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Department of Natural Resources

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Why This Guidebook?

Forests are visible from almost every highway in New Brunswick. Often they reach as far as the eye can see. Trees blanket 6.1 million hectares or 85 per cent of the landscape, a greater proportion of forested area than any other jurisdiction in Canada.

Half of New Brunswick's forests grow on Crown land. The provincial government administers Crown forests on behalf of their owners: The citizens of New Brunswick.

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This guidebook is about the management of our Crown forests. It takes you step by step through the management process. It explains why the Government is committed to sustainable forest management. And it shows how Crown forest management affects your daily life as a New Brunswicker.

The forest industry is a cornerstone of the New Brunswick economy. It employs thousands of people and generates millions of dollars in tax revenues that support government services we use every day. Provincial exports of forest-based products average almost \$3 billion per year.

A reliable timber supply is crucial to the forest industry. Sixty per cent of industry's timber requirement is obtained from privately-owned woodlands. (Of this portion, 20 per cent is imported from outside the province.) The remaining 40 per cent comes from our own Crown land. It is essential that Crown forests are managed in a sustainable way so they can produce wood for today and tomorrow. New Brunswick's economic vitality depends on it.

Yet the Crown forests are also home to 30,000 species of wildlife, fish and other organisms. Healthy forest ecosystems are essential to the quality of our soil, air and water. And many New Brunswickers enjoy the woodlands for recreational pursuits such as hiking, snowmobiling and fishing.

So how does New Brunswick integrate these non-timber values with the need for sustainable volumes of timber? Answer:

Through responsible forest management.

This guidebook shows how the Province balances all forestry objectives - economic, social and environmental - while ensuring that Crown forests are sustainably managed for the long-term benefit of New Brunswickers.

New Brunswick Forests at a Glance

Who Owns New Brunswick Forests?

Crown forests represent about 50 per cent of the forested lands in New Brunswick.



Tree Species of New Brunswick Forests

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New Brunswick straddles an ecological transition zone between boreal coniferous forests to the north and deciduous forests to the south. The province's geographic position combined with its variable topography, soils and climate have produced a remarkable diversity of vegetation, including 39 species of native trees.



Forest Management in Our Daily Lives

Forestry is a traditional part of New Brunswick's social fabric. It has propelled our history, sustained our economy and influenced our culture for more than 200 years. Local loggers have been celebrated in legend and song. Visit any provincial museum, and you'll find old photographs showing the camaraderie of lumber camps, and the thrill of log drives in spring.

The sheer number of New Brunswickers in the forestry sector is astounding. About 15,000 people work directly in the forest industry as employees or contractors; 13,000 more people have jobs with industrial support services such as trucking. Fourteen provincial communities depend entirely on the forest industry for their economic survival, and another 40 towns rely heavily on forest-related business.

Chances are you know at least one person in the forestry sector. Your neighbour who drives a logging truck. A local pipe-fitter who works at the pulp mill. Your niece who is hired seasonally to plant trees. Even if you have no personal links to forestry, you still use essential government services funded in part by tax revenues and timber royalties collected from the forest industry.

Forest management is critical to a thriving forestry sector. Management activities take place across the province and around the clock. They're carried out by your fellow New Brunswickers as they plant seedlings, monitor insects and disease, harvest trees, thin tree plantations, interpret forest inventory data, measure tree diameters, monitor harvesting operations, collect soil samples, assess deer habitat, conduct forestry research, analyze sample plots, fight forest fires ... The list goes on.

Some of these individuals work in the private sector - such as those employed directly by the forest industry. Others work for the Department of Natural Resources, which administers and monitors all aspects of forest management on Crown land.

So Crown forest management isn't just about large forestbased corporations. It's also about supporting the scores of smaller companies that process Crown wood in sawmills, particle-board mills, shingle mills and veneer mills. It's about the people who work in those mills - and how their livelihood depends on responsible forest management.



