, efforts, and practices, reflected in the management plan, to reduce the external costs (externalities) associated with forestry and milling operations (e.g. CO<sub>2</sub> emissions, mill effluent, etc. – see Appendix II part B for further examples). Many of these external costs are measurable directly or indirectly (e.g. fossil fuel consumption).

**5.5.5** Owner/manager must work towards reducing reliance on subsidies, if any, for the long-term viability of the operation. This is a step toward full cost accounting.

**5.6 \*** The rate of harvest of forest products shall not exceed levels which can be permanently sustained.

**Indicators:**

The rate of harvest of forest products is determined for defined forest areas (i.e. tenure units), and is derived from a long term ecosystem based planning process that uses up-to-date resource information and considers ecological factors, community stability, stakeholder input, and the full range of resource values and constraints.

Harvest level determinations for defined forest units are publicly available.

Harvest levels are monitored and accurately reported.

**5.6.1** Rates of harvest of any forest product must be sustainable within ecological limits.

***Indicators:***

Harvest rates are based on conservative growth and yield data.

Harvest rates allow for the maintenance or restoration of natural abundance and distribution of deadwood.

**5.6.2** A pre-harvest inventory or sale area reconnaissance must be implemented.

***Indicators:***

There is evidence of pre-harvest inventories.

**5.6.3** An operating/harvesting plan must be written, available, and used in the forest that includes 1) silvicultural guidelines, 2) volume and basal area targets, 3) residual species composition, 4) tree marking guidelines, and 5) transportation and access.

***Indicators:***

There is evidence that such a plan exists.

## **PRINCIPLE #6: \*\* ENVIRONMENTAL IMPACT**

**Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.**

The full value and importance to the forest of any one organism or structure is too complex to be evaluated fully. The least-risk approach to maintaining forest ecosystems while deriving economic value from the forest is to preserve the full range of structures, organisms and elements that are/were present in the natural forest and, in our management activities, to closely imitate the dynamic processes and cycles that influence its development. Whatever remnants of the original old-growth forest that are left today must be preserved as irreplaceable sources of methodological guidance and inspiration. In addition, protection should be extended to areas that (a) are especially sensitive to human activities, (b) are essential to the achievement of ecological goals, or (c) represent an ecotype, land form or habitat that otherwise would not be adequately represented in a network of reserve areas. Such protected areas are an absolute prerequisite to ecologically sound restoration and harvest practices.

**6.1** \* Assessment of environmental impact shall be completed -- appropriate to the scale, intensity of forest management and the uniqueness of the affected resources -- and adequately integrated into management systems. Assessments shall include landscape level considerations as well as the impacts of on-site processing facilities. Environmental impacts shall be assessed prior to commencement of site-disturbing operations.

**Indicators:**

Owner/manager is aware of the regional, sub-regional and landscape context of the property.  
Adequate inventory exists of property characteristics and resources and environmental values.  
Benchmarks have been developed against which to measure potential environmental change.  
Management objectives have been set regarding environmental impacts.  
Monitoring and assessments of environmental impacts or change are conducted and results integrated into forest management activities.

**6.1.1** Environmental impacts shall be assessed prior to and following the harvesting of both timber and non-timber forest products or the non-extractive uses of the woodlands.

**6.1.2** The owner/manager must possess a good knowledge of the variety and extent of soil types in their landholdings and demonstrably use this knowledge in designing management, including road system design and silviculture design.

**Indicators:**

The forest manager can identify soils with severe operating limitations.  
The forest manager can identify indicator plants.  
Selection of road sites is clearly influenced by knowledge of soil types.  
Silvicultural design is clearly influenced by knowledge of soil types.

**6.2** \* Safeguards shall exist which protect rare, threatened, and endangered species and their habitats (e.g. nesting and feeding areas). Conservation zones and protection areas, appropriate to the scale and intensity of forest management and the uniqueness of the affected resources, shall be established. Inappropriate hunting, fishing, trapping and collecting shall be controlled.

**6.2.1** \* Threatened and endangered species (listed by provincial and federal endangered species legislation) and their habitat must be protected or managed in accordance with approved recovery plans. Where recovery plans are not yet approved, disturbance of known occurrences of such species is to be avoided and a cautionary approach taken to protect their habitat. Forest owner/manager activities must ensure that species that are rare, vulnerable or under investigation by COSEWIC, or their provincial equivalents as designated by recognized authorities (e.g. academic experts, provincial or national museums or COSEWIC) are not further threatened by timber or non-timber activities.

**Indicators:**

Areas are inventoried for such species before harvesting, stand improvement or road-building activities are carried out (appropriate to the scale and intensity of the operation).  
Protection of such species is addressed in the management plan.  
Known occurrences of such species and their habitat are not disturbed.  
Forest workers are aware of known occurrences of such species and are following the management plan with respect to protecting such species and their habitat.

Management staff is aware of those species that may occur locally.

**6.2.2 \* Old growth stands must not be harvested.**

**Indicators:**

Inventories are carried out to identify old growth stands (appropriate to the scale and intensity of the operation).

Old growth stands are identified on management plan maps.

No evidence of harvesting old growth stands exists.

Management and forest workers are aware of the characteristics of old growth stands.

**6.2.3 Areas with unusually high native species or ecosystem diversity must be identified, and protected or managed in such a way as to ensure that the diversity is not lost.**

**Indicators:**

Management has identified areas with unusually high native species or ecosystem diversity using the latest regional methodology, formulae, and/or techniques (e.g. those used by WWF, Greater Fundy Ecosystem Research Group or New Brunswick Nature Trust).

Such areas are identified on management plan maps.

Management plans detail measures to ensure the diversity of such sites is not lost.

Forest workers are following the management plan measures to ensure the diversity of such sites is not lost.

**6.3 Ecological functions and values shall be maintained intact, enhanced or restored, including:**

- a) Forest regeneration and succession;
- b) Genetic, species and ecosystem diversity;
- c) Natural cycles that affect the productivity of the forest ecosystem.

**Stand Level Objectives:**

Clear cutting or other aspects of even-aged management may be appropriate when they are used as the best tools to restore the natural forest type, (including non-timber forest values), appropriate to the site (Appendix D). This would apply to natural forest types such as jack pine, black spruce or black spruce/balsam fir. Clearcuts must have irregular perimeters, leave clumps of live trees and an abundance of scattered standing and downed coarse woody debris. This would be intended to maintain natural forest types in natural configurations on the landscape rather than being intended to mimic catastrophic disturbances.

**6.3.1 \* Tree Species Diversity: Indigenous tree species appropriate to the site should occur in relative frequencies similar to those of the natural forest or, if not, demonstrate that management is restoring to those conditions.**

**Indicators:**

Indigenous tree species appropriate to the site occur in relative frequencies similar to those of the natural forest.

Management plan details efforts to restore such conditions.

There is evidence that efforts to restore such conditions are being carried out.

**6.3.2 \* Canopy height: Management shall strive to increase all measures of canopy height including height of the tallest trees and average height of the dominant trees, except in cases where even-age management is appropriate.**

**Indicators:**

Silvicultural prescriptions and marking guidelines foster the development of increased canopy height.

**6.3.3 \* Crown Closure: Canopy closure should be maintained within 20% of the natural range except in cases where even-age management is appropriate.**

**Indicators:**

Management is aware of the natural range of canopy closure.

Canopy closure is maintained within 20% of the natural range.

**6.3.4 \* Age/Size Class Distribution: Maintain a full range of age / size class distribution of tree species, except in cases where even-age management is appropriate.**

**Indicators:**

Tree marking and silviculture techniques foster the maintenance of a full range of age / size class distribution.

A full range of age / size class distribution of tree species is maintained.

**6.3.5 \* Dead Wood:** Restore towards natural patterns (abundance, size, distribution) of dead wood in each stand.

**Indicators:**

There is evidence that management has implemented practices that will increase snags and coarse woody debris toward natural patterns.

**6.3.6 \* Soil:** Minimize soil compaction and erosion.

**Indicators:**

Owner/manager regularly monitors road systems and forestry operations for erosion and compaction and takes corrective actions in a timely manner.

Owner/manager has standards in place for maximum allowable rutting.

A process is in place to match machinery (used in harvesting and other management activities) to site conditions in order to prevent soil compaction and erosion.

Owner/manager and forest workers can identify soils with severe operating limitations.

Landings are located on near level ground.

Where necessary, water bars are constructed as soon as logging completed or when operations are suspended during wet periods.

**6.3.7 \* Nutrient and Water Cycles:** Minimize soil nutrient loss; build soil; avoid any degradation of water quality; use practices that will slow water flow through the forest system, from canopies, through wetlands to primary water courses.

**Indicators:**

Owners/manager demonstrates substantive efforts to increase the amount of dead woody debris left in the forest

Soil and water protection is explicitly addressed within the management plan and followed up with on the ground performance.

**6.3.8 \* Harvest Levels:** Limit the harvest of timber and non-timber products to levels which do not compromise the local populations of harvested species or the health of its habitat or the stand, except in cases where even-age management is appropriate.

**Indicators:**

There is no evidence of habitat destruction or loss of species diversity within the stand

**6.3.9 \* Timber Harvest Selection:** For uneven-age management - mimic non-extensive, non-catastrophic natural disturbance.

**Indicators:**

Silvicultural prescriptions mimic pattern, size, and distribution of natural disturbance patterns appropriate to the ecosite.

**\* Landscape Level Objectives:**

These apply particularly to large landowners.

**6.3.10** Management must strive to approximate typical natural forest characteristics for the ecosite with respect to forest community types, species composition, and seral stage composition and distribution.

**Indicators:**

Owner/manager demonstrates an understanding of landscape level issues relating to the property which is reflected in the management plan.

Efforts have been made to compare current forest conditions with historical and natural levels and an appropriate maintenance/restoration plan is in place.

**6.3.11 \* Management** must strive to approximate a spatial pattern and distribution of forest communities that is representative of natural forest characteristics for the ecosite.

**Indicators:**

Owner/manager demonstrates an understanding of landscape level issues relating to the property which is reflected in the management plan.

Efforts have been made to compare current forest conditions with historical and natural levels and an appropriate maintenance/restoration plan is in place.

**6.3.12** Management must achieve a functional level of connectivity and must avoid excessive fragmentation.

**Indicators:**

Owner/manager shares management information and cooperates with adjacent property owners in an effort to address issues of connectivity and fragmentation

Owner/manager demonstrates an understanding of landscape level issues relating to fragmentation and connectivity which is reflected in the management plan.

In even-aged systems, functional habitat dispersal corridors are well planned and implemented.

New road construction is designed to minimize forest fragmentation.

**6.3.13** \* The rationale for all decisions to plant tree seedlings instead of relying on natural regeneration must be well defended and documented in the management plan.

**Indicators:**

Silvicultural prescriptions are based on a good understanding of pre-colonization and natural forest types and dominant natural disturbance regimes.

**6.3.14** \* Local seed sources must be maintained by ensuring that viable populations remain at the landscape level.

**Indicators:**

Owner/manager demonstrates an understanding of the population dynamics of tree species (e.g. viable population size, frequency of good seed years, seed dispersal characteristics, germination/uptake conditions, etc.).

Where planting occurs, seed sources are genetically appropriate to the site.

**6.3.15** Specific wild life habitat objectives must be set and adequate habitat levels must be maintained and developed.

**Indicators:**

Habitat objectives, including consideration of interior forest species, old forest dependent species, VTE species, and keystone/indicator species (including aquatic species), are specified in the management plan and are being implemented.

**6.3.16** \* Watersheds must be managed in order to protect water quality and to prevent unnatural fluctuations in water temperature and discharge.

**Indicators:**

Forest management is likely to protect/enhance water quality (e.g. turbidity), stabilize surface water flow fluctuations, and maintain/lower water temperature.

**6.4** \* Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps, appropriate to the scale and intensity of operations and the uniqueness of the affected resources.

