DRAFT FOREST MANAGEMENT PLAN
for the
Algonquin Park Forest Management Unit
Southern Region
Algonquin Forestry Authority
for the 10-year period from April 1, 2010 to March 31, 2020

I hereby certify that I have prepared this plan, including the Silvicultural Ground Rules, to the best of my professional skill and judgement in accordance with the requirements of the *Forest Management Planning Manual*.

REGISTERED PROFESSIONAL FORESTER 1532 G. H. CUMMING ONTARIO

G.H. Cumming, R.P.F.
Plan Author

Oct 13/09
(date)

Submitted by:

Daniel R. Janke, M.B.A.
General Manager
Algonquin Forestry Authority

Oct 15/09
(date)

I recommend that this forest management plan be approved for implementation and certify that it has been prepared in accordance with the requirements of the Forest Management Planning Manual and relevant policies and obligations (including any relevant MNR agreements with Aboriginal peoples). I also certify that the forest management plan has been prepared using the applicable implementation manuals and forest management guides. In this forest management plan, prescriptions that differ from specific direction or recommendations in the applicable forest management guides are identified in the attached List of Exceptions.

John E. Winters
Park Superintendent/
District Manager
Algonquin Provincial Park

(date)

Approved by:

Carrie Hayward
Regional Director
Southern Region

(date)

DRAFT FOREST MANAGEMENT PLAN
for the
Algonquin Park Forest Management Unit
Southern Region
Algonquin Forestry Authority
for the 10-year period from April 1, 2010 to March 31, 2020

I hereby certify that I have prepared the sections of the forest management plan as indicated, to the best of my professional skill and judgement, in accordance with the requirements of the Forest Management Planning Manual.

Name: Keith Fletcher, R.P.F.
Job Title: Huntsville Area Forester, AFA
Sections Prepared: 2.3, 4.2.1, 4.5, part of 6.1.2, 6.1.12, 6.1.13, FMP-14, FMP-22, FMP-23

REGISTERED PROFESSIONAL FORESTER KEITH R. FLETCHER ONTARIO

Signature Date: Sept 22/09

Name: Joe Yaraskavitch, R.P.F.
Job Title: Park Forester, Ontario Parks
Sections Prepared: Part of 2.2.2, 2.2.5, part of 2.4, 2.5, 2.6, 2.7, 3.11, part of 6.1.2, 6.1.3, 6.1.7, 6.1.8, 6.1.15, 6.1.17, 6.1.22, 6.1.23, 6.1.24

REGISTERED PROFESSIONAL FORESTER 1628 J. P. YARASKAVITCH ONTARIO

Signature Date: Sept. 24, 2009

Name: Stephen Bursey, R.P.F.
Job Title: Pembroke Area Forester, AFA
Sections Prepared: 3.3, part of 4.4.1, 4.4.2, 4.7.3, FMP-5, FMP-25

REGISTERED PROFESSIONAL FORESTER 2171 STEPHEN BURSEY ONTARIO

Signature Date: Sep. 25, 2009

Name: Brad Steinberg
Job Title: Park Biologist, Ontario Parks
Sections Prepared: 2.2.4

Signature

Oct 9 2009
Date

Name: Paul Gelok
Job Title: Acting Park Planner, Ontario Parks
Sections Prepared: Part of 1.0, part of 2.4, 6.1.21

Signature

Oct. 8, 2009
Date

Name: John Doering
Job Title: Chair, Algonquin Park Local Citizen's Committee
Sections Prepared: 6.1.16

Signature

Oct 5/09
Date

List of Exceptions
for the
FOREST MANAGEMENT PLAN
for the
Algonquin Park Forest Management Unit
Southern Region
Algonquin Forestry Authority
for the 10-year period from April 1, 2010 to March 31, 2020

All silvicultural treatments in the silvicultural ground rules which are exceptions to the recommendations in the silvicultural guides, and all operational prescriptions for areas of concern which are exceptions to the specific direction or recommendations (standards and guidelines) in the applicable forest management guides, are provided in this list of exceptions. The specific section of the forest management plan that provides documentation of the exception is also referenced in this list.

There are no exceptions in this Forest Management Plan.

Description of Exception	Specific Section of the Plan

FOREST MANAGEMENT PLAN CONTRIBUTORS
for the
Algonquin Park Forest Management Unit
Southern Region
Algonquin Forestry Authority
for the 20-year period from April 1, 2010 to March 31, 2020

PLANNING TEAM MEMBERS

Gordon Cumming, R.P.F	Plan Author, Co-chair	Chief Forester, AFA
Joe Yaraskavitch, R.P.F	Co-chair	Parks Forester, Ontario Parks
Elizabeth McRae	Project Manager	Resource Technician, Ontario Parks
Keith Fletcher, R.P.F	Member	Area Forester, AFA
Brad Steinberg	Member	Park Biologist, Ontario Parks
Jim Murphy	Member	Operations South Supervisor, Ontario Parks
Paul Gelok	Member	Acting Park Planner, Ontario Parks
Tom Ballantine	Member	LCC and Archaeologist
Chief Richard Zohr	Member - Algonquin Rep.	Bonnechere Algonquin First Nation
Robert Craftchick R.P.F.	Member - Algonquin Rep.	Whitney Algonquins
Dave Joanisse	Member - Algonquin Rep.	Antoine First Nation
Chief Clifford Bastien Jr.	Member - Algonquin Rep.	Mattawa/North Bay Algonquins
Emmett Godin	Member - Algonquin Rep.	Algonquins of Greater Golden Lake
Steve Sarazin, R.P.F.	Member - Algonquin Rep.	Algonquins of Pikwakanagan
Francis McDermott	Member - Algonquin Rep.	Sharbot Obaadjiwan Algonquins
Chief Randy Malcolm	Member - Algonquin Rep.	Snimikobi (Ardoch) Algonquin First Nation
Irvin Yateman	Member - Algonquin Rep.	Algonquin Nation Kijicho-Manito (Bancroft)

PLANNING TEAM ADVISORS

Daniel Janke	General Manager	AFA
Jeff Leavey	Manager of Operations, Pembroke	AFA
Bill Hubbert	Area Manager, Huntsville	AFA
Stephen Bursey	Area Forester, Pembroke	AFA
John Winters	Park Superintendent/District Manager	Ontario Parks
Rick Stronks	Chief Park Naturalist	Ontario Parks
Craig MacDonald	Outdoor Recreation Specialist	Ontario Parks
Jeremy Inglis	Operations North Supervisor	Ontario Parks
Roger Davison	Regional Senior Forest Mgmt. Planning Specialist	Southern Region
Rick Lambert	Regional Forest Industry Specialist	Southern Region
Norm Cottam	Regional Analyst	Southern Region

John Boos	Regional Planning Biologist/ Wildlife Advisor	Southern Region
Glen Watt	Regional Planning Analyst	Southern Region
Doris Krahn	Regional Forest Program Specialist	Southern Region
Debra MacEwen	Regional Forest Industry Liaison	Southern Region
Nancy Houle	Senior Forest Advisor	Southern Region
Bill Rose	Regional Silviculture and Forest Health Specialist	Southern Region
Barb Boysen	Genetic Resource Management Specialist	Southern Region
Dave Heaman	Fire Science Specialist	Southern Region
Roxanne St. Martin	Species at Risk Biologist	Southern Region
Dorothy Shaver	A/Senior Planner	Southern Region
Renee Carriere	Cultural Heritage Specialist	Main Office, MNR
Emmanual Asinas	Planning Economist	Main Office, MNR
Ian Manson	Socio-economics	Main Office, MNR
Ken McWatters	Native Liaison Advisor	Pembroke District
Terry Woermke	Fire Operations Supervisor	Pembroke District
Scott Lee	MNR Aboriginal Advisor	Main Office, MNR
David Webster	Regional Hydro Geologist	Southern Region
Hank van Luit	Zone Planner	Central Zone
Scott Reid	Forestry Specialist	Southern Science Section
Brian Naylor	Wildlife Specialist	Southern Science Section
Bill Crins	Landscape Ecologist	Ontario Parks
Scott McPherson	Growth and Yield Specialist	Southern Science Section
Chris Anderson	Regional Archaeologist	Southern Region

LOCAL CITIZENS COMMITTEE MEMBERS

Tom Ballantine	Wendy Milne
John Doering	Bob Robinson
Bill Dickinson	Richard Swift
Don Lloyd	John O'Donnell
Tom Adair	Grant Tayler
John McRae	Mike Wilton
Chief Richard Zohr	Betty Coutu
Patrick Glassford	

The majority of the LCC is in support of the draft FMP as developed, with one member currently engaged in issue resolution over sections of the LTMD related to wildlife habitat modeling, old growth and target setting decisions. The committee's report is included in the supplementary documentation which accompanies the plan.

PLAN REVIEWERS

Joe Yaraskavitch	Park Forester	Algonquin Park
Brad Steinberg	Park Biologist	Algonquin Park
Mike Taylor	Project Forester	Algonquin Park
Paul Gelok	Acting Park Planner	Algonquin Park
Darrell Reynolds	Senior Forest Technician	Algonquin Park
Jim Murphy	Operations South Supervisor	Algonquin Park
Roger Davison	Regional Forest Management Planning Specialist	Southern Region
Bill Rose	Forest Health and Silviculture Specialist	Southern Region
Doris Krahn	Regional Forest Program Specialist	Southern Region
Norm Cottam	Regional Analyst	Southern Region
Glen Watt	Regional Planning Analyst	Southern Region
Roxanne St. Martin	Species at Risk Biologist	Southern Region
John Boos	Regional Planning Biologist/ Wildlife Advisor	Southern Region
Ian Manson	Forest Industry Liaison Officer	Southern Region
Barb Boysen	Genetic Resource Management Specialist	Southern Region
Emmanual Asinas	Planning Economist	Main Office, MNR
Dave Heaman	Fire Science Specialist	Southern Region
Debra MacEwen	Regional Forest Industry Liaison	Southern Region

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	▪ Aboriginal Background Information Report	SD 6.1.7
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1.0 INTRODUCTION

The Minister of Natural Resources (MNR) is responsible for forest management on Crown land in Ontario. Forest management activities on Crown land in Ontario must be carried out in accordance with an approved Forest Management Plan. Forest Management Plans (FMPs) are a statutory requirement of the Crown Forest Sustainability Act and must be prepared by a professional forester registered under the Professional Foresters Act, 2000. Forest management activities covered by these plans include road access, timber harvesting, and forest renewal, tending and protection treatments.

The goal for Ontario forests is "to ensure the long-term health of our forest ecosystems for the benefit of the local and global environments, while enabling present and future generations to meet their material and social needs." (Policy Framework for Sustainable Forests) Since forested land provides a range of values and opportunities to the public, its management must be planned in a manner that recognizes the requirements of other uses. This aspect of planning is accomplished by the Park Superintendent and District Manager of Algonquin Provincial Park who establishes a team of resource managers to provide input and review during the planning process. The planning team ensures that all uses are considered.

The Planning Team, a team of resource managers appointed by the District Manager/Park Superintendent, developed this Plan. A local citizens committee (LCC) helped prepare the Plan and will continue to advise the District Manager/Park Superintendent throughout Plan implementation. The primary role of the local citizens committee is to communicate local interests to the planning team and to the District Manager/Park Superintendent, to discuss management options with the planning team and the District Manager/Park Superintendent and to advise the District Manager/Park Superintendent on issue resolution.

The following Algonquin communities had representatives on the Planning Team and participated in the planning process: Bonnechere Algonquin First Nation, Mattawa/North Bay Algonquins, Whitney Algonquins, Antoine First Nation, Sharbot Obaadjiwan Algonquins, Algonquins of Greater Golden Lake, Algonquins of Pikwakanagan, Snimikobi (Ardoch) Algonquin First Nation and the Algonquin Nation Kijicho-Manito (Bancroft).

This Plan has been prepared in accordance with the Forest Management Planning Manual for Ontario's Crown Forests, (FMPM, 2004). Forest sustainability has been determined in accordance with this manual and within the overall context of higher order provincial and regional land use and resource management policies and strategies.

The strategic direction for forest management plans is written for a ten-year period, with two five-year phases of operational planning. This Plan is for the period April 1, 2010 to March 31, 2020. It includes details on operations scheduled for the initial five-year phase of the Plan. It also contains detailed information related to operational planning for the second five-year phase of operations, with the understanding that Phase II planning will commence 3-4 years after the implementation of this Plan. Five years from now, in 2015, a new operational plan will be approved using the same strategic direction outlined in the first phase. At that time

there will be the opportunity to adjust operational planning to consider actual events occurring on the management unit between now and then.

Annual Work Schedules outline actual implementation of forest operations on a yearly basis. These schedules provide the link between work proposed in the Forest Management Plan for five-year terms and financial resources determined through the annual budgeting process.

Yearly, annual reports document the implementation of forest management operations and monitor the progress towards achieving targets identified in the Forest Management Plan. Additional detail is provided in the year 3, 7 and 10 annual reports as per the requirements of the FMPM (2004).

Objectives and strategies for a FMP must meet the MNR's policy direction identified in Beyond 2000. Sustainable development is the cornerstone of this policy and MNR's goal is `To contribute to the environmental, social and economic well-being of Ontario through the sustainable development of natural resources'.

MNR's Statement of Environmental Values (SEV) under the Environmental Bill of Rights (EBR) is a document which describes how the purposes of the EBR are to be considered whenever decisions that might significantly affect the environment are made in the Ministry. In the development of this Forest Management Plan, MNR's Statement of Environmental Values (SEV) has been considered. The plan is intended to reflect the direction set out in the SEV, and to further the objective of managing Ontario's natural resources on a sustainable basis. A SEV briefing note has been prepared for the plan, and is provided in Supplementary Documentation section 6.1.21.

Formal opportunities are provided at various stages in the planning process for the participation of other government ministries and agencies, interest groups or individuals. These opportunities allow organizations or individuals to supply information, identify concerns, comment on proposals and determine to what extent their comments were considered.

An index to the environmental assessment components of this Forest Management Plan can be found prior to Section 1 at the beginning of the plan. The index identifies the location in this Forest Management Plan of specific sections of Part A of the Forest Management Planning Manual which address each of the environmental assessment components.

A summary of the Forest Management Plan has been made to assist the public in the review process and can be found in the supplementary documentation binder section 6.1.20. This summary is available on the internet at www.ontario.ca/forestplans, as is the rest of the FMP

Appendix 6.2.9 contains a glossary of commonly used forestry terms.

1.1 History

The Algonkin Indians were the first people to inhabit areas of the management unit. Their settlements were along the Ottawa River during summer and in winter they travelled into the central part of the unit to hunt and trap. Archaeological sites date back 10,000 or more years showing aboriginal occupation.

In 1608, Étienne Brûlé, on a mission for Samuel de Champlain, was the first European to explore the vicinity of the Park while searching for its fur potential and travel routes to the west. Fur trade was important during the latter part of the 17th century and early 18th century. The war of 1812 started the first intensive exploration of the area to find a water route from the Ottawa River to Georgian Bay away from the American border.

In 1829, Alexander Sherriff explored the area to examine the waterways and assess the suitability of the land for settlement. Sherriff records a meeting with a son of the Algonquin (Grand) Chief at Cedar Lake where he had established his winter quarters. Sherriff also refers to the Algonquin Indian Amable du Fond who hunted along the river named after him. He concluded that the presence of tolerant hardwood forests indicated the land was suitable for agriculture. This was a mistaken judgement which prevailed for almost fifty years. Between 1850 and 1910 commissioners of Crown lands arranged the building and maintenance of several colonization roads to establish an overland route from the Ottawa River to Georgian Bay, and to increase settlement of the area. These roads are located on the southern, western, and eastern perimeters of the unit. A detailed map and the timing of this development is filed in the archives room of the Algonquin Visitor Centre. These early colonization roads provided little benefit to the lumber industry, because they did not extend into the unit.

Surveyors J. A. Snow and Alexander Murray also refer to meeting Algonquins within or in the vicinity of the present day southern boundary of Algonquin Provincial Park.

A petition in 1863 presented to the Department of Indian Affairs by eight Algonquin Chiefs and over 250 Algonquins states that their hunting grounds include the headwaters of the Madawaska and other rivers of central Canada. The petition asks that a tract of land be set aside for them in Lawrence Township which is in their hunting grounds.

From this time, and more emphatically in the 1880's and early 1890's, the Algonquins advocated for a reserve within the townships of Lawrence, Sabine and Nightingale. At one point one quarter of Lawrence township was actually set aside for a reserve.

The Algonquin’s land claim is currently under negotiation with the Federal and Provincial governments. The claim comprises approximately 34,000 square kilometres which includes most of the area covered by this Forest Management Plan.

Establishing Algonquin Provincial Park was first proposed in 1878 in a published volume entitled The Undeveloped Lands of Northern and Western Ontario. Authors Alexander Kirkwood and J. J. Murphy worked in the office of the Ontario Department of Crown Lands. Recommendations made by Kirkwood and Murphy were shortly reinforced and elaborated on

by the Provincial Land Surveyor for the area, Mr. James Dickson. Dickson's reports were based on his first hand knowledge of the area and contained detailed descriptions of resources of the area and specific recommendations.

In 1892 a Royal Commission recommended creation of a park, and in 1893 the Algonquin National Park Act was passed by the Legislative Assembly of the Province of Ontario.

Objectives listed for establishment of the Park were:

1. To preserve the headwaters of the watersheds;
2. To preserve the native forest;
3. To protect game and fur bearing animals, fish and birds;
4. To provide an area for forestry experimentation;
5. To serve as a health resort and pleasure ground for the benefit, advantage and enjoyment of the people of the province.

The Park included 18 townships and covered an area of 379,987 hectares. Additions were made in 1894, 1904, 1911, 1914, 1951, 1960 and further additions were proposed in the Park Master Plan of 1974. These proposed additions were completed between 1974 to 1993. Today, the area of the Park is 763,555 hectares as detailed in FMP-1.

1.2 Logging History

Logging for square timber (white and red pine) began about 1830 when James Wadsworth obtained a timber licence to cut red pine from Round Lake to the source of the Bonnechere River. In 1846, 141,600 cubic metres of red and white pine were harvested and floated down the Madawaska, Bonnechere, and Petawawa Rivers. Peak of the square timber trade was reached in 1864 and the last square timber was cut near the Petawawa River north of Brûlé Lake in 1912.

One account which was critical of the square timber trade estimated that "about 4 or 5% of the trees in a stand were suitable for squaring. Trees were cut that would square to a minimum of 15 inches with a minimum length of 30 feet, and a surface free of knots and blemishes." (Hughson, J.W. & Bond, C.J., 1964) The square timber trade declined in the late 1800s and sawmilling replaced it as the new industry.

Major improvements in transportation resulted with the construction of the Canada Central Railway from Pembroke to Mattawa in 1881, and the Ottawa, Arnprior, and Parry Sound Railway (J. R. Booth) in 1897. In 1915 the Canadian Northern Railway was built across the northeast side of the unit (now CNR). These railroads greatly facilitated access to the unit and the sawmill industry benefited significantly. The last train to use the railroad was in November 1995 and the CNR rails have since been lifted.

Raw material for these early sawmills was still predominantly pine. At first the largest pine which hadn't been straight enough or accessible to the square timber trade were cut. In

subsequent cuts, smaller pine and spruce were taken. By the 1930s, species other than pine were cut. Yellow birch was the first hardwood sought out. This evolution resulted from a variety of factors:

1. Reduced availability of pine and spruce.
2. Introduction of trucks for transport instead of river driving.
3. Use of birch veneers for the manufacture of the "Mosquito" bomber of World War II.
4. Incidence of birch dieback in some parts of the unit which led to a salvage effort.
5. Development of a domestic furniture industry.

The harvest of yellow birch peaked in the mid-1950s and has declined since then. The cut of hard maple increased slowly from 1945 - 1955 and expanded significantly from 1955 to present.

This evolution coincided with some other major changes. The last river drive occurred on the Petawawa River in 1959. Trucks were introduced in the early 1940s and crawler tractors shortly after. Cutting of hardwoods required roads to move the logs to mills before logs stained from heat, resulting in construction of all weather roads. In the period 1955 - 60 small crawler tractors were used to skid logs from stump to landing instead of horses. The wheeled skidder was developed shortly thereafter, and by 1965 it was established as the predominant machine for the primary transport of logs. These changes enabled the logging season to start earlier, and thus lengthened the logging season by four months (May to March).

In the early 1950s, diameter limits were applied as a means to control the amount of timber harvested from specific areas.

These limits were usually 38 centimetres for yellow birch, maple, and hemlock and 46 centimetres on pine. Diameter limits were used in some areas up until the 1970s as the mechanism to carry out the selection or uniform shelterwood silvicultural systems.

Around 1950, individual trees in the former Petawawa Management Unit were first marked with paint to designate either their removal or retention. In the rest of the unit, diameter limits prevailed until the late 1960s and early 1970s when marking became the rule, to implement the selection system in the tolerant hardwoods or uniform shelterwood system in the pine working group. Presently, all stands are marked before cutting.

The dominant logging system in the 1970s and 1980s was: fell with chain saw; skid tree length by wheeled skidder distances of 150 - 450 metres to central landings; cut, sort, and pile the products and then load and haul using trailer type trucks for distances of 42 - 210 kilometres. Although the above-mentioned system is still used to a certain extent, the primary method now is to cut and skid to small landings, and haul treelengths to central landings where products are manufactured. This process allows for better recovery of the more valuable forest products, provides more flexibility in haul schedules and, more importantly, reduces the amount of area required for landings in the bush. The manufacturing of treelength at central landings or yards is used for about 75% of the wood cut in Algonquin Provincial Park. For the most part these landings are located outside Algonquin Provincial Park.

Recently, the use of mechanical feller bunchers has increased to a level of approximately 40% of the total harvested area in Algonquin Park. This trend towards mechanical felling is consistent throughout the province. Trees harvested with a feller buncher are placed on the forest floor in a fashion that minimizes the impact on residual trees and regeneration. The trees are limbed and topped at the stump and are skidded out of the forest with either with cable or grapple skidders. This system is currently being used in clearcut, shelterwood and selection system areas.

The utilization of various tree species and especially their pulp component has been evolving steadily. From 1974 to 1980 the annual volume of tolerant hardwood produced for pulpwood increased from 6,500 m^3 to 130,260 m^3. In 2006-2007 tolerant hardwood pulp harvested was approximately 188,000 gross m^3. There are three apparent reasons for the changes:

1. Tree marking systems adopted since 1974 designate declining trees for harvest and the better quality for retention in the residual stand.
2. Markets for pulp quality products had developed.
3. Lower quality stands have been harvested when the pulp component is marketable.

Up until 2007, pulp mills actively increased their purchases of sawmill-produced pulp chips. This resulted in sawmills installing roundwood chipping plants at their mill yards. These chip mills use pulp quality hardwoods for raw material which has had a beneficial impact on forest utilization.

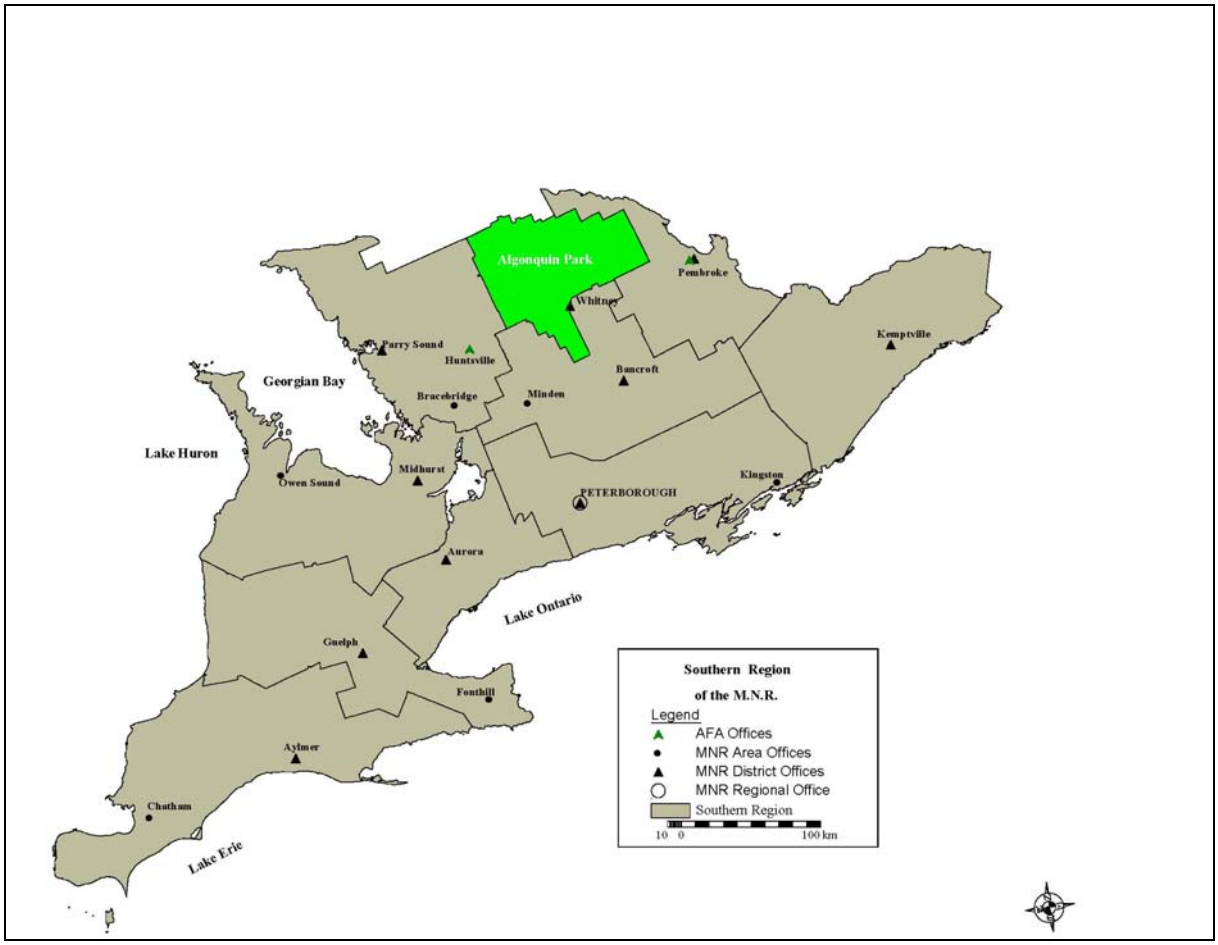
Recently however, from 2006 to present (2009), the weakening economy has reduced demand for forest products worldwide and has resulted in numerous temporary and permanent mill closures across the province affecting all forest product sectors. The state of the forest industry of central and eastern Ontario is reflective of this global situation. There have been numerous pulp mill closures in the region resulting in reduced demand for low-end material. The 2008-2009 tolerant hardwood pulp harvest has dropped back down to approximately 116,000 m^3.