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Crown Forest Management: The Beginnings

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New Brunswick's original inhabitants relied on the forest environment for shelter, food and clothing. They developed spiritual traditions around trees and gathered woodland plants for medicine. Early aboriginals had little impact on the forests, partly because of their benign technology and population level.

European pioneers used wood for everything from barrels and furniture to buckets and sewer pipes. Settlers who received Crown land grants were encouraged to clear as much forest cover as possible to make way for farms and villages. The sole exclusion was tall white pine, which the Crown reserved to export as ship masts for the British Royal Navy.

Over a span of two decades, annual wood production skyrocketed from 5,000 tons to more than 400,000 tons. Lumber mills opened throughout the province, and loggers felled up to 200,000 white pine in a single year. The colonial government grew alarmed and in the mid-1800s took legislative action. It placed stumpage fees on Crown timber, and prohibited the logging of trees below a minimum diameter. These laws represented the beginnings of forest management in New Brunswick.

Until 1900, inefficient harvesting techniques and limited access restricted human impact on the forest. Logging occurred mainly in forest stands

adjacent to major river systems and railroads. Yet eventually the bucksaws, horses and river drives gave way to chainsaws, skidders and long-haul trucking. Technological advances and highways radically changed the face of forestry. Timber consumption rose steadily until 1950, then soared in response to post-war construction and other demands. Wood harvest tripled over the next three decades.

By the mid-1970s, it became apparent that if harvest levels continued to increase -New Brunswick could experience severe timber shortages in the future. Government reports such as the 1974 Forest Resources Study recommended a more sustainable approach to forest management. The Province responded with a series of initiatives that culminated in 1982 with the landmark Crown Lands and Forests Act.





Crown Forest Management: The Foundation

The Crown Lands and Forests Act is the legal foundation of Crown forest management in New Brunswick. It was proclaimed in 1982 and is administered by the Department of Natural Resources.

Crown Timber Licenses

The Act divides New Brunswick's Crown land into 10 timber licenses. Each timber license is leased through a 25-year forest management agreement to a large forest-based company called a licensee. Licensees are the managers of Crown licenses under the administration of the Department of Natural Resources. The 10 Crown licenses are presently leased to six licensees.

Each license also has an assigned number of sub-licensees. Many sub-licensees operate smaller forest-based mills.

In simplest terms, the Act creates the framework that provides the forest industry access to a stable supply of wood from Crown lands in



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exchange for achieving strictly defined management objective and standards set by Government. Among other elements, the Act:

- Provides for forest management agreements between Government and the licensees.
- Outlines forest management responsibilities of Government and the licensees.

License	Licensee	Area (HA)
1 Upsalquitch	Bowater Maritimes Inc.	427,580
2 Nepisiguit	UPM-Kymmene Miramichi Inc.	259,369
3 Lower-Miramichi	UPM-Kymmene Miramichi Inc.	316,354
4 Upper-Miramichi	UPM-Kymmene Miramichi Inc.	384,049
5 Kent	Weyerhaeuser Company Limited	71,590
6 Queens-Charlotte	J. D. Irving, Limited	631,351
7 Fundy	Irving Pulp & Paper, Limited	428,784
8 York	St. Anne Nackawic Pulp Company Ltd.	252,027
9 Carleton	Fraser Papers Nexfor	133,245
10 Restigouche-Tobique	Fraser Papers Nexfor	402,200
TOTAL AREA		3,306,549

Forest Management Agreements

Forest management agreements represent a contract between licensees and Government. They specify the forest management responsibilities of each party and have a 25-year span. Every five years, the Department of Natural Resources assesses how a licensee has managed during the previous five years. If the licensee has performed satisfactorily, the Department renews the forest management agreement for another fiveyear period.