**Indicators:**

Existing ecosystems on the ownership are inventoried and documented on management plan maps.

Management plan addresses the protection of representative samples of existing ecosystems within the landscape.

Representative samples are protected in their natural state.

**6.4.1** The landowner must protect all ecologically unique areas/ features that occur on the ownership.

**Indicators:**

There is a program in place to identify ecologically unique areas/features.

Such areas are identified on management plan maps.

Forest workers are aware of their locations.

There is on the ground evidence that these areas are protected.

**6.4.2** For large landowners: if the holding presents the only opportunity for protecting a feature in need of representation in the given ecological unit, an appropriate proportion of the area must be protected to IUCN I or II. The level of representation, and the appropriate proportion to protect, must be determined by the landowner, making reference to accepted and peer reviewed gap analyses and ecological integrity principles (e.g. those of WWF , NB Nature Trust, or Fundy Model Forest).

**Indicators:**

Provincial or other specialists have been consulted on the occurrence and the protected status of ecologically unique areas/features and/or under represented features in the landscape.

An appropriate proportion of any ecologically unique features has been appropriately protected.

**6.4.3** For large landowners: if the holding is located in an ecoregion or natural landscape unit that is not adequately represented by protected areas, the owner/ manager must commit for protection (no logging, no road building) an appropriate proportion of the land base until representative goals are met. The level of representation, and the appropriate proportion to protect, must be determined by the landowner, making reference to accepted and peer reviewed gap analyses and ecological integrity principles (e.g. those of WWF, NB Nature Trust or Fundy Model Forest).

**NOTE: No specific proportions are specified here because there is no scientifically-agreed minimum proportion and it was determined to be inappropriate to specify an arbitrary percentage. The certifier will be able to assess compliance with this standard objectively with the help of the cited references.**

**Indicators:**

The owner/manager is familiar with the level of representation across the landscape and is aware of the potential of features/sites on the property to contribute towards representation.

The owner/manager has consulted with provincial and WWF representatives to ensure that the selection, locations, and size of reserves are ecologically sound and beneficial to a provincial system of protected areas.

**6.4.4** In view of the importance of protected areas for best forestry practice in the Maritimes the owner/manager will actively support multi-stakeholder initiatives that include government, industrial and private landowners, and non-government agencies to establish systems of protected areas in the region of the landholding.

**Indicators:**

The landowner/manager can demonstrate their contribution to the provincial protected areas system.

The landowner/manager can demonstrate support of multi-stakeholder initiatives to establish a protected areas system in the region of the landholding(s) both in principle and in practice.

The landowner/manager has either acted alone to ensure that the protected areas approach to representing regional ecological diversity has been applied on the landholding, and/or has collaborated with neighbouring landowners to this end.

**6.5** \* Written guidelines shall be prepared and implemented to control erosion; minimize forest damage during harvesting, road construction and all other mechanical disturbances; and protect water resources.

**6.5.1** Road construction and maintenance must be conducted so as to minimize damage to the forest and water areas.

**Indicators:**

Road systems are designed to minimize loss of productive forest land and to minimize erosion.

Haul roads, landings and main skid trails are designed planned and laid out prior to tree marking and logging activities

Area of property that is covered by skid trails, roads, landings is less than regional norms.

Trail systems avoid wet spots, seeps, poorly drained areas, and intermittent streams.

**6.5.2** \* Watercourse crossings must be designed and laid out to minimize damage to the forest and water course.

**Indicators:**

Efforts are made to minimize the number and area of stream crossings.

There is no evidence of mineral soil exposure on slopes within 15 metres of the watercourse, except natural occurrences of exposed mineral soils.

Surface water runoff from roads does not flow directly into the watercourse.

**6.5.3** \* Buffer zones must be maintained adjacent to all bodies of water and water courses including seasonal ponds and vernal pools (see Appendix III). The extent and levels of protection of these buffer zones must be adequate to serve all the natural forest functions of such zones including:

**6.5.3.1** control of erosion of soil and organic debris;

**6.5.3.2** control of stream sedimentation;

**6.5.3.3** stabilization of surface and ground water flow fluctuations;

**6.5.3.4** stabilization of water temperatures;

**6.5.3.5** provision of organic debris (large diameter wood) for the aquatic habitat;

**6.5.3.6** provision of habitat (shelter, water, food, travel corridors, etc.) for many species of plants and animals; and

**6.5.3.7** an abundance of dead wood, standing and fallen, of the full range of sizes available, within the entire buffer zone after any harvesting activity.

***Indicators:***

The management has a written policy to address the protection of riparian areas.

There is evidence that the policy is being implemented.

**6.5.4** An owner/manager must have a written policy that addresses wetland protection.

***Indicators:***

There is a policy that addresses wetland protection.

**6.6** \* Management systems shall promote the development and adoption of environmentally friendly non-chemical methods of pest management and strive to avoid the use of chemical pesticides. World Health Organization Type 1A and 1B and chlorinated hydrocarbon pesticides; pesticides that are persistent, toxic or whose derivatives remain biologically active and accumulate in the food chain beyond their intended use; as well as any pesticides banned by international agreement, shall be prohibited. If chemicals are used, proper equipment and training shall be provided to minimize health and environmental risks.

**6.6.1** \* Management is explicitly committed to using no biocides in its forestry practices, and has demonstrated the steps which have been taken, and will be taken, to fulfill this commitment.

***Indicators:***

There is no evidence of use of biocides, or synthetic chemical fertilizers or, if there is, the appropriate authorizations are on file.

**6.7** Chemical, containers, liquid and solid non-organic wastes including fuel and oil shall be disposed of in an environmentally appropriate manner at off-site locations.

**6.7.1** Biodegradable oil and other biodegradable products should be used when available, and an active recycling program be in place for oil and plastic products.

***Indicators:***

A policy exists, and is implemented, related the disposal of any inorganic wastes and substances.

**6.8** \* Use of biological control agents shall be documented, minimized, monitored, and strictly controlled in accordance with national laws and internationally accepted scientific protocols. Use of genetically modified organisms shall be prohibited.

**Indicator:**

There is no evidence of use of genetically modified organisms.

**NOTES**

1. *Genetically modified organisms refer to genetically engineered organisms but not organisms that have been developed through a classical breeding program.*
2. *'6.8' is understood to include biological control and all other organisms.*

**6.9** The use of exotic species shall be carefully controlled and actively monitored to avoid adverse ecological impacts.

**Indicators:**

Management demonstrates an understanding that the use of exotics is negative from an ecological perspective. Management demonstrates an understanding of the risks associated with the introduction of exotics.

**6.9.1** \* An exotic tree species may be introduced only after the land manager provides clear evidence that:

- there is no risk of invasion of surrounding habitats;
- it is compatible with the ecosystem;
- it is limited to no more than 5% of a contiguous portion of an ecosite; and
- it is a step towards restoration of the natural forest

**Indicators:**

The manager can provide clear evidence that there is no risk of invasion of surrounding habitats.

The manager can provide clear evidence that the exotic tree species is compatible with the ecosystem.

Management plans and field evidence indicate that exotic planting is limited to less than 5% of a contiguous portion of an ecosite.

The manager can demonstrate the exotic tree species' role in restoration of the natural forest.

**6.9.2** \* Given the current state of knowledge, exotic control organisms are prohibited.

**Indicators:**

Exotic control organisms are not introduced.

**6.10** \* Forest conversion to plantations or non-forest land uses shall not occur, except in circumstances where conversion:

- a) entails a very limited portion of the forest management unit; and
- b) does not occur on high conservation value forest areas; and
- c) will enable clear, substantial, additional, secure, long-term, conservation benefits across the forest management unit.

**Indicators:**

Where plantations have been established, none of the above conditions has been violated.

Conversion to plantations has not occurred on more than 5% of the management unit.

## **PRINCIPLE #7: \*\* MANAGEMENT PLAN**

**A management plan -- appropriate to the scale and intensity of the operations -- shall be written, implemented, and kept up to date. The long-term objectives of management, and the means of achieving them, shall be clearly stated.**

**7.1** \* The management plan and supporting documents shall provide:

- a. Management objectives;
- b. Description of the forest resources to be managed, environmental limitations, land use and ownership status, socio-economic conditions, and a profile of adjacent lands;
- c. Description of silvicultural and/ or other management system, based on the ecology of the forest in question and information gathered through resource inventories;
- d. Rationale for rate of annual harvest and species selection;
- e. Provisions for monitoring of forest growth and dynamics;
- f. Environmental safe guards based on environmental assessments;
- g. Plans for the identification and protection of rare, threatened and endangered species;
- h. Maps describing the forest resource base including protected areas, planned management activities and land ownership;
- i. Description and justification of harvesting techniques and equipment to be used.

**7.1.1** The vision and objectives of the owner/manager must be articulated clearly to employees, contractors, suppliers, customers, and the public.

***Indicators:***

The management plan contains a statement of landowner objectives.

**7.1.1.1** The management plan must assess the strengths and weaknesses of the management unit relative to the stated vision and objectives.

**7.1.2** The owned/managed lands, and the adjacent lands, must be described and mapped in adequate detail to provide the information necessary for making management decisions in accord with the other sections of this document.

**7.1.2.1** Management plan must detail the history of ownership and management, as much as reasonably can be known by the owner/manager.

**7.1.3** Management plans must document the owner's management strategies and prescriptions for meeting the objectives in the mission statement within the context of the forest's long-term sustainability.

**7.1.4** Procedures for identifying and safeguarding vulnerable, rare, threatened, and endangered species, and their habitat, must be included in the management plan, in accordance with 6.2.

**7.1.4.1** Areas of special ecological significance, including habitat of vulnerable, rare, threatened, and endangered species, old growth remnants, areas with unusually high species diversity, or concentrations of species having medicinal or cultural value must be clearly marked on maps with buffer areas and management options described, as appropriate to the scale and sensitivity of the ecological feature.

**7.1.4.2** Plan must provide for the protection of identified sites of significant cultural, spiritual, or aesthetic value.

***Indicators:***

There is evidence of how identified sites and values have been considered in management planning.

**7.1.5\*** For all lands which do not have the physical or functional characteristics of the natural forest for that site (see Appendix I), a restoration plan must be in place which considers various options and which will be effective in moving the site toward a condition more characteristic of an appropriate natural forest type.

**7.1.5.1** The landowner must have an active and reasonable fire prevention program. The program must include provision for adequate fire suppression capability in all timber harvesting operations. A fire prevention training program must be in place for all woodworkers, contractors and supervisors.

**7.1.5.2** Written guidelines and specification for avoiding damage to ecosystems (e.g. in road building and harvesting) must be comprehensive, readily available and understandable to field personnel. The greater landscape context of individual stands must be taken into account when prescribing activities.

**7.1.5.3** \* If the management unit is larger than 500 hectares, a landscape level plan is required in addition to a stand level plan. The owner/manager must initiate or participate in a landscape plan at a community level. If the management unit is less than 500 hectares, the owner/manager must participate where opportunity exists to the development of landscape level forest planning in the local community. Plans must take into consideration landscape-level restoration, including connectivity of habitat, on local and regional scales, among late seral stage areas, and the habitat requirements of animals that have large home ranges.

**7.1.6** Projections of growth levels, harvest values, change in relative species abundance and distribution and periodic allowable cut must be justified by clear evidence in the form of historical information, research findings or traditional wisdom.

**7.1.6.1** \* Actual harvest levels must be less than actual incremental growth on the “commercial” land. “Commercial” land is defined as total land base minus “unproductive” land, and protected areas, and riparian zones, and other no logging buffers, and “full-cycle” trees. Calculation of growth increments must be conservative.

**7.1.6.2** The management plan must present and evaluate market information reasonably for the scale and complexity of the operation.

**7.1.6.3** The predictable future influence of “pests”, “pathogens” and “non-commercial species” on allowable harvests, timber values, stocking etc. must be taken into account and prepared for in the management plan.

