

# **FOREST OPERATIONS AND SILVICULTURE MANUAL**

Prepared under the Authority of the Crown Forest Sustainability Act

First Edition  
February 20, 1995  
[Amended April 1, 2000 Ont. Reg. 283/00](#)  
Ministry of Natural Resources



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Printed in Ontario, Canada

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Cette publication est également disponible en français

## **ACKNOWLEDGEMENTS**

The production of a document like the *Forest Operations and Silviculture Manual* which covers such a wide range of topics is not possible without the efforts of many people.

The text of this Manual was produced by a team representing both government and non-government organizations including the forest industry and environmental groups. Staff of the Ministry of Natural Resources included Joe Churcher and Chuck Mason (team leaders), Jim Baker, Eric Boysen, Merrick Buck, Al Corlett, Janet Joyce, Mac Kilgour, John McNicol, Tom Richardson, Al Tithecott, Betty van Kerkhof, Ron Waito and Neville Ward. The Ontario Forest Industries Association was represented by Mac Squires of Abitibi-Price Inc. and Brian Nicks of E. B. Eddy Forest Products Ltd. The Ontario Lumber Manufacturers Association was represented by Mark Stevens of Green Forest Lumber Corp. and Jules Laforest of Normick-Perron Inc. Bill Hubbert of the Algonquin Forest Authority and Marcelo Levy of the Federation of Ontario Naturalists were also members of the writing team.

Additional reviews, advice and suggestions were provided by a number of people representing a wide range of perspectives and opinions, who attended two public workshops in July and October 1994.

Many other people, and in particular Dan Cooligan, reviewed earlier drafts of this document; their time, advice, expertise and constructive suggestions are greatly appreciated.

## **FORWARD**

### **The Policy Framework for Sustainable Forests**

The overall context for forest management in Ontario is the Policy Framework for Sustainable Forests which was approved by Cabinet in 1993. The framework sets broad direction for forest policy and makes forest sustainability the primary objective of forest management. Its legislative authority is found in the *Crown Forest Sustainability Act (CFSAct)*.

### **Overview of the *Crown Forest Sustainability Act***

The *CFSAct* was passed by the Ontario Legislature on December 7, 1994. It replaces the *Crown Timber Act* and will come into force on April 1, 1995. The *CFSAct* is enabling legislation and provides for the regulation of forest planning, information, operations, licensing, trust funds, processing facilities, remedies and enforcement, and transitional provisions. The *CFSAct* is designed to allow for the management of all forest-based values.

### **A Manual Approach to *CFSAct* Implementation**

The *CFSAct* requires the provision of four manuals to guide various aspects of forest management in Ontario. These manuals are authorized by Section (68) of the Act and form part of the regulations (Section 69 (29)). The four manuals are:

1. The *Forest Management Planning Manual*
2. The *Forest Operations and Silviculture Manual*
3. The *Scaling Manual*
4. The *Forest Information Manual*

The *Forest Management Planning Manual* is the pivotal document which provides direction for all aspects of forest management on Crown lands in Ontario. Like the other three manuals, it was developed by a team led by the Ontario Ministry of Natural Resources (OMNR) in collaboration with a wide spectrum of non-government organizations during 1994 and 1995. Forest management plans provide the authority to carry out activities including road construction, timber harvesting, forest renewal and protection treatments, wildlife habitat management, sensitive values protection, surveys and evaluation.

The *Forest Operations and Silviculture Manual* is a compendium of guidance and direction for the conduct of operations authorized by approved forest management plans. This manual provides for the qualification of persons engaged in forest operations as well as measures for assessing the performance of forest operations.

The *Scaling Manual* provides direction for the measurement of all timber harvested from Crown land in Ontario. It provides the means through which Ontario collects revenue from the disposition of Crown timber.

The *Forest Information Manual* provides guidance for information management that supports forest management planning and operations. Much of its content has been set by planning and operational information requirements.

The *CFS Act* defines sustainability as long-term Crown forest health. The subject of sustainability is addressed in the *Forest Management Planning Manual*. Related information and operational direction are contained in the *Forest Information Manual* and *Forest Operations and Silviculture Manual*.

### **Manual Revision**

These manuals will always be works in progress. They will be revised, improved and updated often to reflect the many changes that lie ahead. This manual has a futures section which indicates what work is still outstanding and the future direction. Revisions to these manuals will be made through consultation with non-government organizations and the Provincial Policy and Technical Committees.

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## PART 1 - INTRODUCTION

This *Forest Operations and Silviculture Manual*, as required under Section 68 of the *Crown Forest Sustainability Act (CFSA)*, provides direction and guidance to resource managers responsible for managing and operating in Crown forests. It contains provisions with respect to forest operations including:

- o standards for forest operations
- o standards for silviculture practices
- o minimum qualifications for persons specified in this manual who are engaged in forest operations
- o assessment procedures and standards to be used in the evaluation of forest operations and forest management

Rather than give forest managers a set of strict rules that must be followed, Ontario relies on the professional judgement, within a set of broad guidelines and principles, of the people given the responsibility to manage the forest resource. These guidelines and principles are spelled out in a number of publications and directives, all of which are described in this Manual.

This Manual is a directory or catalogue of the various guidelines and direction which a resource manager **must** consider during the preparation and implementation of forest management plans. There has been no attempt to reproduce the information in each of the published guidelines; instead a general overview of their content is provided.

This Manual has five parts:

- o **Part 1** describes the Manual and its application.
- o **Part 2** describes the provincial guidelines and manuals that provide up-to-date scientific and technical knowledge for Ontario's resource managers during their forest management planning and implementation activities.
- o **Part 3** contains information about certification requirements for forestry workers who conduct operations.
- o **Part 4** contains information about the evaluation of forest operations to ensure that the objectives of the forest management plan are being met.
- o **Part 5**, "Future Direction", discusses subjects that are not yet ready for implementation but are planned for later editions of this Manual.

Following Part 5 are four appendices:

- o **Appendix A** is a list of the most recent versions of each of the guidelines described in the Manual, the exact titles and dates of publication are given so that readers can be sure they have the most recent edition.
- o **Appendix B** is a list of Ministry of Natural Resources policies and procedures relating to forest operations and silviculture, again including the complete title, reference number and date of publication.
- o **Appendix C** is a list of additional reference material.
- o **Appendix D** is background information on Woodland Caribou.

The appendices are followed by a **glossary** of specialized forest management terms used in this Manual.

## 1. Use of the *Forest Operations and Silviculture Manual*

**ALL guidelines, manuals and direction described in Parts 2, 3 and 4 of the Forest Operations and Silviculture Manual must be considered during the preparation of management plans and the conduct of forest operations (sections 7 to 23 (inclusive) of the CFSA).**

**Sections 42 to 47 (inclusive) of the CFSA describe how forest operations may be conducted in a Crown forest. In particular, Section 43 requires that forest operations in a Crown forest must be in compliance with the *Forest Operations and Silviculture Manual*.**

Each guideline and manual referred to in this Manual is a complete document in itself. Based on the most up-to-date scientific knowledge, they describe the practical application of this science to the subject matter addressed by that guideline or manual. Thus, they are just as applicable to private land as to Crown land, although the private landowner is not obliged to follow them.

The key to good management is common-sense and practical application of the principles contained in the guidelines and manuals. Therefore, in some local situations it may be necessary to use management methods and deviate from those described in the documents listed in the *Forest Operations and Silviculture Manual*. All such deviations must be noted in the forest management plan and documentation of the rationale for not following the guidelines is required.

Compliance or non-compliance with the documents referred to in this manual,

or with the exceptions noted above, will be determined during compliance monitoring as set out in the forest management plan. Non-compliance will be dealt with by the Minister in accordance with the *CFSAct*.

When applying the guidelines and manuals named in this Manual, it is important to recognize the cumulative effects of management practices. For example, a stream crossing proposed in a draft forest management plan may in itself not be a serious threat to the ecology of that stream. However, if there are already other crossings along that waterway, there could be cumulative detrimental effects on fish migration and habitat.

## **2. Achieving Forest Sustainability**

The *CFSAct* is the legislative means by which the province of Ontario will ensure that its Crown forests are managed to meet the social, economic and environmental needs of present and future generations. The *Forest Management Planning Manual* provides direction on the determination of sustainability. This *Forest Operations and Silviculture Manual* describes the techniques used to implement forest management plans.

## **3. Managing for Biodiversity**

Biodiversity has been described in many ways. One description of the term states:

**"Biological diversity [i.e. biodiversity] refers to the variety and variability among living organisms and the ecological complexes in which they occur."**

**"Diversity can be defined as the number of different items and their relative frequency. For biological diversity, these items are organized at many levels, ranging from complete ecosystems to the chemical structures that are the molecular basis of heredity. Thus, the term encompasses different ecosystems, species, genes and their relative abundance." (U.S. Government Office of Technology Assessment)**

Ontario has in the past addressed components of biodiversity through legislation (eg: the *Endangered Species Act*, *Provincial Parks Act*, the *Game and Fish Act*, the *Conservation Land Tax Act* and the federal *Fisheries Act*) and programs (eg: those on Areas of Natural and Scientific Interest, parks, wetlands, and tree improvement areas). The MNR guidelines and policies described in this Manual relate to various aspects of biodiversity. Details of some of these techniques currently under development are listed in the Part 5 - Future

Direction.

Interim biodiversity guidelines have been prepared for MNR's Central Region. They provide direction on describing forest biodiversity at the forest and stand levels and on setting diversity objectives. Part 5 of this Manual, "Future Direction" contains a discussion of the incorporation of biodiversity into landscape management.

#### **4. Maintenance of the *Forest Operations and Silviculture Manual***

It will be the responsibility of the Provincial Technical Committee (under establishment at the time this Manual was prepared) to ensure that the implementation manuals and guidelines referred to in the *Forest Operations and Silviculture Manual* and listed in Appendix A, are kept current or are revised or amalgamated as necessary, and that new manuals or guidelines are written when needed. All manuals and guidelines will be re-evaluated at least every five years. There will be a continuing need, therefore, to add to, alter or delete parts of this Manual.

The writing and revising of guidelines and implementation manuals will require the participation of interest groups and stakeholders. It will include consultation with appropriate government ministries and agencies, provincial non-government organizations, local interests and representatives of Local Citizens Committees.

Once the guidelines and implementation manuals are approved by MNR, references to them will be incorporated into the next edition of the *Forest Operations and Silviculture Manual*.

#### **5. Training**

It is the responsibility of anyone who conducts forestry operations on Crown land to understand and comply with the requirements of the *Forest Operations and Silviculture Manual*. Training in the use of the Manual will be incorporated into the annual *Forest Management Planning Manual* training programs to ensure that both manuals and associated documents are applied consistently by all those involved in the forest management planning and implementation.

In addition, training in the application of individual guidelines described in this Manual will be given separately when necessary.

## PART 2 - STANDARDS FOR FOREST MANAGEMENT ACTIVITIES

This part of the Manual is a compendium of guidelines and implementation manuals applicable to the conduct of forest operations and silviculture activities.

