

SILVICULTURE GUIDE TO MANAGING  
SPRUCE, FIR, BIRCH, AND ASPEN MIXEDWOODS  
IN ONTARIO'S BOREAL FOREST

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# MNR'S STRATEGIC DIRECTION AND ITS STATEMENT OF ENVIRONMENTAL VALUES

The Ministry of Natural Resources (MNR) is responsible for managing Ontario's natural resources in accordance with the statutes that it administers. As the province's lead conservation agency, MNR is steward of Ontario's provincial parks, natural heritage areas, forests, fisheries, wildlife, mineral aggregates, fuel minerals, Crown lands and waters. Crown lands and waters make up 87 percent of the province.

In 1991, the Ministry of Natural Resources released a document entitled *Direction '90s* that outlines the Ministry's goals and objectives. They are based on the concept of sustainable development. This document was updated in 1994 with a new publication *Direction '90s... Moving Ahead '95*.

In 1994, MNR finalized its Statement of Environmental Values (SEV) under Ontario's Environmental Bill of Rights (1994). The purpose of the Environmental Bill of Rights (EBR) is to ensure the integrity of the environment by protecting, conserving, and where reasonable restoring Ontario's environment. The EBR has a public review process for new policies, acts, and regulations. In accordance with the EBR, any new policy, direction, act, instrument, or regulation must be posted on the EBR web site for public review and comment; these comments must be considered prior to final approval.

MNR's Statement of Environmental Values is based on *Direction '90s and Direction '90s... Moving Ahead '95*. The SEV explains how the EBR is to be applied when decisions that might significantly affect the environment are made in the Ministry. It also provides an interpretation of the Ministry's objectives at an operational level to assist in setting priorities for legislative and policy reform, policy and program development, and the application of legal and policy direction through resource management practices.

In 2000, MNR released a document *Beyond 2000* that reaffirms the Ministry's mission of ecological sustainability, and sets out six supporting strategies for the Ministry. Recognizing the importance of maintaining healthy and productive ecosystems across the province, *Beyond 2000* embraces the concept of sustainable development and ecological sustainability as originally expressed by the World Commission on Environment and Development. Policy and program development for Ontario's forest resources are also rooted within the long-term strategic direction provided by the Policy Framework for Sustainable Forests (OMNR 1994). These strategic directions and principles of resource management are considered in Ministry land use and resource management planning.

During the development of this silviculture guide, MNR has considered *Direction '90s, Direction '90s... Moving Ahead '95, Beyond 2000*, and its Statement of Environmental Values. This guide is intended to reflect the directions set out in these documents and to support the objectives of managing our natural resources on a sustainable basis for future generations.

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## PREFACE

This is the *Silviculture Guide to Managing Spruce, Fir, Birch, and Aspen Mixedwoods in Ontario's Boreal Forest*. This tool recognizes the extent and importance of the boreal mixedwood forest across Ontario's forested landscapes and the significant contribution that soil and site features play in ensuring healthy and productive boreal mixedwood stands and forests. It is intended as a companion document to the *Silvicultural Guide to Managing for Black Spruce, Jack Pine and Aspen on Boreal Forest Ecosites in Ontario* (OMNR 1997c).

Developing a silviculture guide for the boreal mixedwood forest condition in Ontario grew out of a legal requirement stated in Term and Condition 94 of the *Class Environmental Assessment for Timber Management on Crown Lands in Ontario* (MOEE 1994). Many factors have contributed to a sense that the future health and productivity of Ontario's boreal mixedwood site and stand conditions were being compromised. These included: stand conversion from mixed hardwood-softwood stands to softwood stands, selective harvesting of higher value hardwood and softwood species in response to market conditions, poor regeneration success following harvest disturbance, and a seeming proliferation of forest health issues such as eastern spruce budworm (*Choristoneura fumiferana*).

In response, the Crown has developed two complementary publications: *Boreal Mixedwood Notes* (OMNR 2000), and this Guide. *Boreal Mixedwood Notes* (OMNR 2000) provides information on the ecology, silviculture, and management of boreal mixedwood sites and stands in northern Ontario. They cover a range of topics including autecology of important mixedwood species, site characteristics, silvicultural options, wildlife habitat, and disease and pest management considerations. The notes can be used as a reference for specific issues, or be read in their entirety to better understand the ecological context and philosophy of boreal mixedwood management.