2.0 MANAGEMENT UNIT DESCRIPTION

2.1 Administration

Algonquin Park Forest Management Unit is located within Algonquin Provincial Park, part of the Southern Region Administrative Unit of the Ontario Ministry of Natural Resources. Algonquin Provincial Park is administered by Ontario Parks, a branch of the Natural Resources Management Division (MNR). Map 1 illustrates the Park in relation to Southern Region of the Ontario Ministry of Natural Resources.

Map1 MNR Southern Region



Algonquin Provincial Park is a Natural Environment Park under the Provincial Parks Classification system. A Natural Environment Park incorporates outstanding recreational landscapes with representative natural features and historical resources to provide high quality recreational and educational experiences. Part of the Park is zoned Recreation-Utilization. Low intensity recreation and commercial timber harvesting are permitted within this zone.

Algonquin was established in 1893 and overall management policy since that time has been directed at preserving and protecting the Park's values. This basic thrust continues and, while timber harvesting is permitted, it is conducted under strict environmental controls.

The Algonquin Provincial Park Management Plan (1998) establishes the framework for all activities within the Park and this FMP is written in accordance with this Plan and other relevant provincial guidelines and manuals.

As stated in the Algonquin Provincial Park Management Plan (1998), “the protection of the Park’s significant natural, cultural and recreational values is paramount. Within this parameter the renewable resources of Algonquin Park are and will continue to be managed on a sustainable basis. Management Plans have or will be prepared for all resource uses in the Park to ensure that the Park’s resources are managed in this manner”.

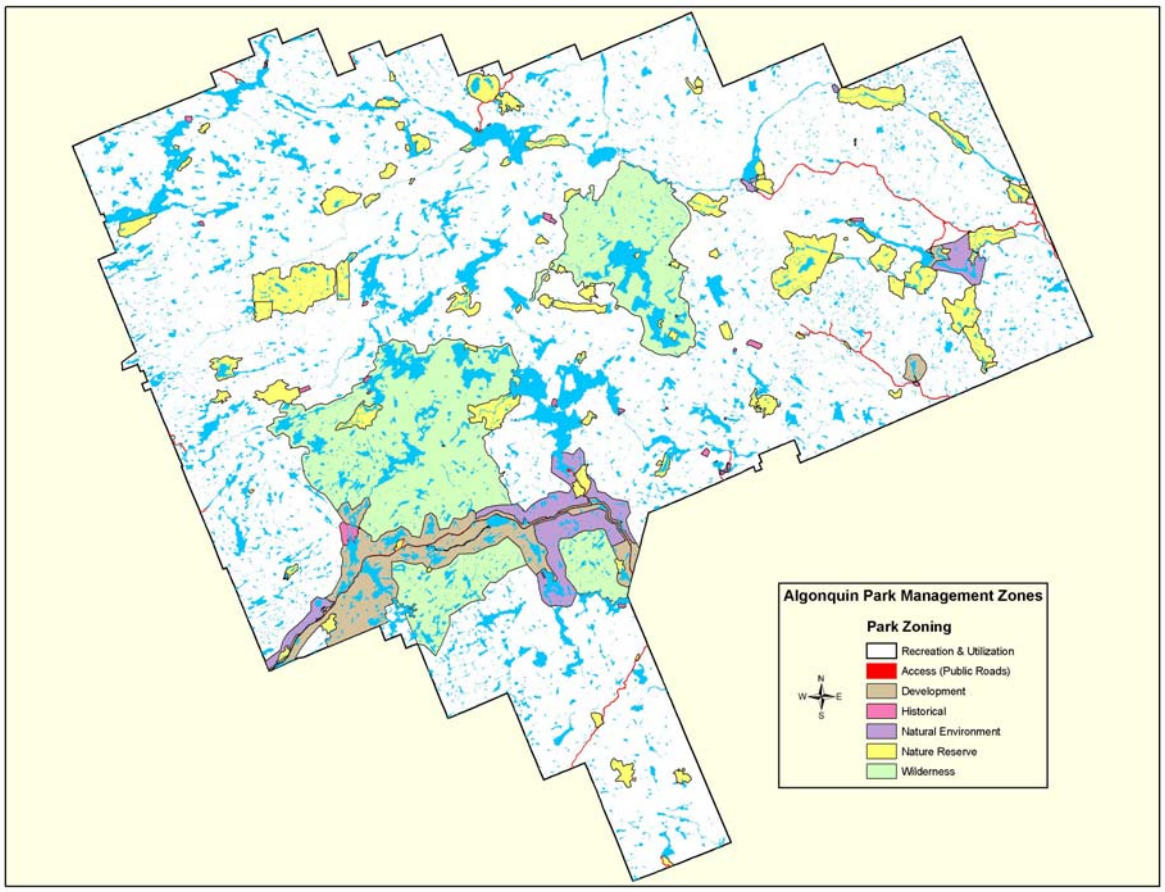
The Algonquin Park Forest Management Plan describes silvicultural practices (including harvesting and renewal activities) that are designed to protect Park values such as wildlife, fisheries, tourism and outdoor recreation. All forest management activities must be in accordance with the Park Management Plan”.

The goal of Algonquin Provincial Park is `to provide protection of natural and cultural features, continuing opportunities for a diversity of low intensity recreational, wilderness and natural environmental experiences, and, within this provision, continue and enhance the Park's contribution to the economic, social and cultural life of the region'. Algonquin Provincial Park also advances the Ministry's goal `to contribute to the environmental, social and economic well-being of Ontario through the sustainable development of natural resources' (Beyond 2000). Algonquin Provincial Park protects natural and cultural heritage values including plants, fisheries, wildlife and cultural heritage values and provides a variety of recreational opportunities. Algonquin also serves to maintain the economic base of many local communities and contributes to resource production activities in the Region.

The Algonquin Provincial Park Management Plan establishes policy and objectives for all land use within the Park. Further information about other specific values can be found in Appendix 6.2.1 - Management Guidelines for Land Use Areas and Strategies for General Resource Areas.

A major mechanism to control land use is the zoning of the Park into land use categories. The categories are access, development, historical, nature reserve, wilderness, natural environment and recreation/utilization. Forest management activities occur in the recreation/utilization zone which is the land base with which this plan deals. Resource utilization takes place in the recreation/utilization zone in a discreet manner in an attempt to minimize the impact on the natural and cultural values of the Algonquin Park landscape shared with recreational users. (Algonquin Provincial Park Management Plan, 1998) A description of the purpose for each zone is found in the Algonquin Provincial Park Management Plan. Zones such as nature reserve and historical zones contain a buffer around the feature to be protected, in order to protect values in these areas from adjacent harvesting operations. A map of the zones is displayed below and on the values map in the supplementary documentation binder.

Map 2 Algonquin Park Management Zones



One of the major provisions of the 1974 Algonquin Park Master Plan relative to forest management, was establishment of the Algonquin Forestry Authority (A.F.A.) which is a Crown agency established by the authority of Bill 155 "An Act to Incorporate the Algonquin Forestry Authority". This act terminated Order-In-Council timber licences held by fourteen companies and vested in A.F.A. the responsibility of licensee. The objectives of the AFA as defined in its governing legislation are:

a) Subject to the Crown Forest Sustainability Act (1994), to harvest Crown timber and produce logs therefrom and to sort, sell, supply and deliver the logs.
b) To perform, undertake and carry out such forestry, land management and other programs and projects as the Minister may authorize and to advise the Minister on forestry and land management programs and projects of general advantage to Ontario.

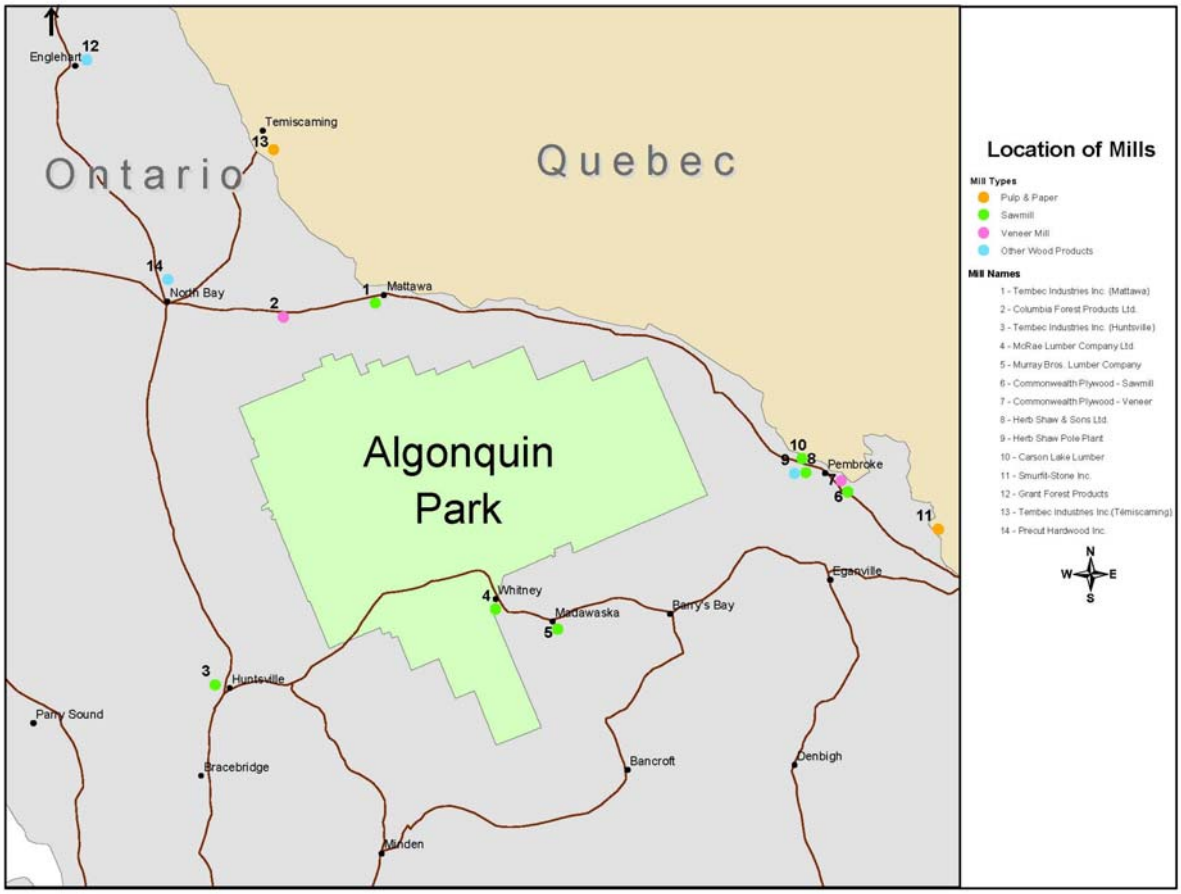
As also stated in this Act ,“The Authority shall conduct its operations in conformity and harmony with the provisions and true intent and spirit of the park management plan and all amendments thereof, and shall ensure that such operations are conducted, so far as it is practicable so to do, with full regard at all times for the aesthetics, ecology and all other qualities of the environment”.

A.F.A. has offices in Huntsville and Pembroke and day-to-day relationship with the Ministry is with the Ministry's Ontario Parks' Office at Whitney. The General Manager of the A.F.A. reports to the A.F.A. Board of Directors, whose Chair reports to the Minister of Natural Resources.

A.F.A. is party to the Algonquin Park Forestry Agreement with the Minister of Natural Resources, which specifies that the Minister agrees to offer five year licences to the A.F.A. for a twenty-year period commencing April 1st 2002. The Forestry Agreement is similar to a Sustainable Forest Licence (SFL) arrangement that spells out the roles and responsibilities and financial structure for forest management activities. The agreement further specifies the companies to which the A.F.A. will sell Crown timber produced from the tract. These wood supply commitments are reviewed every ten years in conjunction with a new FMP and are based on what the Algonquin Park forest can sustainably supply. The Minister of Natural Resources approves in writing the volume for each company.

Map 3 illustrates the location of allocation holder mills. Permanent closures of the Tembec Mattawa sawmill and the Smurfit-Stone pulpmill were announced in 2008/09, however, wood supply commitments currently remain in place for these facilities.

Map 3 Location of Mills



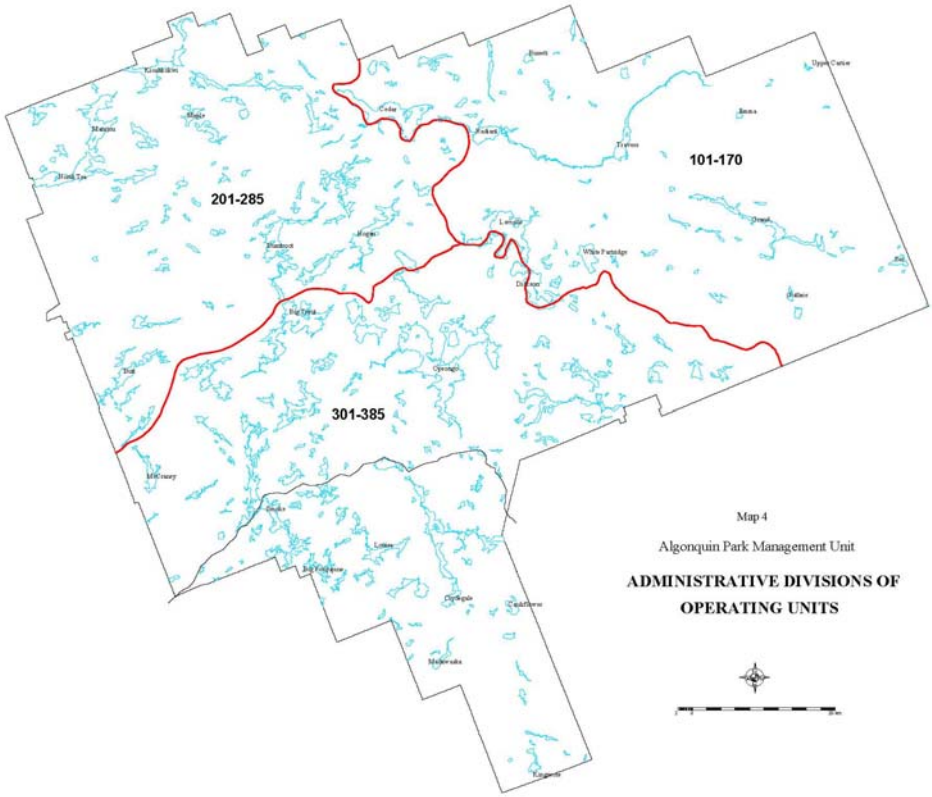
The Forestry Agreement requires 5 year performance reviews to determine whether the Authority's obligations under the Agreement have been satisfactorily performed. There have been four independent forest audits thus far with the last being in 2007.

A revised digital Park boundary was received by AFA on May 22nd 2007, based on 2005 direction from the Surveyor General's Office. While the location on the ground is well established and has not changed, the digital representation of the boundary has been revised based on the most recent survey evidence and the use of "best-evidence" principals. Discrepancies with the old boundary were focused in four areas along the north and west side of the Park. This new revised boundary is much closer to the original boundary that was used in the 2000 FMP, prior to the boundary changes made for the 2005 FMP. This revised Park boundary accounts for the changes in management unit areas from the 2005 FMP.

2.1.1 Operating Units

For administrative purposes, the management unit is divided into three parcels. This administrative division is illustrated in Map 4.

Map 4 Administrative Divisions of Operating Units



The Algonquin Park Forest Management Unit is divided into 220 operating units. The former Petawawa management unit had previously been divided into operating units and these were retained as they were, except where adjustments were necessary to join with adjacent areas. The former Round Lake unit also had some operating units established which were retained.

Balance of the unit was divided using a combination of geographic and physical features as boundaries. Average size of the existing operating units at that time was approximately 3,240 hectares and on the balance of the area the average size is 1,942 hectares.

This system facilitates administration and makes it possible to plan and maintain records in a systematic manner. All operations are recorded by operating unit in Forest Management Plan documents and reports. The establishment of these operating units in 1980, represented the first step toward dividing the forest in an organized way to assist in the planning of harvest, silviculture and protection. In 1991 the Authority acquired a Geographic Information System (GIS) to track information needed to manage Algonquin's forests.

Operating units are eventually divided into sub-compartments, based on topographic features, operational feasibility, and park constraints and vary in size from 200 - 800 hectares. Shape of compartments on the eastern portion of the unit will most often be rectangular, because the land is flat to gently rolling. On the west and central portion of the unit, the topography will require irregular compartment boundaries to conform to terrain, which is more broken.

Delineation of compartments is done at the time of FMP preparation when specific areas are being planned for operations.

2.2 Forest Description

The management unit contains two basic forest complexes - the tolerant hardwoods and hemlock, which primarily occupy the Precambrian Uplands on the west and the white and red pine, poplar and white birch found mainly in the eastern Ottawa Lowlands. These forest types were described in the 1974 Master Plan for Algonquin Provincial Park as the `meeting of northern and southern ecosystems in transition'.

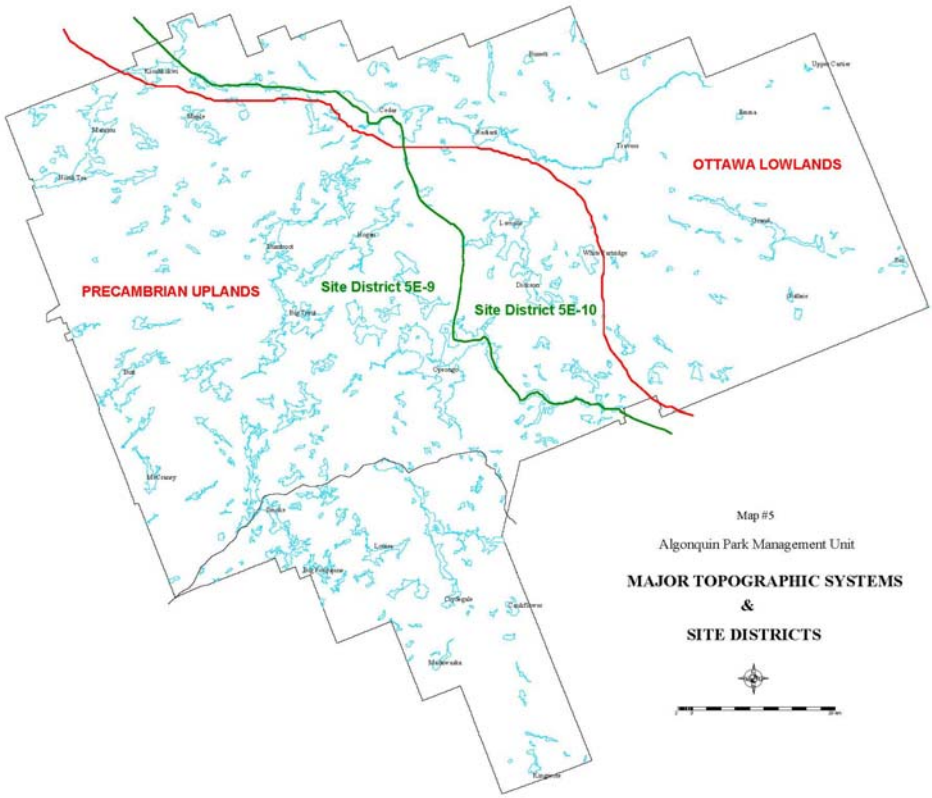
The Algonquin Park Management Unit is 763,555 hectares in size. The unit includes 43 whole or part townships which were formerly parts of seven separate Crown Management units; the Petawawa, Whitney, Round Lake, Kiosk, Huntsville, Powassan and Gooderham units.

2.2.1 Topography, Geology, Soils and Sites

2.2.1.1 Topography

The Park Master Plan refers to three major topographic systems: the Western Uplands, Central Lakes and Eastern Ridges. Other references have recognized two: the Precambrian Uplands on the west, and the Ottawa Lowlands on the east. The division between the Precambrian Uplands and Ottawa Lowlands roughly coincides with the boundary between Site Districts 5E-9 and 5E-10 respectively, as shown on Map 5. This plan will refer to the latter division because it separates the two major forest conditions.

Map 5 Major Topographic Systems and Site Districts

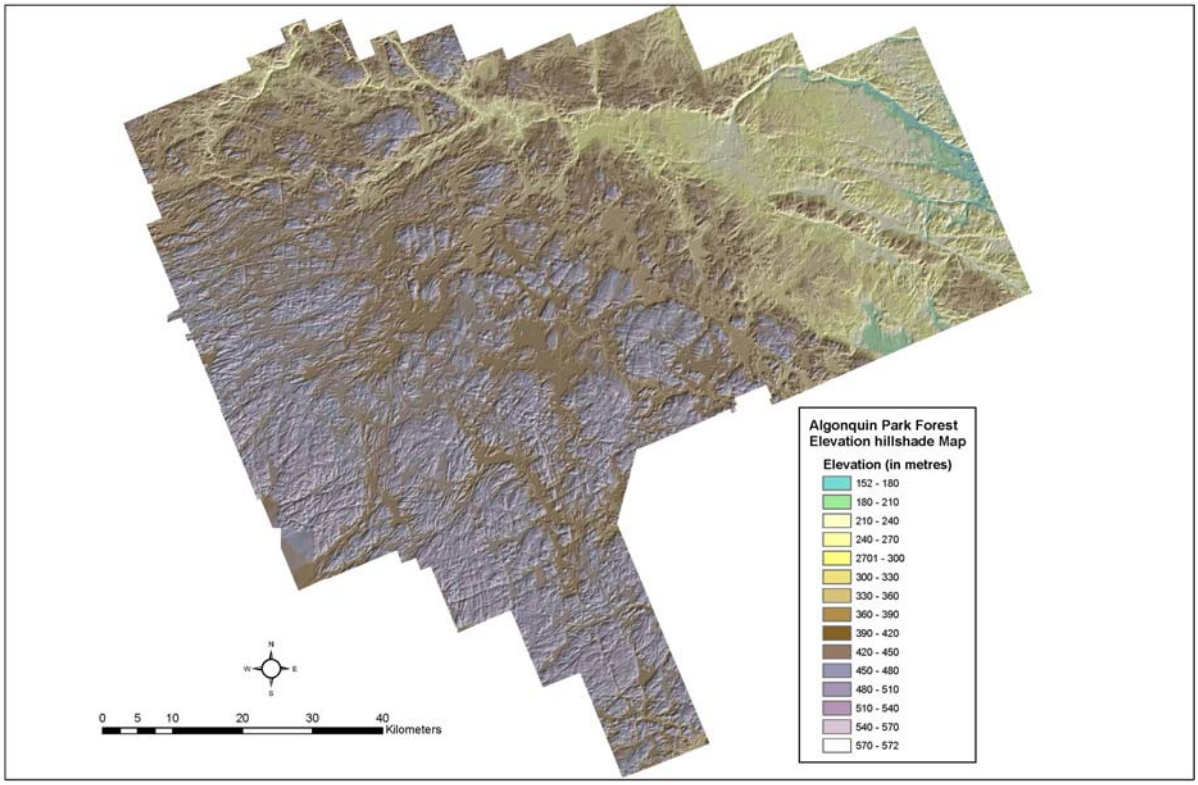


Site District 5E-9 sits on the Algonquin dome, a Precambrian upland area. The highest elevations occur east of Opeongo Lake where the elevation reaches 580 metres (Map 6). Elevations decrease in all directions from this point. These uplands represent some of the highest elevations in Ontario.

The Ottawa lowlands of Site District 5E-10 are situated on the east side of Algonquin Provincial Park. It features generally lower elevations, in the range of 180 - 380 metres, and less relief, but is also the location of the only major bedrock dislocation in Southern Ontario. This is the Ottawa-Bonnechere fault system, a series of downfaults extending northwesterly as far as Lake Lavieille.

These two topographic systems support distinctly different forests. The Ottawa lowlands is occupied by a forest comprised primarily of white and red pine, poplar, and white birch. The Precambrian uplands supports a tolerant hardwood forest of hard maple, beech, yellow birch and hemlock.

Map 6 Algonquin Park Forest Elevation Map



2.2.1.2 Bedrock Geology

The bedrock in the unit is part of the Precambrian Shield known as the Grenville Structural Province. This rock is approximately 1.7 billion years old and is predominantly of igneous origin.

The last major metamorphic event (orogeny) occurred about 950 million years ago. Following this, the metamorphic rocks eroded down to present levels by the start of Ordovician time, leaving a drainage pattern and relief similar to today. During Ordovician time the area was blanketed with marine sediments (limestone). Erosion, partly by Quaternary ice advances, stripped most of the limestone away. Remnants of Ordovician limestone remain in the vicinity of the Brent Crater and Cedar Lake.

The northeastern portion of the unit is crossed by the Ottawa-Bonnechere fault system. This system of faults is still active with localized seismic activity and occasional minor earthquakes. The Brent Crater, located on the northern boundary in Deacon and Cameron Townships is thought to originate either from a meteorite impact or by crypto volcanic activity. This geological feature is part of the nature reserve system in the Park.