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Forest Management and Operating Plans

The Crown Lands and Forests Act requires each licensee to produce a forest management plan. Management plans cover a 25-year period, but are updated



every five years. As well, they must be sustainable over an 80-year planning horizon. Forest management plans describe how licensees will satisfy forest management objectives that have been established by Government.

Licensees also submit annual operating plans to show how they will carry out their five-year management plan on the ground. Operating plans give details about harvesting, silviculture and related activities for the coming year. Staff with the Department of Natural Resources regularly monitor the licensees' field operations to ensure they follow Government regulations and standards.

Forest Management Responsibilities

Crown forest management involves many responsibilities ranging from harvesting and silviculture to monitoring and protecting that forest from insect and disease. The Crown Lands and Forests Act divides the responsibilities between the Department of Natural Resources and the Crown licensees.

Among other items, Government has the responsibility to:

- Establish objectives that reflect current society values and the newest scientific information on Crown forest management.
- Define strict standards for implementing those management objectives.
- Monitor forestry activities of licensees and sub-licensees operating on Crown land.

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- Conduct forest inventories.
- Protect Crown forests from insects, disease and fire.

Licensees are required to:

- Develop forest management strategies that incorporate all objectives set by Government, and that follow regulations of the Crown Lands and Forests Act.
- Produce forest management plans and annual operating plans describing how they will meet the objectives and implement the strategies.
- Apply forest management strategies in the field by following established Government standards.

Forest Management Responsibilities: A Closer Look

Forest Management Objectives and Standards

The Department of Natural Resources is responsible for establishing the objectives and standards of Crown forest management. We'll define these objectives first, then see how licensees apply them to harvesting and silviculture.

Objectives

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The Department has established various timber and non-timber objectives. Licensees must integrate both types of objectives into their forest management plans.

- The timber objective requires licensees to sustainably harvest the maximum volume of wood from their license, while meeting each of the non-timber objectives.
- Non-timber objectives relate to the social and environmental aspects of forest management. Licensees must manage their license with attention to wildlife habitat, water quality, biodiversity requirements, recreational needs and protected areas.

The Department revises its forest management objectives - timber and nontimber - every five years to reflect changing values of society. At the same time, it has the opportunity to incorporate new forest inventory data and other scientific information.



Standards

Licensees must follow specific operating standards while conducting silviculture, harvesting, road construction and related activities on Crown licenses. These standards are reflected in their annual operating plans.

Operating standards represent best management practices designed by Government to make the most efficient and sustainable use of our Crown timber resources, while limiting disruption of the forest environment.

Timber Objective

1. Harvesting

The basic timber objective of Crown forest management allows industry to harvest the maximum sustainable volume of timber from Crown licenses, while accommodating non-timber objectives. The Minister of Natural Resources, through the Crown timber allocation process, assigns specific volumes of Crown timber to licensees and sub-licensees.

Other standards and regulations determine how and where timber is harvested, and how much can be removed.



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How Much Timber Can Be Harvested?

- As part of the management plan process, a sustainable harvest level is calculated for each license through a detailed wood supply analysis. The analysis incorporates a range of scientific data relating to the management of timber and non-timber objectives.
- That harvest level is called the annual allowable harvest, and represents the volume that can be harvested from that license year after year without depleting the resource. Through the forest management agreements, the annual allowable harvest is assigned to licensee and sub-licensee mills for each year of the five-year management period.
- The actual harvest from each license is closely tracked by licensees and Natural Resources to ensure it does not exceed identified annual allowable harvest.

All wood harvested from Crown land in New Brunswick must be used or processed within the province, unless Government gives permission to export a particular timber product that cannot be marketed in New Brunswick.

How and Where is Crown Timber Harvested?

New Brunswick's Crown forests presently have an uneven age distribution. They contain a relative abundance of very old and very young tree stands with fewer stands in the age range between 25 and 60 years. Careful forest management - particularly the use of intensive silviculture and a respect for annual allowable harvests - is needed to ensure future wood supplies. Without it, the 'middle-aged gap' could lead to timber shortages within two decades.