The *Silviculture Guide to Managing Spruce, Fir, Birch, and Aspen Mixedwoods in Ontario's Boreal Forest* builds on the information in the *Boreal Mixedwood Notes* and provides ecological and management

interpretations for boreal mixedwood site and stand conditions. Management interpretations provide specific direction to resource managers on the various silvicultural strategies and treatments to be used during the preparation and implementation of forest management plans.

Moreover, silviculture guides provide descriptions of general standard site types used to develop silvicultural ground rules in forest management plans. General standard site types provide a logical ecologically-based framework for collecting, organizing, and presenting information about silvicultural strategies, tactics, and practices. Ecologically-based general standard site types enable silviculturalists to identify, interpret, and address elements of species autecology, biological legacy, and forest and site productivity that may influence the achievement of a desired future stand condition. General standard site types, defined in the *Forest Management Planning Manual for Ontario's Crown Forests* (OMNR 1996), are synonymous with ecosites, the inventory-scale classification units of Ontario's Ecological Land Classification framework.

## Guideline Revision

This is one of several publications associated with the forest management planning process required by the Crown Forest Sustainability Act (CFSA) (CFSA 1994).

As a condition of Ontario Ministry of Natural Resources' (OMNR) environmental assessment approval, OMNR must undertake a review of all forest management guides on a five-year cycle to ensure that they reflect current scientific knowledge as it applies to Ontario. Revisions to this guide will be made following consultation with the Provincial Forest Technical Committee.



## ACKNOWLEDGEMENTS

This silviculture guide was developed by an integrated team from OMNR's Northeast Science and Information (NESI) Section, Northwest Science and Information (NWSI) Section, Forest Health and Silviculture (FHSS) Section, and Ontario Forest Research Institute (OFRI).

The members of the writing team (in alphabetical order) include:

Colin Bowling	Stand Management Forester, NWSI
Han Y.H. Chen	Senior Forest Management Practices Specialist, NESI
Gordon J. Kayahara	Forest Science Specialist, NESI
Leanne M. McKinnon	Boreal Mixedwood Project Forester, NESI
C. Lynn Palmer	Silviculture Guide Project Forester, NWSI
Roman V. Popadiouk	Boreal Mixedwood Project Forester, NESI
Jim A. Rice	Boreal Silviculture Research Forester, OFRI
Kimberly C. Taylor	Terrestrial Ecologist, NESI
W.D. (Bill) Towill	Senior Forest Management Practices Specialist, NWSI
Bob White	Silviculture Specialist, NWSI

This Guide would not have been made possible without significant contributions of many people who provided vision and guidance during the development of this guide. In particular the development team would like to thank: Alf Aleksa, Rob Arnup, Wally Bidwell, Bill Crins, Alison Luke, Blake MacDonald, Brian Naylor, John Parton, Lisa Pauloff, Fred Pinto, Gerry Racey, Shannon Robertson, and Stan Vasiliauskas. We would also like to thank F. Wayne Bell, W.C. Parker, Julie Elliot, and D.R. Duckert for writing the original *Autecology of Selected Forest Plants* (OMNR 1997), which was modified to address mixedwood conditions and makes up Section VII of this guide.

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Thanks go to Doug Skeggs for leading the design of the initial detailed document structure, and to Shelagh Duckett as project manager. Joe Churcher provided guidance for the duration of the project; his support and sense of humour were greatly appreciated.

Many thanks go to Wendy Mairs for her patience and dedication in designing and completing the desktop publishing for the Guide. All illustrations were done by Wendy Mairs with the exception of the illustration of the backpack sprayer on the cover of Section VI by Shayna LaBelle-Beadman. Thanks go to Annalee McColm for English editing, and Diana Callaghan who carried out the task of completing the final edit.

Finally the authors would like to thank the other members of the Regional Science and Information teams for their ongoing patience, support, and stress management skills which they provided to us during the development and refinement of this publication.



## ABOUT THIS GUIDE

This guide contains ecological and silvicultural information for the sustainable management of certain stands of spruce-fir-birch-aspen forest mixtures in northern Ontario. For the purposes of this guide, these mixed stands growing on a selected range of soil conditions will be referred to as “boreal mixedwood stands”.