**7.1.7** Access and harvest schedules and techniques must be described and justified.

***Indicators:***

The management plan addresses target conditions and cutting cycles, or other descriptions of cutting frequency.

**7.1.8** Plan must include a detailed plan for monitoring forest changes and assessing environmental and social impacts of forest management.

**7.2** The management plan shall be periodically revised to incorporate the results of monitoring or new scientific and technical information, as well as to respond to changing environmental, social and economic circumstances.

**7.2.1** Indicators of progress relative to objectives must be identified and an effective and thorough plan for monitoring these indicators must be in place.

**7.2.2** \* Management plans must be current and be revised at least every five years.

**7.3** Forest workers shall receive adequate training and supervision to ensure proper implementation of the management plan.

**7.3.1** Investment in employee and training education must be sufficient to ensure the proper and efficient implementation of the management plan. Employees should maintain currency with developing management principles and practices, including the FSC P&C.

**7.4** While respecting the confidentiality of information, forest managers shall make publicly available a summary of the primary elements of the management plan, including those listed in Criterion 7.1.

**7.4.1** \* A summary of the management plan, including management objectives, prescriptions, resource descriptions, and sources of material inputs must be made available to the public.

## **PRINCIPLE #8: \*\* MONITORING AND ASSESSMENT**

**Monitoring shall be conducted -- appropriate to the scale and intensity of forest management -- to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.**

**8.1** The frequency and intensity of monitoring should be determined by the scale and intensity of forest management operations as well as the relative complexity and fragility of the affected environment. Monitoring procedures should be consistent and replaceable over time to allow comparison of results and assessment of change.

**Indicators:**

A documented monitoring program that outlines the frequency, intensity, and rationale for monitoring is in place.

Consistent and replicable monitoring procedures for each activity are documented and implemented.

Contractors' performance is monitored, including compliance with contract specifications.

Staff members with responsibility for implementing monitoring programs are identified.

Where non-compliances are identified, corrective actions are implemented.

Records of monitoring activities are available.

**8.2** Forest management should include the research and data collection needed to monitor, at a minimum, the following indicators: (a) yield of all forest products harvested; (b) growth rates, regeneration and condition of the forest; (c) environmental and social impacts of harvesting and other operations; (d) costs, productivity, and efficiency of forest management.

**Indicators:**

Data are collected concerning yield of all forest products harvested.

Data are collected concerning growth rates, regeneration, forest health, productivity and condition of the forest.

Data are collected concerning composition and observed changes in the flora and fauna (including rare, threatened, and endangered listed species), and seral stages, as a result of forest operations.

Data are collected concerning designated watershed condition (CWAP/IWAP), water quality, road condition and drainage structures.

Data are collected concerning environmental and social impacts of harvesting and other operations.

Data are collected concerning costs, productivity and efficiency of forest management.

**8.2.1** Forest management should include the research and data collection needed to monitor species at risk, protected areas and other indicators of high biodiversity appropriate to scale.

**Indicators:**

Owner/manager is aware of species at risk that may be present on the property.

Data are collected concerning natural populations and communities in protected areas.

**8.3** Documentation shall be provided by the forest manager to enable monitoring and certifying organizations to trace each forest product from its origin, a process known as the "chain of custody".

**Indicators:**

There is a documented procedure for identifying all products leaving the forest so that the recipient can easily determine the forest of origin.

**8.4** The results of monitoring shall be incorporated into the implementation and revision of the management plan.

**Indicators:**

The results of research, data collection and monitoring programs are regularly analyzed and summarized.

The results of monitoring are incorporated into periodic revisions of the management plan, policy and procedures.

**8.5** While respecting the confidentiality of information, forest managers shall make publicly available a summary of the results of monitoring indicators, including those listed in Criterion 8.2.

**Indicators:**

A regular summary is compiled of the results of monitoring activities on the indicators listed in 8.2, and is made publicly available.

**PRINCIPLE #9: \*\* MAINTENANCE OF HIGH CONSERVATION VALUE FORESTS**

**Management activities in high conservation value forests shall maintain or enhance the attributes which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.**

**9.1** Assessment to determine the presence of the attributes consistent with High Conservation Value Forests will be completed, appropriate to scale and intensity of forest management.

***Indicators:***

There is documentation that an assessment has been carried out.

**9.2** The consultative portion of the certification process must place emphasis on the identified conservation attributes, and options for the maintenance thereof.

***Indicators:***

There is evidence that during the certification process emphasis has been placed on conservation attributes and options for the maintenance thereof.

**9.3** The management plan shall include and implement specific measures that ensure the maintenance and/or enhancement of the applicable conservation attributes consistent with the precautionary approach. These measures shall be specifically included in the publicly available management plan summary.

***Indicators:***

There is documented evidence of the above.

**9.4** Annual monitoring shall be conducted to assess the effectiveness of the measures employed to maintain or enhance the applicable conservation attributes.

***Indicators:***

There is evidence of annual monitoring confirming the assessment of the effectiveness.

## **PRINCIPLE #10: \*\* PLANTATIONS**

**Plantations shall be planned and managed in accordance with Principles and Criteria 1-8, and Principle 10 and its criteria. While plantations can provide an array of social and economic benefits, and can contribute to satisfying the world's need for forest products, they should complement the management of, reduce pressures on, and promote the restoration and conservation of, natural forests.**

**10.1** \* The management objectives of the plantation, including natural forest conservation and restoration objectives, shall be explicitly stated in the management plan, and clearly demonstrated in the implementation of the plan.

**10.1.1\*** Conversion of natural forest cover to plantation is prohibited.

***Indicators:***

Management plans do not include conversion of natural forest cover to plantation.

No field evidence exists of conversion of natural forest cover to plantation.

**10.2** \* The design and layout of plantations should promote the protection, restoration and conservation of natural forests, and not increase pressures on natural forests. Wildlife corridors, streamside zones and a mosaic of stands of different ages and rotation periods, shall be used in the layout of the plantation, consistent with the scale of the operation. The scale and layout of plantation blocks shall be consistent with the patterns of forest stands found within the natural landscape.

**10.2.1** Plantation management must be based on a long-term plan for the restoration of the natural forest for the district and soil site (as outlined in Appendix I).

***Indicators:***

Restoration plan relating to the use of plantation exists, and there is evidence of its consistent implementation.

**10.2.2** Natural regeneration should be allowed to restore natural structure and composition into planted stands.

***Indicators:***

Plantation design and lay out encourages natural regeneration.

Silvicultural prescriptions are designed to encourage natural regeneration within the plantation.

**10.3** Diversity in the composition of plantations is preferred, so as to enhance economic, ecological and social stability. Such diversity may include the size and spatial distribution of management units within the landscape, number and genetic composition of species, age classes and structures.

**10.3.1** When a site is planted, species selection and spacing must be based on appropriate microsite selection to move the stand towards the forest type which is natural for the site.

***Indicators:***

Site capability and characteristics are the principal determinants in the selection of species for planting.

**10.4** \* The selection of species for planting shall be based on their overall suitability for the site and their appropriateness to the management objectives. In order to enhance the conservation of biological diversity, native species are preferred over exotic species in the establishment of plantations and the restoration of degraded ecosystems. Exotic species, which shall be used only when their performance is greater than that of native species, shall be carefully monitored to detect unusual mortality, disease, or insect outbreaks and adverse ecological impacts.

***Indicators:***

Management demonstrates an understanding that the use of exotics is negative from an ecological perspective.

Management demonstrates an understanding of the risks associated with the introduction of exotics.

**10.4.1** \* An exotic tree species may be introduced only after the land manager provides clear evidence that:

- there is no risk of invasion of surrounding habitats;
- it is compatible with the ecosystem;
- it is limited to no more than 5% of a contiguous portion of an ecosite; and
- it is a step towards restoration of the natural forest

**Indicators:**

The manager can provide clear evidence that there is no risk of invasion of surrounding habitats.

The manager can provide clear evidence that the exotic tree species is compatible with the ecosystem.

Management plans and field evidence indicate that exotic planting is limited to less than 5% of a contiguous portion of an ecosite.

The manager can demonstrate the exotic tree species' role in restoration of the natural forest.

**10.4.2** \* Given the current state of knowledge, the introduction of genetically engineered species is prohibited.

**Indicators:**

Genetically engineered species are not introduced.

**10.5** A proportion of the overall forest management area, appropriate to the scale of the plantation and to be determined in regional standards, shall be managed so as to restore the site to a natural forest cover.

**Indicators:**

A restoration plan relating to the use of plantations exists and there is evidence of its consistent implementation

**10.6** Measures shall be taken to maintain or improve soil structure, fertility, and biological activity. The techniques and rate of harvesting, road and trail construction and maintenance, and the choice of species shall not result in long term soil degradation or adverse impacts on water quality, quantity or substantial deviation from stream course drainage patterns.

**10.6.1** \* Preparation of a site for planting must consider adverse effects on soil structure, fertility and biological activity; it must include erosion control and not alter watercourses.

**Indicators:**

Here is no evidence of adverse effects on soil structure, fertility, biological activity, or erosion, and there is no evidence of alteration of watercourses.

**10.7** Measures shall be taken to prevent and minimize outbreaks of pests, diseases, fire and invasive plant introductions. Integrated pest management shall form an essential part of the management plan, with primary reliance on prevention and biological control methods rather than chemical pesticides and fertilizers. Plantation management should make every effort to move away from chemical pesticides and fertilizers, including their use in nurseries. The use of chemicals is also covered in Criteria 6.6 and 6.7.

**10.7.1** The risk of damage to plantations by wind, fire, pests, and disease should be minimized through careful management, which includes: 1) robust and well researched planting design and restoration plan, 2) management for a diverse forest in terms of age/height, species, structure, and genetics, 3) sensitive and careful implementation of silvicultural operations.

**Indicators:**

There is a robust and well researched planting design and restoration plan and evidence of consistent application.

A plan exists for the restoration of the ecological diversity appropriate to the site, including : age/height, species, structure, & genetics and there is evidence of increasing ecological diversity.

Plantations exhibit age/height, species, structural, & genetic diversity.

**10.7.2** \* Management is explicitly committed to using no biocides in its forestry practices, and has demonstrated the steps which have been taken, and will be taken, to fulfill this commitment.

**Indicators:**

There is no evidence of use of biocides, or synthetic chemical fertilizers or, if there is, the appropriate authorizations are on file.

**10.8** Appropriate to the scale and diversity of the operation, monitoring of plantations shall include regular assessment of potential on-site ecological and social impacts, (e.g. natural regeneration, effects on water resources and soil fertility, and impacts on local welfare and social well-being), in addition to those elements

addressed in principles 8, 6, and 4. No species should be planted on a large scale until local trials and/or experience have shown that they are ecologically well-adapted to the site, are not invasive, and do not have significant negative ecological impacts on other ecosystems. Special attention will be paid to social issues of land acquisition for plantations, especially the protection of local rights of ownership, use, or access.

***Indicators:***

There are periodic assessments of onsite and off-site ecological and social impacts.

**10.9** Plantations established in areas converted from natural forests after November 1994 normally shall not qualify for certification. Certification may be allowed in circumstances where sufficient evidence is submitted to the certification body that the owner/manager is not responsible directly or indirectly for such conversion.

***Indicators:***

There is no evidence that natural forests have been converted to plantations since November 1994, or if so sufficient evidence has been provided indicating that the said conversion was not the responsibility of the current owner/manager.

## GLOSSARY

Terms identified by an asterisk were defined by Jamie Simpson or Judy Loo.  
Other sources are noted.