These guidelines are the tool kit through which the objectives of forest management plans will be achieved in Ontario. For ease of reference, this part has been organized under the following headings:

- o Forest Operations
- o Silviculture Practices
- o Fish and Wildlife Habitat Management
- o Socio-Economic Considerations

### 1. Forest Operations

#### a) Access Roads and Water Crossings

The *Environmental Guidelines for Access Roads and Water Crossings* contain a series of guidelines about access roads on Crown land in Ontario. Their application will ensure a minimum of disturbance to the natural environment.

These guidelines:

- o Provide up-to-date environmental guidelines, appropriate for the construction, maintenance and abandonment of access roads and water crossings
- o Establish mandatory standards and provide practical advice for the construction, maintenance and abandonment of access roads and water crossings on Crown land to ensure environmental protection
- o Provide for the recording and dissemination of information about practices being used in Ontario which have proven effective in preventing or reducing harm to the environment
- o Describe special mitigation techniques that may be used to eliminate or reduce potential harm to the environment

Good-practice guidelines are provided for each stage of planning, constructing, maintaining and abandoning access roads and water crossings.

The mitigation techniques described in the manual are intended primarily to control erosion and sediment at water crossings to protect fish habitat and water quality. The techniques also address beaver management, the creation of

spawning areas and the protection of fish passage at water crossings.

In areas of unique or special value, identified before or during construction, some good-practice guidelines or mitigation techniques must be considered. For example, MNR may require sediment control plans outlining the erosion and sediment control measures at a water crossing before giving approval for construction to begin.

Relevant MNR policies and procedures that compliment this guideline are included in a document called the *Access Roads Manual*. This manual provides information pertaining to the administration, planning, operation (construction and maintenance), and monitoring of access roads.

**b) Riparian Code of Practice**

The area where land and water meet is called a riparian zone. These are areas surrounding waters that are identified in fisheries policy FI.3.03.01. Because this transitional zone contains elements of both terrestrial and aquatic ecosystems, it is often the most productive environment in the forest. Harvesting and renewal activities, even though they are normally conducted well within the forest, may harm these sensitive areas unless care is taken.

The *Code of Practice for Timber Management Operations in Riparian Areas* recommends that care be taken when forestry equipment is operated in or near riparian areas. Things to consider are the slope of the terrain, vegetation cover, soil compaction and season of operations as well as the types of harvesting and equipment used. It also recognizes safety factors, environmental considerations and economics.

The code of practice requires training be given by MNR as well as by industry staff to ensure that forestry workers understand the sensitivity of riparian areas. It also includes a monitoring and enforcement component.

The code of practice is used in conjunction with the *Timber Management Guidelines for Protection of Fish Habitat*.

The code of practice is being revised to address the rehabilitation of trails used for trap lines and portage routes in riparian areas once timber operations are finished.

**c) Aerial Spraying**

The *Aerial Spraying for Forest Management* manual applies to the aerial spraying of pesticides and to the Air Blast Sprayer.

The manual describes the legislative and operational requirements for doing aerial spraying on Crown land in Ontario. It includes guides for an application boss, an occupational health and safety officer, a navigator and a weather officer.

It also outlines the requirements regarding:

- o description of the spray project
- o equipment
- o schedule for planning and operations
- o guiding of aircraft
- o airstrip and heliport standards
- o project reporting
- o weather interpretation
- o equipment set-up
- o maintenance of equipment and storage standards
- o aircraft specifications
- o weather terminology

The manual refers to all relevant policies and procedures such as those that address licensing for pesticide use, experimental use of pesticides, application of pesticides and posting of treated areas.

There are also regulations under other provincial and federal legislation that must be adhered to when conducting aerial spray programs. These deal with health and safety, the handling and application of pesticides, aircraft and pilots, the environment, the transporting and handling of chemicals and fuels, and staffing and personnel.

This manual must be used by MNR staff, but not necessarily by forest industry staff. While some companies have developed their own manuals, at a minimum industry is required to follow the applicable legislation including guidelines of the Ministry of Environment and Energy.

**d) Prescribed Burns**

The *Prescribed Burn Planning Manual* contains the guidelines for planning and conducting all prescribed burns in Ontario. Its purpose is to ensure that there is

is a uniform approach to all prescribed burns. For each prescribed burn in Ontario, an operational plan must be prepared in accordance with the instructions set out in the manual. Such a plan must include the following information:

- o a description of the methods used to notify the public
- o clear statements of the objectives to be achieved
- o a burn prescription that will meet the objectives
- o a list of all areas of concern
- o a description of ignition, suppression, safety and support measures

A new edition is expected in 1995.

**e) Seed Zones**

The Ontario Tree Improvement Board is writing the *Seed Zone and Seed Transfer Manual*. This manual will outline provincial seed zones and guidelines for seed transfer.

New seed zones are being defined and procedures reflecting the new policies on seed and stock transfer will be developed. The manual will provide forest managers with consistent rules, based on sound scientific research, for the collection, purchase and transfer of seeds.

It will be mandatory for the transfer of seed and stock within and between seed zones to conform to the rules outlined in the manual. This new manual is expected in 1995.

**f) Avoiding Wasteful Practices**

Wasteful practices are defined in relation to the minimum utilization standards for the province. These standards have been designed to promote good forest management by ensuring optimum utilization of forest products on harvesting operations. Poor utilization of forest products may result in loss of revenue, lower productivity or higher regeneration costs or may cause inferior or undesirable trees to remain on the site.



The following paragraph replaced the paragraph in the 1995 First Edition, as authorized by Ontario Regulation 283/00 April 1, 2000. This came into effect June 12, 2000.

The minimum utilization standards must be followed on all forest operations unless otherwise described in an approved forest management plan. For example, merchantable trees and/or wood fibre may be left at a harvest site in order to satisfy silviculture and habitat requirements, or because of market-related issues associated with a certain species or product. Leaving merchantable trees at the harvest site because of market-related issues must not jeopardize the silviculture or habitat objectives of that harvest site. Reasons for leaving merchantable trees and/or wood fibre in specific areas within a forest must be described in the approved forest management plan. Failure to comply with minimum utilization standards unless otherwise described in the approved forest management plan is a wasteful practice. No person shall commit wasteful practices in forest operations.

**8 (b)**

There are five kinds of wasteful practices pertaining to:

- o leaving high stumps
- o leaving merchantable timber
- o leaving merchantable trees
- o leaving lodged trees
- o not utilizing wood chip fibre

It is recognized, however, that not all of a tree or stand is merchantable. Unmerchantable waste is that part of the stem or stand that is below a specified quality or size.

Definitions and details of each of these standards along with administrative penalties for violations are hereby authorized in the *Scaling Manual*.

**g) Other Infractions Involving Crown Forest Resources**

No person shall commit trespass or engage in the unauthorized hauling of Crown forest resources.

A **trespass** is defined in this manual as the unauthorized cutting or possession of Crown forest resources. A trespass takes place in any of the following (and other) situations when:

- o a person harvests forest resources in a Crown forest without the authority of a forest resource licence
- o a person fails to comply with the forest resource licence
- o a forest resource licensee harvests forest resources without an approval
- o a forest resource licensee harvests forest resources outside of the approval area

**Unauthorized hauling of Crown forest resources** is the movement of Crown forest resources from the place of cutting before they are measured and counted without the written approval of the Minister.

Definitions and details for trespass and unauthorized hauling, as well as administrative penalties for infractions, are hereby authorized in the *Scaling Manual*.

**h) Salvage**

In forest operations, salvage is the recovery or harvesting of timber that has been killed or damaged by natural causes, such as fire, wind, flood, insects and disease.

Harvest operations must be conducted in a manner that:

- o maximizes the recovery of "killed" or "damaged" timber, or
- o restricts further damage or infestation to the stand

Stumpage prices of salvaged timber will be set to enhance these objectives and will be established according to criteria set out in provincial policies and procedures which provide further guidance on this subject.

**i) Environmental Guidelines**

New environmental guidelines to protect the physical environment during forest harvesting, renewal and maintenance are being developed. See Part 5 - Future Direction, for more information on this subject.

**2. Silviculture Practices**

**a) Silvicultural Guides**

The silvicultural guides describe silvicultural practices for the major forest working groups in Ontario. These guides provide current scientific and technological information for resource managers to use in developing forest prescriptions.

There are five silvicultural guides:

- o *A Silvicultural Guide to the Jack Pine Working Group*
- o *A Silvicultural Guide to the Spruce Working Group*
- o *A Silvicultural Guide to the Poplar Working Group*
- o *A Silvicultural Guide for the White Pine and Red Pine Working Groups in Ontario*
- o *A Silvicultural Guide for the Tolerant Hardwoods Working Group in Ontario* (the hard maple, yellow birch, hemlock and other hardwoods working groups)

Each silvicultural guide describes the silvical characteristics of the working group and current silvicultural practices. The guides make use of scientific research and the knowledge and experience of professionals who manage these types of forests in Ontario and elsewhere. They are a record of the best silvicultural methods available. They will be updated periodically as new technologies and practices are developed. The guides are now an integral part of forest management planning and must be considered during that process and its implementation. The use of silvicultural guides during the development of silvicultural ground rules and operational prescriptions for forest management plans is outlined in the *Forest Management Planning Manual*.

The guides are for use at the management unit level, where they must be adapted and interpreted to meet local conditions. In particular, they must be considered by the manager as a source of information that, together with local knowledge, will assist in the development of silvicultural ground rules within forest management plans.

*A Tree Marking Guide for the Tolerant Hardwoods Working Group in Ontario* serves as an operational companion volume to *A Silvicultural Guide for the Tolerant Hardwoods Working Group in Ontario*.

Additional direction for boreal mixedwood forests (eg: mixtures of poplar, spruce, balsam fir and white birch) will be provided in *Boreal Mixedwood Notes*. The Notes will be published periodically as information and techniques are developed. Boreal mixedwood forest types are defined more by the conditions of the forest site than by species alone. The first issue of the Notes is expected in 1995. Additional information regarding these notes is contained Part 5 - Future Direction.

Although not considered a part of the silvicultural guides, there are additional publications addressing specific silvicultural situations or local conditions (see OMNR, 1983; OMNR, 1986) which are useful references for the forest manager. These are listed in Appendix C - References.

## b) Old Growth

The management of old growth from a landscape perspective should be considered in planning for all forest tree species in Ontario's forests.

The *Conservation Strategy for Old Growth Red and White Pine Forest Ecosystems for Ontario* (OMNR, 1994) provides direction to field staff when preparing forest management plans and conducting forest operations. The knowledge gained from working with these two species will be applied when

similar measures are considered for other tree species.

MNR has also received the report of a two year investigation into this topic (Old Growth Forests Policy Advisory Committee, 1994). Further direction for old growth management is under development.

**c) Forest Operations Prescriptions**

The *Forest Management Planning Manual* will describe the process for preparing forest operations prescriptions. *The Development of Forest Operations Prescriptions* guidelines are being prepared. They will outline responsibilities and methods for gathering information to help develop forest operations prescriptions in the forest management planning process, specifically during preparation of the annual work schedule.

**d) Ecological Classification Systems**

*A Guide to Ecological Classification Systems and Their Use in Ontario* provides the resource manager with a current description of the ecological classifications in Ontario. These classifications offer a standardized language for identifying and interpreting ecosystems. These systems are to be used during the preparation of the forest management plan and, in particular, when the author of the plan is developing forest operations prescriptions.