To date, there has been little evidence of commercial mineral deposits, except a small iron deposit south of Dickson Lake and the many small sand and gravel deposits. The Park

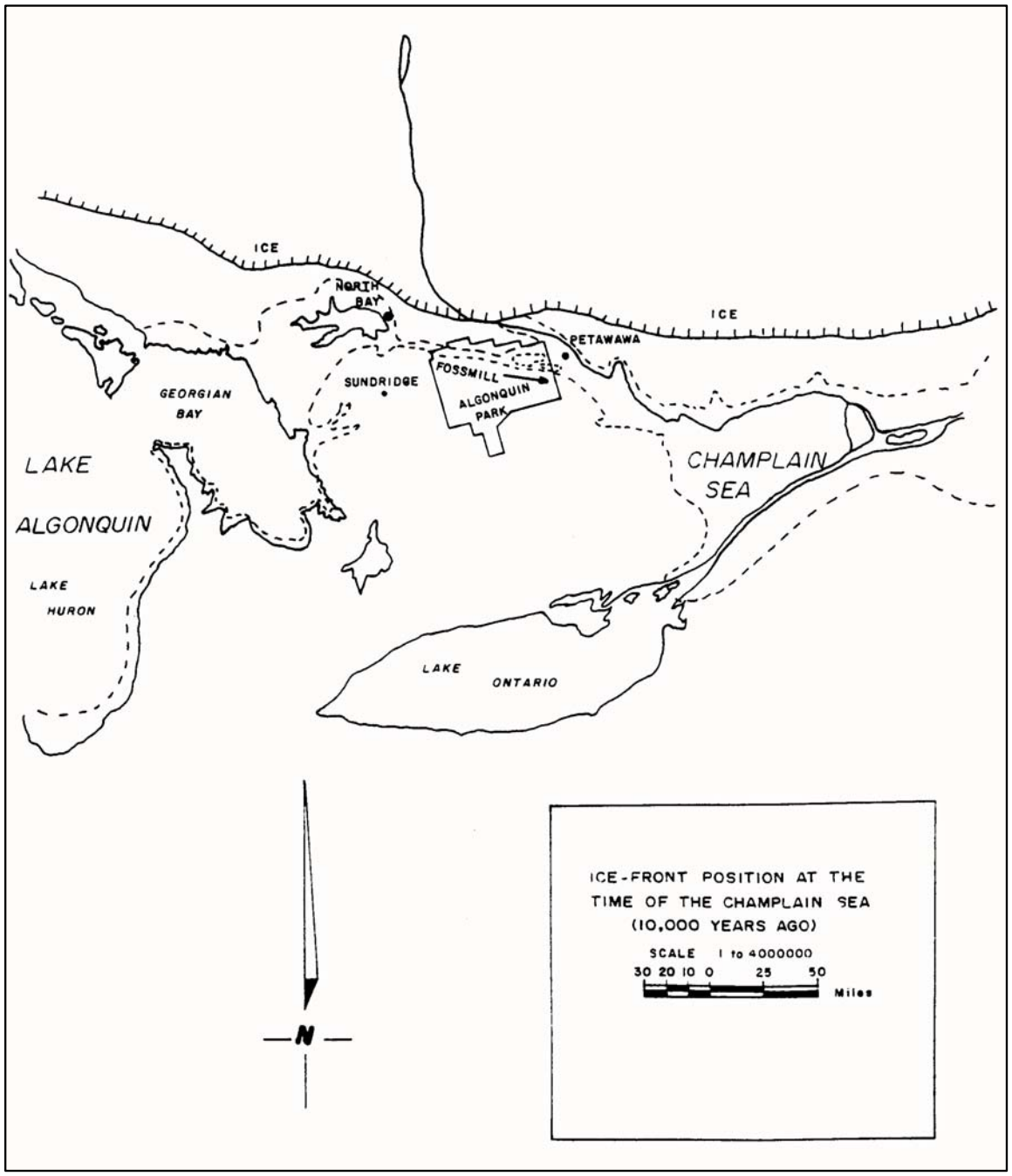
Management Plan prohibits prospecting, the staking of claims, and the working of mines within the Park. Sand and gravel may be used for road construction and maintenance purposes inside the Park's Recreation/Utilization zone with the approval of Ontario Parks.

2.2.1.3 Glaciation and Surficial Features

During the Quaternary period all of Ontario was covered by a succession of ice sheets. There were probably four, of which the last was the Wisconsin. This last glaciation had the major influence on the formation of landforms present today. Southern Ontario is estimated to have been free of glacial ice for about 10,000 years.

The glacier receded in a northeasterly direction across Ontario until the leading edge was in the vicinity of North Bay (see Map 7). Lake Algonquin found an outlet by way of the Fossmill channel into the Champlain Sea. The present day location of the Fossmill channel is the valley now followed by the old Canadian National Railway (CNR) bed and the Petawawa and Barron Rivers. The deep sand beds in the Petawawa area were deposited as a delta at that time. It should be noted that the last train used the CNR line through the Park in November, 1995 and the tracks have since been removed.

Map 7 Glaciation History



As the ice front moved northward, the land gradually rose above the level of the Champlain Sea. These uplifts progressively lowered the water levels in the northern part of Lake Algonquin and in the Champlain Sea. Lake Algonquin levels were about 260 metres above sea level when the ice front reached the Ottawa River. At this point, an eastern channel was exposed and a discharge flowed past Mattawa, cutting channels into the Petawawa delta, and carrying sand downstream to a bay east of Ottawa. This discharge lowered the water level in

the upper great lakes basins by about 30 metres. This series of events produced the broad areas of sand and gravel on the eastern portion of the unit. The soils in this area are referred to as the Petawawa landtype.

On the western and central portions of the unit, soil materials deposited during glaciation are mainly of two types. As the ice advanced over the rock-knobbed land surface, basal till was moulded firmly into place, often producing a drumlinoid landform. As the ice retreated, it left loosely dumped ground moraine, which often overlays the moulded till on drumlinoid landforms and covers the areas in between to varying depths. These conditions are usually mapped as the Sherborne landtype.

2.2.1.4 Soils

Soils, vegetation and climate form the basis for describing forest ecosites. The "Field Guide to Forest Ecosystems of Central Ontario" is based on these items and should be referenced for further detail on individual ecosites (ES).

The Petawawa landtype is predominantly sandy, but includes a range of mixtures from sand and coarse gravel to sand and silt. Sand plains comprised of mixtures varying from coarse gravel to fine sands and 1.5 - 3 metres deep, occur in portions of the townships of White, Edgar, Clancy, Preston, Dickson and Bower. Jack pine grows on the coarser and drier sites (ES 15), white pine on the fresher, fine sands (ES 11, 13 and 14), and red pine on the intermediate sites (ES12).

The silty sands support good stands of white pine, red pine and poplar. Lower slopes where the moisture content is higher, support a component of white and black spruce. On the higher and drier slopes and ridges, oak, poplar and white birch are found. The soils at lower elevations are 1.5 metres or more in depth with depths on upper and middle slopes ranging from 0.6 - 1.5 metres.

Fresh, silty sand tills occur in Fitzgerald township, the Forbes Creek area and the Lake Lavieille-Dickson Lake area. These soils have a lower sand content and tend to be loamier in texture. They support white and red pine, poplar and tolerant hardwoods (ES 27). Soil depths are similar to the silty sands described above.

Soils of the Sherborne landtype are either loosely deposited ground moraine or compacted till compressed by the moulding action of the glacier with a layer of loose till overlaying it. Soil depths range from 0 - 1 metre for shallow soils, and 1 - 3 metres for deeper soils. The components of this soil include sand, silt, clay, pebbles and large boulders.

The forest cover on these soils varies in type and productivity depending on soil depth, topographic location, slope and moisture regime.

Fresh, deep soils on upper slopes support good tolerant hardwoods such as maple and beech (ES 25, 28 and 29). Where moisture increases, the yellow birch, spruce and hemlock component increases and maple-beech decreases (ES 29 and 30). On very wet lower slopes,

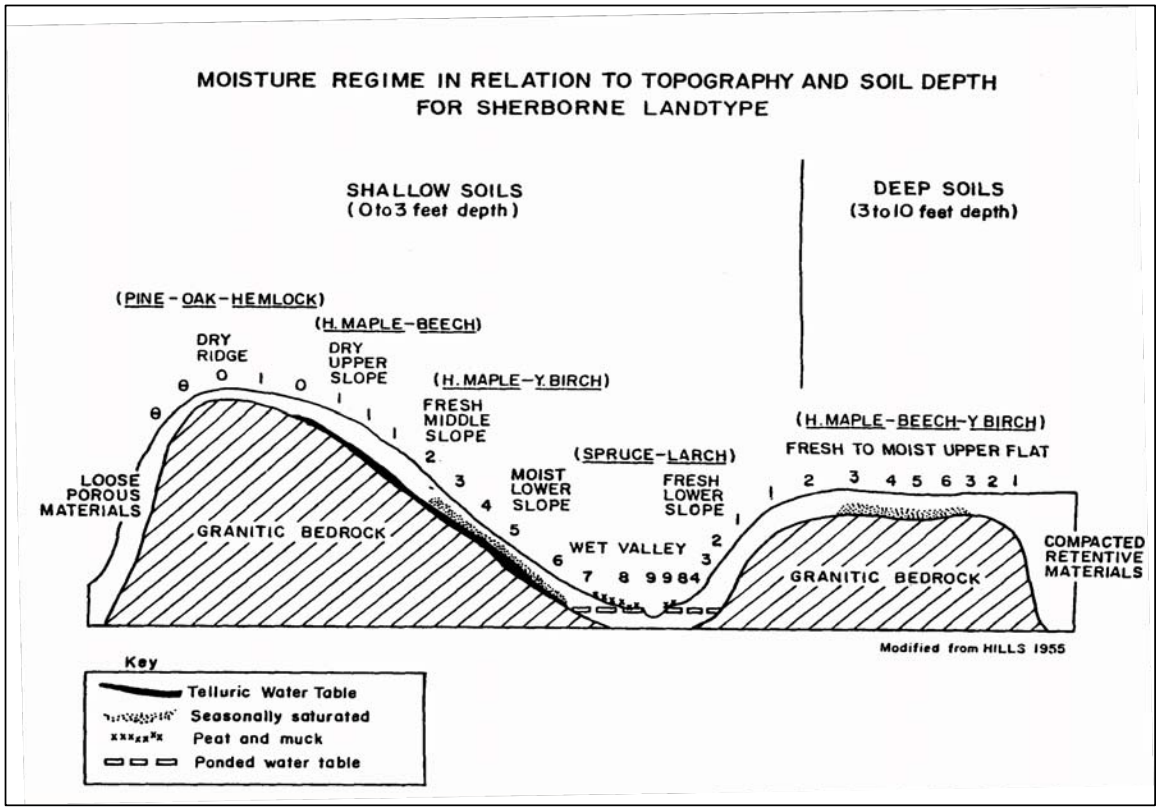
black spruce, cedar and tamarack occur (ES 31 to 34). Lower slope situations are also influenced by a telluric water table which increases the productive ability of the site. As groundwater moves down the slope, it is enriched by picking up oxygen and dissolved chemicals. These added nutrients improve the site for species such as yellow birch (ES 30.2).

Upper slopes and hilltops with drier and shallow soils tend to exclude yellow birch, discourage maple and beech, and favour pine and spruce (ES 20).

There are upper slopes and hilltop sites which support good quality maple and yellow birch (ES 29). These are the moulded till (drumlinoid) landforms which retain moisture very well because the compressed material reduces moisture percolation by virtue of its finer pore space. This produces fresh moisture conditions even on hilltops. These sites are highly productive and often support uniform stands of good quality hardwood.

An illustration of the range of conditions described for the Sherborne Landtype is presented in Figure 1.

Figure 1 Moisture Regime for the Sherborne Landtype



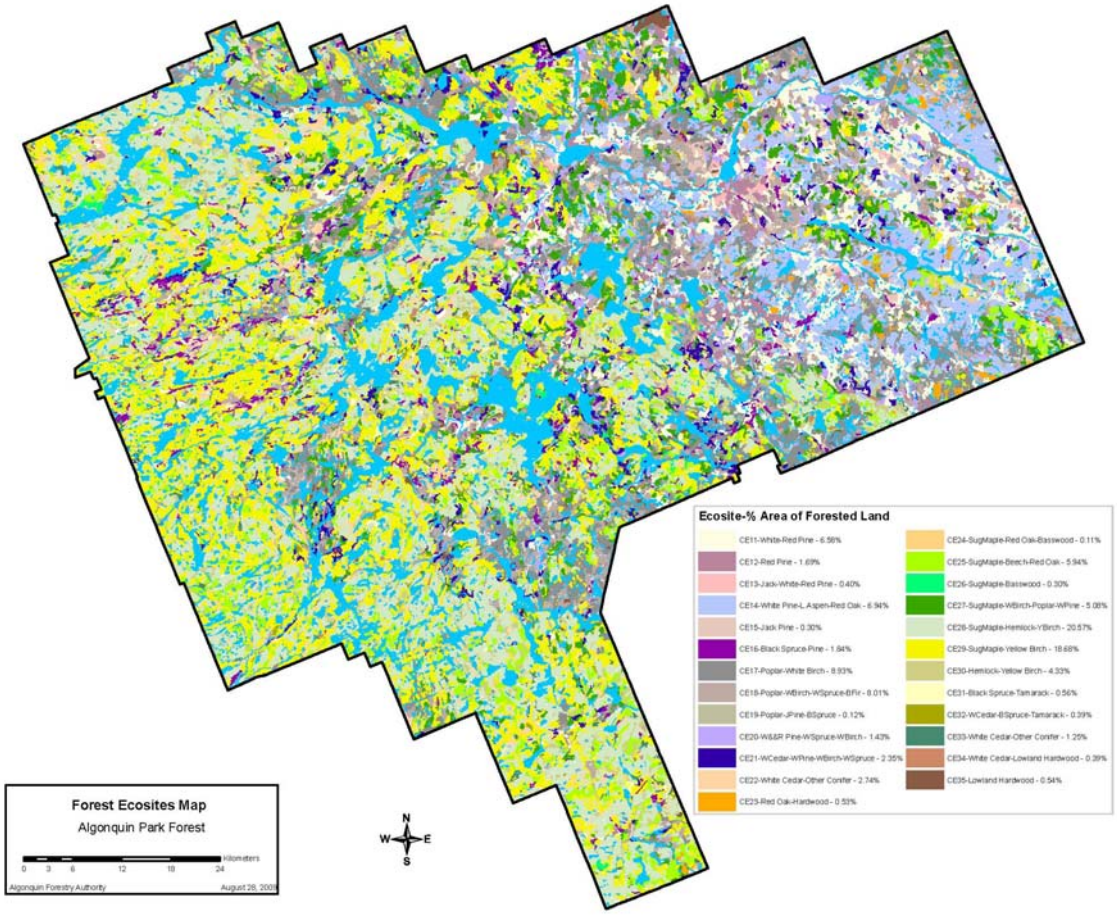
Both the Petawawa and Sherborne landtypes are generally coarse textured, acidic, have an organic surface of varying depth, and a light coloured eluviated horizon (Ae); typical of the podzolic order into which category they fall.

There are limited areas of organic soils, most being found along some lakes and streams and in low lying areas occupied by black spruce, tamarack or cedar (ES 31 and 32).

Soils and forest ecosystem classifications provide the basis for developing the silvicultural ground rules for each forest unit-site type combination (FMP-5).

Map 8 illustrates the distribution of forest ecosites on the Algonquin Park Forest

Map 8 Forest Ecosites



2.2.1.5 Hydrography

The Royal Commission on Forest Reservation and National Parks in 1893 identified preservation of the headwaters of the Park river systems as a primary objective. The Park Master Plan in 1974 maintained this emphasis on "preservation of the high quality of interior waters."

Algonquin Provincial Park has 2,456 lakes in 19 principle watersheds (Algonquin Provincial Park Management Plan, 1998). Since Algonquin is situated on some of the highest land in the region, it serves as the headwaters for all of the watersheds except, the Tim River, Amable du

Fond, Hurdman Creek, North River and York River which originate outside the Park. Five major rivers drain the Park; the Oxtongue, Petawawa, Barron, Madawaska and Bonnechere.

The three largest watersheds are the Petawawa, Madawaska, and Bonnechere systems which drain eastward to the Ottawa River. In the northwest, the Amable-du-Fond is the major system flowing north into the Mattawa River. On the west the major system is the Oxtongue River. The major portion of the pine-intolerant hardwood forest is located within the Petawawa and Bonnechere River watersheds. The tolerant hardwood forest occurs in the other watersheds, plus the western portion of the Petawawa system. The forest access road system both past and present has been greatly influenced by these river systems, which were the original access routes for fur traders and the earliest logging. The Lake Travers road is one example of a road system which follows a river system (Petawawa), the Basin Depot road is another (Bonnechere).

Water quantity in the Park is managed through the operation, maintenance and construction of 10 weirs and 13 gated control dams (Algonquin Provincial Park Management Plan, 1998). Five of these are subject to the "Hackner-Holden" agreement which means they are subject to Hydro One requirements within specified limits.

2.2.1.6 Climate

Because Algonquin Provincial Park rests on the Algonquin dome it has higher elevations than the rest of southern Ontario, which results in lower temperatures and greater precipitation.

The differing elevations of the east and west sides of the Park, due to their position on the dome have an influence on the climate, and thus the forest cover. The mean daily temperature for the year is 2° - 3° Celsius on the west side of the Park and 3° - 4° C on the east. The mean temperature for July is 17° - 18° C and for January the mean is -12° to -14° C. The frost-free period varies from 90 days in the south-central area to 120 days along the eastern boundary. The start of the growing season (date when the average mean temperature rises above 5° C) is April 25 and the mean date of the first occurrence of 0° C (frost) varies from August 31 to September 15.The mean growing season length is 150 - 160 days. The mean annual growing degree-days above 5° C ranges from 1,500-1,600 on the west side of the Park to 1,600-1,700 days on the east. This compares to 4,000 for southwestern Ontario. The annual total precipitation varies from over 110 cm. in the west to less than 75 cm. in the eastern townships. Average snowfall varies from 244 cm. in the west to less than 203 cm. in the east.

The lower precipitation and longer frost-free period on the eastern portion of the unit corresponds with the climatic preferences of white and red pine. Red pine appears somewhat better adapted than white pine to extremes such as dry sands, hot days and cold nights.

White pine requires some protection from these extremes for germination and survival. Both pines are susceptible to frost damage, particularly on low-lying sites where cold air collects. Frost damage is greatest when the foliage first flushes in the spring.

Tolerant hardwoods are better adapted to cooler, fresher conditions. Maple, yellow birch, and hemlock in particular, prefer these conditions. The hardwoods are generally more frost hardy than the pines, but yellow birch and beech are moderately susceptible to frost damage. The greater amount of precipitation and shorter frost-free period on the west coincides with the occurrence of the tolerant hardwood forest.

2.2.2 Historic Forest

2.2.2.1 Forest Cover Types

Forests are dynamic living systems that constantly change to varying degrees over time through a process known as 'succession'. Records do not exist prior to human activity in Algonquin Provincial Park that quantify the state of the forests at that time. It is known that in the early 1800s pine forests on the east side of Algonquin were dominated by large red and white pine stands, including those with 'old growth' attributes. Logging of these large pines commenced around the mid 1830s and within 70 years most of these 'old growth' pine stands were gone. Resulting wildfires, fuelled by vast amounts of pine slash and chips left in squaring, formed today's intolerant forests on the east side of Algonquin of which white and red pine are a significant component.

Today, there are only two places, in fact, where good examples of the "old growth" white pine-hardwood association remain - at Dividing Lake just outside the Park's southwest boundary and in a nature reserve zone near the Crow River in the centre of Algonquin. (Trees of Algonquin Provincial Park, 2006). These stands are not immune to the dynamics of forest succession; many of these trees are now dying and are expected to be gone in the next few decades.

The most reliable measure of the historic forest condition in Algonquin Provincial Park can be obtained from an analysis of Ontario Crown Land Survey records. It should be noted that this analysis is but a 'snapshot' in time of the forest. Also, logging activity in the Park prior to these surveys had some influence on the forest composition at that time. The Ministry of Natural Resources conducted the analysis using surveyor's notes from the survey of 74 township boundaries between 1858-1893 and compared these records to the 2005 Forest Resources Inventory for Algonquin Provincial Park. The analysis was completed to establish trends in the abundance of significant species within the Algonquin Park Forest. The reported abundances of tree species have been aggregated as the original Ontario Crown Land Survey records commonly grouped families of trees together. For example using "Pine" to record occurrences of Red and White pine.

Analysis of the figures in Table 1 indicates that the "historic" forest is similar in tree species composition to the current forest; changes to forest composition have occurred to varying degrees and can be attributed to both human (logging, fire suppression, recreation, etc.) and natural (fire, wind, disease, climate, etc.) influences.

Table 1 Information from Historic Surveyor's Notes Compared to 2005 Forest Resource Inventory

Species	Ontario Crown Land Survey Composition	FRI Composition	Trend
Birch	15.8%	7.7%	Decrease
Cedar	3.8%	0.8%	Decrease
Hemlock	3.3%	4.3%	Minor increase
Larch	3.75%	0.06%	Sig. decrease
Maple	16.5%	42.3%	Sig. increase
Oak	0.2%	3.8%	Sig. increase
Pine	14.8%	13.3%	Minor decrease
Spruce	2.6%	4.1%	Increase

The above analysis of the historic forest, in conjunction with the natural benchmark trends and the desired forest and benefits information assisted the Planning Team in the setting of forest diversity objectives for this Forest Management Plan.

There is little information on the age class distribution of the historic forest in Algonquin Provincial Park. The first Europeans to set foot in the Park found a forest comprised of mainly large trees, but since forests are living, ever changing systems, these early comments provide just a "snap-shot" in time of what the forest looked like and cannot be used to set future targets.

2.2.2.2 Fire History

Prior to 1921 there wasn't an organized system of fire suppression or records. Some major fires prior to this time are mentioned in historical works, and surveyors' notes mention areas where fires occurred. From these sources, it appears that major fires occurred in 1851 (Bonnechere River watershed), 1863 (North Bay to Ottawa River), 1868 (Lake Travers), 1870 (Opeongo Lake area) and 1876 (Bonnechere and Petawawa watersheds).

In a 1977 study of fire history of Barron Township, L. C. Cwynar reviewed historical documents and used dendrochronological techniques to determine that fires in 1763, 1780, 1854, 1864, and 1875 burned at least half of the township. Increment borings indicated that most present day forest stands in Barron Township originated after the fire of 1875.

Cwynar found that lightning fires occurred at an average rate of 0.19 fires per year per 10,000 hectares. Most were small spot fires that soon burned themselves out. Major fires occurred about every 45 years. These fires would crown and burn about half of Barron Township. The fire rotation (stand replacing fires) for the 225-year pre-suppression period in Barron Township was about 70 years and the interval between all forest fires was 14.1 years.

In the past, lightning was the major cause of these fires. Major fire years also coincided with prolonged periods of summer drought. For example, 1875 was a period of severe drought throughout Southern Ontario.

Cwynar concludes that in Barron Township, "a combination of reduction in seed capacity of pine from selective logging and several severe fires within a short time (1854, 1864, 1875) has resulted in a greater proportion of intolerant hardwoods" in the present forest compared to the forest of the early 1800s.

If the history of Barron Township can be assumed to be representative of the townships on the east side of the unit, this study provides evidence that wildfire has had a significant influence on the development of today's forests.

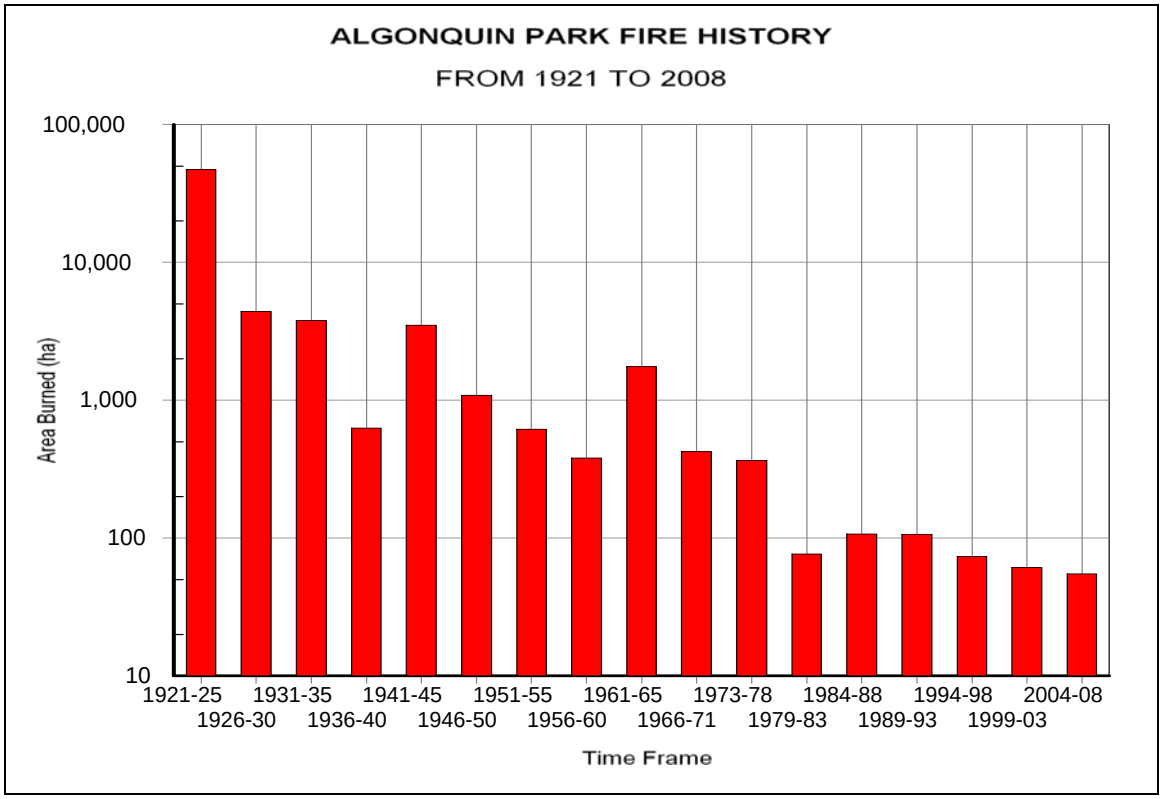
Fire records and organized suppression began in 1921 and from that point onward the records are more detailed. Between 1921 to 2003, the records show a total of 64,865 hectares burned. The large area burned over in the 1921-25 period was a result of fires in 1921, 1922 and 1923. The largest fire in recent times was a fire in 1964 in White Township which burned over 1,595 hectares.

Figure 2 illustrates the amount of area burned in five year increments for the period 1921 - 2008. The majority of large fires occurred in areas of pine and intolerant hardwood working groups.

The role of fire has decreased dramatically since organized fire suppression techniques were developed. In the period 2003-2008, the average area burned per year was 14 hectares and the average annual number of fires was 24 with an average size of 1.7 hectares each. Lightning is still a major cause of fire and results in the majority of area burned. Fires caused by recreational users account for the second largest area burned and the railway, the third largest area. (Note: Use of the rail line was discontinued in November, 1995) Recreational users cause the most fires, but these fires tend to be smaller in size.

At an average of 14 hectares per year, fire does not play a major role in the development of the forest as it did in the past.