**age-class:** a distinct group of trees or portion of the growing stock recognized on the basis of age. (4)

**biocide:** a toxic material with the potential of causing lethal damage to metabolic systems, and producing effects in all forms of living organisms in a more or less comparable range of exposure, or more generally, a substance potentially lethal to an organism, but not necessarily to all organisms. (3)

**biological control:** the deliberate regulation of a pest species to acceptable levels by conservation and/or augmentation of the natural enemy complex of this pest species, or by introduction of exotic natural enemies. (3)

**biological pesticide:** a pesticide in which the active ingredient is a living organism, such as a virus, bacterium, or nematode. (3)

**biological diversity (biodiversity):** the variety, distribution and abundance of different plants, animals, microorganisms, the ecological functions and processes they perform, and the genetic diversity they contain at local, regional or landscape levels of analysis. Biodiversity has five principal components: 1) genetic diversity (the genetic component of all living things); 2) taxonomic diversity (the variety of organisms); 3) ecosystem diversity (the three-dimensional structures on the earth's surface, including the organisms themselves); 4) functions or ecological services (what organisms and ecosystems do for each other, their immediate surroundings and for the ecosystem as a whole (i.e. processes and connectedness through time and space); and 5) the abiotic matrix within which the above exists (the unity of the soil, water, air, and organisms, with each being interdependent on the continued existence of the other). (3)

**clearcutting:** a silvicultural system in which an entire stand of trees is cleared from an area at one time, regardless of their potential utility on or off the site. It is usually used as a simple means of obtaining wood fibre, but may also be used as a means of removing low quality standing timber in order to regenerate a new forest. Clearcutting results in the establishment of a new even-aged stand of trees which can be naturally or artificially created. (3)

**COSEWIC:** Committee on the Status of Endangered Wildlife in Canada

**connectivity:** a measure of how well different areas (patches) of a landscape are connected by linkages, such as habitat patches, single or multiple corridors, or 'stepping stones' of like vegetation. The extent to which conditions among late successional/climax forest areas provide habitat for breeding, feeding, dispersal and movement of late successional- or climax-dependent wildlife and fish species. (3)

**conversion:** the substantial or severe modifications of the physiognomy, structure and dynamics of a forest, as a result of management activities, resulting in a significant reduction in the complexity of the forest system; or the transformation of a forest into permanently non-forested area. (2)

**culturally sensitive areas:** areas of traditional use such as trapping, fishing, hunting, or berry picking and may be areas of outstanding scenic value, recreational or wilderness potential; and may be areas from which ceremonial materials such as sweet grass and medicinals are gathered. Culturally sensitive areas may be further defined by considering and respecting community values; drawing upon scientific information; mapping a specific area for protection and identifying a buffer zone; rating a protective area to sensitivity to forest stewardship activities and by defining activities within the protected area. (Bill McKay)

**culturally significant areas:** may include, but not restricted to, areas of spiritual or religious value such as burial sites, spirit caves, vision quest areas, ceremonial grounds, lands containing unique historical, archaeological and architectural sites and areas of specific claim or comprehensive claim. (Bill McKay)

**deforestation:** the long-term removal of trees from a forested site to permit other site uses. (3)

**degraded forest stand:** a forest stand that has suffered damage to natural composition, structures, and functions to such an extent that population levels and diversity of organisms have been changed in an unnatural

manner, or where structures required for ecological processes and populations in later temporal phases have been removed and/or will not be regenerated due to human disturbance. (3)

**ecological integrity:** the quality of a natural, unmanaged or managed ecosystem in which the natural ecological processes are sustained, with genetic, species, and ecosystem diversity assured for the future. (3)

**ecological land classification:** a classification scheme used to delineate differing scales of landscape, or ecosystems, based on factors such as climate, physiography, and vegetation. (3)

**ecoregion:** unit of ecological classification characterized by macroclimate conferred by elevation, broad-scale aspect, and proximity to oceans as these affect solar radiation and degree of maritime climatic influence. (N.B. Ecological Land Classification)

**ecosite:** a unit of ecological classification which is characterized primarily by soil conditions.

**ecosystem functions:** the many and varied biotic and abiotic processes that make an ecosystem functional, changing, and interactive (e.g., biogeochemical processes, nutrient cycling, decomposition, regeneration, and succession). (3)

**endangered species :** any species which is in danger of extinction throughout all or a significant portion of its range. (1) (List will be in appendix)

**environmental impact assessment:** the actual technical assessment work that leads to the production of an environmental impact statement. The technical methodologies used must be scientifically sound, and explainable and defensible in a court of law. The scope of the assessment is typically outlined at the start of the project so that the project has some well-defined boundaries. These may include physical, temporal, political, cultural and financial limits within the project mandate. (3)

**even-aged stand:** a stand of trees in which the age differences among trees are small, usually less than 10 to 20 years, or 30 percent of the rotation age in stands more than 100 years old. Even-aged stands result from disturbances occurring at one point in time, such as wildfires, a clearcut, a seed tree cut, a shelterwood cut or coppicing. (3)

**exotic species:** an introduced species not native or endemic to the area in question. (1)

**First Nations Peoples:** - see Indigenous peoples.

**forest structures \* :** physical aspects of the forest, including tree size, canopy composition, quantity and quality of deadwood, ephemeral herbaceous species, corticolous bryophyte species, density of wildlife trees, fungi, avian community, age structure, forest height, etc.

**gap analysis:** an assessment of the protection status of biodiversity in a specified region, which looks for gaps in the representation of species or ecosystems in protected areas. (WWF)

**genetically engineered organisms \* :** organisms that have been genetically altered by introduction of genetic material from a different organism; usually a different species.

**genetically modified organisms:** biological organisms which have been induced by various means to consist of genetic structural changes. (1)

**Golet:** a scoring system that rates wetlands potential for waterfowl production. Wetlands or = 0.25 ha are given scores ranging from 60-118. The highest scores are given to wetlands that are large in size, productive, in proximity to other wetlands, and interspersed with open water.

**habitat:** 1. those parts of the environment (aquatic, terrestrial, atmospheric) often typified by a dominant plant form or physical characteristic, on which an organism depends, directly or indirectly, in order to carry out its life processes. 2. the specific environmental conditions in which organisms thrive in the wild. (3)

**high biodiversity value:** forest types which are rare, or unique, have significantly reduced present range (either of forest type or several classes) compared to relevant evolutionary or ecological distribution patterns, are critical habitat for rare, threatened or endangered fauna or flora; and/or contain other important elements of genetic, species or community diversity required to ensure adequate representation in a reserve system. (2)

**Indigenous people:** (equivalent to First Nations peoples) "the existing descendants of the peoples who inhabited the present territory of a country wholly or partially at the time when persons of a different culture or ethnic origin arrived there from other parts of the world, overcame them and by conquest, settlement, or other means reduced them to a non-dominant or colonial situation; who today live more in conformity with their particular social, economic and cultural customs and traditions than with the institutions of the country of which they now form a part, under State structure which incorporates mainly the national, social and cultural characteristics of other segments of the population which are predominant." (Working definition adopted by the UN Working Group on Indigenous Peoples)

**interior forest species:** species of plants or animals that are adapted to and depend upon the conditions associated with a closed-canopy forest ecosystem unaffected by edge conditions. Forest interior birds tend to require large tracts of forest habitat for nesting and foraging. (3)

**international agreements:** ILO and CBD are covered by the document in other places, and ITTA and CITES do not apply. There are no other binding international agreements.

**landscape:** an expanse of natural or human-made scenery, comprising land-forms, land cover, habitats, and natural and human-made features that, taken together, form a composite. 2 A mosaic of habitat types occupying a spatial scale intermediate between an organism's normal home-range size and its regional distribution. (3)

**landscape level considerations \* :** management considerations which are appropriately addressed at the landscape level, including ecosystem diversity, disturbance regime, hydrologic cycles, age class distribution, species distribution, species abundance

**large landowners:** see "ownership size"

**laws and administrative requirements:**

#### New Brunswick

-- Water Course Buffer Zone Guidelines for Crown Land Forestry Activities, developed by the NB Department of Natural Resources and Energy, 1996, updated 1999

This document contains administrative requirements, guidelines for watercourse buffer zone structure and width, and guidelines for forestry activities within watercourse buffer zones. This document refers to five objectives, namely water quality and aquatic habitat, aquatic recreation and aesthetics, waterfowl production areas, wildlife travel corridors, and snags and mature trees.

-- Forest Management Manual for Crown Lands, developed by the Department of Natural resources and Energy, 1994

This document contains requirements and standards for practices, annual reports and operating plans for Crown Land Licensees.

-- Crown Lands and Forests Act & Amendments, 1980

This is a legal document describing the use of New Brunswick's Crown Lands.

Regulations referring to 4.2 -- "laws and/or regulations covering health and safety of employees and their families."

New Brunswick Occupational Health and Safety Act, Regulation 91-91. Part 7 -- requirements for protective equipment Part 21 -- Logging and Silviculture Operations, which covers the following: protective equipment; chain saws, brush saws, and clearing saws; safe operation of powered mobile equipment; hauling logs; woods roads; and loading operations.

## Nova Scotia

Forest/ Wildlife Guidelines and Standards for Nova Scotia. 1985. Department of Natural Resources.

Forests Act, 1989. Amended 1992, 1998.

Legal document directed towards the use and forest management planning process of Crown and private land forests. It includes sections regarding the protection of wildlife, habitats, watercourses and wetlands.

Forest Management Programs, Principles and Techniques of Forest Management, Extension Services, Forest Management Planning Process, Inventory, Wildlife Management, Tree Seedling Quality, Forest Research, Training of Silvicultural Workers, Management of Crown Land, Agreements with Owners of Private Land, Incentive Assistance, Timber Loan Board, Protection of Forests, Insect, Fire and Disease Programmes and Monitoring

Crown Lands Act, 1989

Legal document regarding the use of Crown lands including forest management, leasing and licensing arrangements (i.e. stumpage rates), and wildlife and outdoor recreation considerations in forest management. Land Information, Surveys, Roads, Special Areas, Wildlife Management, Protective Measures, Fuelwood, License Agreements, Scaling Standards

Wildlife Act, 1989, amended 1990, 1993, 1995-96

Legislation to (a) develop and implement policies and programs for wildlife designed to maintain diversity of species at levels of abundance to meet management objectives; and, (b) integrate appropriate protective measures into policies for use on Crown lands and in guidelines for forest management and other programs on privately owned land to ensure adequate habitat for established populations of wildlife. Habitat Conservation Fund, Wildlife Management Area, Wildlife Park, Habitat for Endangered or Threatened Species, Hunting and Fishing: Licenses and Tags.

Wilderness Areas Protection Act, 1998.

Legislation to (a) maintain and restore the integrity of natural processes and biodiversity; (b) protect representative examples of natural landscapes and ecosystems; (c) protect outstanding, unique, rare and vulnerable natural features and phenomena; (d) provide reference points for determining the effects of human activity on the natural environment; (e) protect and provide opportunities for scientific research, environmental education and wilderness recreation; and (f) promote public consultation and community stewardship in the establishment and management of wilderness areas.

Advisory and Ad hoc Committees, Management Plans, Additions and Exchanges of Land, Adjoining and Affected Lands, Accessibility, Prohibited Activities.

Endangered Species Act, 1998.

Legislation regarding the protection, designation of endangered species. Species at Risk Conservation Fund, Working Group, Protection, Listing, Recovery Plans

Worker's Compensation Act, 1994-1995.

Eligibility and Claim for Compensation, Permanent Impairment Benefit, Earnings Replacement Benefit, Survivor Benefits, Review of Compensation, Duties of Employees and Employers, Medical Aid, Rehabilitation, Accident Fund and Assessments, Liability and Collection

Occupational Health and Safety Act, 1996.

Accident Fund, Employer's, Contractor's and Employee's Precautions and Duties, Occupational Health and Safety Advisory Council, Occupational Health and Safety Policy Requirements, Joint Occupational Health and Safety Committees in the Workplace, Health and Safety Representatives

Natural Products Act, 1989.  
Legal document regulating the marketing of certain natural products in Nova Scotia, including maple products and forest products.