At the stand level, the classifications identify a combination of plant community and soil and site characteristics which define the various types and attributes of ecosystems. At this most detailed level of classification, these characteristics represent ecological conditions which respond predictably to silvicultural practices applied to meet various site and forest-level objectives. The classifications are also a standardized way of describing certain ecosystems in more detail than is found in the present Forest Resource Inventory (FRI).

Earlier classification systems are now being harmonized into a single, standardized classification and site description format.

Classification work is also proceeding on a definition of ecological regions for the province. These eco-regions and eco-districts will provide a framework for planning and resource analysis.

e) **Regeneration Surveys**

The *Regeneration Survey Manual for Ontario* contains the procedures and guidelines used by MNR for assessing regeneration in Ontario. The purpose of the manual is to ensure that the same methods and standards are used everywhere in the province to assess the success of regeneration and to provide meaningful information on the state of regeneration to various levels of management within MNR.

The manual contains instructions for conducting stocking and survival assessments. It also describes the proper method of completing the required forms.

An investigation into alternative methods of assessing regeneration in areas harvested by the clearcut silvicultural system of the boreal forest was done during the summer of 1994. This study was prompted by a concern that the present method of assessing regeneration does not provide enough, or the right kind of, information for the management decisions that are required today. This investigation examined the use of "well-spaced, free-growing trees" as a standard for measuring regeneration success.

At the time this Manual is being written, these new standards are under review by forest managers. The proposal includes the following principles:

- o local standards will be determined as part of the silvicultural ground rules, at the time of writing the forest management plan
- o standards to be set locally include:
  - o management objectives
  - o acceptable tree species
  - o minimum tree height
  - o number of growing seasons elapsed since last disturbance before survey conducted
  - o minimum acceptable number of well-spaced, free-growing stems per hectare
  - o target number of well-spaced, free-growing stems per hectare
- o results of surveys must be reported with a 90% level of statistical accuracy, and in the format described by the *Forest Management Planning Manual* (ie: area in hectares declared free-growing, by treatment package and forest unit)
- o use of either extensive or intensive methodologies, at the discretion of the resource manager

- o intensive survey method described in *Free-Growing Regeneration Assessment in Ontario* will be used as the standard for audit purposes
- o fifth year stocking and free-to-grow surveys will be replaced by the regeneration assessment method; earlier surveys (eg: second year survival study) will be done at the discretion of the resource manager
- o manager of the resource has responsibility to conduct the regeneration assessment survey, and provide an FRI description

Finalization of these standards is expected in 1995. The *Regeneration Survey Manual* will be replaced by new guidelines at that time.

A similar review is being conducted of regeneration assessment methods for other silvicultural systems and forest regions. Where needed, new methods will be developed.

### **3. Fish and Wildlife Habitat Management**

MNR's policy is to ensure that no species declines on a provincial scale because of forest management activities. Consideration will be given to "provincially featured species" when developing wildlife habitat management objectives for forest management plans and operational prescriptions.

Provincially featured species are moose, white-tailed deer, pine marten and pileated woodpecker, along with threatened and endangered species.

Consideration is also to be given to "locally featured species" when managers wish to provide for species of local importance.

All of the habitat guidelines referenced in this Manual are implementation manuals and guidelines that must be considered during forest management planning and forest operations. Although some of the wildlife guidelines exist in draft form, information is supported by scientific literature and peer review and can be used by resource managers.

#### **a) Provincially Featured Species**

Terrestrial forest wildlife species in Ontario are adapted to periodic natural disturbances, such as fire, blowdown and outbreak of insects. With the exception of threatened and endangered species, each of the current provincially featured species requires a wide variety of habitat. This variety of habitat types provides for a wide diversity of wildlife. When there is a concern for the

well-being of some other species, then site-specific habitat management prescriptions will be considered.

**i) Endangered and Threatened Species Guidelines**

Endangered species by law, and threatened species by policy, are viewed as provincially featured species wherever they occur. A regulation made under the *Endangered Species Act*, protects, among other species, bald eagles, golden eagles and peregrine falcons and their habitat.

The following management guidelines are available for these species:

- o *Bald Eagle Habitat Management Guidelines*
- o *Golden Eagle Habitat Management Guidelines*
- o *Peregrine Falcon Habitat Management Guidelines*

Guidelines pertaining to these species contain measures to mitigate negative effects of forest operations. The species most likely to be of concern is the bald eagle, because it nests in areas forest management operations commonly occur. Golden eagles and peregrine falcons do not occur in large numbers in Ontario and do not usually nest in places where forest operations occur. The guidelines are applicable, however, where either of these species is encountered during the planning or operational phases of forest management. Assistance and advice can be obtained from MNR area biologists.

There are no threatened species that are known to be at risk because of forest management activities conducted on Crown land.

**ii) Other Provincially Featured Species Guidelines**

**Timber Management Guidelines for the Provision of Moose Habitat**

The purpose of these guidelines is to help resource managers maintain or create the diversity of age classes and species of vegetation that provide for moose. To assist in reaching provincial and local population targets, the guidelines must be applied where forest management operations occur in moose range, except where their implementation might jeopardize another species.

### **Timber Management Guidelines for the Provision of White-tailed Deer Habitat**

The purpose of the *Timber Management Guidelines for the Provision of White-tailed Deer Habitat* is to help resource managers maintain or create, through forest management, a diversity of age classes and species of vegetation that provide habitat for white-tailed deer. These guidelines are in draft form, and thus some revisions can be expected before they are approved. However, they are supported by scientific literature and peer review and can be applied by resource managers. They allow a great deal of flexibility for management with due regard for local conditions.

Deer are "featured" primarily in the Great Lakes - St. Lawrence forest region. Of concern is wintering habitat, particularly stands where hemlock or cedar predominate. It has long been recognized that sufficient high-quality habitat is crucial for winter survival of deer in Ontario. Local information about the abundance of deer and seasonal distribution is essential to the proper application of guidelines.

The guidelines are accompanied by background material which discusses deer habitat. Specific information is provided for identifying winter and summer habitat.

### **Timber Management Guidelines for the Provision of Pine Marten Habitat**

The *Timber Management Guidelines for the Provision of Pine Marten Habitat* are under development.

There is general concern that in the long-term the population of this species may decline as a result of changes in forest cover. Marten are generally found in the boreal forest in mature and over-mature conifer stands. More background information on current knowledge of pine marten at the forest and stand level is contained in Part 5 - Future Direction.

The pine marten will be considered a featured species on Crown lands in the boreal forest region and elsewhere where deemed appropriate. These guidelines will be completed by April 1996.

### **Timber Management Guidelines for the Provision of Pileated Woodpecker Habitat**

The *Timber Management Guidelines for the Provision of Pileated Woodpecker Habitat* are under development. The provision of habitat for this species will be

considered at both the forest level and the stand-level. More background information about current knowledge on the pileated woodpecker is contained in Part 5 - Future Direction.

The pileated woodpecker will be considered a featured species on Crown lands within the Great Lakes-St Lawrence forest region. These guidelines will be completed by April 1996.

**b) Locally Featured Species**

Managers must also give consideration to the habitat of locally featured species. Conflicts between various habitat management strategies for different species in one area will be resolved by local managers in consultation with experts and Local Citizens Committees. These decisions are made as part of the forest management planning process and during the preparation of the annual work schedule. Consideration must also be given to legislative and policy requirements, approved production targets, relative abundance and distribution of the species, degree of risk to the species or site from planned activities, local priorities and other local concerns.

**c) Guidelines for Other Wildlife**

The species referred to in the following wildlife guidelines are distributed throughout the area of forest management activity in Ontario. They exist in a variety of habitats, both aquatic and terrestrial. Relevant guidelines are to be applied, with local interpretation, during the forest management planning process and the conduct of operations where there is a concern about undesirable effects on the habitat of a particular species or group of species. Any of these species may be determined in the course of forest management planning to be "locally featured", and habitat management may be undertaken for them.

These guidelines make general suggestions about suitable cut patterns for many of these species. Many of them contain practical examples and advice to help forest managers mitigate or avoid undesirable impacts of forest operations. Additional advice can be obtained from local area biologists and other sources of local expertise. More specifically, these guidelines either prescribe distinct no-cut reserves around such areas as nesting sites, or they give general descriptions of cutting patterns that are beneficial to a species or group of species.

***Timber Management Guidelines  
for the Provision Woodland Caribou Habitat***

The *Timber Management Guidelines for the Provision of Woodland Caribou Habitat* apply in areas where caribou are a locally featured species. The objective of the guidelines is to ensure suitable and sustainable year-round caribou habitat at a landscape level. These guidelines are currently in draft form. The contents are supported by scientific literature and peer review.

The caribou guidelines describe the measures that must be considered when planning forest operations throughout the life of the forest where caribou are locally featured. They provide for protection for specific critical habitat features, such as calving sites, travel corridors and wintering areas. They also provide for an adequate distribution of suitable wintering habitat throughout the forest and throughout the life of the forest.

See Appendix D for background information on woodland caribou management in Ontario.

***Habitat Management Guidelines for Ontario's Forest Nesting Accipiters,  
Buteos and Eagles***

These guidelines state that raptors are easily disturbed by clearing or logging practices, especially during the breeding season. These birds are by nature uncommon, even in undisturbed forests. Often the guidelines suggest simple solutions that will provide the necessary habitat for forest-dwelling raptors. Slight modifications to operations may be necessary; specific no-cut reserve prescriptions are often suggested.

The guidelines discuss the habitat needed by six raptorial birds: northern goshawk, Cooper's hawk, sharp-shinned hawk, red-shouldered hawk, broad-winged hawk and bald eagle.

***Hawk Guide for Ministry of Natural Resources Field Personnel***

This guide provides additional guidance for Cooper's hawk and red-shouldered hawk. It also contains an excellent identification guide and information on all of the hawks common in Ontario's forests.

### **Management Guidelines and Recommendations for Osprey in Ontario**

The osprey guidelines discuss the requirements for reserves to protect nests from many kinds of disturbance. Because osprey are widely distributed in the world and highly visible, a great deal is known about their sensitivity to disturbance. These guidelines describe prescriptions for restrictions on human activity and removal of vegetation during the breeding season.

### **Management Guidelines for the Protection of Heronries in Ontario**

Large established heronries, some consisting of hundreds of pairs, may be occupied for decades. If these heronries are disturbed during the breeding season, the herons may desert them. In order to prevent this, these guidelines prescribe reserves of specified sizes together with seasonal restrictions on forest operations.

### **Habitat Management Guidelines for Cavity Nesting Birds**

There are at least 30 kinds of birds that need cavities in trees. They include woodpeckers, chickadees and their relatives, some of the owls and several other species. The cavity-nesting guidelines give specific cutting requirements and some general principles which will conserve tree cavities for these species.

### **Habitat Management Guidelines for Bats in Ontario**

Although little is known about bat biology in Ontario, it is believed that many species live in snags (large dead trees). The bat guidelines are consistent with the guidelines for cavity-nesting species described above.

### **Habitat Management Guidelines for Warblers of Ontario's Northern Coniferous Forests, Mixed Forests or Southern Forests**

The habitat guidelines for warblers describe in general the habitat needed for 19 species of small birds found in wooded areas throughout Ontario. Many of these species are abundant, though not often seen. Because of their abundance and diversity, it is not possible to make specific guidelines (such as nest

reserves) for these birds. The guidelines do, however, make some general suggestions. This group of species should benefit from being provided with a variety of habitats, including large undisturbed areas, across broad landscapes.