Figure 2 Algonquin Park Fire History



2.2.2.3 Wind and Hail Damage

Severe wind storms occurred in isolated areas of the Park in 1964, 1972, 1973, 1983 and 1999 and 2006. The Portal Lake area in Bishop and Osler townships was the location of the 1964 storm which flattened an area sixteen kilometres long by four tenths of a kilometre wide. In 1972, a .4 kilometre wide strip stretching from Thomas Lake in Dickson Township to Foys Lake in Guthrie Township (32 kilometres) was flattened. An area of 20 square kilometres between Wilkes and Biggar lakes was affected in 1973. Part of the 1972 blowdown has been included in a nature reserve zone to provide an example of this phenomenon of nature. In 1983 high winds (referred to as a downburst storm) affected 8,200 hectares in Barron, Stratton and part of Guthrie Townships. In July of 1999 a severe windstorm affected approximately 6,154 hectares of forest on the east side of the park to varying degrees. Approximately 1,200 hectares of this affected area was classified as heavy blowdown and was essentially flattened. In July 2006 the Park was subjected to a windstorm which resulted in substantial blowdown in the northern, central and eastern areas of the unit. Approximately 5,471 hectares were affected by this wind event, with 4,358 hectares classified as heavy blowdown.
The area affected by these blowdowns has been accurately identified and classified in the 1978 and 1987 forest inventories and in the planning inventory for 2010.

Severe winds and hail in the summer of 1987 caused 95% defoliation in mixed forests (aspen, white and red pine) in a narrow strip 3 km wide and 45 km long in Algonquin Park and Pembroke District. Parts of Barron, Stratton and Master Townships were affected. Foliage

and small branches were smashed and broken off trees. Whole tree mortality to severe branch mortality resulted from this storm.

Localized blowdown in the Little Madawaska Lake and Clamshell Lake areas in June 1993 led to a minor amendment to the 1990-2010 FMP to allow salvage operations.

Thirty years of data on blowdowns in Algonquin Provincial Park, supports the contention that blowdowns are generally large; 1 percent of area in patches < 100 hectares, 17 percent of area in patches 100 to 1,000 ha, and 82 percent of the area in patches > 1,000 ha (OMNR unpublished data).

2.2.2.4 Insect and Disease History

The history of forest insect and disease occurrence for Algonquin Park is well documented in reports titled A Review of Insect and Disease Problems in Algonquin Provincial Park 1950-1979 and annual reports on Forest Insect and Disease Conditions in Ontario. These reports were prepared by the Forest Insect and Disease Survey Unit of Forestry Canada at Sault Ste. Marie, Ontario.

A summary of the more important occurrences follows:

2.2.2.4.1 Insects

- Eastern Spruce Budworm, Choristoneura fumiferana (Clem.)

The insect's principal hosts are balsam fir, white spruce and occasionally hemlock. Moderate to severe infestations were reported in 1970 in the south central portion of the Park near Opeongo Lake. It spread rapidly, missing only the western, predominantly tolerant hardwood portion of the Park. By 1974, balsam fir mortality in the townships of Bruton, Preston and Stratton reached as high as 90 percent. Salvage operations took place in Bruton Township and a limited spraying program to protect high value recreation areas was conducted in 1974 and 1976. Both aerial and ground spraying was conducted and in 1976 using Bacillus thuringiensis.

Defoliation of balsam fir began to decrease in 1976 followed by a peak in tree mortality in 1978 (Park average of 45%).

There was an infestation in 1982 in the central and eastern sections of the Park which peaked in 1983, but collapsed in 1984. The most recent infestation started in 1990 in Biggar Township (2,815 ha) and in 1992 covered an area of 26,900 hectares. It had expanded beyond Biggar to Devine and Osler Townships. In 1993 it covered 20,405 hectares, expanded to 57,505 ha in 1994 and dropped to 33,672 ha in 1995. Host trees balsam fir and white spruce, in some areas, experienced total loss of current years growth and in some cases extensive backfeeding on the older foliage. Intensity of defoliation was reduced in 1994 even though the insects range had expanded. Defoliation averaged 30-40% in most areas.

These infestations will have an impact on the availability of balsam fir and white spruce during the period of this plan.

In 2007, moderate to severe defoliation was reported on a total of 1,994 hectares. Areas affected were south of Gibson Lake in the townships of Biggar and Paxton, as well as a smaller area near Axton Lake in Paxton Township.

- Birch Skeletonizer, Bucculatrix canadensisella Cham.

This species attacks both white and yellow birch with outbreaks lasting an average of three to four years. The most serious attacks occurred in 1959 - 1962, 1970 - 1972, 1984 and 1990 - 1993. This most recent infestation caused moderate to severe defoliation (20 to 100%) to all age classes of white birch in an area stretching from Georgian Bay to the Ottawa River and encompassing the Park.

The defoliation caused by this insect occurs late in the growing season and is not as serious as it would be if it occurred earlier. It causes a reduction in effective leaf area and subsequent reductions in growth.

- Forest Tent Caterpillar, Malacosoma disstria Hbn.

It has caused heavy damage in outbreaks throughout Ontario. Stands within the park were severely defoliated in the early 1950s and 1960s. The former attack covered the eastern two thirds of the Park while the latter was contained mainly in the southeastern corner. The most recent infestation was in the northern and central areas during 1988 to 1989. In 1989 total area with moderate to severe infestation was 171,988 hectares and this was reduced to 330 ha in 1990 and zero hectares in 1991 to 1993. Populations were generally observed to be at a high level throughout southern Ontario in 2007. Caterpillars rarely kill trees outright, but are capable of weakening poplar, aspen and maple stands measurably. It is difficult to predict a recurrence with any accuracy.

- Saddled Prominent, Heterocampa guttivitta (Wik.)

The main hosts are beech, birch and sugar maple and severe attacks for more than two consecutive years can cause mortality. The only recorded infestation in Algonquin Park occurred from 1968 - 1970 and concentrated on the west side. There have not been any reports of a new epidemic since then.

- Greenstriped Mapleworm, Dryocampa rubicunda rubicunda (Fabr.)

The mapleworm defoliates both red and sugar maples. There have been periodic outbreaks recorded, the latest of which caused 10% mortality in townships bordering the northeast area of the Park in 1976, the year that particular infestation collapsed.

- Jack Pine Budworm, Choristoneura pinus Free.

This species of budworm feeds primarily on jack pine, red pine and white pine. Outbreaks last three to four years and can cause extensive mortality during that time. Its most severe onslaught took place in the eastern half of the Park from 1967 to 1969, during which time mortality figures of over 25 percent were suffered over roughly 4,000 hectares in White, Edgar and Niven townships in 1970. Much of the damaged timber was salvaged, and the area is today regenerating to natural jack pine and planted red pine.

An area of 465 ha northwest and southeast of Lake Travers had moderate to severe defoliation in 1992, which was reduced to 380 ha in 1993, expanded to 1,590 ha in 1994 and 6,312 ha sustained mostly severe defoliation in 1995.

In 2007, moderate to severe defoliation was reported on a total of 185 hectares. Areas affected were mainly in the vicinity of Lake Travers. Defoliation was occurring on young jack pine, with low levels of defoliation also occurring on surrounding red and white pine.

- White Pine Weevil, Pissodes strobi (Peck)

Infestations of varying intensities have been recorded in the Park in scattered locations. It is said to be the most damaging pest of the North American white pine. Weevils kill the terminal leader in young pines and spruce, forcing a lateral branch to take over, thus forming a definite crook in the bole. Spraying operations were undertaken in Sproule Township in 1960 to combat a particularly serious outbreak and in Clancy Township during 1968. It appears as though the weevil may emerge in force in any place at any time with young plantations being its primary target.

- Eastern Hemlock Looper, Lambdina fiscelleria (Gn.)

The primary host is mature hemlock, although the looper has been known to feed on balsam fir, white spruce and even deciduous species. The only infestation recorded is in 1992 on the east side of the park. Infestation was in balsam fir stands.

- Gypsy Moth, Lymantria dispar (L.)

The first positive results were from gypsy moth pheromone trapping in Bruton Township in 1985. Moderate to severe infestation first occurred on the east side of the Park in 1990 and increased in 1991 to 1,172 ha in Algonquin Park District and decreased to 591 ha in 1992. The population crashed in 1993 due to the cold winter of 1992 and zero hectares were recorded as infested up to 1998. This infestation was in red oak pockets and mortality is expected to be very minor.

Other insect species which have been responsible for a moderate degree of damage within the Park include:

- Bruce Spanworm, Operophtera bruceata (Hlst.)

Primary hosts are sugar maple, birch, aspen, oak.

- Tamarack Sawfly, Pristiphora erichsonii (Htg.)

Primary host is tamarack.

- Birch Sawfly, Arge pectoralis (Leach)

Primary host is white birch.

- Jack pine Sawfly, Neodiprion pratti banksianae (Roh)

Primary host is jack pine.

- Pine Spittlebug, Aphrophora parallela (Say)

Primary host is white pine.

- Aspen leafroller, Pseudexentera oregonana (Wlshm)

Primary host is trembling aspen.

- Red Pine sawfly, Neodiprion nanulus Schedl.

Primary host is red pine. Has caused damage to plantations along Highway 60 and in Bruton township.

2.2.2.4.2 Disease and Abiotic Damage

Damage has been caused by disease in both hardwood and softwood species. Most diseases are endemic and cause small but continuous losses due to progressive decay. Periodically, one disease may cause major losses over large areas for a particular species (ie., spruce budworm).

Spotty mortality occurred in widely scattered stands as a direct result of the extensive areas of drought damage in 1997. Mortality showed up on red oak and maple on hill tops in the southeast part of Algonquin Provincial Park and on hills north of Aylen and Round Lakes in Clancy, Guthrie and Master townships. No actual area figures can be given for drought damage because the damage was widespread and spotty. (Results of the Forest Health Monitoring in the Southern Region on Ontario in 1998)

Some of the more significant diseases which have affected the forest of today or are currently a concern are described.

- White Pine Blister Rust, Cronartium ribicola J. C. Fischer

This introduced disease attacks white pine of all ages. It was first reported in the Park in the early 1940s and is now present in pine areas throughout the Park. Blister rust slowly causes mortality in individuals and groups of infected trees while acting as a source of further infection.

This infection is transmitted via the ribes plant and the eradication of this plant is the most direct control of the disease. Attempts at ribes eradication were done in the late 1960's and early 1970's in the Kiosk area, but were abandoned as not being feasible on an operational

scale. The cutting of infected pine also helps to control the disease. Blister rust causes minor damage to the white pine stands in Algonquin Provincial Park.

- Birch Decline

This disease affected much of the birch in eastern Canada in the late 1940s and early 1950s. Damage was so extensive in the Park that efforts were made to salvage as much birch as possible. This is one of the reasons for heavy cuts of birch in the mid and late 1950s.

The symptoms of the problem are dead branches and twigs and progressive dying back from the top. There is no clear cause for the condition, but contributing factors include insect defoliation, maturity, site disturbance and poor bud development following heavy seed years.

- Maple Decline

This problem caused serious damage in areas adjacent to the Park such as Parry Sound, Bracebridge and Minden district in 1978 and 1979. It is potentially very serious for Algonquin Park because of the large area of maple working group. The symptoms are a general crown dieback and no specific causal organism has been identified. The cause is currently thought to be the cumulative effects of defoliation by forest tent caterpillar, drought, and stand disturbance.

In 1987 maple decline plots were located in Deacon Twp., on the north-central edge of the park, Peck Twp., in the southeast part of the park, and Murchison Twp., just southwest of the Park and were part of 55 plots established within the Central Region to monitor the health of sugar maple stands.

The plots show there has been an improvement in the cumulative dieback class since 1987. The average crown dieback in 1995 was Deacon - 10%, Peck - 11% and 13% for Murchison. Plots in Deacon and Peck Townships have improved slightly since 1993 while dieback percentage in Murchison has increased by 5 percent.

In 1989 Forestry Canada surveys found abiotic damage in the southern townships of the Park and adjacent to the west boundary. Premature foliar discolouration and leaf drop occurred on 104,400 ha and 511 ha displayed branch and/or whole tree mortality. A 1990 survey showed that the southern and north-western townships had abnormal foliage as a result of leaf scorch, premature leaf discolouration and dwarf foliage on 38,781 hectares. There was no area with moderate to severe dieback and tree mortality. Surveys in 1991 did not find any abiotic damage.

It is believed the cause is associated with the drought that was experienced in the late 1980s.

A pamphlet on the health of Ontario's hardwood forests from 1986-1998 was released in 1999 by the OMNR and the Ministry of Environment. The Ontario Hardwood Forest Health Survey reports on the health of 110 forest observation plots in southern and central Ontario. The survey showed:

- The mixed hardwood forests in Ontario are generally healthy.
- Short-term stresses were the main cause of changes in the health of Ontario hardwood forests.
- Hardwood trees growing in Ontario's southern regions are in better health than hardwood trees in the north.
- On acid-sensitive soils, tree health declined as the soil became more acidic and water-soluble aluminum increased.
- While most of the forest plots have improved (includes Algonquin Park), a few have declined.
- Only by surveying forest health over the long term will important changes be detected in the forest.

- Eutypella Canker of Sugar Maple, Eutypella parasitica Davidson and Lorenz

This fungus is common in many maple stands throughout the Park. It causes mortality in small stems and predisposes larger stems to breakage. Most trees infected with this disease are high risk and are normally marked for removal and harvested or felled during stand improvement operations.

- Tar Spot Needle Cast, Davisomycella ampla (Davis) Darker

Moderate levels of damage were reported in 2007, affecting sapling size jack pine in plantations in White township.

- Acid Rain

At present in the Park, there are two ongoing studies of the effect of acid rain on the forest. The first is part of the Acid Rain National Early Warning System (ARNEWS) established by the Canadian Forest Service in 1984 and the second study is by the Ministry of the Environment. No acid rain damage has been observed to date.

2.2.3 Planning Inventory

The Algonquin Park Planning Inventory was prepared using direction contained in the Forest Information Manual and Technical Specifications for Providing Planning Inventory Information. Details surrounding the data sources and the construction of the planning inventory are contained in the Analysis Package – Planning Inventory Checkpoint #1. The Forecast of Depletions layer was unioned with the Planning Inventory to create the Base Model Inventory (BMI) layer. The Base Model Inventory provides the information required for forest management planning, including forest modelling, habitat modelling, forest diversity analyses and operational planning.

Information to produce Tables FMP-1 and FMP- 2 (FMP Tables are presented in Section 9) came from the 2010 Base Model Inventory. Included in the Base Model Inventory was an update of all areas harvested from 2000 to 2005, natural depletion areas (2006 blowdown) and

the inclusion of results from the Authority's barren and scattered surveys. This inventory was electronically updated to the year 2010 using a Forecast Depletions layer in the Authority's Geographic Information System.

Table FMP-1 shows the summary of all land ownerships in the Park which includes 673 hectares of alienated land. Approximately 11 hectares of private land, in small parcels, contain privately owned cottage lots. The remaining 662 hectares are Canadian National Railway (CNR) lands used for its right-of-way and station grounds and area occupied by the hydro corridor running through the Park. Presently, CNR is going through the abandonment process for this line. When the Crown acquires this right-of-way, it will be added to Algonquin Park. (Algonquin Park Management Plan, 1998). The overall total park area has increased by 239 ha. from the 2005 FMP. This is due to the incorporation of the revised digital park boundary.

Parks in FMP-1 refers to nature reserves, natural environment, wilderness, historical, development and access zones. Forest management occurs in only the 'managed' area in FMP-1 which is the recreation/utilization zone. Figure 3 illustrates the information provided in FMP-1. The recreation/utilization zone comprises approximately 71% of the total Park area. Further areas are withdrawn from harvesting such as non-productive forest, protection forest and reserves around lakes, rivers, portages, etc. The net result is that 55% of the total Park area is available for harvesting on a periodic basis.

Figure 3 Algonquin Park Total Area Summary

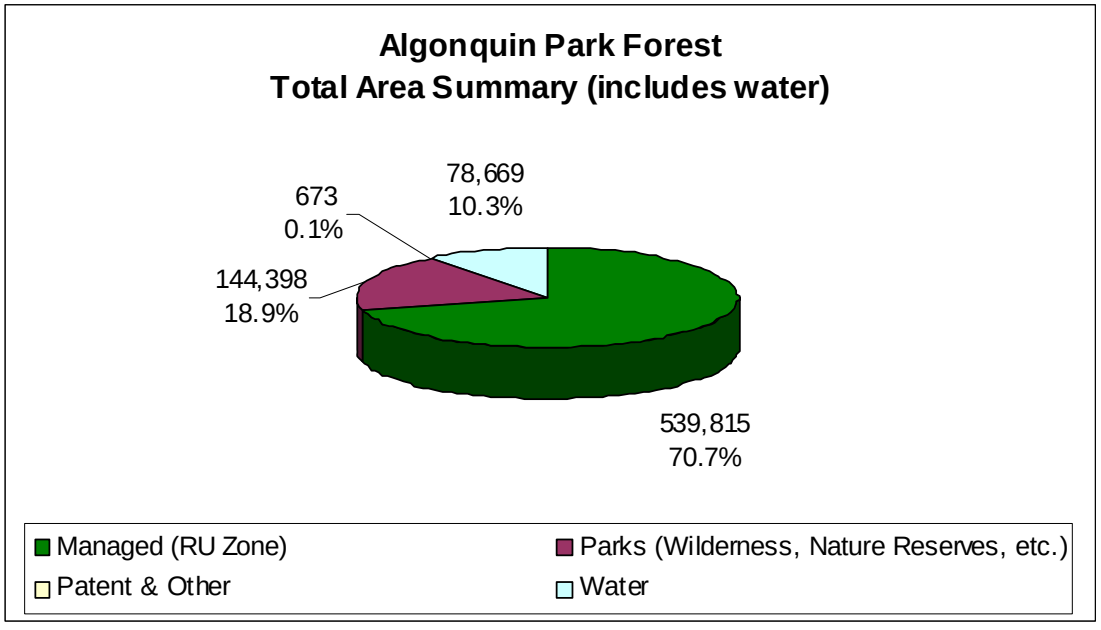


Figure 4 illustrates the land area summary for the managed forest in Algonquin Park (i.e. the RU zone). This area consists of 89% production forest, 9% non-productive forest, 1.4% protection forest and 0.6% non-forested land.

Figure 5 illustrates the land area summary for the "Parks" component of table FMP-1. This area consists of the non-RU zone area of the Algonquin Park (i.e.wilderness, nature reserve, natural environment, historical zones etc). Forest management is not permitted in this area of the Park. This area consists of 88% "production" forest, 10% non-productive forest, 1.9% protection forest and 0.2% non-forested land.

Figure 4 Managed Forest Land Area Summary

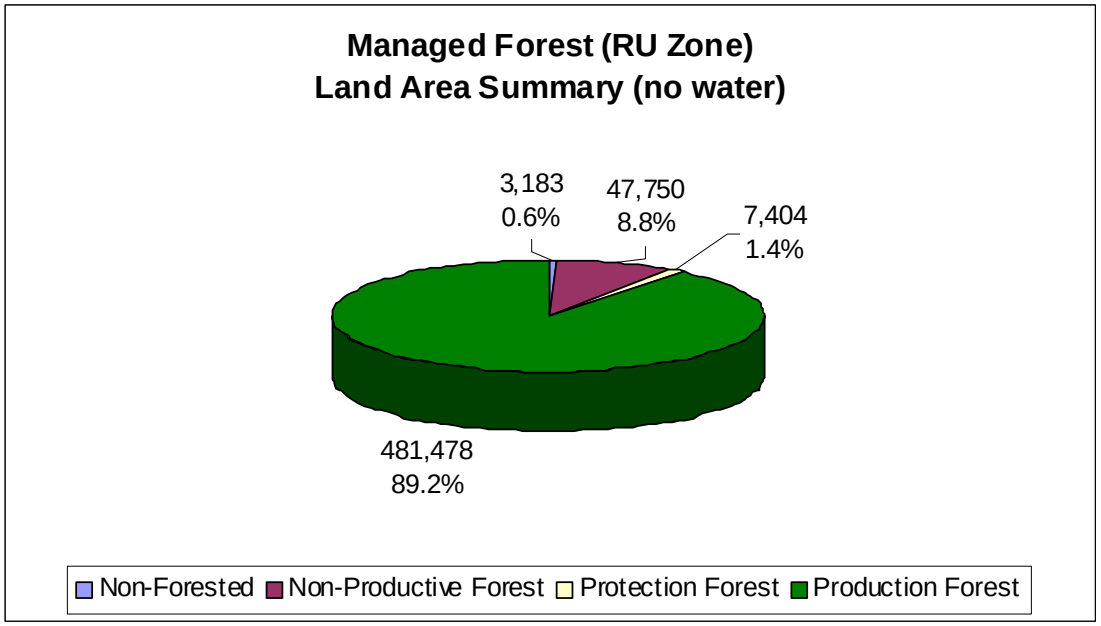
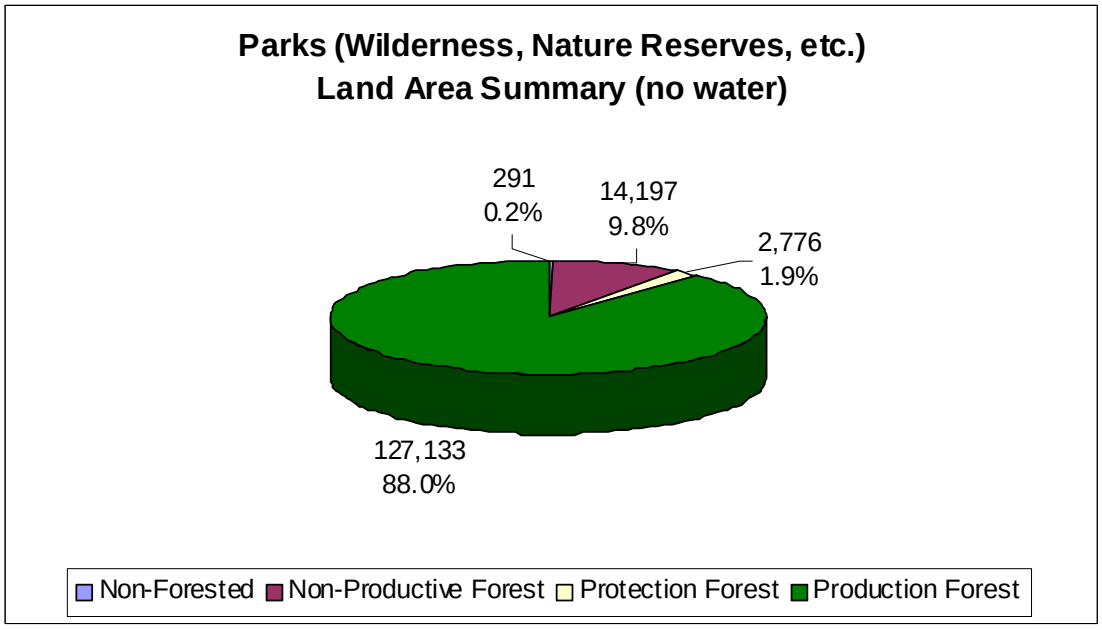


Figure 5 Parks Land Area Summary



A summary of Crown productive forest by provincial forest type is displayed in table FMP-2. Forest units have been organized into provincial forest types as identified in table FMP-3 Description of Forest Units.

Table FMP-2 summarizes the number of hectares of each provincial forest type by age class for the production and protection forest. Three separate tables illustrate composition of the Crown managed, Crown other and total Crown forest.

Table 2 shows how the provincial forest types were designated to each of the forest units and Figure 6 illustrates how the forest is structured into the different provincial forest types. Figure 7 illustrates the ageclass structure of the current forest condition by provincial forest type.