#### Prince Edward Island

PEI Forest Management Act & Amendments: Forest Policy, Inventory, Forest Management, Crown Forest land, Forest harvesting, Scaling & Grading, Forest Conservation, Disease Control, Fire Protection, Forest Improvement Advisory Council, Forest Renewal program regulations.

Occupational Health & Safety Act: Part 41 - Forest Operations Safety, Protective Clothing, Chain Saw Operation, Vehicle Operation, Loading, Safety Precautions, Skidding Equipment.  
Environmental Protection Act: Environmental Advisory Council, Environmental Coordinating Committee, Environmental Management Division, Environment Management Division, Environment Officers, Environmental Impact Assessment, Watercourse Permits, Littering, Spills.

Workers Compensation Act: Accidents, Compensation, Effect of Act in Law, Medical Aid & Rehabilitation, Workers Compensation Board, Wage Loss benefits, Review & Appeals, Accident Fund & Assessment, Liability.

Wildlife Conservation Act: Conservation Officers, Endangered, Threatened or Vulnerable Species, Migratory Birds, Permits, Licenses, Angling, Prohibited Activities, Enforcement Activities.

Fish & Game Protection Act: Licenses, Wildlife Trapping, Fur Dealers, Hunting, Firearm Safety, Game Farms, Fishing, Wildlife Management Areas.

Checkoffs is provided for under the Forest Renewal Program regulations under the Forest Management Act.

#### *References for the gap analysis and ecological integrity reports:*

Kavanagh, Kevin and Tony Iacobelli, 1995. A Protected Areas Gap Analysis Methodology: Planning for the Conservation of Biodiversity. World Wildlife Fund Canada, Toronto, Ontario. 68 pp.

Noss, R.F. 1995. Maintaining Ecological Integrity in Representative Reserve Networks. World Wildlife Fund Canada / World Wildlife Fund-United States Discussion Paper, Toronto, Ontario, Canada. 77 pp.

**local community:** a group of people with similar interests living under and exerting some influence over the same government in a shared locality, having a common attachment to their place of residence where they have some degree of autonomy. People in the community share social interactions with one another, with organizations beyond government, with the larger society, and with the local environment, molding the landscape within it rests and being molded by it. (5)

**local seed source \*** : a source of seed for planting which is adapted to the environmental conditions of the area in question; for well-studied species, a local seed source would be in the same seed zone as the planting site, with seed zones established by common garden and genetic testing. For other tree species for which testing has not been carried out, a local seed source is from an area having similar climatic conditions and elevation as the area to be planted.

**Native values:** The First Nations way of harvesting resources without jeopardizing the integrity, diversity, or productivity of the environment. Native values generate from the knowledge passed from generation to generation incorporating a circular thought process demonstrating interconnectivity and respect for all life forms. Native values are developed from the following principles:

1. The Earth is Mother.
2. Knowledge is powerful only if shared.
3. The spiritual world is not distant from the earth.
4. Responsibility is the best practice.
5. Everything is connected to everything.
6. There is harmony.

**natural forest:** forest areas where most of the principal characteristics and key elements of native ecosystems such as complexity, structure and diversity are present as defined by FSC-approved national and regional standards of forest management. (1) or forest areas, including primary forest, where most or all of the principal characteristics and key elements of native ecosystems, such as complexity, structure, and diversity, are present given the physical parameters of climate, geology, hydrology and successional patterns. (2)

**natural landscapes:** Nova Scotia uses 77 "natural landscapes" as an approximate equivalent to ecodistricts. In Nova Scotia, in concert with government policy, this is the appropriate level for assessment of representative protected areas.

**non-commercial species:** tree species that within a stand whose yields, if harvested, would be too small to include in volume assessments. Such species may yield commercial volumes for specialized end uses, such as furniture-grade wood or firewood. (3)

**non-timber forest product \* :** any commodity obtained from the forest that does not necessitate harvesting trees.

**old-growth forest:** forest having the following structural characteristics: 1. An abundance of old trees, recognizable by the asymmetrical shapes, relatively long trunks free of low branches (i.e., in-forest as opposed to open-grown shapes), deeply furrowed or plated bark, signs of heartwood decay, large prominent root structures, flattened crowns with protruding dead limbs, large thick limbs, and trunks often showing a twist that develops with age; 2. Fallen logs in all stages of decomposition, crisscrossing the forest floor and lying in and across stream beds, covered by moss and lichens; 3. Plentiful snags (standing dead trees); 4. Canopy gaps, large and small, formed from trees that have fallen; 5. Undulating forest floor, expressed in randomly scattered pits and mounds where trees have fallen over and decomposed; 6. Majority of tree species that fall into the late succession class and a conspicuous absence of multiple-stemmed trees; 7. Minimal of signs of human disturbance. (6)

**ownership size:** For the purposes of these standards, landowners are categorized as small, owning 500 hectares or less forest land, and large, owning more than 500 hectares of forest land.

**plantation (general FSC definition):** forest areas lacking most of the principal characteristics and key elements of native ecosystems as defined by FSC-approved national and regional standards of forest management, which result from the human activities of planting, sowing or intensive silviculture treatments. (1)

**pre-colonization forest \* :** the species composition and structure considered to be characteristic of forest prior to colonization by Europeans.

**primary forest:** an ecosystem characterized by an abundance of mature trees, relatively undisturbed by human activity. Human impacts in such forest areas have normally been limited to low levels of hunting, fishing and harvesting of forest products, and in some cases, to low density, shifting agriculture with prolonged fallow periods. (1)

**protected area:** generally an area protected by legislation, regulation, or land-use policy to control human occupancy or activity. Protection can be of many different forms. The International Union for the Conservation of Nature (IUCN) identified six main categories of protected areas.

**Category I:** Strict Nature Reserve/Wilderness Area is a protected area managed mainly for science or wilderness protection. **Category Ia:** Strict Nature Reserve is a protected area managed mainly for science. It is an area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring. Management objectives include: to preserve habitats, ecosystems, and species in as undisturbed a state as possible; to maintain genetic resources in a dynamic and evolutionary state; to maintain established ecological processes; to safeguard structural landscape features or rock exposures; to secure examples of the natural environment for scientific studies, environmental monitoring and education, including baseline areas from which all avoidable access is excluded; to minimize disturbance by careful planning and execution of

research and other approved activities; and to limit public access. Guidelines for selection include: the area should be large enough to ensure the integrity of ecosystems and to accomplish the management objectives for which it is protected; the area should be significantly free of direct human intervention and capable of remaining so; the conservation of the area's biodiversity should be achievable through protection and not require substantial active management or habitat manipulation. Ownership should be by a national or other level of government, acting through a professionally qualified agency, or by a private foundation, university or institution which has an established research or conservation function, or be owners working in cooperation with any of the foregoing government or private institutions. Adequate safeguards and controls relating to long-term protection should be secured before designation. **Category Ib:** Wilderness Area is a protected area managed mainly for wilderness protection. Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition. Objectives of management include: to ensure that future generations have the opportunity to experience understanding and enjoyment of areas that have been largely undisturbed by human activity over a long period of time; to maintain the essential natural attributes and qualities of the environment over the long term; to provide for public access at levels and of a type that which will best serve the physical and spiritual well-being of visitors and maintain the wilderness qualities of the area for present and future generation,; and to enable indigenous human communities living at low density and in balance with the available resources to maintain their lifestyle. Guidelines for selection include: the area should possess high natural quality, be governed primarily by the forces of nature, with human disturbance substantially absent, and be likely to continue to display those attributes if managed as proposed; the area should contain significant ecological, geological, physiographic, or other features of scientific, educational, scenic or historic value; the area should offer outstanding opportunities for solitude, enjoyed once the area has been reached, by simple, quiet, non-polluting and non-intrusive means of travel (i.e. non-motorised). Ownership is as in sub-category 1a

**Category II:** National Park is a protected area managed mainly for ecosystem protection and recreation. It is a natural area of land and/or sea designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area, and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible. Objectives of management include: to protect natural and scenic areas of national and international significance for spiritual, scientific, educational, recreational or tourist purposes; to perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources, and species, to provide ecological stability and diversity; to manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state; to eliminate and thereafter prevent exploitation or occupation inimical to the purposes of designation; to maintain respect for the ecological, geomorphological, sacred or aesthetic attributes which warranted designation; and to take into account the needs of indigenous people, including sustenance resource use in so far as these will not adversely affect the other objectives of management. Guidelines for selection include: the area should contain a representative sample of major natural regions, features or scenery, where plant and animal species, species, habitats and geomorphological sites are of special spiritual, scientific, educational, recreational and tourist significance; and the area should be large enough to contain one or more entire ecosystems not materially altered by current human occupation or exploitation. Ownership and management should normally be by the highest competent authority of the nation having jurisdiction over it. However, they may also be vested in another level of government, council of indigenous people, foundation, or other legally established body which has dedicated the area to long-term conservation.

**Category III:** Natural Monument is a protected area managed mainly for conservation of specific natural features.

**Category IV:** Habitat/Species Management Area is a protected area managed mainly for conservation through management intervention

**Category V:** Protected Landscape/Seascape is a protected area managed mainly for landscape/seascape conservation and recreation.

**Category VI:** Managed Resource Protected Area is a protected area managed mainly for the sustainable use of natural ecosystems. Categories I to III have legally recognized protection prohibiting activities such as mining, commercial logging or hydroelectric projects.

**representation:** inclusion within a reserve network of the full spectrum of biological and environmental variation, including genotypes, species, ecosystems, habitats and landscapes. (World Wildlife Fund)

**restoration:** a process of returning ecosystems or habitats to their original structure and species composition. Restoration requires a detailed knowledge of the (original) species, ecosystem functions, and interacting processes involved. (3)

**secondary forest:** the ecosystems that regenerate from a substantial disturbance (flood, fire, land clearing, or extensive or intensive logging) characterized by a scarcity of mature trees and an abundance of pioneer species and a dense understory of saplings and herbaceous plants. Although secondary forests frequently peak in terms of biomass accumulation well-within one felling cycle, the transition to primary forests usually requires several rotation lengths, depending upon the severity of the original disturbance. Irreversible transformation of the underlying soil and nutrient cycle brought about by chronic or intense use may render it impossible for the original, primary forest type to return. (1)

**secondary species \* :** species that are not dominant in a forest canopy.

**semi-natural forest:** forest areas where some of the principal characteristics and key elements of native ecosystems, such as complexity, structure and diversity are present, given the physical parameters of climate, geology, hydrology and successional patterns. (2)

**shade tolerant species:** plant species that have evolved to grow well in shade. Typically, these species grow in the understory, thus shade-tolerant species often dominate a climax forest type (e.g., hemlock, beech, sugar maple) (3)

**small landowners:** see “ownership size”.

**stand:** an aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition so that it is indistinguishable from the forest in adjoining areas. Stands are the basic management unit in silviculture. (3)

**stand level considerations \* :** management considerations appropriately addressed at the stand level, including disturbance regime, tree size, deadwood quality and quantity, species composition, species abundance, age structure.

**structure:** 1 in forestry generally, the various horizontal and vertical physical elements of the forest 2. In landscape ecology, the spatial inter-relationships between ecosystems including energy fluxes, distribution of materials and species relative to the sizes, shapes, numbers, kinds and configurations of the ecosystems. 3. The distribution of trees in a stand or group by age, size or crown classes (e.g. all even-aged, uneven-aged, regular, and irregular structures). (3)

**structural diversity:** the diversity of forest structure, both vertical and horizontal, that provides for a variety of forest habitats for plants and animals. The variety results from layering or tiering of the canopy and die-back, death, and ultimate decay of trees. In aquatic habitats, structural diversity results from the presence of a variety of structural features such as logs and boulders, that create a variety of habitats. (3)

**succession:** a series of dynamic changes in ecosystem structure, function and species composition over time as a result of which one group of organisms succeeds another through stages leading to a potential natural community or climax stage. For example, the series of plant communities (seral stages) following a major disturbance. (3)

**threatened species** - any species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. (1)

**traditional access** - open to non-commercial use by people from local communities where there is a history of such use. Examples of uses would include berry picking, fiddle-heading, fishing, hunting, hiking, and bird watching.