#### **Guidelines for Providing Furbearer Habitat in Timber Management**

The furbearer guidelines contain a general discussion about the biology and needs of furbearing animals in Ontario. They make suggestions about measures to mitigate the potential adverse effects of timber harvesting on furbearers. These guidelines should be applied only with the guidance of biologists and others with local expertise.

#### **Habitat Management Guidelines for Birds of Ontario Wetlands including Marshes, Swamps, Fens or Bogs of Various Types excluding Waterfowl**

These guidelines cover shorebirds, gulls, terns, wrens, some warblers, some sparrows and a number of other species. The guidelines contain a brief discussion of the requirements for each species and, when known, their sensitivity to disturbance.

The habitat of wetland birds will also benefit from the application of the *Code of Practice for Timber Management Operations in Riparian Areas*, the *Timber Management Guidelines for the Protection of Fish Habitat* (discussed in the next section) and the *Wetlands* policy statement.

#### **Habitat Management Guidelines for Waterfowl in Ontario**

The guidelines for waterfowl make general suggestions about the care that must be taken in riparian areas. They are consistent with other guidelines about the ecotone between water and land. This very productive zone is always a concern in forest operations. These guidelines also give a general description of the kind of sites which are desirable for waterfowl breeding.

#### **d) Fish Habitat**

The responsibility for managing fisheries in Ontario is shared by MNR and the federal Department of Fisheries and Oceans (DFO). The federal *Fisheries Act* prohibits "any work or undertaking that results in the harmful alteration,

disruption or destruction of fish habitat" (section 35(1)). MNR and DFO have an agreement by which MNR reviews any projects which may result in the harmful alteration, disruption or destruction of fish habitat. Projects determined to be harmful to fish habitat are referred to DFO for authorization (section 35(2)).

Matters concerning sections 36 to 42 of the *Fisheries Act* and the discharge of a deleterious substance are administered by the federal Department of the Environment in cooperation with DFO in collaboration with the Province.

### **Timber Management Guidelines for the Protection of Fish Habitat**

These guidelines describe ways of protecting aquatic ecosystems by maintaining water quality and protecting fish habitat from the potentially harmful effects of certain forest operations.

The guidelines are intended to ensure that there is a consistent approach to the protection of fish habitat across Ontario. Because of many site-specific factors, the guidelines should be used with some flexibility. However, any departures from the guidelines must be consistent with the objective of protecting fish habitat.

Some fish habitats are essential for the maintenance of a population and are usually quite scarce. Such habitats, such as spawning or nursery areas, must be given a high degree of protection by establishing an adjacent shoreline reserve. Bodies of water with cold-water species (lake and brook trout) and muskellunge require more stringent protection than other waters.

Forestry equipment operators must follow the *Code of Practice for Timber Management Operations in Riparian Areas* (see Part 2, section 1b of this Manual).

Further direction in the use of these guidelines is given in MNR fisheries policy. It defines the waters to which the guidelines apply. It also describes the kinds of information which must be available for the guidelines to be used and establishes acceptable methods for obtaining this information. Finally the policy states how water quality and fish habitat are to be protected when there is too little information to make effective use of the guidelines.

Relevant documents that complement this guideline are included in a publication by Kerr (1993), especially the portion dealing with forest management and logging.

## **4. Socio-Economic Considerations**

Socio-economic factors must be taken into account during the development of local objectives for a forest management plan (see *Forest Management Planning Manual*). Subjects that require specific attention are addressed below.

### **a) Tourism Values**

The *Timber Management Guidelines for the Protection of Tourism Values* describe various ways of dealing with the effect of forestry operations on tourism values. The guidelines should be applied after tourism values are confirmed through a comprehensive consultation process, and before forestry operations begin. Because the guidelines recognize a wide variety of activities as part of tourism, they are applicable throughout Ontario.

Forest management plans must contain a section on visual resource management. The guidelines describe the relationship between the tourism and the forest industries and suggest a variety of ways of dealing with specific areas of potential conflict. The goal is to foresee unacceptable effects of forest operations and try to reach a consensus on how to deal with these conflicts.

The guidelines encompass the main aspects of the forest-based tourism industry, from remote tourism to the use of public roads and recreation facilities on Crown land. The guidelines discuss measures such as the use of skyline reserves and the specific location of roads.

### **b) Cultural Heritage**

The *Timber Management Guidelines for the Protection of Cultural Heritage Resources* are designed to help forest management planning teams and heritage planners protect Ontario's non-renewable cultural heritage.

Cultural heritage resources (eg: aboriginal burial sites) are considered non-renewable because they are unique to the people who created them and used them as part of their culture. Heritage resources are usually fragile and susceptible to irreparable damage or destruction. These guidelines emphasize the importance of identifying heritage resources in advance of forest operations.

Resource managers must consider these guidelines in forest management planning and during forest operations.

In addition, the cultural heritage resources of the province are protected by several Acts and Regulations. They include, in addition to the *CDSA* and the *Environmental Assessment Act*, the *Ontario Heritage Act*, the *Cemeteries Act* and the *Planning Act*.

## **PART 3 - QUALIFICATIONS FOR PERSONS ENGAGED IN FOREST OPERATIONS**

Minimum qualifications for persons engaged in forest operations have been established for certain activities. The licensing of scalers, certification of fellers and skidder operators and licensing of pesticide applicators, for example, are covered by legislation, policies and procedures of MNR, the Ministry of Labour and the Ministry of the Environment and Energy, respectively.

The *CFSAct* states that a forest management plan (section 8(3)) and forest operations prescriptions (section 16 (2)) must be certified by a registered professional forester (RPF). In some cases, a person specified by the Minister may certify forest operations prescriptions (section 16(3)).

Other aspects of forest management may be considered for certification in the future. The requirements of such certification will be included in future editions of this Manual. At present, a certification system is being planned for tree markers working in partial-cutting operations.

### **1. Tree Marking**

Certification of tree markers will be a requirement for all partial-harvest systems on Crown land in the deciduous and the Great Lakes - St. Lawrence forest regions. It should be noted that silvicultural marking does not include the marking of lines, layout of cut boundaries, etc. All MNR administrative regions will be affected, although the bulk of the tree marking will continue to be in the Central and Southern Regions.

Tree marking is used to regulate partial-cutting operations (ie: systems such as selection, shelterwood or clearcut with seed trees) in which a residual stand remains for several years.

The tree-marking certification program will develop and maintain a workforce of experienced and well-trained tree markers. Certified tree markers will be able to:

- o interpret and apply continually updated resource management guidelines
- o use discretion in adapting general marking prescriptions to unanticipated variability in terrain, stand type, habitat conditions, etc.
- o apply marking prescriptions in a consistent manner

Certified tree markers will be fully trained in:

- o silvicultural objectives, systems and variations to be applied
- o forest stocking levels and structural types
- o the ecological requirements of the species being managed
- o indicators of tree vigour, defects and quality
- o wildlife and fisheries management objectives for the area, habitat requirements, and the impact of tree marking decisions and options on those factors
- o forest health, site, species, integrated resource management and forest product considerations
- o practical aspects of tree marking (ie: tools, crew organization, reading a prescription, etc.)

Tree markers with a minimum amount of initial training may mark under close supervision for a period of time before the next available certification course. A probationary certificate, upon successful completion of the course, will allow practical experience to be gained under close supervision before final field certification. Tree markers will be certified for a period of three years. There will also be refresher courses and requirements for annual upgrading.

There will be three levels of certification:

- o Level One markers will be those trained and certified to work as members of a tree-marking crew
- o Level Two certification will be recommended for crew bosses and will be required for auditors
- o Level Three certification will be recommended for prescription writers and required for trainers.

Full implementation is expected within five years.

## **PART 4 - EVALUATION OF FOREST OPERATIONS AND MANAGEMENT**

Forest operations may proceed only after a forest management plan, an annual work schedule and a work permit (plus an approval to commence cutting operations, if applicable) have been approved by the MNR. The content of the first two documents is outlined in the *Forest Management Planning Manual*.

Once operations have commenced, a number of means are used to evaluate their progress. **Monitoring** is used to measure the effects and effectiveness (or success) of individual operations and compliance with the forest management plan, standards, manuals and guidelines. Periodic **audits** can be used to determine whether the overall objectives of the forest management plan are being met.

The rest of Part 4 describes certain survey methods to be followed. For more details about how data obtained from such assessments will be recorded, stored, transferred, shared, and reported, refer to the *Forest Management Planning Manual* and, in particular, the *Forest Information Manual*.

### **1. Monitoring**

There are three reasons for monitoring. One can monitor the effectiveness of a particular treatment, the effects that treatment has on other aspects of the environment, and whether the operator has complied with any permits, plans, restrictions, guidelines or rules established before the treatment was applied.

#### **a) Effectiveness Monitoring**

MNR is developing an effectiveness monitoring system for operational treatments carried out in the forest. At present, more specific surveys are used to measure the effectiveness of certain techniques. The survey for assessing regeneration success, referred to in Part 2, section 2e of this Manual, for example, is a means of monitoring the effectiveness of a renewal treatment.

#### **b) Effects Monitoring**

At present, effects monitoring is done through a number of scientific studies to survey and record the effects of certain operations on the forest ecosystem. The results of these studies increase knowledge, which in turn is incorporated into the various guidelines discussed throughout this Manual. Road construction, for

example, especially water crossings, is an operation that must be monitored for its effects on other resources, in this case aquatic conditions.

**c) Compliance Monitoring**

Compliance monitoring begins with the inspection of a forest operation to ensure that it conforms to the approved plan or permit. MNR has a series of policies and procedures describing the Area Inspection Program currently carried out by MNR. These directives will be reviewed, and possibly revised, in the near future to incorporate any changes required by the business relationship formed recently between the province and various forest products companies.

Details regarding the consistent application of compliance direction will be described in the *Compliance Handbook* currently being written.

**2. Auditing**

**a) Independent Audit**

The *CFS Act* provides for the independent audit of Crown forests, whether they are managed by a company or consortium of companies or by MNR. Such audits will be done regularly to ensure that the forest is being managed on a sustainable basis. The independent audit program is in the early stages of development.

**b) Operational Audit**

In addition to, and totally separate from the independent audit, an interdisciplinary, internal operational audit will be conducted by MNR staff to assess the interpretation and application of provincial policies, manuals and guidelines. All Crown forests will be subjected to such an internal audit periodically.

### **3. Reporting**

Reports on forest management will be made annually by MNR to the Legislature of Ontario. The five-yearly State of the Forest Report, also delivered to the legislature by MNR, will give, on a provincial basis, the results of actual forest operations conducted, as well as the findings of the various independent audits. It is through these reports that the general public will be informed about the condition and management of Ontario's Crown forest.

## **PART 5 - FUTURE DIRECTION**

Section 4 of Part 1 of this Manual discusses the process for maintaining its content and that of various guidelines and manuals to which it refers. At the time of writing, a number of initiatives are either under way or are identified as requiring attention in the near future. They are listed here, partly to inform the reader, and partly to act as a starting point for the next edition of this Manual.