Table 2 Forest Unit to Provincial Forest Type Summary

Forest Unit	Provincial Forest Type	Area (ha)
HDSEL	Tolerant Hardwoods	216,259
HDUS	Tolerant Hardwoods	67,512
HeSEL	Mixed Conifer Upland	40,001
INTCC	Poplar	50,641
LCUS	Mixed Conifer Lowland	7,264
MWUS	Mixedwoods	57,059
OrUS	Tolerant Hardwoods	16,409
PjCC	Jack Pine	3,803
PrCC	Red and White Pine	8,259
PwUS	Red and White Pine	94,926
SbCC	Mixed Conifer Lowland	8,712
SFUS	Mixed Conifer Upland	47,946

Figure 6 Provincial Forest Type Total Area Summary

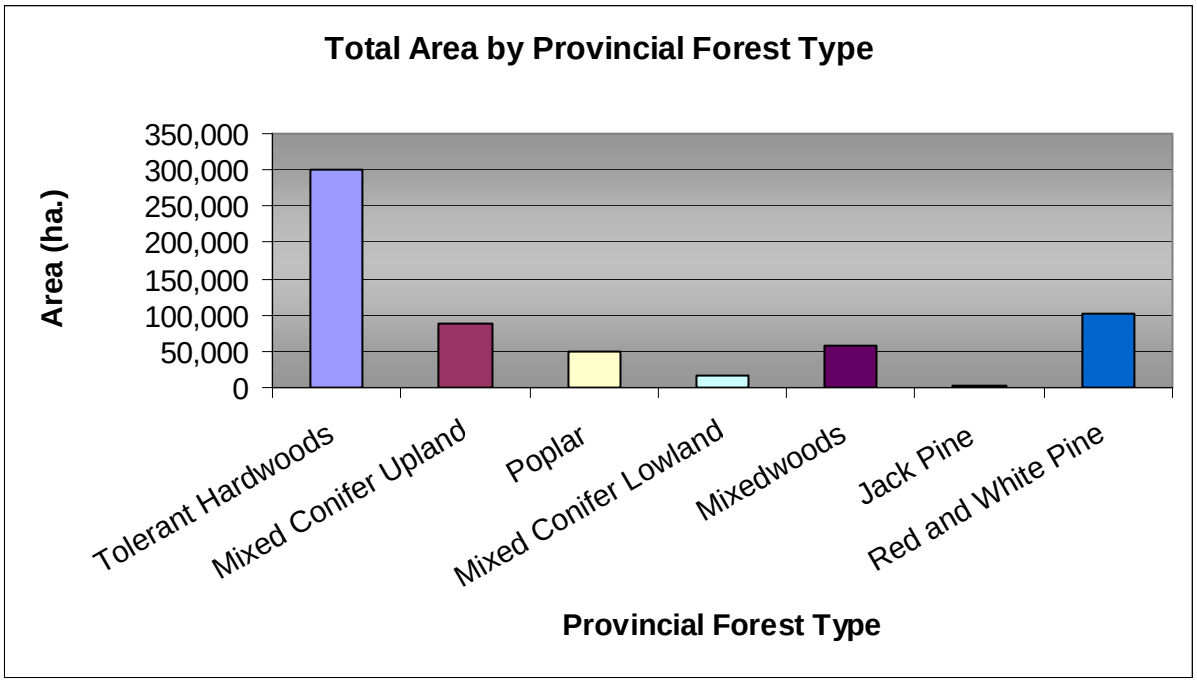


Figure 7 Ageclass Distribution of the Current Forest Condition by Provincial Forest Type

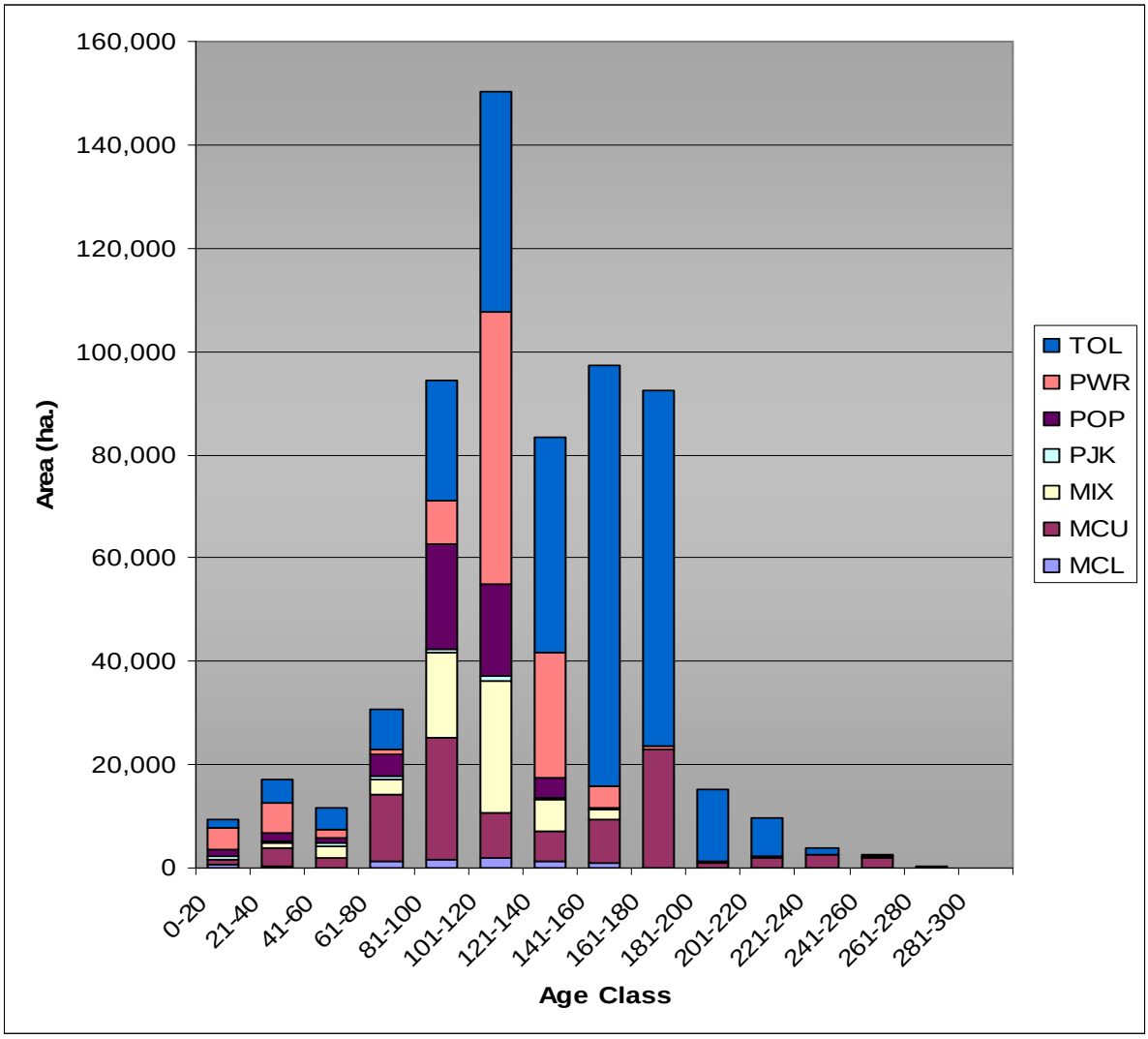


Figure 7 depicts a lack of younger age classes, especially 60 years of age and less. Heavy cutting prior to the turn of the century has caused this skewed age class structure. Future forest inventories will also show a lack of younger age classes (40 years and less) due to the use of the uniform shelterwood system. In these instances, the new forest is developing under the canopy of the original forest and the age of this new forest will not be depicted in the forest inventory until the original forest canopy is harvested (i.e. final removal cut). Figure 7 also depicts a significant amount of area beyond 120 year of age, which assists in meeting old growth objectives and targets.

The major management implications of the current forest condition are illustrated in Section 3.6, Forest Diversity Objectives, where objectives and strategies are provided to attempt to move the forest toward a forest composition more similar to that at a time before fire suppression and before logging, referred to as the natural benchmark condition.

The FRI will reach 20 years of age during the implementation of this FMP since the last major update was delivered by MNR to AFA 1993. FRI updates for recently depleted areas have been occurring with the development of each FMP. Provincially, MNR has reclaimed some of its responsibilities relative to forest inventory and has set funds aside with the Forestry Futures Trust. Photo acquisition is currently ongoing by MNR so that interpretation can take place and the inventory updated before the end of implementation of this plan.

2.2.4 Fish and Wildlife Resources

2.2.4.1 Fisheries

Protection of headwater areas was one of the reasons Algonquin Park was created over a century ago. Containing the headwaters of 5 major river systems and over 2400 lakes, Algonquin Park has served this purpose well for over a hundred years.

Algonquin contains the single largest complex of natural brook trout lakes in the world, and contains hundreds of naturally sustaining lake trout lakes as well. Furthermore, the quality of these fisheries attracts tens of thousands of people to the park every year, generating tourism dollars for neighbouring communities and providing a high quality angling experience. In addition to these game fish, other fish including Lake Whitefish and Cisco occur in the Park in forms and densities that reflect the protected status of these lakes. The many variations recently found in Algonquin Park lake food webs represent true diversity in how lake food webs are structured. The protection role afforded by Algonquin Park is essential for ensuring the persistence of these food webs through time. It is for these reasons, also, that Algonquin Park is vitally important for research opportunities and as a 'control' for exploited aquatic ecosystems elsewhere.

Most of the lentic, or lake dwelling, Brook Trout in Algonquin Park are genetically unique to the park, having evolved in isolation from other Brook Trout populations over thousands of years. For this reason, Brook trout are also addressed in section 2.2.4.4, Species At Risk and locally, regionally and provincially significant species.

Several aquatic species at risk inhabit the Park; these species are addressed in the Species At Risk Section of the Forest Management Plan.

These aquatic ecosystems have remained relatively intact and in high quality because of one main reason: restricted (ie. difficult) access has ensured low exploitation and a ban on the possession/use of live baitfish has thwarted the widespread introduction of alien or exotic species.

As a result of this restricted access and protection, Algonquin Park is home to many unique and rare aquatic food webs. In some watersheds glacial relict species like Mysis relicta (opossum shrimp) help support equally unique fish communities including some forms of species found no where else. The patterns of fish communities found across Algonquin Park

reflect the post-glacial drainage patterns of the Great Lakes that are now retained with the park boundaries and lost outside of these boundaries.

Logging appears to have little direct impact on fish communities or their habitat. A minimum 30 metre set back from all waterways within the park ensures a relatively intact riparian area around aquatic features to buffer any negative consequences of logging.

However, economical forest management must also involve a transportation system, and this road system involves water crossings – where a bridge or culvert must be installed in/over a creek/river in order to facilitate road building and wood movement. Roads directly and indirectly impact aquatic ecosystems and their habitat – those impacts have been addressed through a suite of measures described herein.

Concern for aquatic resources as a result of forest roads can be divided into four topics: sedimentation, hydrology, exploitation and invasive species.

Sedimentation

All road building and maintenance leads to release of sediment into the environment. This is of particular concern around water bodies, where a release of sediment or aggregate can have serious consequences for aquatic life and the productivity of an aquatic ecosystem.

Work in water in Algonquin Park is generally prohibited between Oct.1 and June 1st to protect this important stage in the reproductive history of trout. Exceptions to this rule are made only if all impacts to fish communities can be effectively mitigated.

Forest Management in Algonquin Park has moved largely to the use of portable bridges for crossing water bodies. This best practice ensures minimum disruption to aquatic resources, and, even better, leaves the stream channel largely untouched. As installation of a portable bridge does not necessarily involve work-in-water, they also provide greater flexibility with working around water timing windows.

Each water crossing is screened for risk by Park staff prior to installation; this includes review of park values, species at risk and fish habitat.

Installation (and decommissioning) of water crossings are overseen by staff from the Algonquin Forestry Authority, who ensure adequate sedimentation and erosion control measures are in place, and ensure the decommissioning of the water crossing does not pose a future risk to the ecosystem.

Water crossings are inspected by both industry and park staff regularly, and workshops are held to ensure best practices are being upheld. Furthermore, as old water crossings are revisited throughout the forest management planning cycle, old culverts or inadequate crossings are upgraded and replaced to current standards.

Hydrology

Roads, water crossings and aggregate pits can also impact the hydrology, or flow of water, both above and below ground. This can be of particular concern around critical fish habitat such as brook trout nursery creeks, or around naturally sustaining brook trout lakes, which are dependent upon groundwater upwellings for reproduction.

All known naturally sustaining brook trout lakes are evaluated to establish the presence or absence of brook trout nursery creeks. Furthermore, road placement in these areas undergoes very high scrutiny by park staff for other reasons described in the exploitation section. No new aggregate pits are allowed within the hydrologically sensitive portion of the Brook Trout lakes AOC.

In addition, aggregate pits are not permitted to extend within 1.5 metres of groundwater anywhere in the park. This protects the flow of groundwater to lakes, streams and other aquatic features. However, groundwater levels can fluctuate throughout the year and pits are often used for only short durations of time. Thus there is risk that groundwater can be impacted by aggregate extraction. Furthermore, the removal of vegetation can actually redirect surface water into groundwater.

The risk of impacting groundwater dependent ecosystems is further minimized through the placement of aggregate pits in areas where groundwater concerns are minimal. Through analysis utilising the most current scientific modelling available, important groundwater recharge and discharge areas in Algonquin Park have been mapped. This mapping, in conjunction with operational direction from the Regional Hydro-geologist, will be used to assess groundwater concerns prior to approval. Groundwater protection and research will continue to be reviewed regularly.

Exploitation

Algonquin Park fisheries have remained healthy and intact in part because exploitation levels have been low. Recent research using state of the art Hydroacoustic technology indicates that most interior lakes have high densities of trout, especially compared to similar lakes outside the Park. This difference is due to the fact that Park lakes receive low fishing pressure because of the difficulty in accessing these lakes, and because anglers who do access these lakes practice high rates of catch and release fishing.

Trout lakes are known for having low productivity and recruitment – some small brook trout lakes have populations of adult fish that number less than 100. Thus, trout lakes are extremely vulnerable to over-exploitation. This has not happened in interior trout lakes because the majority of park users cannot use the road system to access these lakes and easily remove large numbers of trout.

However – lakes with roads near them do get exploited, often heavily and unsustainably. There are numerous examples of this in Algonquin Park on the highway 60 corridor where special ‘slot limits’ protecting breeding trout have been established in order to keep the trout population viable.

In order to protect sensitive brook trout lakes, no new roads are built within 500 metres of the lake unless approved by Ontario Parks. Furthermore, where possible, timber harvest in particularly sensitive areas is timed to occur outside of the late winter when exploitation rates are highest.

Invasive Species

It is the professional opinion of most researchers and fisheries scientists that invasive aquatic species are the single greatest threat to the ecological integrity of Algonquin Park lakes. The creation of roads in proximity to trout lakes can lead to increased use of the lake and increase the risk of alien fish introduction through the use of live baitfish. In general, most anglers will not carry live baitfish for long distances in a canoe. However, the interior logging road system is used to access park lakes frequently, especially in winter. On average, over 50% of winter anglers checked by Conservation Officers are in possession of live baitfish. Virtually all of the winter access to Park lakes is via the forest access road system. Bait bucket introductions have already led to the introduction of several alien fish species into Algonquin Park including Rainbow Smelt, Ninespine stickleback, Hornyhead chub and Rusty Crayfish. Recent Hydroacoustic surveys of lakes outside of Algonquin Park have brought into sharper focus the effects of rainbow smelt on lake food webs and the loss of native fish production.

Preventing the further infiltration of invasive species into Algonquin Park waters has been addressed in several ways. First the ongoing prohibition on the use and possession of live baitfish should slow the spread of alien and exotic species, however, compliance with this rule is low despite decades of education (less than 50% of winter users).

Furthermore, fishing is prohibited at all dams throughout the park to prevent anglers moving alien fish species past these barriers. On numerous occasions this has already happened, and has led to the permanent degradation of several high quality trout lakes, such as Booth, Rock, Whitefish, Lake of Two Rivers and Sasajewan. Alien fish species to the majority of Algonquin Park include Northern Pike, Rock Bass, Largemouth Bass, Walleye and Smallmouth Bass.

Access control is currently the most effective method for preventing further degradation of aquatic ecosystems. No new roads are allowed within 500 metres of a natural brook trout lake unless approved by Ontario Parks, and, where feasible, forestry operations in particularly sensitive areas of the Park are timed to be completed by early winter so that roads are not kept ploughed and accessible all winter long. This, with the further direction to reduce overall road density within 500 metres of natural Brook Trout lakes, is the most effective means of preventing further spread of alien and invasive species into Park lakes.

2.2.4.2 Wildlife

A listing of the species of mammals, birds, amphibians and reptiles and rare species in Algonquin Park can be found in Appendix 6.2.8.

The 2010 Forest Management Plan has used the latest approved models, the Strategic Forest Management Model (SFMM) and the Ontario Wildlife Habitat Assessment Model (OWHAM). This represents the best science available at the time of plan preparation. The species modelled are used to represent a range of habitats, and by modelling several species with different habitat needs, and ensuring habitat levels that emulate the natural benchmark trends, the FMP provides for the habitat needs all wildlife species in the Algonquin Park Forest.

Black Bear, Makwa, *Ursus americanus*

The Black Bear is an iconic species within Algonquin Park that plays a vital part in the Park ecosystem. Containing the largest unhunted bear population in Southern Ontario, Algonquin Park plays an essential role in enhancing our understanding of predator/prey interactions and bear ecology. Currently, several research projects on black bears are underway in Algonquin Park under the supervision of Dr. Martyn Obbard, the Ministry of Natural Resources bear specialist. Black Bear research in Algonquin has attracted national media attention, including television programs such as The Rick Mercer Report, CBC's The National, and The Hour, as well as radio coverage.

Bears are considered a sacred animal by many aboriginal groups.

Black bears can be found throughout much of North America, from the Boreal Forest to the Florida Everglades and from the Rocky Mountains to Mexico. This range is a testament to the resilience and adaptability of Black Bears. Despite this adaptability, bears have low reproductive success compared to other large mammals like moose or deer. Thus black bears can be very susceptible to human influences such as hunting and habitat loss.

Plant matter makes up the bulk of a bears' diet; however they are omnivorous and will also feed on insects, salamanders, fish, carrion and occasionally mammals such as moose calves. With half a year spent hibernating, a black bear has less than 6 months to reproduce, feed and put on enough fat to survive the long Algonquin winter. Bears are thus physiologically driven to find adequate food sources during the spring, summer and fall months. The loss of a food source due to drought or human influence can drive bears into conflict with humans, especially if there are open attractants such as garbage.

Important spring food sources include grasses, sedges, and the buds and leaves of aspen, along with spawning suckers and the occasional moose calf. Later in spring and into the summer berries such as pin cherries, blueberries and raspberries and hazelnuts are important food sources. In the fall tree nuts such as acorns and beech nuts are particularly important for black bears in their efforts to gain weight for the winter.

Black bears den under stumps, fallen trees, inside hollow trees or in crevices/caves. Field work examining black bear dens in Algonquin Park would suggest that forest management activities do not adversely impact a black bear's ability to find suitable hibernation sites.

Black bear habitat for Algonquin Park during the 2010 FMP is analyzed through the Strategic Forest Management Model (SFMM) in two ways; 1) summer habitat and 2) foraging habitat, representing both early successional areas that produce berries, and mast producing beech and oaks respectively. For fall forage, SFMM predicts that the amount of fall forage available will be slightly below natural benchmark levels. Silvicultural effectiveness monitoring will be used to confirm effective regeneration of mast producing species such as beech and oak.

According to this model, under current forest management direction there will be a dramatic decline in suitable bear summer habitat. This is reflected because Black Bear summer habitat is best created through large disturbances such as wildfire or clear cuts. Neither event is common on the Algonquin landscape because most wildfires are suppressed (usually before getting larger than one hectare in size), and partial cutting systems are most commonly used which result in a forested condition immediately after the cut, not a pre-sapling condition which is preferred black bear summer habitat in the SFMM model. While clear cutting does occur in Algonquin (in appropriate forest types), it is generally less than .05% of the entire park in any given year.

Recent research suggests that black bear densities in Algonquin Park range from 20 to 50 bears per 100km2, well within the averages for Ontario. This means Algonquin Park probably has a population of over 2,500 resident black bears.

The declining preferred habitat trend in SFMM is directly linked to the projected declines in the presapling forest condition (preferred black bear summer habitat). The modelling of the MWUS and SFUS forest units as uniform shelterwood limits the ability of the model to create this habitat condition. These forest units do contain preferred BLBE habitat, however this is not being created in the model because following the final removal cut, a sapling condition is created. The group shelterwood approach for intolerant tree species within these forest units will increase the presapling habitat on the forest, benefiting black bear foraging and result in movement towards the desirable levels of this pre-sapling habitat condition.

It is also likely that certain other aspects of forest management create some summer berry crops that are not accounted for in SFMM. For example, when disturbances such as roads, landings, skid trails and aggregate pits start to regenerate they are often colonized by raspberries and blueberries.

It is hoped that the introduction of fire to the non-managed forests of Algonquin Park (the wilderness and nature reserve zones) through the Fire Management Plan will provide additional early successional habitat for bears. Fire has also been identified as a potential silvicultural tool in the silvicultural ground rules (FMP-5).

Moose, Monz, *Alces alces,*

Moose are the most sought out species for tourists visiting Algonquin Park. Often weighing over 600kg, these large herbivores are particularly easy to see in Algonquin because a) the park has a high density of moose and b) half the population of moose is unhunted, and has little fear of humans.

Moose are also particularly important to local Algonquin communities, who have sustainably harvested moose on the Park's east side for almost 20 years.

Moose feed on up to 35kg of vegetation per day, consuming twigs, buds, leaves, and aquatic plants. Habitat requirements include a combination of younger forest with browse, winter conifer cover and aquatic feeding areas. Aquatic feeding areas are fairly common in the parks west side and less so on the east.

Algonquin Park's moose population has fluctuated between 2,000 and 4,500 animals over the last 25 years. The latest population survey in 2009 revealed a healthy moose population of approximately 3,250 animals. This is among the highest moose densities in Ontario.

Forest management undoubtedly creates forage and browse for moose. This is reflected both in the SFMM modelling for moose foraging areas as well as on the ground. Moose surveys in recently harvested areas of Algonquin often yield high numbers of moose. The SFMM modelling for moose forage indicates substantially higher levels of forage with forest management when compared to the natural benchmark run.

Conifer cover, which is particularly important for moose in the winter, is maintained within 75% of the natural benchmark. SFMM analysis does show a 5,000 hectare decrease in winter habitat over the next 30 years; however this is within the accepted bounds of sustainability. Analysis of the Algonquin landscape using the Ontario Wildlife Habitat Assessment Model (OWHAM), a spatial analysis of suitable habitat types, indicates high levels of suitable habitat for moose throughout the park. According to OWHAM, even the poorer areas of Algonquin Park can still support healthy and robust moose densities.

Forest management can also lead to greater exploitation and higher success rates during the hunting season by opening up previously inaccessible areas to vehicular traffic. Moose in hunted areas often avoid linear features such as roads – thus road density is often negatively associated with the health of the moose herd.

Forest management practices in Algonquin include the decommissioning of water crossings once forest management is finished. Thus the total 'driveable' area within the park should remain relatively static over time – with some areas opening up while others become inaccessible.

Moose management in Algonquin includes population surveys, hair-loss surveys, computer modelling of habitat, active research, and co-management meetings with the Algonquin Nation. Several additional moose features are mapped and protected on the landscape, these include mineral licks, aquatic feeding areas and calving sites.

White Tailed Deer, Wawashkeshee, *Odocoiles virginianus*

The White-tailed Deer is not a featured species in this Forest Management Plan, despite their fairly common presence on the Algonquin landscape during the summer. There are several reasons for this change in direction.

Deer are present in Ontario in current numbers largely as a result of human alteration of the landscape and predator control. Historically they were not a major component of the Algonquin Park ecosystem until widespread logging, fire and predator control allowed their population to expand. The Algonquin Park deer population crashed in the late 1970's, when severe winters and logging of yarding areas in the 1940's and 50's made them vulnerable to the elements and predators. The reduction in deer numbers coincided with the rise of the moose population, which is presumed to have been low because of high transmission rates of lethal parasites from deer to moose. These parasites include the Meningeal brainworm *Paralaphostrongylus tenuis*, which is harmless to White-tailed Deer, but fatal to Moose.

Historically, Moose would have been the major Cervid on the Algonquin landscape –thus the park is more 'natural' in its wildlife composition now then it was throughout most of the 20th century. Maintaining this composition is desirable for several reasons. Having a healthy ecosystem with moose is more in keeping with the mandate of Ontario Parks to maintain ecological integrity. Also, one of the objectives of forest management in Algonquin is to manage the forest to a natural forest condition. Creating additional or better deer habitat is not compatible with either objective.

One of the recommendations put forth by the Algonquin Wolf Advisory Group was that forest management in Algonquin include provisions to create more habitat for White-tailed Deer (and Beaver). This was based off the premise that Algonquin Park wolves were reliant on deer and to a lesser extent beaver for food. However, current research suggests the Park's wolf population is not solely reliant upon White-tailed deer for food and are capable of feeding on moose as well.

Efforts to create browse and deer yards over the last decade have been unsuccessful – most White-tailed Deer leave Algonquin Park in early winter to travel to deer yards in neighbouring areas with less snow. As this is a learned behaviour, it is unlikely deer will change even if suitable habitat is created in the park.

Despite this change in management philosophy, any deer yards encountered within the Park forest will receive appropriate management and protection as per 'Guidelines for the provision of White tailed deer Habitat' in Ontario. To date, no active deer yards are known within Algonquin Park.

This topic will no doubt continue to be visited in future discussions around forest management in Algonquin Park, as it should. Climate change, disease, changing social values and aboriginal needs may cause future forest managers to change their philosophy on White-tailed Deer yet again.

Eastern Wolf, Mahigan, *Canis lycaon***,**
Refer to the Species At Risk Section

Barred Owl, *Gookookoo'oo*, *Strix varia,*

The call of the Barred Owl is a common sound of the Algonquin. These nocturnal raptors prefer mature hardwood forests, especially hemlock/yellow birch/maple ecotypes. Barred Owls are strongly associated with mature or old growth forests, especially those without large openings in the canopy. It nests in cavities in old or dead large hardwoods. Despite this affinity for hardwood forests it has also been observed to use old growth Pine and mixed conifer forests. This is an ideal indicator species of what we consider the original forests of Algonquin Park to have been prior to human alteration. Given its preference for northern hardwood forests, it is not surprising that there is over 250,000 hectares of suitable habitat for this species in Algonquin. SFMM modeling for this species indicates that forest management maintains habitat well within the bounds of sustainability into the future. The creation of gaps and reducing the age of forest stands through logging may decrease the suitability of some forest types.

Blackburnian Warbler, *Dendroica fusca,*

The Blackburnian Warbler is an upper canopy dweller that prefers mature conifer forests. Like all warblers, this beautiful insectivore is migratory, spending part of its year in warmer climes and returning to Algonquin to breed and raise young. In Algonquin there is a clear affinity for mature hemlock, including individual trees within hardwood forests stands. This species likely suffered historically from the widespread reduction in hemlock in Algonquin's west side forests. This species is often used as an indicator species for the condition of conifer components in hardwood forests. Forest management in the eastern side of Algonquin, which includes uniform shelterwood to favour conifer growth, will likely benefit this species. In fact, SFMM modelling for this species shows longer term increase in preferred habitat for this species.

Black-backed Woodpecker, Papase, *Picoides arcticus,*

Black-backed woodpeckers prefer mature and old growth conifer and mixed wood forests as well as recently burned forests. It forages frequently on stumps and downed wood and is often seem flaking off pieces of bark as it searches for wood-boring insects and their eggs and larvae. Because of the abundance of wood-boring insects in trees left standing after a fire, this species is often abundant after a forest fire in older forests. It is also found in recently logged forests where a considerable amount of downed wood is left in the forest. The Black-backed woodpecker is considered uncommon in the Algonquin Forest, but can be regularly found throughout the Park. It is associated predominantly in the Boreal forest of Ontario, and is frequently sought after by birdwatchers who come to Algonquin seeking some of the southernmost populations of boreal species.

Bay-breasted Warbler, *Dendroica castenea*

The Bay-breasted Warbler is an uncommon species in Algonquin Park, mainly observed as it passes through the Park during its spring migration in late May and again during its fall migration between late August and early September. The exception to this is when there are outbreaks of Spruce Budworm (*Choristoneura fumiferana*), a caterpillar which sometime builds to dense numbers, consuming the needles of Spruce and Balsam fir and sometimes killing them in the process. Bay Breasted Warblers take advantage of these outbreaks, nesting and feeding young with this abundant food source. These cyclical infestations are important for Bay Breasted Warblers, as well as other species such as the Cape May Warbler.

The Bay-breasted Warbler is on the Audubon Watch list, with threats including large scale clear-cutting of the Boreal Forest and use of pesticides to control Spruce Budworm outbreaks. Neither factors is significant in Algonquin Park. Clear-cutting is limited to less than .04% of the Park in any given year, and limited to tree species like Jack Pine that won't regenerate through other means of cutting.

Spruce Budworm outbreaks are entirely natural events, and are an important ecological process that maintains the ecological integrity of the Park. It is highly unlikely that use of pesticides to control an outbreak of a native insect would be considered as a tool for forest management in Algonquin Park.

Non spatial modelling using SFMM shows that habitat for Bay-breasted Warbler is maintained well above the natural benchmark for the future in Algonquin Park, ensuring that forest management in the Park does not impact the survival of this species.