Government has several forest management standards concerning harvest schedules and methods.

- Licensees must schedule their annual harvest so that they achieve a maximum supply. Generally, this is accomplished by harvesting the oldest and declining forest stands.
- Forest management plans must identify which harvest method will be applied to different forest stands. Clearcutting is the appropriate method for even-aged, mature and over-mature stands. As the area of older, over-mature forest stands decreases over time, clearcut size will become smaller.



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- Adjacent harvest blocks cannot be clearcut within 10 years of each other if their combined area exceeds 100 hectares.
- Where possible, licensees may use alternate harvest methods. Approximately 30 per cent of Crown forest stands are now selectively cut, reflecting a trend towards non-clearcut harvest methods such as partial cutting, strip cutting, two-pass cutting and shelterwood cutting.

Non-Timber Objectives

Approximately 28 per cent of New Brunswick's Crown land is under management for non-timber objectives. These objectives include:

1. Biodiversity

(a) Tree Communities

Tree communities represent complex ecological systems. They contain one or more tree species and support a characteristic assemblage of wildlife, insects and other organisms. Nine types of naturally-occurring tree communities occur within Crown forests in New Brunswick. Their community names reflect the tree species dominating upper levels of the forest stand.

Licensees identify where each type of tree community grows on their license. Their forest management plans must ensure that 12 per cent of the total area for each type remains in a mature (large and/or old) stage of development. 'Large' means that some tree trunks are at least 45 cm in diameter, and 'old' means that trees have begun to decay in their uppermost branches.

Naturally-Occurring Tree Communities on Crown Land

- 1. Tolerant hardwood 4. Pine 7. Black spruce 2. Tolerant hardwood-softwood 5. Jack pine 6. Cedar
- 3. Intolerant hardwood-softwood
- 8. Spruce 9. Balsam fir

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(b) Unique Sites and Protected Areas

Every county in New Brunswick shelters areas of exceptional aesthetic, cultural or ecological value. The Province has designated the protection of such sites as a forest management objective.

In May 2001, Government established 10 Protected Natural Areas across the province. They total approximately 147,000 hectares and occur mainly on Crown land. Forest management activities in these areas are disallowed or highly restricted.

Protected areas serve many important functions. They help to protect biodiversity. They provide benchmarks for monitoring environmental change. As well, their wilderness setting makes them ideal for outdoor education and ecological research projects.

2. Forest Habitat

Six types of forest habitat on Crown land are particularly significant for wildlife survival. Licensees must track the area of each habitat type on their license to monitor its sustained presence. One such example is old spruce-fir habitat, where a specified minimum area must be maintained on the ground in patches of at least 375 hectares.



Old Forest Habitats on Crown Land

- 1. Old tolerant hardwood
- 2. Old hardwood
- 3. Old spruce-fir

- 4. Old pine
- 5. Old mixed wood
- 6. Large mixed wood



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3. Deer Wintering Areas

White-tailed deer need protective habitat to survive New Brunswick winters. Temperature and snow conditions vary, so licensees must provide habitat for both moderate and severe winter weather.

The Department requires that a specified area of land be maintained as deer habitat on each license. Crown forest currently has more than 275,000 hectares of deer wintering areas.



4. Watercourse Buffer Zones

Watercourse buffer zones are the vegetated strips of land found immediately beside all banks of lakes, rivers and streams. They protect watercourses from effects of erosion, soil compaction and siltation caused by timber harvesting and road construction. Timber harvesting is permitted in buffer strips, as long as their protective function is maintained.

5. Recreational Land

A vast number of New Brunswickers regularly enjoy nature-related activities. Activities range from canoeing, bird-watching and snowmobiling to angling, hunting and trapping.

Government recognizes that need. It requires licensees to protect the integrity of existing recreation sites on Crown land. As well, they must leave aesthetic buffer zones measuring 30 metres wide beside all numbered highways in the province.