### **1. Environmental Guidelines**

The protection of the physical environment during operations associated with the harvest, renewal and maintenance of the forest is a principle of good forest management. Concerns have been expressed about the maintenance of the productivity of some sites (because of possible loss of nutrients) and the size and shape of harvest blocks.

In response to these concerns, a guide , Environmental Guidelines for Timber Management in Ontario, is being prepared for use by forest managers to ensure that these specific issues are addressed consistently at the local level. These guidelines will compliment the other guidelines and manuals that address the protection of the environment.

These environmental guidelines will deal with the maintenance of site productivity by describing good practices to be used by an operator when working under certain site conditions (eg: poorly drained soils when they are wet). They will provide criteria to be considered by the forest manager when setting prescriptions.

These guidelines will also give general direction concerning harvest layout and configuration for each eco-region under forest management in Ontario. At the same time they will allow the local forest manager to consider characteristics of individual tree species (as described in the silvicultural guides) the needs of wildlife (as identified in the timber management guidelines for various wildlife species), natural and topographic conditions, and forest types.

### **2. Boreal Mixedwood Notes**

Boreal Mixedwood Notes will be published annually and will contain a cumulative index of all previous issues. The first issue is expected in 1995. It will contain scientific information about, and results of, silvicultural practices in other jurisdictions with implications for Ontario. The Notes will also present case studies of boreal mixedwood silvicultural practices in Ontario. Resource

managers must consider these Notes, in combination with other silvicultural guides, when formulating silvicultural ground rules for boreal mixedwood sites. As they are published, individual Notes shall be considered and treated as part of the Boreal Mixedwood Notes.

### **3. Landscape Management, Wildlife Habitat and Biodiversity**

Considerable work has been done on the subject of biodiversity and wildlife (Forest Policy Panel, 1993; Wildlife Working Group, 1991; ad hoc Committee for the Wild Life Strategy Action Plan, 1994). This work has recommended an ecosystem approach to wildlife habitat management rather than a species-by-species approach. MNR is currently working on how such an approach will be implemented.

In the meantime, the habitat management guidelines contained in this manual are a practical means of protecting, maintaining and enhancing wildlife habitat values associated with forest management activities such as harvesting, road construction, renewal and maintenance.

The featured-species approach to habitat management is currently being changed to one which strives more explicitly to conserve biodiversity with methods derived from landscape ecology. Ultimately, this approach will use analysis and management methods on a landscape scale to provide the vegetative mosaic required by all species in the forest. Landscape patterns will be analyzed at the strategic and local management planning stages so that the patterns of vegetation desired at the landscape level are identified and achieved or maintained.

This approach will seek to ensure that wildlife habitat requirements of a broad range of species will be met over the long term and across large areas. It will not, however, eliminate the need for site-specific prescriptions such as those for nest sites and other critical habitat elements for some species. Landscape ecology methods will provide more flexibility by setting objectives on a larger landscape scale in preparing habitat prescriptions for various species of wildlife. Furthermore, it will also be a simpler way of evaluating habitat management objectives for a broad range of wildlife species. MNR is currently developing the analytical tools and manuals for this approach.

In addition, new techniques are being developed to enable resource managers to monitor changes in diversity. The software that is available ranges from programs that use basic information from the FRI to complex, multi-theme

systems using a Geographic Information System (GIS). Among these new techniques are:

- a) **Landscape Diversity Analysis (LDA)** - A computer program which generates several non-spatial indices of diversity, thus summarizing the richness and distribution of landcover for the present forest. This program uses information from the FRI or other data sets. The program can compare the present forest with simulated scenarios using indices of diversity and ecological similarity (Perera and Schnakenburger, 1993).
- b) **Landscape Ecological Analysis Package (LEAP)** - A software package that analyses the spatial characteristics of landscape patterns (Moore Perera, in press.). This software package analyses spatial data in various formats such as FRI and satellite-interpreted classification of land cover.
- c) **Strategic Forest Management Model (SFMM)** - SFMM was designed to model production capabilities of a forest given various levels of management intensity (Davis, 1994). Soon it will also include habitat matrices for a selection of wildlife species representing five forest age classes and all forest units in each forest management unit. SFMM will project the decrease or increase in habitat that will result from the inputted data.

#### **4. Plant Management and Protection**

Consideration is being given to providing direction on this subject. It could include measures for protecting the habitat of uncommon species. For example, in some locations prescriptions are made for forest operations where ginseng is known to exist. Prescriptions include maintaining dense crown closure around intermittent streams and seeps, limiting the seasons of operation and minimizing the number of points at which streams and seeps are crossed.

#### **5. Pine Marten Habitat**

The pine marten will be considered a featured species on Crown lands in the boreal forest region and elsewhere where deemed appropriate. The *Timber Management Guidelines for the Provision of Pine Marten Habitat* will be completed by April 1996.

The provision of marten habitat has the potential to provide, at least partly, the habitat of various other species that depend on mature and over-mature coniferous forests.

Marten habitat must be managed at both the forest and stand-level.

**a) Forest-level**

It is expected that the pine marten guidelines will suggest maintaining a minimum proportion of each conifer-dominated forest unit in older post-rotation age classes and that those older forest conditions be maintained in patches of a minimum size. These areas would ideally be located beside areas of intermediate-aged stands to create "core habitat areas". Wherever possible, core habitat areas would be connected to each other by riparian reserves, unmerchantable areas, etc.

**b) Stand-level**

At the stand level, the guidelines are expected to speak to the retention of coarse woody debris (large downed trees) and snags (standing dead or dying trees) as well as live green trees which are expected to become snags at a later date.

**6. Pileated Woodpecker Habitat**

The pileated woodpecker will be considered a featured species on Crown lands within the Great Lakes - St. Lawrence forest region. The *Timber Management Guidelines for the Provision of Pileated Woodpecker Habitat* will be completed by April 1996.

**a) Forest-level**

The pileated woodpecker feeds and breeds in a range of forest conditions, but shows a strong preference for the mature and overmature stages of forests dominated by tolerant hardwoods and pine primarily in the Great Lakes - St. Lawrence forest.

**b) Stand-level**

The pileated woodpecker requires dead and dying trees and downed woody debris for feeding, nesting and roosting. There is a growing concern about the future supply of habitat for cavity users such as the pileated woodpecker because the *Occupational Health and Safety Act* requires operators to fell standing dead trees. In addition, dying trees are removed preferentially in partial cutting systems.

To address these concerns, current MNR guidelines require that living cavity trees be kept to provide habitat for primary and secondary cavity users in the tolerant hardwood and pine forests of central Ontario. The guidelines describe the number, dispersion and characteristics of trees to retain. The existing guidelines for cavity trees will be evaluated, refined if necessary and incorporated into the pileated woodpecker guidelines.

Since living cavity trees may not meet all the habitat needs of the pileated woodpecker, MNR will continue to work with the Ministry of Labour to find methods to keep dead standing trees without compromising the safety of woods workers. Moreover, MNR will determine:

- o how much dead and downed wood is needed by the pileated woodpecker
- o the effects of management on the supply of dead and downed wood
- o how these effects (if significant) can be mitigated

**7. Potential Certification of Other Forest Workers**

As the details of the monitoring and auditing system described in Part 4 of this Manual are developed, a matter that needs further thought is the possibility of certifying the people who conduct the audits or monitor the forest operations. If such certification is deemed appropriate, then guidelines describing the certification procedure will be written and listed in future editions of this Manual.

**8. Domestic and International Certification of Forest Products**

Domestic and international certification of Canadian forest products is being investigated through the Standards Council of Canada and the International Standards Organization. MNR is involved in these investigations. These programs will lead to the identification of criteria and principles related to

sustainable forest management, which in turn will lead to the certification of forest products.

## **APPENDIX A: Implementation Manuals and Guidelines Referred to in the Forest Operations and Silviculture Manual**

### **Provincial Guidelines:**

A Silvicultural Guide to the Jack Pine Working Group in Ontario, 1986

A Silvicultural Guide to the Spruce Working Group, 1988

A Silvicultural Guide to the Poplar Working Group, 1989

A Silvicultural Guide for the Tolerant Hardwoods Working Group in Ontario, 1990

A Silvicultural Guide for the White Pine and Red Pine Working Groups in Ontario, 1990

A Tree-Marking Guide for the Tolerant Hardwoods Working Group in Ontario, 1993

Boreal Mixedwood Notes (in preparation)

Timber Management Guidelines for the Protection of Tourism Values, 1986

Timber Management Guidelines for the Provision of Moose Habitat, 1988

Timber Management Guidelines for the Protection of Fish Habitat, 1988

Timber Management Guidelines for the Provision of White-tailed Deer Habitat (in preparation)

Timber Management Guidelines for the Protection of Cultural Heritage Resources, 1991

Timber Management Guidelines for the Provision of Pine Marten Habitat (in preparation)

Timber Management Guidelines for the Provision of Pileated Woodpecker Habitat (in preparation)

Environmental Guidelines for Timber Management Activities (in preparation)

**Construction/Operational Manuals:**

Aerial Spraying for Forest Management - An Operational Manual, 1981 (Note: applies to MNR only)

Access Roads Manual, 1992

Prescribed Burn Planning Manual, 1988

Environmental Guidelines for Access Roads and Water Crossings, 1988

Code of Practice for Timber Management Operations in Riparian Areas, 1991

**Resource/Environmental Manuals:**

Management Guidelines and Recommendations for Osprey in Ontario, 1983

Habitat Management for Ontario's Forest Nesting Accipiters, Buteos, and Eagles, 1984

Habitat Management Guidelines for Cavity Nesting Birds in Ontario, 1984

Management Guidelines for the Protection of Heronries in Ontario, 1984

Habitat Management Guidelines for Warblers of Ontario's Northern Coniferous Forests, Mixed Forests or Southern Hardwood Forests, 1984

Habitat Management Guidelines for Bats of Ontario, 1984

Habitat Management Guidelines for Birds of Ontario Wetlands including Marshes, Swamps, and Fens or Bogs of Various Types (excluding waterfowl), 1985

Bald Eagle Habitat Management Guidelines, 1987

Golden Eagle Habitat Management Guidelines, 1987

Peregrine Falcon Habitat Management Guidelines, 1987

Guidelines for Providing Furbearer Habitat in Timber Management (in preparation)

Timber Management Guidelines for the Provision Woodland Caribou Habitat (in preparation)

Habitat Management Guidelines for Waterfowl in Ontario (in preparation)

Hawk Guide for MNR Field Personnel, 1991

**Other:**

Development of Forest Operations Prescriptions (in preparation)

A Guide to Ecological Classification Systems and Their Use in Ontario

Regeneration Survey Manual for Ontario, 1981

Compliance Handbook (in preparation)

Seed Zone and Seed Transfer Manual (in preparation)

Free-growing Regeneration Assessment in Ontario (in preparation)

**APPENDIX B: Ministry of Natural Resources Policies and Procedures  
referred to in the Forest Operations and Silviculture  
Manual**

Appendix B lists those policies and procedures that are in effect as of March, 1995. These documents are being reviewed and revised to make them consistent with the *CFSAs, Forest Management Planning Manual, Scaling Manual, Forest Operations and Silviculture Manual*, and *Forest Information Manual*. This list will be updated with each revision of this Manual.