Boreal Chickadee, Wewebigwangis, *Parus hudsonicus*

The Boreal Chickadee is an uncommon species in Algonquin, being at the southern edge of its range. For this reason it is a frequently sought after species by birdwatchers. Most records of Boreal Chickadees are from the western side of Algonquin Park, where they prefer mature Black Spruce forests often associated with bogs. As such, Boreal Chickadee is a good indicator for this forest type. SFMM analysis shows that the habitat for this species remains slightly above natural benchmark levels over the next several terms.

Broad -winged Hawk *Buteo platypterus*

Broad-winged Hawks are one of the most common raptor species found in Algonquin. This smaller sized hawk can often be found near opening such as beaver meadows where it feeds on frogs, snakes and mice using the 'hover and pounce' technique common to buteos. The nests of this migratory species are also one of the most commonly encountered stick nests by 'tree markers' who subsequently mark the area to protect the nest from forest management.

Broad-winged Hawks prefer mixed and deciduous forests with large trees near gaps or openings such as beaver meadows and wetlands. SFMM analysis shows that there is a decrease in available habitat for Broad-winged hawks into future terms; however, the available habitat remains well above the 75% of the natural benchmark level chosen by the planning team to represent the minimum desirable level.

Canada Lynx, *Lynx canadensis*

Lynx are exceedingly rare in Algonquin Park – in fact – to date no one has ever taken a picture of a Lynx within Algonquin and observations are limited to under a dozen anecdotal reports. However, Lynx denning site habitat is an important indicator of old growth conifer, and many other species rely on this forest stage as well. Thus, while the Canada Lynx would be considered a rarity in Algonquin Park, it is not likely because habitat is limiting. SFMM analysis shows that there are over 40,000 hectares of suitable denning habitat for Canada Lynx at present, and this will double in the next 40 years, albeit slightly lower then the natural benchmark. The lack of cyclical fluctuations in prey species such as the snowshoe hare are more likely to prevent Lynx numbers building to easily detectible numbers in Algonquin Park.

Hermit Thrush, *Catharus guttatus*

Hermit thrushes breed in the interior of both wet and dry mixed and coniferous forest and are considered an area sensitive species. In Algonquin they are encountered more on the drier, higher sites often associated with a pine component. They favour forest edges such as along the margins of ponds or beaver meadows or edges associated with disturbances such as logging, roads or utility lines. It feeds on insects and other arthropods as well as snails, earthworms, and fruits, and forages on ground by watching for movement, and by digging in leaf litter. Its nest is a bulky cup of grasses, leaves, mosses, twigs, rootlets, hair, mud, and lichens, and is placed on ground, or low in small trees.

The hermit thrush is common in Algonquin Park, migrating back from its wintering grounds around April 20th and departing the park around October 20th.

Analysis through SFMM suggests that acceptable Hermit Thrush habitat will not only be maintained, but increased well above natural benchmark levels through forest management over the next several terms.

American Marten, Wàbichèsè, *Martes americana*

The American Marten is one of the most commonly encountered weasels in Algonquin, thriving in the deep snow conditions that are more difficult for its larger cousin, the fisher. Algonquin Park Marten were in fact the source of several marten transfers to the state of Michigan in an effort to re-establish populations in that state.

In the boreal forest, this species requires large patches of old growth conifer. However, research in Algonquin Park has shown that marten in the GLSL forest type are more influenced by forest structure rather than forest age. This includes a preference for abundant downed woody debris in which it hunts for its preferred prey of small mammals like mice, voles and snowshoe hares. Cavity trees are important to this species for denning and resting. Modelling for this species has been adjusted accordingly to better reflect their habitat preferences in the Great Lakes St. Lawrence forest.

SFMM modelling for this species shows that suitable habitat in Algonquin Park is retained above the 75% minimum, but below the natural benchmark levels.

This species is also important economically in areas of the park where trapping is permitted.

Northern Flying Squirrel, Shagashkandawesi, *Glaucomys sabrinus*

The Northern Flying Squirrel is the most common species of flying squirrel found in Algonquin Park. However, southern flying squirrels expand their range after mild winters, and, if there are several mild winters in a row, southern flying squirrels can invade and even displace northern flying squirrels in Algonquin Park. Their range will retract after a harsh winter. These two species have been found to hybridize.

Northern Flying squirrels feed primarily on seeds, nuts and especially fungi. Cavity trees are important for this species, and the presence of woodpeckers such as the Yellow-bellied Sapsucker may be particularly important, as abandoned woodpecker holes are used frequently for denning.

Northern Flying Squirrels prefer mature to old forest and will find suitable habitat in a variety of mixed wood forest types with a solid conifer component. In the park's hardwoods, it has a particular affinity for Hemlock-Sugar Maple-Yellow Birch associations and may have been impacted by the historic loss of hemlock through logging in the 1940's and 50's. Ongoing research into flying squirrel ecology of Algonquin Park is being conducted by the Ontario Ministry of Natural Resources and Laurentian University.

SFMM analysis shows an overall decline in the amount of preferred habitat for this species throughout future terms, however, preferred habitat remains above the 75% minimum desired level.

Pine Siskin, *Carduelis pinus*

The Pine Siskin is an irruptive species in Algonquin, flocking to the park in large numbers when conifers such as spruce, balsam fir and eastern white cedar have abundant seed crops. It is during the winter that this species is most often encountered, sometimes in flocks numbering in the hundreds.

This species does nest in the park but, is uncommon except in years when there have been irruptions. This species prefers older conifer where it usually nests between 9 and 50 feet off the ground, horizontally on a limb. The female lays three to four eggs in a nest built of roots, twigs, hair, bark and feathers. Pine Siskins feed primarily on seeds but will opportunistically glean insects as well.

Modelling for the Pine Siskin using SFMM shows that habitat is maintained over the long term above the 75% minimum desired level.

Pileated Woodpecker, Papase, *Drycopus pileatus*

The Pileated Woodpecker is an iconic species in Ontario, the largest of all woodpecker species found here. This crow-sized bird can frequently be heard and observed in Algonquin Park where its distinctive call and markings make for easy recognition.

This species prefers mature, mixed wood landscapes, with abundant live cavity trees for roosting and dead standing trees for nesting. Many other species, such as Hooded Mergansers and Wood Ducks, utilize abandoned Pileated woodpecker cavities, making this an important species to model.

Habitat modelling for Pileated woodpecker is done both spatially and non-spatially. SFMM (non spatial) modelling shows a decrease in habitat overall, however, staying well above the 75% minimum benchmark.

OWHAM modelling also confirms a decline in pileated woodpecker preferred habitat. Plan end statistics indicate a 10.1% decrease in preferred habitat. This level of decrease is less than the non-spatial modeling indicates. OWHAM modeling projects that the amount of preferred pileated woodpecker habitat available at plan end to be 219,637 hectares, or 2,426 hectares more than the target lower limit from SFMM. Refer to Appendix K of the Analysis Package (supplementary documentation 6.1.6) for the pileated woodpecker habitat maps.

Ruby Crowned Kinglet, *Regulus calendula*

The Ruby Crowned Kinglet is one of the smallest birds found in Algonquin Park. Nonetheless it is commonly encountered, or at least heard in black spruce bogs and in other coniferous habitats as well. This species is often used as an indicator of old growth as it prefers older development stages of conifer and avoids early successional habitats.

An insectivore, this species is migratory and arrives in the park on average on April 17th and departs about October 20th. Large numbers (up to 50%) of Ruby-crowned Kinglets die in migration, so it is particularly important that they have suitable habitat to recoup these numbers once they arrive in Algonquin Park.

SFMM modelling ensures habitat for this species is maintained above the 75% minimum desired level.

Red Eyed Vireo, *Vireo olivaceus*

The Red-Eyed Vireo is one of the most commonly heard species on the Park's west side. Using a variety of deciduous forest types, this attractive, though rarely seen bird is an insectivore, feeding on insects, snails and spiders. It is migratory, arriving in the Park around May 15th and departing for its wintering grounds in the western Amazon around September 25th.

SFMM modelling shows the habitat of this species is maintained very close to natural benchmark levels and well above the 75% minimum desired level.

Ruffed Grouse, *Bonasa umbellus*

The Ruffed Grouse is common, year round resident that is frequently heard, if not observed by visitors to the Park. The sound of a male ruffed grouse 'drumming' is an often heard occurrence in the spring. Ruffed Grouse are an important prey item for many Algonquin predators, including the Northern Goshawk, Fisher, and Red Fox.

Ruffed Grouse typically lay between 9 and 12 eggs in a nest usually located at the base of a tree. The majority of this bird's diet is buds, leaves, flowers, seeds and fruit; however they also consume insects, spiders and small vertebrates.

This is a species that prefers an essentially intact forest landscape, but one with patches of disturbance; for example, areas of young forest – especially birch and aspen, with patches of conifer and large hardwoods (used for nesting). In the absence of fire, this is a species that benefits from the disturbance associated with forest management. Indeed, analysis by SFMM shows that by term 4 the amount of preferred habitat for Ruffed Grouse is well above the natural benchmark run.

2.2.5 Other Forest Resources

Algonquin Park contains an extensive system of Wilderness, Nature Reserve, Natural Environment and Historical zones that provide protection to significant earth and life science features. Special Management Areas (SMAs) also protect these features within the Recreation-Utilization zone. Sites include large wetland complexes (bogs, marshes), different forest complexes, old growth forests, unique/representative landforms, floristic and aquatic sites to mention but a few. Forest management operations are excluded from these zones so there is no direct impact on these features. The SMA AOC prescription provides protection within the Recreation-Utilization zone. This FMP includes measures to ensure roads are carefully located adjacent to Nature Reserve zones to minimize potential 'edge effect' from roads. Refer to the Algonquin Provincial Park Management Plan, 1998 and the Values Maps in supplementary documentation section 6.1.2 for more information on these important sites.

The Checklist of the Vascular Plants of Algonquin Provincial Park (3rd edition) 1998, and the Algonquin Park Herbarium are the best sources of information on flora in Algonquin Park. The different soils and climate across the Park (west side versus east side) result in different flora throughout the Park. The only plant Species At Risk known to occur within Algonquin is the Endangered Butternut *Juglans cinerea*, and is limited to one specimen, likely ornamental in origin and planted on the lawn of a staff house.

Although there are no other endangered, threatened or special concern flora known from the park, many other locally, regionally or provincially significant species occur in Algonquin. Refer to section 2.2.5.1 for a complete description of rare flora.

Algonquin Park contains a wealth of cultural heritage sites - literally hundreds of sites have been identified and mapped. These range from sites registered with Ministry of Culture as 'Borden Sites' (predominately pre-historic archaeological sites) to more common early 1900 era logging related features – camboose camps, dams, etc. The Algonquins of Ontario have provided important cultural heritage information through the production of 'Aboriginal Background Information Reports' and 'Values Maps' (see supplementary documentation section 6.1.7). Updated mapping of areas of high archaeological potential has been prepared for this FMP. Tables FMP-14 and 23 outline the protection for the four different cultural heritage AOC types; Borden sites, two cultural landscape AOCs and archaeological potential area. Note that the best cultural heritage sites are protected through the Historic zone designation. Ongoing archeological work in Algonquin will continue to enhance the understanding and protection of these features.

2.2.5.1 Species At Risk and Locally, Regionally and Provincially Significant Species

Algonquin Park supports fewer designated Species At Risk than its neighbouring districts of Parry Sound, Bancroft and Pembroke. This is likely because the park is slightly higher in elevation and cooler in temperature then the surrounding districts, and many Species At Risk are more associated with warmer, southern Ontario climes than those in the north.

Nonetheless, the Algonquin Park Forest provides critical habitat to many Species At Risk (SAR), and plays an important role in the conserving these species at a provincial, national and global level. These species are protected through legislation such as the Ontario Endangered Species Act, Crown Forest Sustainability Act, Park Policy and other legislation. In addition, all Species At Risk within a Provincial Park must be managed as if they are endangered (PM 11.03.02). Thus species protection measures within a Provincial Park or Conservation Reserve may exceed those prescribed for Crown Land.

Many of the Species At Risk within Algonquin Park are not directly affected by forest management activities. However, as new species are evaluated by scientists every year, and this is a 10 year Forest Management Plan, there is the potential for new species to be added to the SAR list that may be impacted by Forest Management. In order to address this gap an examination of all rare species known to occur in Algonquin Park and their protection through forest management activities is addressed. This includes species evaluated by the Committee on the Status of Species At Risk in Ontario (COSSARO), the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), species considered Globally rare (G1-G3), Provincially rare (S1-S3), genetically unique to Algonquin Park, and/or considered significant or sacred to local Aboriginal populations (the Algonquin's of Ontario). Ranking is as per the Natural Heritage information Centre (NHIC) as of September 21, 2009. Refer to Appendix 6.2.8 for a list of rare species known to occur in Algonquin Park.

Mammals

Bats, Pagwanadjinjish

Eight species of Bat have been recorded from Algonquin Provincial Park, including two species with an S3 Ranking (Eastern Pipistrelle, *Pipistrellus subflavus* and Northern Long-eared bat, *Myotis septentrionalis*) and one species with an S2S3 ranking (Small-footed bat, *Myotis leibii*).

There are no known bat hibernacula or swarming sites within Algonquin Park (Fraser and Davies, 2004). Should a bat hibernacula be discovered within the Algonquin Park forest the direction outlined in the Stand and Site Guide will be applied. Bat roosting sites are difficult if not impossible to find without the use of transmitters thus protection is directed at maintaining habitat.

Northern Long-eared bat, *Myotis septentrionalis*

This bat is associated with general woodlands including boreal forest and has been found in several habitats in Algonquin Park , suggesting it utilizes a wide range of forest types. This species is known to roost in trees, which could be cut down through forest operations. However, the diversity of forest types and ages, retention of cavity trees (as roosting/nursery sites) and intact aquatic shoreline reserves address the general habitat requirements of bats.

Small footed bat, *Myotis leiibi*

Little is known about the habitat requirements of the Small footed Bat. It has been recorded at several sites in Algonquin Park including the highly disturbed old Whitefish Mill site. As with the Northern Long-eared bat, general habitat requirements are likely met through normal forest management practices.

Eastern Pipistrelle *Pipistrellus subflavus.*

This bat prefers open country with large trees and woodland edges. These habitat types were likely never naturally common within Algonquin Park. Forest management practices which create gaps and retain large trees (such as Shelterwood cutting) and disturbance pattern emulation may enhance suitable habitat for this species. The Eastern Pipistrelle has been recorded at only three locations in Algonquin Park.

The Bats of Algonquin Park, Results of a trapping and acoustic survey, 2004, Erin Fraser and Christina Davy, Unpublished report, University of Western Ontario.

van Zyll de Jong, C.G. Handbook of Canadian Mammals 2 Bats, National Museum of Natural Sciences (Canada), Ottawa, Canada, K1A 0M8.

Eastern Wolf, **Mahingan,** *Canis lycaon*,

Listed as Special Concern both Federally and Provincially, approximately 35 packs of Eastern Wolves live in Algonquin Park. Algonquin Park, in combination with the surrounding townships, comprises the largest protected area for the Eastern Wolf in its range. Furthermore, research suggests that the wolves of Algonquin Park may be more genetically

'pure' than Eastern Wolves living outside of protected areas. Wolves are one of the most iconic of species Park wildlife and hundreds of thousands of people have come to Algonquin Park to hear the call of wild wolves.

In general, forest management operations do not impact the survival of wolves, and may actually benefit wolves by creating more food (early successional plants) for wolf prey. Wolves may be disturbed by forest management activities around rendezvous sites and Den sites: Area of Concern prescriptions have been developed to address these concerns. Many of these sites are known in Algonquin Park because of extensive and ongoing wolf research involving radio telemetry. These sites are considered a sensitive value and are not released to the public. Wolves are sometimes killed as a result of vehicle collisions, more often on busy Highway 60, but occasionally on logging roads as well. Research has indicated that Algonquin wolves actively use the primary forest access road system. This may speed their movement from one feeding area to another.

Creating better habitat through forest management for prey species, namely deer and beaver, was a recommendation of the Algonquin Wolf Advisory Report (AWAG 2000). This recommendation was based off of the assumption that Park wolves are unable to prey on moose and preferred beaver and white tailed deer. Since that time, research has shown that the wolves of Algonquin Park can and do prey on moose in addition to deer, beaver and occasionally, bear.

Managing the Algonquin Park forest to create extra 'wolf prey' is problematic in that the prey species of White-tailed Deer and Beaver prefer edge and early successional habitat, respectively. Creating 'extra' deer and beaver habitat is not compatible with the mandate of Ontario Parks to protect the Ecological Integrity of the Algonquin ecosystem (to allow natural processes to take place). Thus, managing the Algonquin Park forest to a pre-contact condition with moose as a featured species (rather than White-tailed deer), is more in keeping with Park goals. Experts agree this will allow the wolves of Algonquin Park to continue to evolve and adapt over time into the fittest canid for the Algonquin Park landscape. Nonetheless, this topic will be revisited at the 5-year review of this Forest Management Plan with a review and integration of new wolf research.

Birds, Pineshinjish

277 Species of bird have been recorded in Algonquin Park to date (September 2009). Of these, 142 species are known to breed. As a transition area between boreal and southern forests, Algonquin Park plays an important role in bird conservation provincially, nationally and globally.

Non-breeding, migratory birds at risk,

There are several rare or at-risk bird species that have been documented in Algonquin Park, but do not breed in Algonquin. These include; Yellow Rail *Coturnicops noveboracensis*, Golden-winged Warbler *Vermivora cyrsoptera*, Yellow-breasted Chat *Ictera virens virens*, Short-eared Owl *Asio flammeus*, Loggerhead Shrike *Lanius ludovicainus migrans*, Least

Bittern *Ixobrychus exilis*, Golden Eagle *Aquila chrysaetos*, Black Tern *Chlidonias niger*, Red-headed woodpecker, Meme, *Melanerpes erythrocephalus* and American White Pelican *Pelecanus erythrorhychos.*

These species are considered very rare or vagrant visitors to Algonquin Park. As the park does not support breeding populations of these species, forest management has negligible impacts on them.

Breeding Birds at Risk

Peregrine Falcon *Falco peregrinus anatum,*

Federally listed as Threatened and Provincially listed as endangered, the Peregrine falcon formerly bred in Algonquin Park. Despite regular surveys and a captive release program in the 1980's, Peregrine Falcons have not bred naturally in Algonquin Park for over half a century. Should this species return to the cliffs of Algonquin, an Area of Concern prescription for Peregrine Falcon nest sites based off of provincial direction will be developed. It should be noted that most suitable cliff faces in Algonquin Park are on canoe routes, which already receive a 1.6 km timing restriction on forestry operations, by default providing some protection to these features.

Red-shouldered Hawk, *Buteo lineatus*

Recently down listed from threatened to Not At Risk, nesting Red-shouldered Hawks have not been documented in Algonquin Park for over a decade. (R. Tozer, M. Runtz, pers. comm). Adult birds are usually observed every year, but nesting pairs have not been found recently despite surveys. Red-shouldered Hawk habitat has been modeled spatially in this Forest Management Plan to ensure adequate contiguous habitat on the landscape in Clyde, Bruton and Ayre townships (where they historically nested). In addition, an Area of Concern prescription is in place to protect the nest sites and habitat of any breeding pairs of Red-shouldered hawks found in Algonquin Park.

Olive-sided Flycatcher, *Contopus cooperi*

Considered threatened federally, the Olive-sided flycatcher is regularly encountered in Algonquin Park. Although forest management appears to create suitable habitat for the Olive-sided flycatcher, research suggests that logged areas harbor more nest predators for this species and they have lower reproductive success than when nesting in naturally disturbed (eg. Fire) areas (COSEWIC/Robertson and Hutto). Thus logged areas may serve as ecological sinks for this species. Nonetheless, the protection of all aquatic features, including wetlands, likely provides ample habitat for this species in the park. The implementation of the Fire Management Plan for the park will likely benefit this species.

Bald Eagle *Mikisew,* *Haliaeetus leucocephalus*

Recently down-listed to Special Concern in southern Ontario, Bald eagles were first recorded nesting in Algonquin Park in 2002. Since then, four separate nests have been recorded, and it

is likely others exist. An Area of Concern prescription is in place to protect Bald Eagle nests and retain suitable nesting and perching trees in the vicinity of the nest. Bald Eagles are considered sacred to many aboriginal groups, and the Area of Concern prescription has the support of the aboriginal members of the Forest Management Planning team.

Great Gray Owl *Strix nebulosa*

Listed as Special Concern by COSSARO, the majority of great gray owl records in Algonquin Park result from winter irruptions in which owls from further north in Ontario migrate south in search of prey. However, there have been scattered breeding records of this species in the park. Although it is not likely to be encountered during nesting season in Algonquin, an Area of Concern prescription is in place to protect Great Gray Owl nesting sites.

Chimney Swift, Mizatigoningwisi, *Chaetura pelagica*

Listed as threatened by COSEWIC, Chimney swifts may be impacted by forest management through the reduction of large diameter trees. This species is considered uncommon in Algonquin, although there are a number of breeding records, mostly associated with old buildings (and their chimneys).

Any roosting or nesting sites for this species discovered in the managed forest will receive a protective buffer during the nesting season, including retention of suitable cavity trees. This protection will be developed in consultation with local and regional experts.

Rusty Blackbird, Ishwakadjekoj, *Euphagus carolinus*

The Rusty Blackbird has declined rapidly in North America, presumably as a result of habitat loss on its wintering grounds in the United States and bird control programs in agricultural areas of the U.S. The preferred breeding habitat of this species includes wetlands, often associated with early successional habitat like those created by fires, wind damage or beaver flooding. This is a species that may not benefit from the 30 metre reserve afforded to all water bodies in the Park. In the absence of fire, few of these areas become early successional. It is hoped that with the implementation of the Park's Fire Management Plan a more natural disturbance regime can be established in portions of the Park.

Rusty Blackbirds are considered uncommon in Algonquin, although they are regularly observed during migration in the spring and fall. Recent research on Rusty Blackbirds in Ontario, including Algonquin Park, will hopefully yield insight that will help this species recover.

Common Nighthawk, Kigibigomesi, *Chordeiles minor*,
Whippoorwill, Wawonesi, *Caprimulgus vociferous*,

These aerial foragers are all in decline in North America for unknown reasons. However, it is reasonable to assume a combination of habitat loss, use of pesticides, forest succession and climate change are impacting these species. Common nighthawks and Whippoorwills are

much more common on the Park's East Side where forest management and the forest openings it creates may actually increase the amount of suitable habitat for these bird species. While no specific Area of Concern prescriptions have been developed for these species, any nesting pairs discovered will receive a protective buffer during the nesting season, developed in consultation with local and regional experts. Surveys for these species in appropriate habitat will be conducted, and this information will be used to enhance protection on the landscape.

Kirtland's warbler *Dendroica kirtlandii*

This endangered species has never been documented in Algonquin Park. However, recent breeding records adjacent to Algonquin Park and this species preference for young Jack Pine means there is high potential that this species will breed in Algonquin. Management of Jack Pine in Algonquin will assist in maintaining a component of young Jack Pine (between 12 and 20 years old) so that there will be some suitable habitat in the park for this species in perpetuity. Should breeding Kirtland's warblers be discovered within Algonquin Park, an appropriate Area of Concern prescription will be implemented, in consultation with local and regional experts.

Gray Jay, Kwingwishi, *Perisoreus canadensis*,

Although not listed as at risk, Gray Jays have gradually declined in Algonquin Park and the present territorial occupancy rate is only 30-35% of what it was 30 years ago. They have entirely disappeared from hardwood-dominated, apparently marginal habitats, have suffered moderate declines in upland mixed coniferous-deciduous stands and lesser declines in lowland Black Spruce stands. These birds are iconic and an encounter with them is emblematic of an Algonquin camping experience.

A long-term study in Algonquin Park suggests the decline may be tied to warming temperatures and the consequently increased degradation of perishable stored food items used by the jays for winter survival and reproduction. Some evidence exists also to show that spruce has antibacterial properties that may mitigate the negative effects of warmer temperatures and explain the lesser declines in spruce dominated habitats

As most black spruce stands in Algonquin are associated with bogs, and most bogs are within the aquatic layer of the park, much of this habitat is already protected from forest management through the 30 metre reserve applied to all park water bodies. Furthermore, SFMM modelling for preferred habitat of species which occupy similar habitats, like Boreal Chickadee, will ensure Black Spruce is retained at sustainable levels across the Park.

Tozer, Ron. Checklist and Seasonal Status of the Birds of Algonquin Provincial Park. the Friends of Algonquin Park, Box 248 Whitney ON. 2007.

Strickland, Dan, personal correspondence – Gray Jay papers.

<u>Reptiles and Amphibians</u>

Seven Reptiles at Risk have been recorded within Algonquin Park. Of these, two, the Eastern Hognose Snake, *Heterodon platyrhinos,* and the Spotted turtle, *Clemmys guttata* are presumed extirpated, with no records within the last 20 years despite some dedicated search effort by researchers and staff.

Should these species be re-discovered on the Park landscape an Area of Concern prescription will be implemented to address the risk factors for these species as they relate to forest management.

Snakes, Kinebig

Two snakes, the Ribbonsnake *Thamnophis sauritus,* and the Milksnake, *Lampropeltis triangulum,* are infrequently observed in Algonquin Park. Both of these species are listed as 'Special Concern' by COSSSARO. All records of the Ribbonsnake are from wetlands or riparian areas, suggesting there would be little impact on this species from forest management (which does not occur within 30m of any waterbody in Algonquin Park.)

The majority of Milksnake records are from areas outside the Recreation Utilization zone where forest management occurs. Nevertheless, should any significant habitat features requiring protection, such as hibernacula, be discovered within the R/U Zone, an AOC for the protection of these features will be implemented in consultation with local and regional experts.

Turtles, Mikinak

Four turtles at risk are known to occur in Algonquin Park, the Wood Turtle*Glyptemys insculpta*, the Blanding's turtle, *Emydoidea blandingii*, the Common Snapping Turtle, Mishige, *Chelydra serpentina*, and the Spotted Turtle *Clemmys guttata*.

In order to further increase knowledge of Species At Risk turtles and their habitat, ongoing research on turtles at risk is supported by Algonquin Park and the Algonquin Forestry Authority. These projects will lead to real life, applicable solutions to help turtle conservation both in Algonquin Park and in Canada.

Wood Turtle, Posikado, *Glyptemys insculpta*

The survival and recovery of these species in Algonquin Park is most threatened by road creation and use. The most significant Species at Risk in the park, the endangered Wood Turtle, is particularly vulnerable because it is terrestrial and spends much more time on land with greater chance of exposure to roads. Roads are the biggest threat, with human collection for the pet trade (enhanced by easy access) a close second. A detailed Area Of Concern for this species is in place based off of the best scientific research and data. For sensitivity reasons, site specific information for this species is confidential.