**traditional ecological knowledge:** knowledge that aboriginal people have accumulated over countless generations of intimate contact with all aspects of local ecosystems, including plants, animals and other natural phenomena. (National Aboriginal Forestry Association)

**under-represented species \*** - species which would be expected to be present at higher frequency under natural conditions than is the case today.

**uneven-aged stand:** a stand in which intermingling trees differ markedly in age. The differences in age permitted in an uneven-aged stand are usually greater than 10-20 years. Usually form more than three distinct age classes. (4)

**wetland:** lands transitional between terrestrial and aquatic systems where the water table is at or near the surface, or the land is covered by shallow water at some time during the growing season. Wetlands are characterized by poorly drained soils and predominantly hydrophytic or water tolerant vegetation (Watercourse Buffer Zone Guidelines for Crown Forestry Activities, NBDNRE)

**wild life:** any species of amphibian, bird, fish, mammal, reptile, or plant found in the wild, living unrestrained or free-roaming and not domesticated. (3)

**wild life travel corridors:** a physical linkage, connecting two areas of habitat and differing from the habitat on either side. Corridors are used by organisms to move around without having to leave the preferred habitat. A linear habitat patch through which a species must travel to reach habitat more suitable for reproduction and other life-sustaining needs. Many corridors, linking several patches of habitat, form a network of habitats. The functional effectiveness of corridors depends on the type of species, the type of movement, the strength of edge effects, and its shape. (3)

Sources for the glossary are, in order of precedence:

1. FSC glossary, printed in the Principles and Criteria document
2. additional FSC terms proposed in the December, 1996 FSC newsletter
3. Dictionary of Natural Resource Management (J. and K. Dunster. 1996. UBC Press, Vancouver)
4. Silvicultural Terms in Canada (1995. 2nd Ed. Policy, Economics and International Affairs Directorate, Canadian Forest Service, Natural Resources Canada, Ottawa)
5. Sustainable Community Development : Principles and Concepts (C. Maser. 1997. St. Lucie Press, Delray Beach, Florida)
6. Eastern Old-Growth Forests: Prospects for Rediscovery and Recovery (M.B. Davis (Ed.) 1996. Island Press, Washington, DC).

Terms identified by an asterisk were defined by Jamie Simpson or Judy Loo. Other sources are noted.

## APPENDIX I - NATURAL FORESTS OF THE MARITIME REGION

### INTRODUCTION

#### General

Although incomplete and arbitrary, the Acadian Forest Region shall be defined with the political boundaries of the Maritime provinces, NB, NS, and PEI, simply for practicality and for the political boundaries' loose adherence to the bounds of the Acadian Forest. Certainly the Acadian Forest as defined by its patterns and processes expands beyond this region (into a large part of Maine, for example) and is exclusive of certain areas within this region. (As the FSC regional standards mature, this politically-based classification may be adapted to a bio-regional approach.)

The classification of forest regions in this appendix is based on O.L. Loucks' (1962) *A Forest Classification for the Maritime Provinces*. Loucks identifies seven Forest Zones and names them for the tree species that typically occupy zonal sites (i.e. sites that are well-drained on moderately fertile soil, where vegetation composition expresses regional climate), and, within these zones, eleven Ecoregions of similar ecological relationships between species and sites. Within the Ecoregions, Loucks identifies a number of Site Districts based on patterns of relief, drainage, or type of bedrock, which may have ecological significance, but not by definition. This appendix will describe each of the Zones, Ecoregions and Districts with respect to its ecological processes and patterns.

Loucks states that "a fundamental principle in geography is that there is no natural systems of regions inherent in the nature of the world. This principle applies equally to forest classification." Indeed, few definite boundaries in vegetation patterns exist in the Maritime Region. Loucks concurs that "because the Ecoregion is not intended as a discrete or natural entity, the boundaries are not always sharp." Rather, the boundaries found in Loucks' classifications are arbitrary borders that describe the gradation from one area to another.

This gradation can be applied to the Acadia Forest Region as a whole: the region is essentially the transition zone between the Northern Hardwood Forest and the Boreal Forest. As such, it contains elements in terms of patterns and processes of both these forest types. Processes include disturbance regimes and successional trends and patterns include soil type, climate, precipitation, topographic features, tree species distributions and associations, age class distribution, and representative climax species. Note that while pattern is often dependent on process, process can also be affected by pattern.

#### Tree Distribution Patterns

The tree distribution pattern of the Acadian Forest Region shows a high degree of mixing of species belonging to the Northern Hardwood Forest and the Boreal Forest. As Lorimer (1977) suggests, "hardwoods or conifers did not usually occur in pure stands, for the conifer type averaged 76% conifers and the hardwood type averaged 65% hardwoods [for the study area of northeastern Maine]. Thus most of the region was actually mixed forest, with hardwoods or conifers locally achieving partial dominance due to physiographic variation." It is this very mixture that typifies the Acadian Forest Region.

The distribution of this mixture is associated with abiotic factors such as climate, soil type, aspect, topography, precipitation, and temperature. Boreal-like areas (those that naturally achieve a white spruce/ black spruce/ fir/ jack pine/ white birch climax state) tend to be located on areas rocky, poorly drained, and at high elevations—basically those areas similar to harsher, more northern regions. Northern Hardwood-like and mixed areas (those that naturally achieve a shade-tolerant species climax state) tend to be located on sites favorable to tree growth.

The tree distributions detailed in this report reflect natural forest cover: that is, the expected forest composition in absence of human-caused disturbances. Cases in which forest cover has been significantly altered by human use have been noted in the area's description. A common example of human-caused alteration of forest cover is abandoned farmland. These areas often regenerate in even-aged stands of white spruce and fir.

#### Disturbance Regimes

The disturbance regime process throughout most of the Acadian Forest Region is described in terms of gap dynamics. Small openings are created in the forest canopy by wind, disease, and insect disturbances. This often allows for the regeneration of shade-intolerants, and leads to a mosaic of species and age classes throughout the forest. Due to the small-scale nature of this disturbance regime, much of the Acadian Forest reaches a mature state (Lorimer, 1977; Bormann and Likens, 1979). From his pre-settlement forest study, Lorimer (1977) suggested that 88% of northeastern Maine was traditionally in a climax state.

The disturbance regime of Boreal-like inclusions, on the other hand, is often dominated by large-scale disturbance (stand replacement) by fire, wind, and insects (Rowe and Scotter, 1973; Wein and Moore, 1977).

This report describes the disturbance regime likely for each area, given the forest cover type and factors such as precipitation and climate.

### **Justification of Classification in this Report**

The justification of classification, as Loucks points out, lies in the usefulness it serves in achieving a desired purpose. In this document, the classifications and the descriptions thereof are designed to aid forest managers in working toward sustainable forestry practices. This is achieved by giving particular attention to climax species distribution and disturbance regimes, as these are seen as essential to understanding the patterns and processes of the natural Acadian Forest Region.

In developing this description, we recognize that processes and patterns change in a gradual manner, that there are gaps in present and historic forest cover data, and that forests are dynamic entities. We also recognize that the vast majority of the Acadian Forest Region's vegetation patterns have been significantly altered by human use.

## **SUGAR MAPLE - ASH ZONE**

**General:** This Zone is distinguished by the presence of Sugar Maple and Beech with smaller amounts of White Ash, Butternut, Ironwood and Basswood. Characteristic lesser plants include Wild Ginger, Bloodroot, Black Raspberry and Maidenhair Fern.

### **1. Saint John River Ecoregion, Carleton District**

**Tree species:** Sugar Maple, Beech, Butternut, White Ash, Ironwood, Basswood; Red Spruce, Hemlock found on moist sites and steep slopes; Cedar, Black Ash, Red Maple, White Elm found on poorly drained areas; Spruce, Fir, Cedar found in swampy sites; White Spruce, Cedar found on former farmland

**Other Plants:** Bloodroot, Goldie Fern, Four-furrowed Enchanter's-Nightshade, Blue Cohosh, Wild Ginger, Maidenhair Fern

**Climate:** Growing Degree-Days (5 C basis): 1680. Annual Precipitation: 1050 mm.

**Soils:** well-drained heavy loams with shale fragments, and loams with sandstone fragments

**Notes:** Much of the region's productive soil area has been cleared for agriculture. This region is unique in the Maritime Provinces.

## **SUGAR MAPLE - HEMLOCK - PINE ZONE**

*General:* This Zone generally excludes the more demanding species of the Sugar Maple - Ash Zone due to its relatively acidic soils and its moderately cool and moderately dry climate.

### **2. Restigouche - Bras d'Or Ecoregion**

*Tree species:* Sugar Maple, Beech, Balsam Fir, Yellow Birch, White Pine, White Spruce; higher elevations are dominated by Beech, and Sugar Maple with scattered Yellow Birch and slopes and valley bottoms with Balsam Fir, White Spruce, Black Spruce, and White Pine, with Red Spruce and Hemlock occurring locally.

*Other plants:* wood-sorrel, wood fern, maianthemum, and bunchberry under well drained softwood sites; beaked hazel under tolerant hardwood sites.

*Climate:* relatively low summer temperature and moderate summer precipitation.

*Notes:* apparently susceptible to fire.

#### **Edmunston District**

*Tree species:* Balsam Fir, White Spruce, Black Spruce; valley bottoms likely supported White Pine; tolerant hardwoods, with yellow Birch prominent, above 800- 1000'; poorly drained depressions support softwood stands.

*Climate:* Growing Degree-Days (5 C basis): 1580. Annual Precipitation: 1100 mm.

*Soils:* loams and sandy loams; good drainage due to strong relief and deep cleavage.

*Notes:* area has been extensively cleared.

#### **Plaster Rock District**

*Tree species:* flat and/or poorly drained sites support Black Spruce, White Spruce, and Pine; well drained sites support tolerant hardwoods with Balsam Fir and scattered White and Red Pine; Hemlock and Red Spruce found mainly on moist slopes; pure stands of White Spruce on abandoned farmland.

*Climate:* Growing Degree-Days (5 C basis): 1500. Annual Precipitation: 1100 mm.

*Soils:* sandy-loam and clay-loam; droughty, gravely-loamtills; heavy texture and gentle relief make for poor drainage.

*Notes:* predominance of flat, sandy, or ill-drained sites.

#### **Restigouche District**

*Tree species:* Yellow Birch; White Pine, Red Pine, and Jack Pine with Spruce and Fir found on valley bottoms and lower slopes.

*Climate:* Growing Degree-Days (5 C basis): 1400. Annual Precipitation: 1100 mm.

*Soils:* loams and sandy loams; good drainage; coarse sandy and gravely soils along valley bottoms.

*Notes:* history of severe fires

#### **Jacquet River District**

*Tree species:* tolerant hardwoods with Spruce, Fir and White Pine; Red Spruce locally in south; coastal portion is mainly coniferous, but Black Ash swamps are common.

*Climate:* Growing Degree-Days (5 C basis): 1500. Annual Precipitation: 1020 mm. Bay of Chaleur influence.

*Soils:* heavy marine and lacustrine tills on lowlands; sandy loams farther inland.

*Notes:* large areas either burned or cleared

#### **Sevogle District**

*Tree species:* Sugar Maple, Beech, White Pine, and Red Spruce, although large areas are entirely coniferous; Yellow Birch abundant in western half, Hemlock in eastern half; Spruce, Fir, with scattered White Pine and occasional stand of Jack Pine dominate slopes and valley flats.

*Climate:* Growing Degree-Days (5 C basis): 1500 Annual Precipitation: 1100 mm. Falls in the rain-shadow of the NB Highlands, but receives moist air masses directly from the Atlantic.