This silviculture guide was developed to provide:

- definitions for boreal mixedwood sites and stands
- a synopsis of the ecology of boreal mixedwood stands
- an overview of what is currently known about boreal mixedwood silviculture in Ontario and other jurisdictions
- a repository for silvicultural experience in Ontario's boreal mixedwood forests
- a suggested approach for developing forest units and silvicultural ground rules for mixedwood objectives
- a training and educational tool

This guide is intended to provide a framework and context for generating, collecting, validating, and applying local knowledge and experience for the boreal mixedwood forests of Ontario. It is not intended to be the sole source of silvicultural information or constrain the application of sound silvicultural practices.

## What's New

Because of the unique nature of boreal mixedwood sites and the methods of managing them, there are several significant differences between this document and earlier silviculture guides.

The differences include:

- experiences from other jurisdictions (especially British Columbia, Alberta, and Québec) have been drawn upon to develop approaches to managing boreal mixedwood sites and stands in Ontario
- emphasis is placed on management strategies that emulate natural succession

- consideration of broad soil groups and stand development stages in the development of ecological and management interpretations
- emphasis is given to the benefits of using a pre-harvest assessment to determine the opportunities for mixedwood management options
- “developmental” category as a treatment option is introduced

This developmental category of management treatments joins the existing categories of “recommended”, “conditionally recommended”, and “not recommended”. Since little work has been conducted on boreal mixedwood management in Ontario, the authors have had to rely on the results of treatments in other jurisdictions. Treatments with a developmental designation are believed to be ecologically appropriate for a site, and will likely contribute to the management objectives associated with a particular stand development stage; but, these treatments have not had extensive use in boreal Ontario. Developmental treatments require a provincially-coordinated monitoring program to be described in a forest management plan. The data acquired by this monitoring program will be used to refine future versions of this guide.

## How This Guide is Organized

The seven sections in this guide are described briefly below.

### Section I – Introduction

Outlines the legislative, philosophical, and ecological context for this guide. It includes the definitions for boreal mixedwood sites and stands.

### Section II – Ecological Framework

Describes the ecological factors that should be considered when managing boreal mixedwood sites. These include broad soil groups, stand composition types, and stages of stand development that apply to boreal mixedwood sites and stands discussed in this guide.



### **Section III – Silvicultural Practices**

Defines and describes the operational practices that should be considered for boreal mixedwood site management.

### **Section IV – Ecological Interpretations**

Describes the interactions among trees and other plants, animals, and abiotic factors associated with boreal mixedwood sites and how these factors relate to management opportunities.

### **Section V – Understanding Management Interpretations**

Presents the background information necessary for understanding and using the management interpretations presented in Section VI.

### **Section VI – Management Interpretations**

Provides information about silvicultural systems, methods, and treatments that may be used on appropriate sites to achieve desired boreal mixedwood stand conditions.

### **Section VII – Autecology of Selected Forest Plants**

Provides information relating to the growth habits, reproductive characteristics, phenology, ecophysiology, and response to disturbance for trees, shrubs, herbs, and grasses commonly found in Ontario's boreal mixedwood forests.

## **Relationship to Other Forest Management Guides**

This document is one of a series of silviculture guides that are part of a larger group of forest management guides. Each of the silviculture guides addresses ecologically-distinct forest types in the province: jack pine, black spruce, and aspen on boreal ecosites; conifers in the Great Lakes-St. Lawrence forest region; tolerant hardwoods; and trees of the deciduous forest region. Other forest management guides cover such topics as the provision and protection of wildlife habitat, resource-based tourism and cultural

heritage values, the construction of access roads and water crossings, and maintaining forest health and biodiversity.

All of these guides are used during the forest management planning process. Planning team members refer to a specific guide depending on the direction being sought. Thus, this silviculture guide provides direction only on the appropriate silvicultural practices to be followed when managing boreal mixedwood sites to reach a boreal mixedwood future stand condition consisting of spruce, fir, birch, and aspen mixtures. If a desired future stand condition as determined in the development of a forest management plan is not a boreal mixedwood, the appropriate silviculture guide should be consulted for direction. Other silviculture guides provide direction on maintaining or improving wildlife habitat, forest biodiversity, or for silvicultural practices to be used when managing for other future stand conditions.

## **Monitoring**

Effectiveness monitoring for this guide will be conducted as described in the *Silvicultural Effectiveness Monitoring Manual for Ontario* (OMNR 2001c). The “exceptions process” (including monitoring) is required for certain categories of silvicultural practices described in this guide (OMNR 1996) (see Section VI).

## **Implementation**

This guide will be implemented as forest management plans are renewed, commencing with the plans that come into effect April 1, 2006.



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