Blanding's turtle, *Emydoidea blandingii*

The Provincially and Federally threatened Blanding's turtle is found in scattered populations in Algonquin Park. Research in Algonquin has predicted important habitat for this species. Two Area of Concern prescriptions, one for the core population of Blanding's turtles in the park, and one for outlier records, have been implemented.

Recent research has also indicated that Blanding's turtle hibernation sites may be dependent upon groundwater upwellings in wetlands. These sites may in fact be a limiting factor in the amount of suitable Blanding's turtle habitat in Algonquin Park. As these sites may be impacted by changes to groundwater, the area of concern for this species reflects groundwater protection as well.

Common Snapping Turtle, Mishige, *Chelydra serpentina*,

The Snapping Turtle is listed as Special Concern both federally and provincially. The primary threats to this animal are road mortality, human persecution and the excavation of turtle eggs through road grading. Snapping turtles appear to be fairly common in Algonquin – however most reports are anecdotal. Some protection for this species is afforded through the 30 metre buffer on waterways. Mitigation through timing and avoiding grading the one metre shoulder of the road within the cold water reserve will reduce incidents of egg compaction and excavation. An Area of Concern prescription for this species is not deemed necessary for protection of this species at this time.

Fishes, Kigonz

Algonquin Park plays an important role in fish conservation on a number of levels. First, many of the park lakes are relatively free from alien and invasive species, and represent aquatic communities largely unchanged from pre-contact times. For a more complete description of fisheries protection in Algonquin, please refer to the fisheries section.

Several fish species are of specific conservation concern in Algonquin, descriptions on threats and mitigation are outlined below.

American Eel, Pimissi, (*Anguilla rostrata*)

Although no specimens have been recently documented in Algonquin Park, anecdotal reports from anglers suggest eels have been present in Algonquin in recent years. This provincially endangered species is most threatened by the existence of dams, which interrupt the migration of adult eels to the Atlantic Ocean, and also interrupt the migration of young eels up rivers and tributaries. There are 20 dams in Algonquin Park, which are used to regulate water flows, maintain recreational use and prevent the spread of invasive aquatic species. None of these dams are maintained or used by the forest industry. As such, current forestry practices likely have little to no impact on American Eels in Algonquin Park – rather, it is the presence of

scores of dams between the Atlantic Ocean and the Park that exclude eels from the park in large numbers.

Park staff are committed to the recovery of the American Eel, and should American Eels re-establish themselves in Park watersheds, any dams considered a barrier will be retrofitted with eel ladders to facilitate eel movement into the park.

Shortjaw Cisco, *Coregonus zenithicus*
Blackjaw Cisco, Coregonus spp.

These species are recorded from White Partridge and Hogan Lakes respectively, and may occur in other park lakes as well. Both have been evaluated as threatened species in the past, although Black Jaw Cisco is currently considered data-deficient (not enough information to make an evaluation).

The primary threat to these species is the introduction of non-native species through release of baitfish, which is facilitated by road access. Both of these lakes have an Area of Concern preventing increases in road density to protect native Brook Trout from the same threat. By default, this AOC confers protection to these two Cisco species as well. Further research by the OMNR will help shape conservation for these species.

Lake Sturgeon, Name, *Acipenser fulvescens*

Lake Sturgeon have been recently documented from one river system in Algonquin Park. This threatened species is at risk from dams and over-exploitation. Neither of these issues are directly linked to forest management in Algonquin, although roads in and around this river system may be of concern. This river system also enjoys protection from increases in road density because of a variety of other values, including other Species At Risk and recreational features. By default this also doubles as protection for Lake Sturgeon.

Brook Trout, Manjamegos, *Salvelinus fontinalis*

Although not a Species at Risk, and in fact, a game fish, the Brook Trout is important enough to warrant specific protection in Algonquin. The lentic, or lake dwelling Brook Trout that are found in Algonquin Park are genetically unique to the Park and represent the largest remaining complex of natural trout lakes in the word. These lakes are extremely susceptible to over-harvest as well as introduction of alien or invasive aquatic species. Also, young brook trout rely on small, cold, spring fed creeks for early stages in their life history. Furthermore – these fish rely on spring upwellings in the bottom of lakes for spawning. A specific Area of Concern prescription for natural Brook Trout lakes has been established.

Arthropods

Algonquin is home to many insect species that are considered provincially rare, as well as two that are listed as Special Concern.

Butterflies, Memengwe,

Monarch, *Danaus plexippus*

Monarch butterflies *Danaus plexippus* are of conservation concern primarily because of habitat loss due to logging in their wintering areas of Mexico. In Canada, (including Algonquin Park) this butterfly relies on open areas that include milkweed (*Asclepias* spp.), its' larval host plant. In Algonquin Park this conspicuous insect is often found in disturbed areas such as roadside edges, old mill sites, and log landing areas. Forest management in Algonquin increases the amount of open areas and may provide more 'old field' sites which are used by Monarch butterflies for nectaring and egg laying. The restoration of aggregate pits and landing areas will provide additional nectaring and larval host plants. In the absence of fire, this species likely benefits from forest management in Algonquin.

Macoun's Arctic, *Oeneis macounii*

Always associated with Jack Pine, and flying only on even numbered years (eg. 2008, 2010, 2012), Algonquin Park represents one of southernmost populations of the Macoun's Arctic butterfly. This species is presumed to lay eggs on sedges associated with Jack Pine stands. As Jack Pine is a fire-dependent species, and many fires are currently suppressed in Algonquin for safety reasons, ongoing management of Jack Pine is important for maintaining Macoun's arctic populations. The implementation of the fire management plan for Algonquin will likely benefit this species.

Pepper and Salt Skipper *Amblyscirtes hegon*

The pepper and salt skipper is uncommon in Algonquin, usually found on the ground or nectaring at flowers in forest clearings. Like most skippers found in the Park, the larva of this species feed on grasses. Not enough is known about this species to elucidate any positive or negative impacts from forest management, but most park records come from disturbed areas such as campgrounds, suggesting this species is not adversely impacted by disturbance.

Early Hairstreak *Erora laeta*

Feeding on beech and beaked hazel, this species is likely much more common then park records would indicate. However, it is believed to spend most of its time in the crowns of beech trees, where they are rarely encountered. Silvicultural systems that promotes the regeneration of beech, such as single tree selection, are likely important for this species.

Dragonflies and Damselflies, Ajaweyagonidjisi

Considerable effort into dragonfly and damselfly monitoring is expended every year by the Park's naturalist staff. This includes charting emergence and departure data and annual dragonfly counts. These inventories result in a more complete picture of dragonfly and damselfly species throughout the Algonquin landscape then in many other areas.

Many locally and regionally rare species have been documented in the park; however no dragonflies or damselflies within the park have been designated as Species At Risk.

Experts agree that the 30 metre buffer on all bodies of water within Algonquin Park is sufficient to protect these insects, which are dependent upon water for their larval stage. Dragonflies and Damselflies in Algonquin Park that are considered regionally, locally or provincially significant include : Zebra Clubtail *Stylurus scudderi*, Williamson's Emerald *Somatochlora williamsoni,* Sphagnum Sprite *Nehalennia gracilis,* Ski-tailed Emerald *Somatochlora elongate,* Rusty Snaketail *Ophiogomphus rupinsulensis,* Ocellated Emerald *Somatochlora minor,* Ocellated Darner *Boyeria grafiana,* Moustached Clubtail, *Gomphus adelphus,* Mottled Darner *Aeshna clepsydra,* Least Clubtail *Stylogomphus albistylus,* Harpoon Clubtail *Gomphus descriptus,* Incurvate Emerald *Somatochlora incurvata,* Kennedy's Emerald *Somatochlora kennedyi,* Lake Emerald *Somatochlora cingulata,* Forcipate Emerald *Somatochlora forcipata,* Ebony Boghaunter *Williamsonia fletcheri,* Elfin Skimmer *Nannothemis bella,* Extra-striped Snaketail *Ophiogomphus anomalus,* Eastern Red Damsel *Amphiagrion saucium,* Delicate Emerald *Somatochlora franklini,* Delta-spotted Spiketail *Cordulegaster diastatops,* Cyrano Darner *Nasiaeschna pentacantha,* Brush-tipped Emerald *Somatochlora walshii,* Boreal Snaketail *Ophiogomphus colubrinus,* Azure Bluet *Enallagma aspersum,* Beaverpond Clubtail *Gomphus borealis.*

Should any species of dragonfly or damselfly be designated as a Species At Risk, a closer examination of the impacts of forestry on this species will be undertaken and appropriate protection measures will be implemented if required.

A Tiger Beetle, Chigawesi, *Cicendela hirticollis*

This Tiger beetle is associated with dry, light coloured sand. Although records for this species are found from coast to coast in Canada, it is quite rare (S2) in Ontario. In Algonquin its location is known from one place, an exposed sandy area next to a large lake. The location is not within the Recreation Utilization zone, and furthermore, most of the sandy, exposed locations (beaches) this species might use are well within the 30 metre reserve on waterways. Thus this tiger beetle is unlikely to be impacted by forest management. (Wallis, 1961, The Cicindelidae of Canada)

Lichens

Lichens are a long lived, slow growing organism that is a symbiotic relationship between an algae and a fungus. Many lichens have specific requirements for growth (light, humidity, tree species, rock type etc). Lichens are extremely susceptible to air pollution, and are often used as an indicator of air quality.

Despite their ecological importance, there are relatively few ‘experts’ in lichens, and identifying species can be difficult – often requiring chemical tests. A number of rare lichens have been found in Algonquin Park, including some S1 species. However, no lichens found in Algonquin are listed as Species At Risk. Experts have examined parts of the park for rare lichen species, and the park will continue to increase knowledge on lichen diversity and

locations. Should any rare lichens be found within areas planned for operations, expert advice on the species will be sought, and protection applied.

Rare lichen species found within the park include: *Chaeonothecopsis savoinica, Microcalicium arenarium, Arthonia byssacea, Bacidia circumspecta, Cresponia chloroconia, Pachyphiale fagicola, Rhizocarpon lavatum, Bryoria trichoides, Cladonia merochlorophaea, Evernia prunastri, Lobaria scrobiculata, Pseudocyphellaria crocata.* (Lichens of Algonquin, Report on Merganser Lake by Chris Lewis and Irwin Brodo).

Plants, Netawigingin

Few SAR plants are found within Algonquin Park, likely because the cooler climate and higher elevation results in lower overall plant diversity than warmer, more diverse areas. Nonetheless, dozens of regionally, provincially and locally significant plants are found within Algonquin Park.

Butternut *Juglans cinerea*

The only plant species known from Algonquin Park that has been ranked as a Species At Risk as of 2009, only one butternut tree is known to exist in Algonquin Park. It is located on the lawn of the former superintendent's summer home, and is almost certainly planted. Furthermore, it is possible that this butternut tree is a hybrid, meaning it is not the native butternut tree that is considered endangered. There are no concerns about forest management and this tree.

There are a number of locally, regionally and provincially rare plant species that require discussion and examination. The majority of these plants occur in aquatic habitats, and thus receive protection from forest management through the 30 metre reserve on all water bodies within the park. These include:

Virginia Meadow-beauty *Rhexia virginica*: Found in open damp, sandy to mucky marshy places, and shores. One location known in Algonquin from over 50 years ago; in a muddy stream behind an old camp on Lake of Two Rivers, Canisbay Twp. This population does not occur within the managed forest. (Voss 2)

Thread-like Naiad, *Najas gracillima:* Occurs in the shallow water of mucky-bottomed lakes. Stratton and Master Twp (APH). (Voss 1).

Threadfoot, *Podostemum ceratophyllum:* Found in rapidly flowing water (Gleason and Cronquist). In Algonquin, along rapids of the Petawawa River. Lister and Bronson Twp (APH).

Southern Twayblade, *Listera australis*: Found in shaded bogs and wet woods (G&C). 1 location in Algonquin from a bog on Berm lake, Stratton Twp.(APH)

Snailseed Pondweed, *Potomogeton bicupulatus*: Found in shallow water (MF#1). Peck, Hunter, Mclaughlin, Master Twp.(APH)

Ram's-head lady-slipper, *Cypripedium arientinum*: Rich cedar mires, in sphagnum, or in thin beach sand over limestone (native Orchis of US and Canada). In Algonquin from Stratton, Guthrie Twp. 2 locations, shores of Carcajou bay, rocky slope and semi open hill on Barron River opposite Brighton Chute, cover of Red Pine, White Pine, Cedar (APH).

Bayonet Rush, *Juncus militaris*: Shallow acid waters, sandy gravely shores, and peaty shores. Devine, Canisbay, Barron, Guhtrie, Master, Peck, Sproule, Hunter, McLaughlin, Nightingale, Butt, Pentland Twp (APH)

Long-stemmed Waterwort, *Elatine triandra:* Lakes, muddy intermittent pools (G&C) 1 record, East shore of Frontier Lake near McManus Road, Wylie Twp (APH

Carey's Smartweed, *Carex careyi*: Swamps, thickets, meadows, wet fields, riverbeds, wet disturbed sites (Crow and Hillcrest Aquatic and Wetland Plants of NA). 2 records Louie Creek to Whitson Lake, Stratton Twp, and Beaverpond Trail post marker #5, Sproule Twp (APH).

Cloud Sedge, *carex haydenii*: Marshes, wet meadows, wet open woods (G&C). In Algonquin open muddy shores on Costello creek, sand bar of Booth lake, moist open clearing in tamarack woods, flooded shores of river. Guthrie, Sproule, Preston Twp. (APH)

Limestone Swamp Bedstraw, *Galium brevipes*: Calcareous sites, mudflats, riverbanks, sandy shores, moss swales, rarely acidic boggy soil (G&C). 1 record; beaverpond along Hwy 60.

There are a number of additional locally, regionally or provincially significant plant species found within terrestrial components of Algonquin Park. Those that are known are discussed below along with the possible impact from forest management.

Secund Rush, *Juncus secundus*: Found in clay soil, widespread in dry to moist ground along roadsides, ditches, gravel pits etc, on shores and less commonly in boggy areas (*J.tenius*). as this species is found along roadsides ands gravel pits, it is unlikely that forest management has any negative impacts on this species. Known from Canisbay, Bronson, Master and Stratton Townships. (APH). (G&C)

New England Sedge, *Carex Novae Angliae*, moist woods(G&C) in Algonquin found in a variety of habitats a including black ash swamps, dry mesic sandy loam hilltops in maple forest, disturbed cleared areas, birch pin cherry, balsam fir forests, young mixed balsam fir and white spruce forests. Frequently encountered along portages and hiking trails. This species may be impacted by forest management, but most known sites occur along portages and hiking trails which receive protection from forestry. It is likely that this species is more widespread in the park and known locations from portages and hiking trails are a reflection of these areas being used frequently. Found in Canisbay, Peck, Devine, Finlayson, Lawrence, Stratton, Bruton Townships.

Long-stemmed Sedge, *Carex Folliculata*, Found in wet organic soil, wet swampy woods. There is only one record of this plant, from the Bonnechere River, Guthrie Twp. This population is protected within the waterway reserve.

Field Sedge, *Carex conoidea*: Found in moist open places. There is one record of this plant on the steep sandy gravel slope to shore- 10ft from Schooner Rapids Bridge on N. side of Petawawa River. This area is on the hydro-line and is not subject to forest management. The 30 metre reserve provides redundant protection. (APH)

Flat Poverty Grass *Danthonia compressa:* Found in dry woods, in Algonquin on gravel roads, old logging roads, gravel roadsides, trails, railbeds, portages. As this species is found on gravel roads including old logging roads, it is unlikely this species is negatively impacted by forest management and may benefit from disturbance created by roads. Found in Canisbay, Hunter, Deacon, Master, Peck, Dickson, Stratton, and Bruton Townships. (APH) (G&C)

Clinton's Leafless-bulrush, *Trichophorum clintonii:* Found in dry woods, hillsides, banks, opens sandy ground such as oak, pine woodlands. In Algonquin there is one record, Crooked Chute Portage, Petawawa River, Edgar Twp. This particular plant is protected by the Portage Area of Concern and the 30 metre reserve on water. (APH) (G&C)

Coast Jointweed, *Polygonella articulata*: Found on dry acid sands, inland sand dunes. In Algonquin found on gravel roadsides, sandy clearings, and disturbed areas. As this species seems to benefit from disturbed areas it likely benefits from road creation and forest management. Records are from Sproule, White and Preston Townships. (APH) (G&C)

Braun's Holly Fern, *Polystichum braunii*. Found in moist woods, thickets, sometimes among rocks. The one record for this plant is within the Nature Reserve Zone surrounding Laurel Lake, in Boyd Township, and thus is not impacted by forest management.

(Lellinger, D. Field Manual of the Ferns and Fern Allies of the US and Canada). 1 record. South CNR, S. end of Laurel lake, Boydd Twp (APH)

Purple-stemmed Cliffbrake, *Pellaea autropurea*: Found among calcareous rocks and open woods or dry steep exposed limestone rocks or cliffs. This plant is known from the Barron Canyon area on the Barron River, within a Nature Reserve Zone, thus it is not at risk from forest management.

(F&FaoC). 1 record, Stratton Twp., Barron Canyon area open rocks woods in Red and White Pine (APH) (GC)

Purple Reed Grass *Calamagrostis purpurascen.* Found among rocky slopes and well drained sandy soil (G&C). This species is known from the Greenleaf Lake area of Barron Township, within the Nature Reserve Zone where forest management does not take place. record, Greenleaf Lake, Barron Twp *(APH)*

Smooth Woodsia, *Woodsia glabella*: Found among calcareous rocks, in moss or humus among rocks, or in protected cool, moist crevices. In Algonquin it is found in the Barron Canyon within the protected Nature Reserve Zone.

(F&FAoC). (APH). (G&C)

2.2.6 Landscape Pattern

The landscape pattern refers to the size and juxtaposition of forest disturbances on the Forest. A requirement of forest management planning is to analyze landscape patterns and measure these against one resembling a landscape pattern that would be created naturally. Forest landscape patterns that occur naturally are influenced primarily by events such as wildfires whereas forest management can affect landscape patterns primarily through harvesting activities.

The Forest Management Guide for Natural Disturbance Pattern Emulation Guide (NDPEG) provides the basis of forest landscape pattern evaluation. As stated in the guide its purpose is to "provide direction for forest management practitioners in the development and implementation of forest management plans such that managed forest landscapes will resemble more closely the landscapes recently created naturally by fire with respect to location and size of disturbances, residual stand structure, species composition of the forest and its age class distribution". The intent then is for the Forest Management Plan to consider what would occur naturally by fire during the planning of harvest areas and to create a mosaic of larger and small harvest areas that would more resemble the natural condition caused by fires. For purposes of the analysis, only clear cuts and some removal cuts in shelterwood are considered disturbances.

The term "emulation" is used throughout the guide as it is generally recognized that harvesting will not result in the same conditions in the forest as a fire (i.e. mimic fire) and that constraints on the extent of harvesting due to social, economic and silvicultural factors, will limit the extent to which harvesting will resemble the natural condition created by fire. The term "forest disturbance" is also used in the guide and is described as "a natural (e.g. fire) or anthropogenic (e.g. timber harvest) event in the forest that alters the natural succession of a forest stand or stands". It is the analysis of existing and planned forest disturbances through the management planning process that allows for an objective assessment of whether the FMP will move the pattern of disturbances over the landscape towards a more ideal or natural condition.

The analysis of forest disturbances (both natural and depletions from harvest) starts at the beginning of the planning period (2010). This resultant information is compared to a "template" of what is believed to be the frequency of disturbances (by specified size classes) that would occur naturally for the same area. Adjustments to the template are made where required by the Planning Team based on local information. Efforts are then made to plan harvest allocations in such a manner that will move the current landscape pattern of disturbances at plan start towards the template pattern of landscape disturbances by plan end.

2.2.6.1 Natural Disturbance Template

Evaluating current landscape patterns that are comprised of both natural and human influenced events against a pattern created naturally required the use of historical fire datasets as the basis for comparison. The details of the development of the disturbance template for the Algonquin Park Forest are contained in Appendix K of the Analysis Package (supplementary documentation 6.1.6).

This information was grouped by size class and is referred to as a Natural Disturbance Frequency Distribution Template (Table 3) from which current landscape patterns and proposed landscape pattern changes can be compared against.

Table 3 Natural Disturbance Frequency Distribution Template

	Size Class Range (ha)							
Disturbance Frequency	0 to 10	11 to 70	71 to 130	131 to 260	261 to 520	521+		
25th percentile	37%	46%	2%	1%	2%	3%		
minimum	30%	41%	2%	0%	2%	2%		
median	40.55%	46.90%	2.66%	1.01%	2.66%	6.16%		
maximum	46%	48%	4%	3%	7%	17%		
75th percentile	43%	47%	3%	2%	4%	9%		

Figure 8 Natural Disturbance Frequency Distribution Template

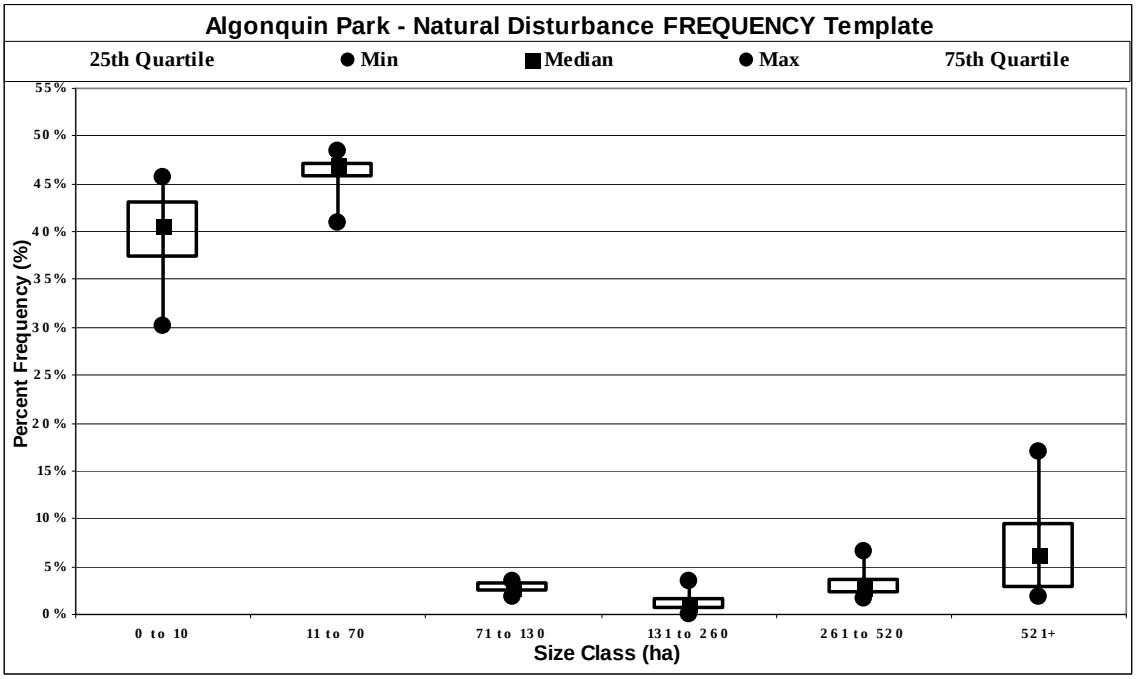


Figure 8 displays the same information as found in Table 3 but in chart form. The information shows that the majority of disturbances occur in the smaller size classes (0-10 and 11-70 ha) but that larger disturbances do occur as evidenced by the size classes greater than 260 ha.

On the Algonquin Park Forest, fire has been a negligible influence on landscape pattern since the late 1940's, when fire detection and suppression became greatly improved. As a result, forest disturbances have only been created in recent decades by forest harvesting. However, clearcutting accounts for less than 5% of forest activities. Partial harvesting (selection and shelterwood silviculture systems) which occurs on the other 95% of planned harvest operations generally do not result in a forest condition that meets the definition of a forest disturbance. Shelterwood stands result in a two-staged stand until the final removal cut occurs at which time normally a sapling or immature forest condition is retained. Selection cutting results in an uneven-aged forest condition. The forest is dominated by tolerant hardwoods which experience few fires and extremely rare stand replacing fires. The second major forest type is white/red pine which naturally would experience understory fires on a more frequent basis but stand replacing fires would be quite rare. Due to the proximity of human and social values (campgrounds, camps, backcountry recreation values, cottages leases) in this forest, there is no “let burn policy”.

Therefore, the landscape pattern is one in which the forested landscape is heavily dominated by mature, old, two-aged and uneven-aged stands with some immature stands and very few presapling stage stands that are representative of a forest disturbance.

Information on the current landscape pattern at plan start (2010) can be found in Section 3.0 of Appendix K of the Analysis Package and includes the frequency distributions of the regional template, 2010 disturbances and 2020 disturbances. At plan start the distribution of forest disturbances is similar to the Natural Disturbance Frequency Distribution Template above in that the forest landscape contains many smaller disturbances and fewer larger disturbances. However, while the general trend of the current landscape pattern is similar, there are opportunities to bring the future landscape pattern at Plan end (2020) more in line with the natural template. This was achieved through the planning of harvest areas.

Supplementary documentation section 6.1.2 contains a Natural Disturbance Pattern Map at plan start (2010), and a summary map of disturbances at plan end (2020) and planned clearcuts.

The impact of this current landscape pattern on the development of the FMP is that while there are some challenges to move fully towards the natural disturbance template, it is possible to do so with the planned harvest area.

2.2.6.2 Spatial Old Growth

Other landscape patterns considered on the Forest related to the spatial arrangement of older seral stages on the landscape. A spatial assessment of old growth was conducted using the Patch Analyst model as part of the objective achievement process (FMP-13). A series of landscape metrics were calculated for 2010 (plan start) and re-calculated for 2020 (plan end) in order to assess the spatial distribution and progression of old growth patches across the landscape. These metrics were compared, and an assessment of objective achievement was conducted. Targets have been met for all designated landscape metrics as presented in table

FMP-13. Refer to table FMP-13 and Appendix K of the Analysis Package – Spatial Analysis for complete details.

2.3 Existing Roads

The Algonquin Park Forest Management Unit has had an approved permanent forest management road system strategy since 1981. Since 1979 the primary and secondary forest access road system was completed by AFA within the Park to provide for the economical transportation of forest products to processing facilities and access for renewal and tending activities.