*Soils:* light, sandy-loams; stony loams locally.

### **Guysborough- Bras d'Or District**

**Tree species:** tolerant hardwoods; Hemlock and White Pine found locally; White Spruce and Fir found on abandoned farmland.

**Climate:** Growing Degree-Days (5 C basis): 1630. Annual Precipitation: 1480 mm.

**Soils:** mostly sandy loams

**Notes:** compaction of surface horizons has occurred from pasture use and normal aeration needs restoring in places.

### **3. Magaguadavic - Hillsborough Ecoregion**

**Tree species:** tolerant hardwoods abundant on upland sites; red Oak and Black Cherry widely distributed; mainly coniferous slopes found on steep slopes of narrow valleys, on broad valley bottoms and on outwash plains; Fir, Hemlock, White Spruce, Red Spruce, and White Pine found on valley tills; White Pine, Fir, and Black Spruce on sandy outwashes; stands of Red Maple, Wire Birch and Aspen also found.

**Other plants:** dogtooth-violet, cucumber-root, yellow violet, and zigzag smilacina.

**Climate:** low summer precipitation, warm summer temperature and high potential evapotranspiration; water deficiency in most of region, except for LaHave District

**Soils:** moderately deep sandy-loam soils; sandy outwash soils found locally in southern NB.

**Notes:** the region has a generally rolling, drumlinoid topography.

### **Pokiok District**

**Tree species:** conifers abundant on middle and upper slopes with Red Spruce and Yellow Birch; White Pine found in the broad valleys.

**Climate:** Growing Degree-Days (5 C basis): 1680. Annual Precipitation: 1050 mm.

**Soils:** range from light and sandy to moderately heavy, stony and slightly limy.

**Notes:** poorly drained areas tend to form a neutral muck or swamp.

### **Magaguadavic District**

**Tree species:** Pine found on sandy outwash soils, and with Beech, Sugar Maple, Red Maple, and Red Oak on the low ridges; Black Ash, Red Spruce, Cedar, and Red Maple found in swamps.

**Climate:** Growing Degree-Days (5 C basis): 1700. Annual Precipitation: 1100 mm.

**Soils:** slightly limy loams found over most of the area; sandy and gravelly soils common along the Magaguadavic River.

**Notes:** repeated burning has greatly reduced the former abundance of Pine.

### **Mount Pleasant District**

**Tree species:** Beech, Sugar Maple, Red Maple, and Red Oak; White Pine found with the hardwoods on slopes and ridges, forming pure stands locally, sometimes with Spruce and Fir on valley bottoms; Red Spruce and Hemlock common on slopes and narrow valleys.

**Climate:** Growing Degree-Days (5 C basis): 1680. Annual Precipitation: 1150 mm.

**Soils:** shallow, gravelly-loam soils common; slightly limy loams occur locally in the western part; sandy plains found along main drainages.

**Notes:** strongly rolling terrain

### **Grand Lake District**

**Tree species:** Sugar Maple, Beech, Hemlock and Red Spruce; tolerant hardwoods in pure stands on ridges; Basswood and Butternut found along the St. John River; Red Oak, Bur Oak, Silver Maple, and Red Ash found along the St. John River and near lakes; Spruces and Fir on poorly-drained land; Wire Birch, and Red Maple found on burned areas and abandoned farmland.

**Climate:** Growing Degree-Days (5 C basis): 1800. Annual Precipitation: 1100 mm. micro-regional climate moderated somewhat by the relatively large bodies of water found within the area.

**Soils:** mainly heavy clay loams; sands, gravels and recent sandy alluvium common along the St. John River.

**Notes:** most of the area has been settled.

### **Sussex District**

**Tree species:** White Pine, Jack Pine, and Black Spruce found on sandy soils; Sugar Maple, Beech, White Pine, Hemlock, Yellow Birch and scattered Red Spruce found on slopes; White Spruce found on abandoned farmland.

**Climate:** Growing Degree-Days (5 C basis): 1700. Annual Precipitation: 1150 mm. dry, micro-regional climate

**Soils:** loams, sandy loams and sands, some of which are limy.

**Notes:** most of area once cleared for agriculture

### **Hillsborough District**

**Tree species:** Sugar Maple and Beech with scattered Yellow Birch; Hemlock and Red Spruce found on lower slopes and moist sites; White Pine common on light soils; White Spruce found on abandoned farmland.

**Climate:** Growing Degree-Days (5 C basis): 1700. Annual Precipitation: 1020 mm. Water-deficient.

**Soils:** mainly loams and sandy loams of high fertility; coarser soils in the southwest.

**Notes:** rolling topography

### **East River-Antigonish District**

**Tree species:** Beech and Sugar Maple; White Pine, White Spruce and Fir widely distributed; Black Spruce common on poorly drained land; White Spruce found on cleared areas.

**Climate:** Growing Degree-Days (5 C basis): 1700. Annual Precipitation: 1200 mm.

**Soils:** clay loams, gravely clay loams and sandy loams

**Notes:** much of area has been cleared

### **LaHave District**

**Tree species:** Beech, Sugar Maple and Red Oak with White Pine common on lower slopes and valley floors; Black Cherry common; Red Spruce and Hemlock found on moist sites and lower slopes.

**Climate:** Growing Degree-Days (5 C basis): 1730. Annual Precipitation: 1400 mm. relatively low rainfall and high temperature.

**Soils:** mainly drumlinized loam soils; loams and sandy loams, mostly podolic rather than podsols; generally deep with good drainage.

**Notes:** one of few sites where white Pine forms pure stands on abandoned fields.

## **SUGAR MAPLE - YELLOW BIRCH - FIR ZONE**

**General:** This zone is a predominately hardwood forest with Yellow Birch formerly abundant, characterized by Yellow Birch, White Spruce and Fir in the hardwood stands, general lack of Hemlock on mixedwood slopes and general restriction of White Pine to sandy and gravely soils of the valley bottom.

### **4. Maritime Uplands Ecoregion**

**Tree species:** Sugar Maple, Beech, and Yellow Birch found on hills; Beech absent in some northern areas; White Spruce, Red Spruce, and Fir, with Sugar Maple, Yellow Birch and Red Maple found on steep slopes; hemlock found in ravine slopes in some areas; Fir, Black Spruce, White Spruce and White Pine common in valley bottoms; higher hills capped by conifers in certain areas.

**Other plants:** wood-sorrel, wood fern and shining clubmoss; mountain maple, beaked hazel and hobblebush found in mixed and hardwood stands.

**Soils:** mostly podsols with a broadleaf mor humus; leached layer under often greater than 2"; mostly fertile, stony loams and silt loams of moderate depth.

### **Glazier Lake District**

**Tree species:** Sugar Maple, Yellow Birch, Red Spruce, White Spruce and Fir common on upper slopes and most hill tops; Spruce, Fir, Red Maple and Birches found on slopes; White Pine common on sandy valley bottoms; Trembling Aspen common after fires.

**Climate:** Growing Degree-Days (5 C basis): 1550. Annual Precipitation: 1150 mm.

**Soils:** mainly stony, silt loams; shallow soils with rock outcropping can be found. **Notes:** generally rough topography.

#### **Gounamitz District**

**Tree species:** Sugar Maple, Beech and Yellow Birch found on hill tops; Fir, White Spruce and Black Spruce found in valley bottoms; mixed stands of Fir, Yellow Birch, White Spruce, Red Maple and White Birch occupy the slopes; Red Spruce found locally.

**Climate:** Growing Degree-Days (5 C basis): 1400. Annual Precipitation: 1150 mm.

**Soils:** rubbly silt loams; bedrock often near surface.

#### **St. Quentin District**

**Tree species:** Sugar Maple and Yellow Birch; lower slopes and glacio-fluvial flats are mainly coniferous (White spruce and Balsam Fir); Red Spruce occurs occasionally.

**Climate:** Growing Degree-Days (5 C basis): 1400. Annual Precipitation: 1180 mm.

**Soils:** loamy and commonly contain calcareous fragments; coarse, rubbly tills found locally on lower slopes.

#### **Gulquac-Rocky Brook District**

**Tree species:** Sugar Maple, Yellow Birch, Fir and Red Spruce with occasional stand of beech; tendency for Spruce and Fir to cap the higher hills, with Sugar Maple on the middle slopes, and Fir and Spruce with scattered White Pine in the valleys; Cedar common in swamps; Red Spruce found in mixedwood slopes in southern area of District. **Climate:** Growing Degree-Days (5 C basis): 1380. Annual Precipitation: 1200 mm. relatively cool and moist

**Soils:** coarse sandy-loams; bare rock and granite boulder pavements occur locally

**Notes:** area is mountainous highlands rising 1500-2000'.

#### **Napadogan District**

**Tree species:** Sugar Maple and Yellow Birch; beech common on exposed sites; Red Spruce, White Spruce and Fir occur occasionally with hardwoods on hilltops and slopes and form softwood stands with Hemlock and scattered White Pine on lower slopes and flats; Cedar, black Spruce, Red Spruce and Fir found in swamps.

**Climate:** Growing Degree-Days (5 C basis): 1550. Annual Precipitation: 1170 mm

**Soils:** mainly sandy loams, usually deep, but bedrock exposure common on the higher hills.

**Notes:** elevations from 800 to 1800'.

#### **Lepreau-Kierstead District**

**Tree species:** Sugar Maple, Yellow Birch, Red Spruce, Fir, Beech, Red Maple, White Spruce and Hemlock in various mixtures on steep slopes and upland flats; hardwood stands confined to dry exposed sites; Red Spruce, Black Spruce, Fir and Red Maple found in poorly drained areas; White Spruce and Fir found in cleared areas.

**Climate:** Growing Degree-Days (5 C basis): 1700. Annual Precipitation: 1200 mm. high humidity.

**Soils:** clays, clay-loams and sandy loams.

#### **Fundy Mountain District**

**Tree species:** hilltops over 700 to 800' mainly tolerant hardwoods; Yellow Birch and Fir on gentle slopes and upland flats; Red Spruce and White Spruce distributed throughout; Hemlock limited to steep slopes away from the Bay of Fundy; Red Spruce and Fir found on abandoned farmland.

**Climate:** Growing Degree-Days (5 C basis): 1600. Annual Precipitation: 1400 mm.

**Soils:** mainly loams and sandy loams, moderately rich mineralogically; till 3 or more feet in depth in many places, thin in other spots.

**Notes:** much of District cleared during early settlement.

#### **Cobequid Mountain District**

**Tree species:** Beech and Sugar Maple with Yellow Birch, Fir, Red Spruce and White Spruce found on lower ridges; flat portions of upland areas with poor drainage are boreal in character; Hemlock common in ravines along the steep slopes of the upland area.

**Climate:** Growing Degree-Days (5 C basis): 1650. Annual Precipitation: 1180 mm. moderately cool and moist.

**Soils:** sandy loam soils of great variety; seepage sites common; soils relatively deep and productive where not exposed to excessive desiccation from wind.

**Notes:** part of plateau cleared and now used for blueberry cultivation; elevations up to 1200'.

### **Musquodoboit Hills District**

**Tree species:** Red Spruce, White Spruce, Fir, and Hemlock found on upland flats, lower slopes and valleys; tolerant hardwoods found on hill areas.

**Climate:** Growing Degree-Days (5 C basis): 1650. Annual Precipitation: 1380 mm.

**Soils:** mainly sandy loams; shallow soils and outcroppings of bedrock are common.

**Notes:** District is removed from direct effects of the Atlantic.

### **Pictou Uplands District**

**Tree species:** Yellow Birch, Sugar Maple and Beech common; Red Spruce, White Spruce, Hemlock and Fir scattered on the upland flats, and form coniferous stands on the lower slopes and valley bottoms; White Spruce found on abandoned farm land.