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Silviculture

Silviculture is the science of establishing, growing and tending forest stands, and can boost the rate of natural forest renewal. Properly tended stands grow more quickly and achieve greater timber volumes in a shorter time than do untended forests.

Silviculture activities will support higher sustainable harvest levels. The Province requires licensees to plant trees and conduct pre-commercial thinning over specified areas of their license.

The majority of harvested areas on Crown land regenerate naturally through seeds dispersed by parent trees. All other areas are reforested by full planting or fill-planting using cultivated seedlings. Seedlings for Crown land are grown in the Government nursery at Kingsclear near Fredericton and shipped to licensees for planting.

Both natural regeneration and plantations are treated before maturity to encourage tree growth.

- Plantations are cleaned mechanically or with the use of herbicides. Cleaning removes unwanted vegetation so planted trees have less competition for nutrients, water and light.
- Natural regenerating sites are thinned at about 15 years of age, giving preference to the more commercially desirable tree species, including black spruce, balsam fir, birch and maple.

About 265,000 hectares of plantations have been established on Crown land since the 1970s. That represents nearly 583 million trees. As well, 290,000

hectares of Crown forest have been precommercially treated over the last 30 years. Some of those areas will be ready for harvesting around 2015.



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Monitoring

Monitoring of licensee activities is one of Government's most important forest management responsibilities.

The Department of Natural Resources regularly inspects licensee and sublicensee operations in the field to assess how they are meeting Government objectives and standards. Departmental staff monitor the following:

- Areas of softwood planting
- Areas of pre-commercial thinning
- Areas harvested, and harvest methods used
- Areas and quality of deer wintering areas and mature forest habitat
- Timber use standards
- Watercourse buffer zones
- Watercourse crossings
- Road construction.

Harvesting and silviculture activities on Crown licenses must follow the approved annual operating plans. If licensee performance is unsatisfactory, the Department imposes penalties and (where appropriate) requires the licensee to take corrective action.

Licensee monitoring occurs at three stages.

- Departmental staff make routine field visits throughout the year.
- The Department holds informal annual meetings with licensees to review how operations over the previous year match their operating plans.





• At the end of each five-year period (and as specified by the Crown Lands and Forests Act), the Minister of Natural Resources evaluates the performance of each licensee. Based on successful performance over the previous five years, Government renews the 25-year forest management agreement for another five-year period. Performance reviews were conducted in 1987, 1992, 1997 and - most recently - in 2002.

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Forest Inventory

Inventories are critical to forest management. They are used to assess the impact of forestry activities on forest composition, growth patterns and ecosystems. Whether we are projecting habitat and biodiversity requirements ... analyzing wood supply ... or determining sustainable timber levels ... we rely heavily on inventory data compiled by Government staff for these and other management decisions.

Earliest forest surveys in New Brunswick took place when 18th-century timber merchants hired 'cruisers' to locate the tallest white pines. Naturalists acquired some inventory knowledge in the 1800s, but were limited by poor forest access and technology. Not until the 1940s did systematic aerial photography allow us to gain a more representative view of the forests. The province's first official forest inventory appeared in 1958.

New Brunswick has the best forest inventory in Canada.

- The most recent inventory began in 1993. It is based on a 10-year continuous cycle: 10 per cent of the province is photographed and interpreted yearly, and after 10 years the cycle is repeated.
- Aerial photographs reveal data on tree species, height, density, diameter and other factors. This material is supported by information obtained from thousands of ground sample plots, and charts timber growth and yield.
- Crown land inventory is updated annually to record the year's harvesting and silviculture activities.
- All data is stored on a computerized geographic information system for rapid retrieval and analysis.