REFERENCE NUMBER	TITLE	DATE OF PUBLICATION
POLICIES		
FR 04 01 01	Licensing Requirements for Pesticides	1990
FR 04 02 01	Eligibility of Aerial Spray Companies for Work on MNR Programs	1990
FR 04 05 01	Operational and Experimental Use of Pesticides in Forest Management	1990
FR 04 07 01	Alcohol on Aerial Spray Projects	1990
FR 04 10 01	Aerial Application of Insecticides for Forest Management in Ontario	1990
FR 04 20 01	Aerial Application of Herbicides for Forest Management in Ontario	1990
FR 04 30 01	Borax for Control of Annosum Root Rot ( <i>Heterobasidion annosum</i> )	1990
FR 04 31 01	Control of European Race of <i>Gremmeniella abietina</i> ( <i>Scleroderris</i> Canker) in Ontario	1990
FR 04 05 01	Experimental Use of Pesticides in Forest Management	1990
FR 06 01 01	Regeneration	1983
FR 06 02 01	Regeneration by Seeding	1983

REFERENCE NUMBER	TITLE	DATE OF PUBLICATION
FR 06 03 01	Regeneration by Planting	1983
FR 06 04 01	Contract System for Tree Planting	1983
FR 06 15 01	Regeneration of Exotics	1983
FR 06 16 01	Hybrid Poplar Technology Transfer	1983
FR 08 01 01	Site Preparation	1983
FR 08 03 01	Mechanical Site Preparation	1983
FR 08 04 01	Site Preparation with Chemicals	1983
FR 08 05 01	Site Preparation with Prescribed Burns	1983
FR 10 01 01	Annual Nursery Soil Sampling	1983
FR 10 02 01	Annual Nursery Plant Sampling	1983
FR 10 05 01	Nursery Cost Accounting	1983
FR 11 01 01	Tree Seed Identification	1983
FR 11 02 01	Tree Seed Program	1994
FR 11 04 01	Metric Measurement of Cones and Rough Seed	1983
FR 12 01 01	Forest Tree Improvement	1983
FR 12 02 01	Controlled Collection Areas	1983
FI 3 03 01	Use of the Timber Management Guidelines for the Protection of Fish Habitat	1988
COS 1.01.01	Philosophy of Compliance	1994
COS 1.02.01	Strategies for Compliance	1994
COS 1.03.01	Goals and Principles of Compliance	1994
WM 5.01.01	Wildlife Information for Use in Timber Management Planning	1988
WM 6.01.01	Standards and Guidelines for Wildlife Management	1982
WM 6.02.01	Moose Management	1980

REFERENCE NUMBER	TITLE	DATE OF PUBLICATION
WM 6.04.01	Management of Timber for Featured Wildlife Species	1990
TS 02 05 01	Salvage of Crown Timber	1987
TS 02 07 01	Infractions under the Crown Timber Act	1987
TS 02 07 01	Suspension of Cutting	1987
TS 03 01 02	Approval of Scalers	1987
TS 03 01 03	Domestic Scaling on Third-Party Agreement Operations	1987
TS 03 01 06	Purchase and Maintenance of Weigh Scales to Mass Scale Crown Timber	1987
TS 03 02 01	Scaler Training	1987
TS 03 02 03	Scaling Refresher Courses	1987
TS 03 03 01	Timber Scaling Audits	1987
TS 03 05 01	Inspection of Timber Cutting Operations	1987
TS 03 05 03	Cut Inspection Reports - Form 2310	1987
TS 03 06 01	Special Scaling Instructions	1987
TS 04 10 01	Procedure for Area Inspection of Timber Procedures	1990
LM 9 00 00	Purpose and Major Policy for the Resource Access Activity	1985
FM 2.10	Prescribed Burning	1995
PROCEDURES		
FR 04 20 10	Aerial Application of Herbicides for Forest Management in Ontario	1990
FR 04 30 10	Borax for Control of Annosum Root Rot ( <i>Heterobasidion annosum</i> )	1990
FR 04 31 10	Control of European Race of <i>Gremmeniella abietina</i> ( <i>Scleroterris</i> Canker) in Ontario	1990

REFERENCE NUMBER	TITLE	DATE OF PUBLICATION
FR 06 16 10	Hybrid Poplar Technology Transfer	1983
FR 08 01 10	Site Preparation	1983
FR 10 01 10	Soil Sampling in Compartments	1983
FR 10 02 10	Sampling Intensity in Relation to Seedbed Density	1983
FR 10 02 11	Determining the Number of Samples for Each Species and Age Class in a Compartment	1983
FR 10 02 12	Collecting Plant Samples for Analysis	1983
FR 10 03 10	Forecasts of Tree Seed and Planting Stock Requirements, Scheduling, and Responsibility	1983
FR 11 01 10	Tree Seed Identification	1983
FR 11 02 10	Crop Forecasts - Reporting	1994
FR 11 02 11	Tree Seed Collection Targets - Formulation and Allocation	1994
FR 11 02 12	Tree Seed Requisitioning	1994
FR 11 02 13	Direct Seeding	1983
FR 11 02 14	Sale of Tree Seed	1994
FR 11 02 15	Returning Seed to Seed Centres	1994
FR 11 02 16	Seed and Stock Deployment	1994
TS 04 10 01	Procedure for Area Inspection of Timber Management Activities	1990
TS 02 07 01	Reporting and Processing Infractions under the Crown Timber Act	1987
TS 02 07 03	Penalties	1987
TS 02 07 05	Forest Products not Utilized	1987
TS 03 03 02	Scaling Controls	1987
TS 03 04 06	Elements of Scaling and Billing Data	1987

REFERENCE NUMBER	TITLE	DATE OF PUBLICATION
TS 03 05 02	Cut Inspection Procedures	1987
RA 1-10	Environmental Guidelines for Access Roads and Water Crossings	1992
RA 1-12	Work Permits - Roads, Trails & Water Crossings	1992
RA 2-6	Road Abandonment	1992
RA 3-1	Geometric Standards	1992
RA 3-2	Engineering and Detailed Design	1992
RA 3-4	Construction	1992
RA 3-5	Maintenance	1992
RA 4-2	Construction Monitoring	1992
RA 4-3	Post Construction Monitoring	1992
RA 4-5	Training Requirements	1992

## **APPENDIX C: References**

ad hoc Committee for the Wild Life Strategy Action Plan. 1994. A proposed action plan for: 'Looking Ahead: A wild life strategy for Ontario'.

Anon. Woodland caribou as a featured species in Ontario.

Anon. Impact on wildlife. Woodland caribou timber management guidelines.

Anon. 1992. Wetlands - A statement of Ontario Government Policy.

Crown Forest Sustainability Act, 1995

Cumming, H.G. 1992. Woodland caribou: Facts for forest managers. Forestry Chronicle 68 (4): 481-491

Darby, W.R. and L.S. Duquette. 1986. Woodland caribou and forestry in Northern Ontario, Canada. Rangifer Spec. Issue No. 1: 87-93

Darby, W.R., H.R. Timmerman, B. Snider, K. Abraham, R. Stefanski and C. Johnson. 1988. Woodland caribou in Ontario: background to a policy. OMNR Publication No. 4175. 68 pp.

Davis, R. 1994. Strategic forest management model: Description and user's guide. Draft. Terrestrial Ecosystem Branch, OMNR. in prep.

Forest Policy Panel. 1993. Diversity: A comprehensive forest policy for Ontario. Queen's Printer, Toronto, Ontario. 147 pp.

Godwin, L. 1990. Woodland caribou in Northwestern Ontario. Why they are different. OMNR, NWOFTDU Tech. Note TN-07

Jackson, G.L., G.D. Racey, J.G. McNicol and L.A. Godwin. 1991. Moose habitat interpretation in Ontario. OMNR, NWOFTDU Tech. Report 52, 74 pp.

Kerr, S.J. 1993. A summary of policies and guidelines for the protection of aquatic habitat in Ontario. Aquatic Ecosystems Branch, OMNR

Moore, T. and A. Perera. 1995. A GIS-based landscape ecological analysis program (LEAP) for forest managers. OMNR, OFRI, Sault Ste. Marie, Ontario. in press

Old Growth Forests Policy Advisory Committee. 1994. Conserving Ontario's old growth forest ecosystems. Queen's Printer, Toronto, Ontario. 90 pp.

OMNR. 1983. Management of tolerant hardwoods in Algonquin Provincial Park. OMNR Publication No. 5281. 72 pp.

OMNR. 1986. Managing red pine plantations. OMNR Publication No. 3449. 134 pp.

OMNR. 1993. Policy Framework for Sustainable Forests. Terrestrial Ecosystem Branch, Sault Ste. Marie, Ont.

OMNR. 1994. Conservation Strategy for Old-Growth Red and White Pine. Terrestrial Ecosystem Branch, Sault Ste. Marie, Ont.

OMNR. 1995a. Forest Information Manual. in prep.

OMNR. 1995b. Forest Management Planning Manual. in prep.

OMNR. 1995c. Scaling Manual, 1st ed. in prep.

Perera, A. and F. Schnekenburger. 1993. A computer program for landscape diversity analysis: LDA Version 2.0 - (A User's Manual). OMNR, OFRI, Sault Ste. Marie, Ontario. 25 pp.

Racey, G.D., K. Abraham, W.R. Darby, H.R. Timmermann and Q. Day. 1991. Can woodland caribou and the forest industry coexist? The Ontario scene. Proc. 5th North American Caribou Workshop, Rangifer Spec. Issue No. 7: 108-115

Wildlife Working Group. 1991. Looking Ahead: A wild life strategy for Ontario.

Wildlife Ministers' Council of Canada. 1990. A wildlife policy for Canada. Canadian Wildlife Service, Ottawa, Ont.

## **APPENDIX D: Woodland Caribou**

Until the past decade, woodland caribou were a little recognized feature of the boreal forest. Forest managers and biologists have become increasingly aware of the presence of woodland caribou in the merchantable boreal forest, and specifically in licensed and active forest management units. They have also become increasingly aware that the range of the woodland caribou in Ontario has receded over the past century. The reasons are thought to include disturbance and change of habitat and increased predation due to increased numbers of wolf and moose following disturbance of the forest.

As a unique feature of the boreal forest, woodland caribou are an important species. They are hunted to some degree by First Nations hunters, but not usually by anyone else.

The guidelines were prepared to aid forest managers in planning forest management operations over the life of the forest so that they will provide a continuous supply of caribou habitat. Caribou have evolved as part of the boreal forest ecosystem where forest renewal occurs over large areas by natural fire. The guidelines attempt to simulate the mosaic of vegetation resulting from these fires. Thus, provision of caribou habitat requires long-term forest planning.

The policy on the management of timber for featured wildlife species stipulates that species should be considered for designation as locally featured where there is a concern about the effects of forest management on that species locally. In the case of caribou, the caribou habitat guidelines should be used where, in the opinion of the district manager and MNR staff, traditional forest management practices are likely to reduce permanently the amount of suitable habitat for woodland caribou and their population in that particular district.

The Northwest Region of OMNR has delineated the known extent and location of the current caribou range across all districts in the region. It has directed that the caribou guidelines are to take precedence over the moose guidelines within that range.

The guidelines are currently in draft form. Some revisions are being proposed by the Northwest Region Caribou Task Team, in response to comments received during public consultation on the regional habitat strategy.