**Climate:** Growing Degree-Days (5 C basis): 1750. Annual Precipitation: 1250 mm. abundant precipitation

**Soils:** rich sandy loams of moderate depth; deeply melanized soils are common locally; bare bedrock is rare.

**Notes:** removed from direct effects of the Atlantic.

### **Cape Breton Hills District**

**Tree species:** Sugar Maple, Beech, Yellow Birch, and Red Maple found on upper slopes and high ridges; Fir, White Spruce, Hemlock and intermittent Red Spruce cover upland flats and ravine slopes.

**Climate:** Growing Degree-Days (5 C basis): 1620. Annual Precipitation: 1450 mm. influenced by air masses from the Gulf of St. Lawrence.

**Soils:** sandy loam and loam soils; most moderately deep, shallow on ridges and steep slopes; seepage sites common on slopes.

**Notes:** narrow coastal strip along the west is exposed and somewhat drier.

## **APPENDIX II - FULL COST/FULL BENEFIT ACCOUNTING**

Sustainable development is defined according to two related criteria:

- (a) Human economic activity cannot exceed the capacity of the encompassing ecosystem to provide the flow of resources, energy and services on which prosperity ultimately depends;
- (b) Economic activity must be conducted in such a way as not to imperil the well-being of future generations.

In other words, sustainability requires both a big view, recognizing the human economic system as a dependent subsystem of the larger ecosystem, and a long view, that goes beyond the current income approach of conventional accounting systems to an investment-oriented cost-benefit balance sheet approach. "Full cost accounting" is the necessary operational basis of any sustainable development strategy and requires that environmental and social benefits and costs be fully incorporated into the economic accounting system.

Full cost accounting effectively includes three related processes:

- a) The valuation of non-market values;
- b) The internalization of external costs; and
- c) The replacement of fixed with variable costs.

Unless non-market values such as ecological services are valued in the economic accounts, they will be given insufficient weight in policy decisions. Fixed costs contain no incentive for conservation in usage, and the maintenance of "externalities" means that society and taxpayers carry industry costs. Full cost accounting procedures are therefore designed not only to promote sustainability, but also to enhance industry efficiency.

For example, conventional accounting systems like the Gross Domestic Product (GDP), introduced during World War II to measure total wartime production, count fish exports and timber sales as economic growth, but do not account for the depletion of the natural resource base on which that wealth depends. Full cost accounting methods view these resources as natural capital subject to depreciation in the same way as produced capital assets. Counting the depletion of a resource as economic gain, as the GDP does, is equivalent to a factory owner counting as profit the sale of his machinery on which the future flow of services depends.

This accounting error was understandable in an era when resources were widely regarded as "free" and unlimited. But international organizations and national statistical agencies now recognize and agree that accurate accounting requires the valuation of non-market natural capital assets. The 1993 System of National Accounts (SNA 93) of the United Nations, OECD, World Bank, IMF and European Community, and universally accepted as the new, revised accounting guidelines for all national accounts, specifically requires the valuation of natural resources in national balance sheets, and the development of a system of integrated economic and environmental accounting (SEEA).

Norway and France have taken a lead in incorporating natural resource accounting into their national accounts. In December 1997, Canada released the new Canadian System of Environmental and Resource Accounts which incorporate natural resources for the first time into the national balance sheets and include resource and energy flows into the Input-Output tables.

### **Forestry Sector Initiatives**

Such important international and national steps towards full cost accounting have been mirrored in the forestry sector. The Canadian Council of Forest Ministers has issued explicit guidelines and criteria for sustainable forestry practices that require the valuation and measurement of non-timber forestry values, including the conservation of biological diversity, the maintenance and enhancement of forest ecosystem condition, the conservation of soil and water resources, forest ecosystem contributions to global ecological cycles, and recreational and aesthetic values. The first report quantifying these variables appeared in May 1998 and the CCFM is committed to moving further in this direction.

The necessity of moving towards full cost accounting methods in forestry was also underlined in the recent report on Maritime woodlots of the Canadian National Round Table on the Environment and Economy. That report described current harvesting practices as unsustainable and warned of a potential collapse of the industry comparable to the collapse of the Atlantic ground-fishery. It noted that the system of financial incentives and

penalties, including taxation and pricing policies, must be re-structured in order to encourage sustainable harvesting practices.

In sum, Canada and other OECD members have made international and national commitments to change their accounting methods to incorporate environmental factors, and have begun to do so in practice. Further movement towards full cost accounting is no longer an option, and it is incumbent on an organization like the FSC, explicitly committed to sustainable forestry, to advance the process further.

### **Practical Challenges**

The two major challenges in applying full cost accounting procedures in practice are:

a) the difficulty of monetizing non-market variables; and  
b) the difficulty of internalizing external costs and translating fixed to variable costs in the absence of legislated taxation and other financial incentives for sustainable harvesting practices.

a) Since businesses, governments and individuals take their behavioural cues from the financial system of prices, taxes and subsidies, monetization is a necessary step if non-market values are not to be under-valued in the policy process. Although money is an inadequate tool to quantify non-market values, it is more accurate to do so than to assign them an arbitrary zero value as is the case in conventional accounting systems like the GDP.

A recent study by Robert Costanza and others<sup>1</sup>, for example, conservatively valued 17 global ecosystem services at \$US33 trillion, based on their replacement value. The Asian Development Bank's Economic Valuation of Environmental Impacts and other similar studies have also assigned monetary values to natural resources and ecological services. Mark Anielski at the Alberta Treasury has monetized the carbon sequestration value of Alberta's forests and developed a forestry sustainability index for that province. Such monetizations are a necessary interim step until environmental quality indicators are fully incorporated into decision making processes in their own right.

b) The FSC acknowledges that, in the absence of corresponding government action, individual woodlot owners cannot adopt a complete full cost accounting mechanism which must eventually affect prices, taxes and subsidies. However, every step towards the measurement and quantification of non-market values and external costs constitutes further movement towards full cost accounting and sustainability.

In practice, this means that FSC certified owners/managers are committed to:

A. Monitoring the following non-market values with a view to enhancing and restoring non-timber forest assets:

- 1) Diversity of ecosystem, species, genetic type, habitat and structure, including age and height.
- 2) Soil quality
- 3) Watershed protection
- 4) Carbon storage and climate regulation
- 5) Recreation, aesthetic and spiritual values
- 6) Social and economic benefits including stable employment, community resilience, and sustainable harvesting levels.

Concrete indicators of progress would include enhanced species diversity and soil quality, increased employment per unit of wood harvested, and that maintenance of beautiful forested viewscapes.

B. Measuring and making progress towards reducing external costs, including:

- 1) Fossil fuel dependence;
- 2) Transportation distances for employees and for hauling and marketing as demonstrated by increased local materials use, closer markets and increased local employment;
- 3) Carbon emissions in production processes;
- 4) Air pollution of particulates, sulfur and nitrous oxides, and biocides;
- 5) Toxic effluents to water sources;
- 6) Damage to fish habitat through siltation, increased water temperatures and flow fluctuations;

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<sup>1</sup> Costanza, R. *et al.* 1997. The value of the world's ecosystem services and natural capital. *Nature*, vol 387.

7) Job related stresses and health costs including biocide poisoning.

In sum, it will take considerable time for full cost accounting practices to be fully incorporated in our system of prices, taxes, subsidies and national accounts. But this process has already begun in practice and is now accepted in principle both internationally and nationally.

While full monetization is not possible in the absence of legislation, the FSC standards encourage individual forestry companies and woodlot owners to advance the process further by translating full cost principles into measurable, quantifiable physical values and to demonstrate progress towards enhancing non-timber forest values and reducing external costs. This will in turn provide additional momentum at the governmental level to ensure that restorative efforts and movement towards sustainability are not financially penalized but rather rewarded in the structure of prices, taxes and incentives.

### APPENDIX III - WATERCOURSE BUFFER ZONE GUIDELINES

Riparian buffer zones must be maintained adjacent to all bodies of water and water courses. The extent and protection of these buffer zones must be adequate to serve all the functions of such zones in primary forests. These functions include, but are not limited to:

- control of erosion of soil and organic debris;
- control of stream sedimentation;
- stabilization of surface and ground water flow fluctuations;
- stabilization of water temperatures;
- provision of organic debris (including large diameter wood) for the aquatic habitat; and
- provision of habitat (shelter, water, food, travel corridors, etc.) for many species of plants and animals.

Minimum standards that must be met in order to assure that these functions are maintained include the width of the buffer zones and the activities that are permitted within the buffer zones.

A) **Width of the buffer zone.** Riparian buffer zones greater than 30 metres wide are required on all sides of all bodies of water and all watercourses with an average width greater than 1 metre. On watercourses with an average width of 1 metre or less, buffer zones may be reduced to as little as 15 metres wide. These buffer zones must reflect changes in forest condition, slope, erosion and windthrow hazard (see Appendix) along the length of the watercourse. Where the variation in these conditions is not delineated, the applied width should equal the maximum determined for the range of objectives identified for the buffer. Factors modifying required buffer zone widths and the required widths for each case follow. Only those objectives for which it is proven conclusively that there is no potential for their realization may be omitted from consideration in determining riparian buffer zone width. Where more than one value or condition is present, the greatest of their required buffer zone widths shall be taken as the standard.

- 1) Slopes: 6-10% = 30m buffer  
>10% = 60m buffer  
> 20% = site specific, minimum 100m.
- 2) Erosion hazard: moderate = 30m buffer  
high = 60m buffer
- 3) Windthrow hazard: moderate/high = 30m buffer
- 4) Government designated watersheds = as required by the appropriate authority
- 5) Waterfowl production areas with a GOLET score of 70-84 = 60m buffer; a GOLET score over 85 = 100m buffer
- 6) Actual wildlife travel corridors and moose calving areas:  
on brooks, streams, bogs, ponds = 50m buffer  
on rivers and lakes = 100m buffer
- 7) Recreational waters: high use = 30-60m  
gov't listed = 30-100m

B) **Forestry activities within riparian buffer zones.** Activities must be in accordance with the following standards:

- 1) All riparian buffer zones must include an area, adjacent the watercourse edge, where no logging is done. This "no logging zone" shall be one third of the width of the buffer zone (alt: 10 metres); no machinery or tracking is permitted within this area (except at stream crossings), and no timber products may be removed.
- 2) Forestry activities in the balance of the watercourse buffer zones also must maintain and/or enhance the ability of the buffer zone to provide its "natural" functions.

- 3) Exposure of mineral soil resulting from forestry operations is not permitted within 30 meters of the bank of the watercourse unless it can be shown to be necessary for buffer zone restoration purposes, and that it will not adversely affect water quality or aquatic habitat. Exposure of mineral soil in the remainder of the buffer zone must be minimal and must not adversely affect water quality or aquatic habitat.
- 4) An abundance of dead wood, standing and fallen, of the full range of sizes available, must remain within the entire riparian buffer zone after any harvesting activity.
- 5) Riparian buffer zones must be managed so as to maintain or increase existing crown closure and wind firmness.
- 6) Trees within the riparian buffer zone must be felled away from water courses.
- 7) No primary forest product shall be piled within 30 metres of a natural watercourse.
- 8) No vehicle shall travel through, or in, a natural watercourse except for approved road building purposes; exposed mineral soil must be stabilized immediately.
- 9) With the exception of stream crossings, no ruts, mineral soil exposure, compaction, or root damage may occur in the buffer zone. At stream crossings any exposed mineral soil must be restored to appropriate natural vegetation immediately.
- 10) Forest and logging roads should not be located in watercourse buffer zones except at approved watercourse crossings. Road right-of-ways built parallel to a watercourse must have a treed buffer zone greater than 30 meters in width.
- 11) Vernal pools, or seasonal ponds, must be protected as follows:
  - no motorized vehicles in the depression itself;
  - slash and siltation must be kept out; and
  - no ruts within a 30 metre buffer area.