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Insect and Disease Management

Thousands of native insects and plant diseases live in New Brunswick's forests. These are normal parts of our natural forest ecosystems and are essential for many food chains and nutrient turnover in healthy forest soils. Unfortunately, populations can erupt to outbreak levels and cause unwanted damage. When this happens, it jeopardizes our ability to attain sustainable forest management objectives. Fortunately, only a few pests reach these levels. Today's global economy brings an increased risk from the introduction of foreign pests into our native forests.

The Department of Natural Resources has a responsibility for protecting the forest resources of the province against insect and disease outbreaks. To do this, the Department uses basic principles of integrated pest management.

These include detection, monitoring and forecasting, and direct control when necessary.

Detection

• Our Forest Pest Management Section maintains a network of plots across the province for the ground detection of pest problems. This is augmented by observations from regional staff trained as pest detection officers, and other cooperators (inductor, marketing boards and privat



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operators (industry, marketing boards and private woodlot owners).

- Aerial surveys are conducted annually by the Forest Pest Management Section to detect and map the extent and severity of damage caused by forest pests.
- The Department liaises with other agencies (Canadian Forestry Service, Canadian Food Inspection Agency, provincial counterparts) that are also involved in the detection of both native and introduced forest pests.

Monitoring and Forecasting

• Specialized surveys (adult trapping, egg surveys, over-wintering larval surveys) are conducted annually by the Department to monitor changes in population levels of major forest pests. This information is used to forecast when pest populations will become high enough to cause levels of damage requiring control.

Control

- The Department works with federal and provincial regulatory officials and research agencies to select and develop the most effective and environmentally acceptable products and application methods for pest control.
- When action is needed, the Department plans and funds operational controls targeted against a specific pest.
- When operational controls are used, the Department conducts special biological surveys to properly time treatments and measure their effectiveness.

Forest Fire Management

Forest fires are a natural part of the forest cycle. Most areas regenerate well naturally. Some species such as jack pine even require the extreme heat of fire to open their cones and release seeds. New Brunswick averages about 473 wildfires a year. These fires destroy approximately 1,900 hectares of forest.

The Department of Natural Resources manages forest fires through prevention, monitoring and detection, and suppression.

Prevention

- Government legislation controls the use and timing of open fires.
- Human activities cause four-fifths of all New Brunswick wildfires. The Department addresses this issue by public education on forest fire prevention.

Monitoring and Detection

- During fire season, the Department monitors 50 weather stations each day for temperature, precipitation and humidity data. The information is used to generate the forest fire index and identify localized hot-spots.
- The Department uses regular air patrols to detect wildfires in their early stages.

Suppression

• Departmental forest rangers and wardens form the backbone of New Brunswick's fire suppression team. Community fire fighters and woods workers provide assistance when needed. Forest fire crews use water bombers, trucks and all-terrain tankers.



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Forest Certification

Forest certification involves the independent auditing of forest management practices for compliance with a series of standards. This provides assurance to all stakeholders that the products are generated from sustainable and well-managed forests. The process began in the late 1980s, and is now a world-wide practice. In Canada alone, the area of certified forestland totals more than 115 million hectares.

The Department requires that all licensee and sub-licensee forest operations on New Brunswick Crown land be certified under the ISO14001 Environmental Management System. Also, they must be certified and routinely audited under an independent Sustainable Forest Management System (either CSA, FSC or SFI). These requirements made New Brunswick the first jurisdiction in the world to require certification of licensee operations.

Aboriginal Harvesting Agreements

The Province has signed aboriginal harvesting agreements with each of New Brunswick's 15 First Nations. Current agreements cover a five-year period.

The agreements allocate five per cent of the annual allowable harvest of Crown timber to First Nations. Wood allotment is distributed among the 15 bands according to community population. First Nations receive the royalties generated from the aboriginal timber harvest as well as proceeds from the sale of timber. The harvesting agreements represent about \$13 million per year to First Nation communities, and

provide significant employment and economic opportunities.

First Nations agreements are monitored to the same level as other Crown operations.



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