Other important documents are listed in Appendix C - References

## GLOSSARY

A common glossary for the *CFSA* manuals is currently under development. The following definitions are works in progress. The next edition of the *Forest Operations and Silviculture Manual* will have a complete and updated glossary.

This glossary contains definitions of many terms used in this Manual. Definitions that have been taken or adapted from other sources are followed by the name of that source in author-date style.

Terms that are underlined have their own separate entry in the glossary.

BCFT	<u>British Commonwealth Forest Terminology</u> , Part I (1953)
CFIT	<u>A Guide to Canadian Forest Inventory Terminology and Usage</u> (1978)
CFSA	<u>Crown Forest Sustainability Act</u> (1994)
CTA	<u>The Crown Timber Act</u> (1982)
EAA	<u>The Environmental Assessment Act</u> (1975)
EA Decision	<u>Environmental Assessment Board: Reasons for Decision and Decision EA-87-02 (Timber Class E.A.)</u> (1994)
FMM	<u>Forest Management Manual for the Province of Ontario</u> (1980)
FMPM	<u>Forest Management Planning Manual</u> (draft November 14, 1994)
FRI	<u>Forest Inventory Procedure for Ontario</u> (1978)
MFM	<u>Manual of Forest Management Plan Requirements for the Province of Ontario</u> (1977)
MMM	Morrison, Michael L., B.G. Marcot and R.W. Mannan. 1992. <u>Wildlife-Habitat Relationships: Concepts and Applications</u> . Madison, Wisconsin, University of Wisconsin Press.
MNR	MNR POLICY FR 12 02 01

- NHB Nyberg, J.B., A.S. Harestad and F.L. Bunnell. 1987. "Old Growth by Design: Managing Young Forests for Old Growth Wildlife". In Transactions of the Fifty-second North American Wildlife Natural Resource Conference, edited by R.E. McCabe. Wildlife Manager, Inst., pp. 70-81.
- OTA Office of Technological Assessment, U.S. Congress (1987)
- SDF "Sustainable Development of Forests: A Systematic Approach to Defining Criteria, Guidelines, and Indicators." Seminar of Experts on Sustainable Development of Boreal and Temperate Forests. Conference on Security and Cooperation in Europe. Natural Resources Canada, Ottawa, 1994.
- SMI Smith, David Martyn. 1962. The practice of silviculture, 7th ed. John Wiley and Sons, pp. 449-450
- SON Sonneveld, I.S. 1979. Land evaluation and land (scape) science. International Training Centre, Enshede, The Netherlands
- STC Silvicultural Terms in Canada, Science and Sustainable Development Directorate, Forestry Canada, Ottawa, 1992.
- URN Items from Terminology of Forest Science: Technology Practice and Products (1971) are listed by Universal Reference Number.

**Age:**

1. Of a tree:
  - breast height: The number of annual growth rings between the bark and the pith, counted at breast height
  - harvest: The number of years required to grow from establishment to maturity
  - stump: The number of annual growth rings between the bark and the pith, as counted at stump height
  - total: The number of years elapsed since the germination of the seed or the budding of the sprout or root sucker
2. Of a forest, stand or type of forest type, the average age of all the trees;
  - harvest: The number of years between the establishment and the final harvest of a forest crop
  - total: The average total age of the trees comprising it (STC)

**Age Class:** One of the intervals into which the age range of forest stands is divided for classification and use (adapted from URN 87)

**Annual Work Schedule:** A statement, mainly in tabular form, showing the order and extent of all work of any nature to be carried out during one year consistent with the forest management plan (adapted from URN 4417)

**Area of Concern:** An area adjacent to, or containing, an identified value which may be affected by operations (FMPM)

**Biodiversity:** The variety and variability among living organisms and the ecological complexes in which they live (OTA)

**Canopy:** The more or less continuous cover of branches and foliage formed by the crowns of trees (STC)

**Clearcut System:** A silvicultural system of regenerating an even-aged forest stand in which new seedlings become established in fully exposed micro environments after most or all of the existing trees have been removed. Regeneration can originate naturally or artificially. Clearcutting may be done in blocks, strips or patches. (STC)

**Cold water Lakes:** Lakes that can support salmonids, such as lake or brook trout

**Cool water Lakes:** Lakes that support percids, such as walleye, and esocids such as northern pike

**Critical Fish Habitat:** Those habitats that, in the best judgement of MNR, are needed to maintain the overall productive capacity of the fishery. These can include spawning areas for fish species with stringent spawning requirements, such as cobble areas for walleye and lake trout; highly productive nursery and feeding areas such as wetlands; essential refuges or cover, such as rocky areas used by young-of-the-year bass to avoid predators during the winter; and any narrow migration routes.

**Crown:** The part of a tree bearing live branches and foliage (STC)

**Crown Closure:** The time at which the space available for the crown has become fully occupied (STC)

**Crown Forest:** A forest ecosystem or part of a forest ecosystem that is on land vested in Her Majesty in right of Ontario and under the management of the Minister. (CFSA)

**Cutting Cycle:** The planned interval between partial harvests in an uneven-aged stand (STC)

**Deleterious Substance:** Any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of water so that it is rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water, or any water that contains a substance in such quantity of concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water (section 34(1) of the Fisheries Act).

**DFO:** Department of Fisheries and Oceans

**Disease:** Harmful deviation from normal functioning of physiological processes, generally pathogenic or environmental in origin (STC)

**DOE:** Department of Environment

**Ecosystem:** The sum of the plants, animals and environmental influences and their interactions within a particular habitat (STC)

**Endangered Species:** Any indigenous species of fauna or flora that, on the basis of the best available scientific evidence, is considered to be threatened with immediate extinction throughout all or a significant portion of its Ontario range (from A Wild Life Strategy for Ontario)

**Environment:** All the biotic factors of a site (URN 2060). In Ontario the legal definition of environment is:

- (i) air, land, or water;
- (ii) plant and animal life, including man;
- (iii) the social, economic, and cultural conditions that influence the life of man or a community;
- (iv) any building, structure, machine, or other device or thing made by man;
- (v) any solid or liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from the activities of man; or
- (vi) any part or combination of the foregoing and the interrelationships between any two or more of them (EAA)

**Featured Species:** A species for which habitat management is conducted explicitly

**Fish Habitat:** Spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly for their life processes (section 34(1) of the Fisheries Act.)

**Forest:** (Ecology) A plant community predominantly of trees and other woody vegetation, growing more or less closely together (URN 2441); (Silvicultural management) An area managed for the production of timber and other forest products, or maintained under woody vegetation for such indirect benefits as protection of site or for recreation (URN 2442)

**Forest Ecosystem:** An ecosystem in which trees are, or are capable of being, a major biological component (CFSAs)

**Forest Information Manual:** A Manual prepared under section 68 of the Crown Forest Sustainability Act and approved by the Regulations, including amendments to the manual approved by the Regulations (CFSAs)

**Forest Maintenance:** Those operations that are undertaken to ensure the continuation and development of the established forest cover

**Forest Management Agreement:** A contractual agreement between MNR and a company under the Crown Timber Act to provide for a continuous supply of forest products from the designated lands for the wood-processing plants of the company and to ensure that the forests on such lands are harvested and regenerated to produce successive crops of timber on a sustained-yield basis

**Forest Management Plan:** A document containing pertinent information and prescriptions by means of which forest policy, aims, and objectives are translated into a series of specific treatments on a forest estate for a specified number of years (MFM modified)

**Forest Management Planning Manual:** A manual prepared under section 68 of the Crown Forest Sustainability Act and approved by the Regulations, including amendments to the manual approved by the Regulations (CFSAs)

**Forest Management Unit:** A piece of forest land managed as a unit for the production of forest resources. This unit can be the entire province, a provincial forest management subdivision, an industrial timber limit, etc. (STC)

**Forest Operations:** The harvesting of a forest resource, the use of a forest resource for a designated purpose, or the renewal or maintenance of a forest resource includes all related activities. (CFSAs)

**Forest Operations and Silviculture Manual:** The Forest Operations and Silviculture Manual prepared under section 68 of the Crown Forest Sustainability Act and approved by the Regulations, including amendments to the Manual approved by the Regulations (CFSAs)

**Forest Products:** Any raw material yielded by trees (URN 2484 adapted)

**Forest Renewal:** Those silvicultural operations that are undertaken to provide forest cover

**Forest Resource:** Trees in a forest ecosystem and any other type of plant life prescribed by the Regulations that is in a forest ecosystem (CFSAs)

**Forest Resource Licence (Forest Management Licence):** A licence under Part III of the Crown Forest Sustainability Act (CFSAct)

**Forest Stand:** See Stand.

**Forest Tree Improvement (Tree Improvement):** The control of parentage combined with other silvicultural measures (such as preparation of site or fertilizing) to improve the overall yield and quality of products from forest lands (STC)

**Forest Type:** A group of forested areas or stands of similar composition, forest types are usually separated and identified by species composition and often by height and crown closure classes. (STC)

**Forest Unit (a management aggregation for management purposes):** An aggregate of stands, including potential forest areas assigned to this category, and managed under the same rotation and broad silvicultural system. A forest unit is a subdivision of a working group based on site or other characteristics. Working groups may not be combined into a forest unit.

**Forestry:** Generally, a profession embracing the creating, conserving, and managing of forests and forest lands for the continuing use of their resources, material, or other forest products (URN 2493)

**Free Growing:** see Free to Grow

**Free to Grow (FTG) Free Growing::**

1. Stands meeting stocking, height, and/or height growth rate, as specified in the ground rules and judged to be essentially free from competing vegetation (FMM adapted)
2. The condition of a forest stand when it is established and acceptable for entry into the productive timber land base. The stand must meet these criteria: minimum stocking, desired species composition, minimum height development, and freedom from competition that impedes growth. (STC)

**Geographic Information System (GIS):** An information system that uses a spatial database to answer geographical questions through a variety of manipulations, such as sorting, selective retrieval, calculation, spatial analysis and modelling (STC)

**Ground Rules:** Specifications, standards and other instructions (mostly silvicultural) to direct management in management unit areas during the period of the Forest Management Plan

**Habitat:** An area with the combination of resources (food, cover, water) and environmental conditions (temperature, precipitation, presence or absence of predators and competitors) that promotes occupancy by individuals of a given species (or population) and allows those individuals to survive and reproduce (MMM)

**Habitat Quality:** Habitat of high quality are those areas that afford conditions necessary for relatively successful survival and reproduction over relatively long periods. Conversely, marginal habitat supports individuals, but their rates of survival and reproduction are relatively low, and/or the area is usually suitable for occupancy for relatively short, or intermittent periods (MMM)

**Harvest:** To remove forest products for utilization comprises cutting and sometimes initial processing and extraction (URN 2944 adapted)

**Landscape:** A part of the space on the earth's surface, consisting of a complex of systems, and formed by the activity of rock, water, air, plants, animals and man, and that by its physiognomy forms a recognizable entity (SON)

**Landscape Ecology:** The study of the response of species or communities to patterns across more than one patch. A patch refers to an area which has more or less homogeneous environmental conditions (MMM)

**Management Unit:** A forest estate organized for efficient administration and control and operated according to one management plan. In Ontario there are three types of management units: (i) Crown management units, formed from unlicensed Crown lands and licensed areas too small to permit sustained -yield operations; (ii) company management units, which are areas of Crown forest large enough to provide sustainable timber harvests in perpetuity that have been licensed and (iii) Forest Management Agreement forests which consist of the part of the Crown land managed under a Forest Management Agreement (FMM modified)

**Mature:** In even-aged management, those trees or stands that are sufficiently developed to be harvestable and that are at or near rotation age, includes overmature trees and stands for which an overmature class has not been recognized. (STC)

**Mixed Stand (Mixed Forest):** A stand composed of two or more species in which less than 80% of trees in the main crown canopy are of a single species (STC)

**Mixedwood(s):**

1. Trees belonging to either of the botanical groups Gymnospermae or Angiospermae and which are substantially intermingled in stands. Also, the wood of such trees mixed together in substantial quantities. (STC)
2. A type of forest in which 26-75% of the canopy is softwood (STC)

**Monitoring:** Measurement of indicators with well-defined and commonly agreed upon methodology and periodicity (SDF)

**Old Growth:** A stand of mature or overmature trees relatively uninfluenced by human activity (STC)

**Old Growth Forest:** A forest well past the age of maximum growth, frequently showing great horizontal and vertical diversity of structure and plant species and possessing one or more features not seen in much younger forests, such as snags, downed woody material and arboreal lichens (NHB)

**Overmature:** In even-aged management, those trees or stands past the mature stage (STC)

**Partial Harvest:** Any cutting in which only part of the stand is harvested (STC)

**Plan Author (Author):** The professional forester, registered under the Ontario Professional Foresters Association Act, 1957, who is responsible for preparing the forest management plan (EA Decision)

**Population:** The entire group of all units, forming the subjects of study (URN 4500)

**Prescribed Burning:** The knowledgeable application of fire to a specific land area to accomplish predetermined forest management or other land-use objectives (STC)

**Principle:** A fundamental law or rule as a guide to action; a rule of conduct; a fundamental motive for action, especially one consciously recognized and followed (SDF)

**Productive Forest Land:** All forest areas capable of growing commercial trees and not withdrawn from such use (FRI modified)

**Professional Forester (Registered Professional Forester):** A person registered under the Ontario Professional Foresters Association Act, 1957 (CTA)

**Regeneration:** The renewal of a tree crop whether by natural or artificial means (sowing and planting). This term may also be used to describe the young crop itself (URN 4843, 4844, 4846, 4848 adapted)

**Registered Professional Forester (RPF):** See Professional Forester.

**Release:** To free a tree or group of trees from more immediate competition by cutting or otherwise eliminating growth that is overtopping or closely surrounding them (STC)

**Rotation:** The planned number of years between the formation or regeneration of a crop or stand and its final cutting at a specified stage or maturity (STC)

**Salvage Cut:** The removal of trees killed or injured by fire, insects, fungi or other harmful agencies for the purpose of using merchantable timber before it becomes worthless (BCFT)

**Sample:** A part of a population consisting of one or more sampling units selected and examined as representative of the whole (URN 5046 adapted)

**Scaling Manual:** The manual prepared under section 68 of the Crown Forest Sustainability Act and approved by the Regulations, including amendments to the manual approved by the Regulations (CFSAs)

**Seed Collection Area:** An area established in a large, relatively pure, uniform stand of mature or semi-mature trees, average or above average in form and vigour. Such an area provides an interim source of identified seed for use for artificial regeneration until such time as genetically improved seed becomes available from seed orchards. The area is assigned a seed source number; any seed collected is identified by that number. These areas receive minimal treatment as the trees are normally cut for seed collection. (MNR)

**Seed-Tree Method:** A method of regenerating a forest stand in which all trees

are removed except for a small number of seed-bearing trees that are left singly or in small groups. The purpose is to create an even-aged stand. (STC)

**Selection Cut (harvesting operation):** The removal of mature and/or undesirable trees individually or in small groups at relatively short intervals.

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

**Selection Method:** A method of regenerating a forest stand and maintaining an uneven-aged structure by removing some trees in all size classes either singly or in small groups or strips (STC)

**Selection System (Selection cutting):** An uneven-aged silvicultural system where mature and/or undesirable trees are removed individually or in small groups over the whole area, usually in the course of a cutting cycle. Regeneration is generally natural (BCFT adapted)

**Settable Basin or Bog:** Any pond or wetland of at least 4 hectares (about 10 acres), the bog not having a discernible channel running through it

**Shelterwood Cut:** A method of harvesting in which mature trees are removed in a series of two or more cuts (preparatory, seeding, first removal, final removal) whether by cutting uniformly over the entire stand, in strips or in groups

**Shelterwood Cutting:** Any regeneration cutting in a more or less regular and mature crop, designed to establish a new crop under the protection (overhead or side) of the old, as typified in shelterwood systems, or where the resultant crop will be more or less regular

Group Shelterwood system: Patches of advanced regeneration arising from thinnings or from natural disturbances, commonly developed in even-aged stands. Where this condition is prominent, shelterwood cuttings can be made specifically in relation to the requirements of each group of advanced regeneration. These clumps of regeneration are enlarged by the removal of all or most of the trees above them and by starting preparatory or seeding cuttings around them. The holes created in the canopy are gradually enlarged to keep pace with the establishment of reproduction.

(SMI)

**Irregular Shelterwood System:** Harvest cutting in which the opening of the canopy is irregular and gradual; generally in groups, with the final cutting often in strips, regeneration natural; regeneration interval long, often up to half the rotation, and the resultant crop considerably uneven-aged and irregular. Much of the harvesting of Canadian old-growth conifer stands composed of tolerant species has been a type of irregular shelterwood.

**Strip Shelterwood System:** A shelterwood system in which regeneration cuttings are carried out on fairly wide strips, generally against the prevailing wind, and progress rapidly, regeneration is mainly natural, the regeneration interval is short, and the resultant crop fairly even-aged and regular.

**Uniform Shelterwood System:** A shelterwood system in which the canopy is opened fairly evenly throughout the regeneration area; regeneration is mainly natural, though it may be supplemented artificially; regeneration interval fairly short and resultant crop more or less even-aged and regular (STC)

**Shelterwood System:** An even-aged silvicultural system where mature trees are harvested in a series of two or more cuts (preparatory, seeding, first removal, final removal) for the purpose of obtaining natural regeneration under shelter of the residual trees, whether by cutting uniformly over the entire stand area or in narrow strips. Regeneration is natural or artificial. Regeneration Interval determines the degree of even-aged uniformity. (MFM adapted)

**Silviculture:** Generally, the science and art of cultivating forest crops, (URN 5384). More particularly, the theory and practice of controlling the establishment, composition, constitution, and growth of forests (URN 5385)

**Silvicultural System:** A process, following accepted silvicultural principles, by which crops constituting forest are tended, harvested, and regenerated, resulting in the production of crops of distinctive form. Systems are classified according to the method of harvesting the mature stands with a view to regeneration and according to the type of crop produced thereby. (URN 5383 adapted)

**Silvicultural Treatment:** The activities, whether biological or managerial, through which a silvicultural prescription is met.

**Site:** An area considered in terms of environment, particularly as this determines the type and quality of the vegetation the area can carry. (URN 5413)

**Site Quality (Site Productivity):** The productive capacity of a site; usually expressed as volume production of a given species per unit area (cubic metres per hectare) or per unit of time (cubic metres per year) (STC)

**Snag:** A standing dead tree from which the leaves and most of the branches have fallen (STC)

**Stand (or Forest Stand):** A community of trees possessing sufficient uniformity in composition, constitution, age, arrangement or condition to be distinguishable from adjacent communities. (URN 5700 adapted)

**Stocking:** An expression of the adequacy of tree cover on an area, in terms of crown closure, percentage of stocked quadrats, number of trees, basal area or volume, in relation to pre-established managerial norm (CFIT adapted)

Fully Stocked: Describes productive forest land stocked with trees of merchantable species. These trees by number and distribution or by average dbh, basal area or volume are such that at rotation age they will produce a timber stand that occupies the potentially productive ground. They will provide a merchantable timber yield according to the potential of the land. The stocking, number of trees and distribution required to achieve this will be determined from regional or local yield tables or by some other appropriate method

Non-stocked: Describes productive forest land that lacks trees completely or that is so deficient in trees, either young or old, that at the end of one rotation the residual stand of merchantable tree species, if any, will be insufficient to allow utilization in an economic operation.

Normally stocked: Describes productive forest land covered with trees of merchantable species of any age. These trees, by number and distribution, or by average dbh, basal area, or volume, are such that at rotation age they will produce a timber stand of the maximum merchantable timber yield. This yield must satisfy the site potential of the land as reported by the best available regional or local yield tables. For stands of less than rotation age, a range of stocking classes both above and below normal may be predicted to approach and produce a normal stocking at rotation age and may therefore be included. This is because higher or lower mortality rates

will occur in over- or understocked stands than in normal stands.

**NSR** (not sufficiently or satisfactorily restocked or regenerated): Inadequately stocked. Describes productive forest land that has been denuded and has failed partially or completely to regenerate naturally or artificially. The regeneration must contain a minimum number of well-established, healthy trees that are free to grow and numerous enough to produce a merchantable timber stand at rotation age.

**Overstocked:** Describes productive forest land stocked with more trees of merchantable species than full or normal stocking would require. Growth is in some respect retarded, and the full number of trees will not reach merchantable size by rotation age according to the regional or local yield or stock tables for the particular site or species.

**Partially Stocked:** Describes productive forest land with too few trees of merchantable species to utilize the complete potential of the land for growth such that they will not occupy the whole site by rotation age without additional stocking. The precise definition in stems per hectare, crown closure, relative basal area, etc. site-specific and is defined locally or regionally.

**Satisfactorily Stocked:** Describes productive forest land that has been regenerated naturally or artificially to at least a minimum number of well-established, healthy trees of merchantable species that are free-to-grow and sufficient to produce a merchantable timber stand at rotation age. (STC)

**Succession:** The gradual supplanting of one community of plants by another, the sequence of communities being termed a sere and each stage seral (STC)

**Sustainability:** Long-term health of the Crown forest (CFSA)

**Sustainable Forest Management:** The process of managing permanent forest land to achieve one or more clearly defined objectives of management with regard to the production of a continuous flow of desired forest products and services, without unduly reducing the inherent value and future productivity of the forest and without causing undue undesirable effects on the physical and social environment (SDF)

**Threatened Species:** Any indigenous species of fauna or flora that, on the basis of the best available scientific evidence, is considered to be undergoing a definite

non-cyclical decline throughout all or a large part of its Ontario range, and that is likely to become an endangered species if the factors responsible for the decline continue unabated (from A Wild Life Strategy for Ontario)

**Unmerchantable:** Of a tree or stand that has not attained sufficient size, quality and/or volume to make it suitable for harvesting (STC)

**Warm water Lakes:** Lakes which support mainly centrarchids such as smallmouth bass or pumpkinseeds

**Water:** Lakes, rivers, etc., taken to the high-water mark of the area generally flooded (FRI)

**Working Group:** An aggregate of stands, including potential forest areas assigned to this category, that have the same predominant species and that are managed under the same rotation or cutting cycle and broad silvicultural system (FRI modified)

**Yield:** The harvest, actual or estimated, over a given period of time

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