Several access roads provide recreational access around the periphery of the Park and off of Highway 60. Algonquin harvesters have been using the interior road system as it exists from time to time to harvest fish and game. Access for Park maintenance and research is a secondary use of the road system.

During the development of the 2010 FMP there were some initiatives undertaken which influenced the classification of the road system:

1) The Algonquin Park Forest Independent Forest Audit 1997-2002 recommended that the roads strategy be reviewed. An updated Forest Management Access Roads Strategy for the Algonquin Park Forest has been developed as an internal policy document by Ontario Parks in partnership with the Algonquin Forestry Authority in order to meet this IFA recommendation and components of it have been incorporated into the FMP. These components include objectives and strategies as well as map-based components such as breaks in the road system and Forestry Access Management Areas (FAMA's).

2) The Forest Management Planning Manual 2004 introduced the concept of an existing roads inventory, which includes responsibility assignment and use management strategies for each road or road network. This FMPM also introduced new definitions for primary, branch and operational roads, which differ from the previous classifications of primary, secondary and tertiary roads. Therefore as part of the roads inventory process, roads were reclassified according to the new definitions.

During the development of the road strategy the RU Zone was subdivided into FAM areas based to the extent possible on the existing road system. FAM areas are portrayed on the roads composite map in the supplementary documentation section 6.1.2. Primary and or branch roads, or in some cases two of these roads form the backbone of access to a FAM area. Adjustments to FAM area boundaries may occur as better field information is obtained. Networks of operational roads were mapped within FAM areas.

Responsibility for each existing primary, branch and network of operational roads was determined based on the criteria in the Forest Roads and Water Crossings Initiative (FRWCI) Report (2003).

Existing primary and branch roads and networks of operational roads are portrayed on maps in Supplementary Documentation section 6.1.2. The roads that are the responsibility of the Algonquin Forestry Authority are indicated.

The Existing Roads Table and associated documentation (supplementary documentation 6.1.2) contain information on use management strategies for each road or road network. Roads constructed late in the 2005 FMP will be added to the existing roads inventory during the first year of implementation of the 2010 FMP so that it is up to date.

The transfer of road responsibility between AFA and MNR will be in accordance with the use management strategy for that particular road or road network. Generally, the responsibility for primary roads will be maintained by AFA. Parts of primary roads may not be drivable for periods of time when not needed for harvest, renewal or tending operations. Responsibility for branch and operational roads will be transferred to MNR when harvest, renewal and tending operations are complete and the road is not needed for a period of time.

2.4 Land Use Description

As described in Section 2.1, the entire Algonquin Park management unit is located within Algonquin Provincial Park and is subject to the direction contained within the Algonquin Park Management Plan. The predominate land use with Algonquin is day use Park activities (primarily along the Highway 60 corridor), campground camping and interior canoeing/camping throughout the Park. As with all Parks in Ontario, protection of ecological integrity is also a primary objective. Algonquin Park is also used by the Algonquins of Ontario to carry out their traditional activities (gathering, hunting, fishing, trapping etc.). There are over 300 cottage leases within Algonquin Park. There are no specific resource based tourism areas in Algonquin, rather the entire Park is important for tourism. There are no mineral or quarry areas within Algonquin (not permitted), however there are a limited number of aggregate sites within the recreation utilization zone for use by the forest industry. There are 19 trapline areas on the east side of Algonquin Park that are operated by Algonquins of Ontario trappers. There are six traplines in the southern ‘panhandle’ portion of the Park, most of which are part of larger trapline areas in adjacent Bancroft District. Trapping activity is generally decreasing given low fur prices and long travel distance to access the traplines. There is only approximately 11 hectares of private land in Algonquin Park, composed of small parcels containing privately owned cottage lots. Supplementary documentation section 6.1.2 contains the Values maps which clearly outline the above mentioned land uses. Supplementary documentation section 6.1.7 provides more detail on Algonquins of Ontario use of Algonquin Park. Tables FMP 14 and 23 outline the various protection measures for the above land uses. These prescriptions have been successful in the past in ensuring that these land uses are not negatively impacted by forestry activities.

Section 2.1 and Map 2 of this text describe and portray the park zoning in Algonquin Park. Given that forestry is excluded from the other Park zones (besides Recreation-Utilization) forest management has no impact. As mentioned in Section 2.2.5, this FMP includes measures to ensure roads are carefully located adjacent to Nature Reserve zones to minimize any ‘edge effect’ from roads.

There are no other land use policy areas documented in the Crown Land Use Policy Atlas for Algonquin Park beyond what in already contained within the Algonquin Park Management Plan.

2.5 Social and Economic Description

Refer to supplementary documentation section 6.1.23 for the complete social and economic description for the Algonquin Park management unit.

2.5.1 Overview of Social and Economic Context

Algonquin Provincial Park plays a number of important roles: not only is it famous for its excellent recreation opportunities, but it is extremely important to the regional wood supply. The Algonquin Forest provides over 45% of the forest products harvested annually from Crown land in Southern Region.

There are fourteen communities (census sub-divisions) that receive substantial amounts of timber, chips, or other forest products from the Park or have substantial employment related to the forest industry: Bancroft, Englehart, Huntsville, Laurentian Valley, Madawaska Valley, Mattawa, Nipissing, North Algona Wilberforce, North Bay, Pembroke, Petawawa, Pikwakanagan (Golden Lake 39), Renfrew and South Algonquin.

There are also a number of Aboriginal communities that have interest and traditional values in the Park. Ten Algonquin communities have identified historical usage of the Park and were invited to participate in the forest management planning process: Bonnechere Algonquin First Nation, Mattawa/North Bay Algonquins, Whitney Algonquins, Antoine First Nation, Algonquins of Greater Golden Lake, Algonquins of Pikwakanagan, Snimikobi (Beaver Creek) Algonquin First Nation, Algonquin Nation Kijicho-Manito (Bancroft), Sharbot Obaadjiwan Algonquins and Ottawa Algonquin First Nation. Nine of the ten held a seat on the forest management planning team and were actively involved in the planning process.

2.5.2 Summary of Demographic Profiles

Demographic profiles for the fourteen communities (census sub-divisions) listed above can be found in supplementary documentation section 6.1.22 of this Plan. These profiles were derived from 2006 Statistics Canada census data. Also included are Local Economy Profiles (highlight importance of forestry to the economy of each census sub-division) and Aboriginal Profiles (highlight Aboriginal population within each census sub-division).

The following is a summary of these profiles for each community related to population trends (2006 census compared to 2001 census), community diversity (% Canadian born and % of population that is Aboriginal), average household income, employment by industry (highest occupation of labour force - %) and importance of forestry to each community (Employment Dependency Ration (EDR) – relative to provincial average of 1) and percentage of labour force working in the forest industry.

Bancroft – 6.12% decrease in population, 93.9% Canadian born and 11.6% Aboriginal, $49,764 average income, sales 28.4% of labour force, 6.867 EDR and 7.4% of labour force in forest industry.

Englehart – 6.33% decrease in population, 96.5% Canadian born and 5.6% Aboriginal, $49,389 average income, trades 25.5% of labour force, 10.857 EDR and 12.9% of labour force in forest industry.

Huntsville – 5.43% increase in population, 91.5% Canadian born and 1.9% Aboriginal, $66,782 average income, sales 29.6% of labour force, 5.908 EDR and 6.2% of labour force in forest industry.

Laurentian Valley – 6.1% increase in population, 95.1% Canadian born and 7.0% Aboriginal, $70,598 average income, sales 25.7% of labour force, 4.973 EDR and 5.7% of labour force in forest industry.

Madawaska Valley – 0.57% decrease in population, 91.4% Canadian born and 2.7% Aboriginal, $48,815 average income, sales 25.5% of labour force, 14.341 EDR and 16.6% of labour force in forest industry.

Mattawa – 11.76% decrease in population, 94.6% Canadian born and 23.6% Aboriginal, $43,833 average income, sales 38.7% of labour force, 15.209 EDR and 20.4% of labour force in forest industry.

Nipissing – 5.73% increase in population, 91.8% Canadian born and 5.2% Aboriginal, average income – not available, finance 22.1% of labour force, 2.261 EDR and 1.2% of labour force in forest industry.

North Algona Wilberforce – 4.11% increase in population, 95.1% Canadian born and 6.9% Aboriginal, $55,130 average income, trades 27.5% of labour force, 5.815 EDR and 4.4% of labour force in forest industry.

North Bay – 2.26% increase in population, 94% Canadian born and 6.0% Aboriginal, $59,525 average income, sales 33.5% of labour force, 0.831 EDR and 0.9% of labour force in forest industry.

Pembroke – 3.26% increase in population, 95.0% Canadian born and 7.8% Aboriginal, $52,025 average income, sales 32.3% of labour force, 3.550 EDR and 3.7% of labour force in forest industry.

Petawawa – 1.76% increase in population, 94.4% Canadian born and 5.2% Aboriginal, $70,502 average income, sales 51.4% of labour force, 0.909 EDR and 1.0% of labour force in forest industry.

Pikwakanagan (Golden Lake 39) – 8.35% decrease in population, Canadian born unavailable and 91.3% Aboriginal, $33,583 average income, sales 28.1% of labour force, 5.981 EDR and 11.4% of labour force in forest industry.

Renfrew – 1.21 % decrease in population, 96.6% Canadian born and 4.8% Aboriginal, $49,616 average income, sales 27.8% of labour force, 2.691 EDR and 2.8% of labour force in forest industry.

South Algonquin – 1.88% decrease in population, 93.6% Canadian born and 16.4% Aboriginal, $56,044 average income, trades 29.2% of labour force, 24.831 EDR and 26.2% of labour force in forest industry.

Forestry is very important to many of the communities listed above (Madawaska Valley, Mattawa, Pikwakangan and South Algonquin) as expressed in the employment dependency ratio and % of labour force working in the forest industry. In South Algonquin employment dependency in the forest industry is 24.8 times higher than the provincial average and 26.2% of the labour force works in the forest industry – a very significant reliance on employment in the forest industry. Some of the other communities have a more diversified economy and rely less on the forest industry (Petawawa, Renfrew and North Bay).

2.5.3 Industrial and Non-Industrial Uses of the Forest

Following is a short summary of the industrial and non-industrial uses of the forest organized by the following sectors; a) timber; b) recreation and tourism; mining, c) aggregate and hydro generation; and d) other. Refer to supplementary documentation section 6.1.23 for a more complete discussion.

a) Timber

Algonquin Park is unique in that there are no mills or communities actually within the Park. Wood flows from the Park to a number of surrounding mills and communities in the Pembroke, Bancroft, Parry Sound, Kirkland Lake and North Bay Districts and to Quebec. Wood from the Park is processed into veneer, lumber, poles, composite wood products and pulp with a small percentage going for firewood.

The sole Forest Resource Licensee for the Algonquin Park Forest is the Algonquin Forestry Authority. There are 14 mills that receive all or part of their wood supply from Algonquin Park through a recognized commitment/supply agreement with another 8-10 mills receiving periodic deliveries. Average volume harvested per year is approximately 500,000 m^3.

There are a significant number of people employed in forestry activities in Algonquin Park (logging, hauling, silviculture) and many more at the receiving mills. Refer to section 3.11 for more discussion on the economic contribution of forestry activities in Algonquin Park.

b) Recreation and Tourism

The Algonquin Park Forest is located within the boundaries of Algonquin Provincial Park. Algonquin Park welcomes approximately 950,000 visitors annually (75% domestic, 15% overseas, 10% US). Visits include day trips, car camping, and backcountry excursions. Algonquin is a destination for wilderness and near-wilderness outdoor recreation activities, including canoe tripping and backpacking, along with brook and lake trout fishing in the spring months.

Algonquin Provincial Park contains three commercial lodges, six children's camps, and 305 cottage properties under private leasehold agreements. Two outfitters operate within the park, along with several contracted stores and campground facilities. In addition, several lodges, outfitters and similar facilities operate in the vicinity of Algonquin Park, and many of these rely heavily on business derived from the park's recreational opportunities.

c) Mining, Aggregate and Hydro Generation

As per the Provincial Parks and Conservation Reserves Act and the Algonquin Park Management Plan, prospecting, claim staking and mining are not permitted in the Park.

Aggregate extraction is permitted in the Recreation/Utilization Zone for the purposes of forest management operations.

There are no hydro facilities within the Park but Ontario Hydro does hold a land use permit for 1335 hectares of land for its transmission line and distribution lines.

d) Other

Algonquin Park supports a number of hunting and fishing activities. Since 1991, an Algonquin First Nation hunting agreement has been implemented for moose harvest on the park's east side. A regulated deer and moose hunt occurs in the southern-most townships (Clyde, Bruton and Eyre). Trapping occurs on 6 registered traplines in the Recreation-Utilization Zone of Clyde, Bruton and Eyre townships and on 19 traplines registered to Algonquin of Ontario in the East side of the park. Traditionally, these have not been heavily trapped. There are no baitfish operations in Algonquin Park as possession of live baitfish is prohibited. The park provides prime angling opportunities for brook and lake trout, along with several other fish species, and is a popular destination for anglers particularly in the spring months. Ontario Parks and the Algonquin Forestry Authority employ significant staff numbers who reside in adjacent communities and contribute to the economic well being of those communities.

2.6 Aboriginal Background Information Report

Supplementary Documentation section 6.1.7 contains the complete Aboriginal Background Information Report. The following is a summary of the use of natural resources on the management unit by Aboriginal communities and forest management related problems and issues for those communities.

There are 10 recognized Algonquin communities identified as having an interest in Algonquin Park. Nine of the 10 had membership on the Planning Team for this FMP and were involved in preparing a specific Aboriginal Background Information Report as detailed in the FMPM. (See Supplemental Documentation section 6.1.8 for more details on Aboriginal consultation for this FMP). At this time 3 communities have submitted their reports and the other communities continue to work on theirs. Three reports are on file from previous FMP efforts in Algonquin Park. Identification of Aboriginal values is of course a 'continual work in progress'.

The Algonquins of Ontario have a long history of use of the Algonquin Park area, it is their homeland. The Algonquins continue to use the natural resources in Park today for many of the same historical activities. The 10 Algonquin communities use the Park to some degree, some more than others depending on geographic proximity. Their uses are all very similar. These include moose and deer hunting, fishing, trapping, birch bark collection, gathering of food and water, medicinal plants, firewood, other collecting (spruce roots and gum, mushrooms etc.), berry picking and practicing of cultural ceremonies and activities. This is not an exhaustive list. More recently many Algonquins recreate in the Park and some Algonquins are now actively involved in all aspects of forest management activities in the Park such as tree marking, silviculture, road building and logging. During the 2007-08 fiscal year over 93,000 m3 of wood was harvested by Native contractors, over 1200 hectares were tree marked and over $3.7 million was paid directly to these contractors for their work.

There are some forest management related problems and issues identified by the communities. These problems and issues include; logging and trucking activities during hunting times, breaching of roads at watercrossings, availability of fuelwood, protection of birch trees, 'equal' harvesting rights/wood allocations/forestry opportunities for every community and more 'decision making' roles for the communities.

Through ongoing dialogue all of these problems and issues will continue to be addressed. The breaching of roads at watercrossings seems to be a focal point for many of the communities as road access is preferred. However for safety and liability reasons and protection of other Park values (species at risk, solitude, brook trout lakes) removal of watercrossings and access control are key measures to meet various standards, manuals and legislation.

It should be noted that the portion of Algonquin Park in the Ottawa River watershed has been subject of comprehensive land claim negotiations between Canada, Ontario and the Algonquins since 1992. Some input from the Algonquins during the FMP process is also

applicable or perhaps more applicable to the land claim process (i.e. beyond the scope of the FMP).

2.7 Values Maps

Values maps are a series of standardized maps produced by the OMNR in accordance with the requirements outlined in the Forest Information Manual (OMNR 2007). The values maps provide a summary of the geographical locations of known natural resource features, land uses and values for the management unit (hence known as MNR values).

A value is considered to be a known value when there is sufficient information to describe its geographic location and its basic features at the time of printing. The values maps are intended to be used primarily as background information for planning, and will also be used for display purposes to solicit additional information about natural resource features, land uses and values.

Also, where a known value may be affected by forest management activities, the Forest Management Planning Manual (2004) requires that a defined geographic area adjacent to the feature be established. The defined geographic area is called an "area of concern" (AOC). An operation prescription is developed for each AOC or group of AOCs to prevent, minimize or mitigate adverse effects of forest management operations on the value. Operation prescriptions for AOCs may be reserves (e.g. prohibition of operations), modified operations (e.g., specific conditions or restrictions on operations) or regular operations (e.g. in accordance with the silvicultural ground rules), individually or in combination.

Additional information regarding the development of operational prescriptions for AOCs associated with known values on the Algonquin Park Forest is provided in Section 4.2.1 Operational Prescriptions for Areas of Concern.

The values maps are created and maintained at the East Gate office of Algonquin Provincial Park. They are continually updated as information is assembled during the production and implementation of the Forest Management Plan.

Sources of information and methodologies used in the acquisition or collection of MNR values include field surveys, research, historical records, stakeholder information, publications, reports from the public, and data from other Ministries. MNR values information is stored in the Natural Resources Values Information System (NRVIS). NRVIS is a Geographic Information System (GIS)-based system for managing the storage of the digital data in a standardized format. MNR will update and provide the most current, relevant information available on MNR values for use in forest management planning.

Information on MNR values will be generally available to the public. However, certain values such as the location and description of Aboriginal values, cultural heritage sites, and Species at Risk may be considered "sensitive information" which, if released or portrayed on maps, may pose a threat to their existence, integrity, or health. MNR values considered to be "sensitive" shall not be made available or accessible to the public, nor will they be portrayed

on the values maps. These values include bald eagle nest sites, red shouldered hawk nest sites, wolf den sites, wolf rendezvous sites, wood turtle habitat, blanding's turtle habitat and brook trout spawning areas.

The Values Maps are found in Supplementation Documentation section 6.1.2. Each of these maps is shown at a composite scale of 1:150,000. A list of sources of information displayed on the maps can be found in Supplementary Documentation section 6.1.3. Along with source of information, the table contains information regarding data collection methodology and whether the data is complete, incomplete or missing.

Seven Values Maps have been produced that depict the following information (note some Values not currently present in Algonquin Park)

Table 4 Values Map Detail

Map Title	Values Illustrated
Natural Resources Features - Wildlife & Forest	Deer Calving/Fawning Sites Moose Calving/Fawning Sites Deer Wintering Areas Moose Wintering Areas Deer Staging Areas Waterfowl Staging Areas Nesting Sites Mast Producing Areas Mineral Licks Moose Aquatic Feeding Area Travel Corridor
Natural Resources Features - Fisheries & Wetlands	Fish Nursery Area Food Supply Area Headwater Spawning Area Thermal Regime of Waterbodies Fish Migration Route Provincially significant wetland
Resource Uses Values	Commercial Lodges Rental Cabins Potential Tourism Area Cottage/Residence Boat Cache Campgrounds Recreation/Access Point Recreation/Hunting/Fishing Camps Recreation Routes/Trails
Land Values	Aggregate Permit (active) Aggregate Permit (non-active) Crown Leases and Land Use Permits

Map Title	Values Illustrated
	Municipal Boundary Crown Land Federal Land Patent Land
Bear Management Areas	Bear Management Areas
Trapline Areas	Registered trapline Trapper cabin
Resource- Based Tourism Values	Recreation/Access Point Designated Interior Campsite Picnic Area &/or Beach Backpacking/Hiking Trails Cross Country Ski Trail Day/Interpretive Trail Dogsled Trail Mountain Bike Trail Portage Trail/Cart Track Snowmobile Trail
Cultural Heritage Values	Archaeological Potential Areas

3.0 LONG-TERM MANAGEMENT DIRECTION

3.1 Introduction

The long-term management direction for the management unit provides guidance for the levels of access, harvest, renewal and tending activities required to achieve the desired forest and benefits. In the development of the long-term management direction, management objectives and indicators were identified and analytical methodologies, models, and tools regarding forest regulation, social and economic assessment, wildlife habitat supply and landscape management were used. This information will be discussed in more detail in Sections 3.2.1 through 3.6. All of this information is used in developing a management strategy (Section 3.7) that balances social, economic, and biological objectives over the long-term.

The level of harvest, as well as the criteria used in the selection of harvest areas (sections 3.8 and 3.9), is established for the 10-year period of the Plan. These criteria are based on forest regulation, models and tools that determine the available harvest area for each forest unit on the Forest.

The long-term management direction also provides a means of assessing the sustainability of the management strategy through the measurement and monitoring of indicators that have been developed for each management objective (Section 3.10). These management objectives have been developed by the planning team and form the basis to develop and achieve the desired forest and benefits.

3.2 Current Forest Condition

The majority of the tree species in Algonquin Park range from tolerant (maple, hemlock, beech, balsam fir) to intermediate (white pine, yellow birch) in tolerance to shade. This fact lends the management of these species to the use of partial cutting silvicultural systems such as selection and uniform shelterwood. These forest management systems, which maintain canopy cover at all times, have a major influence on management strategies.

Approximately 16,000 ha in the northeast quadrant of Algonquin Park has received uniform shelterwood strip cutting. The cutting took place from approximately 1965 to 1974. At that time the Petawawa National Forest Institute (PNFI) was experimenting with strip cuts on the PNFI forests of approximately 66 feet wide which was considered narrow enough to be adequately shaded from the adjacent leave strips. The Ministry of Natural Resources in Algonquin Park used strips 100 feet wide. Areas were laid out in three sets of strips with the second and third strips to be cut when the first strip was adequately regenerated. Approximately ten percent of the strip cut area received the second strip cut. Strip cutting was discontinued in Algonquin Park in the early 1970's based on the results of post cut regeneration surveys. The method did work in many areas, however many of the strips did not regenerate well to the intended species of white and red pine. Poplar and soft maple are common on many of the strips as a result of a significant increase in light.

The Algonquin Forestry Authority assumed management responsibility in 1975 and since then approximately half of the strip cut areas have received subsequent harvesting up to 2005, using other silvicultural systems. The implementation of these other silvicultural systems is slowly removing the evidence of these strip cuts and is restoring a natural landscape pattern to these areas.

3.2.1 Forest Units

Forest Management Plan objectives are achieved by managing forest cover. Therefore, the main strategies to meet forest management objectives involve silvicultural methods for harvest, renewal and tending. In order to develop silvicultural strategies the management unit must be organized into forest units and the silvicultural ground rules defined.

Forest unit is a term that refers to an aggregation of forest stands for management purposes which have similar species composition, develop in a similar manner (both naturally and in response to silvicultural treatments), and are managed under the same silvicultural system. A working group summary is no longer provided in the FMP, however, the old FRI classification of working group continues to be used as the foundation for forest unit classification. Forest units are developed for management purposes and may be a working group or a combination of working groups or a working group subdivision or a combination of working group subdivisions.

Map 9 illustrates the distribution of forest units for the entire productive forest area within the Algonquin Park Forest. Section 2 of the Base Case Analysis package contains the forest modeling assumptions related to the forest units.

Map 9 Forest Unit Distribution

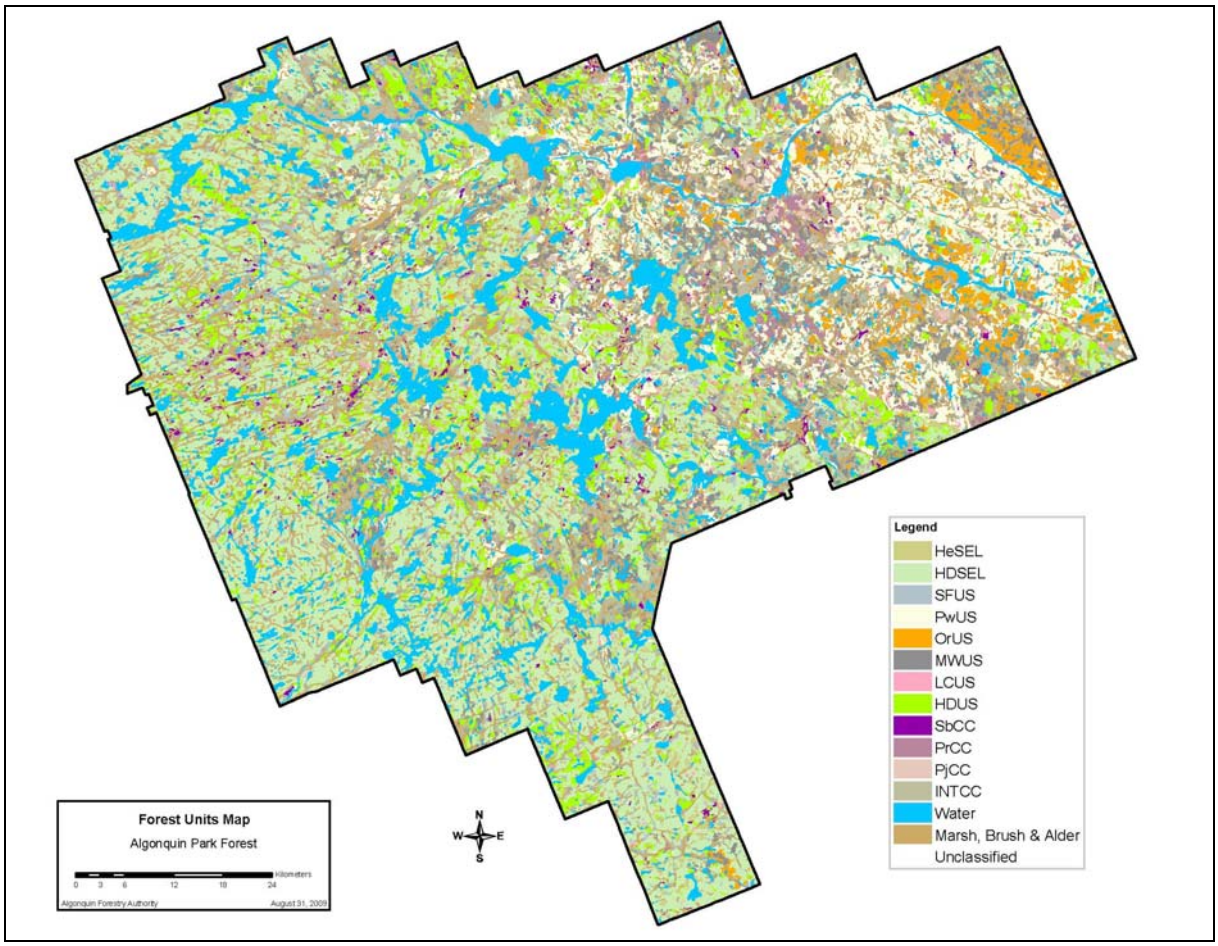
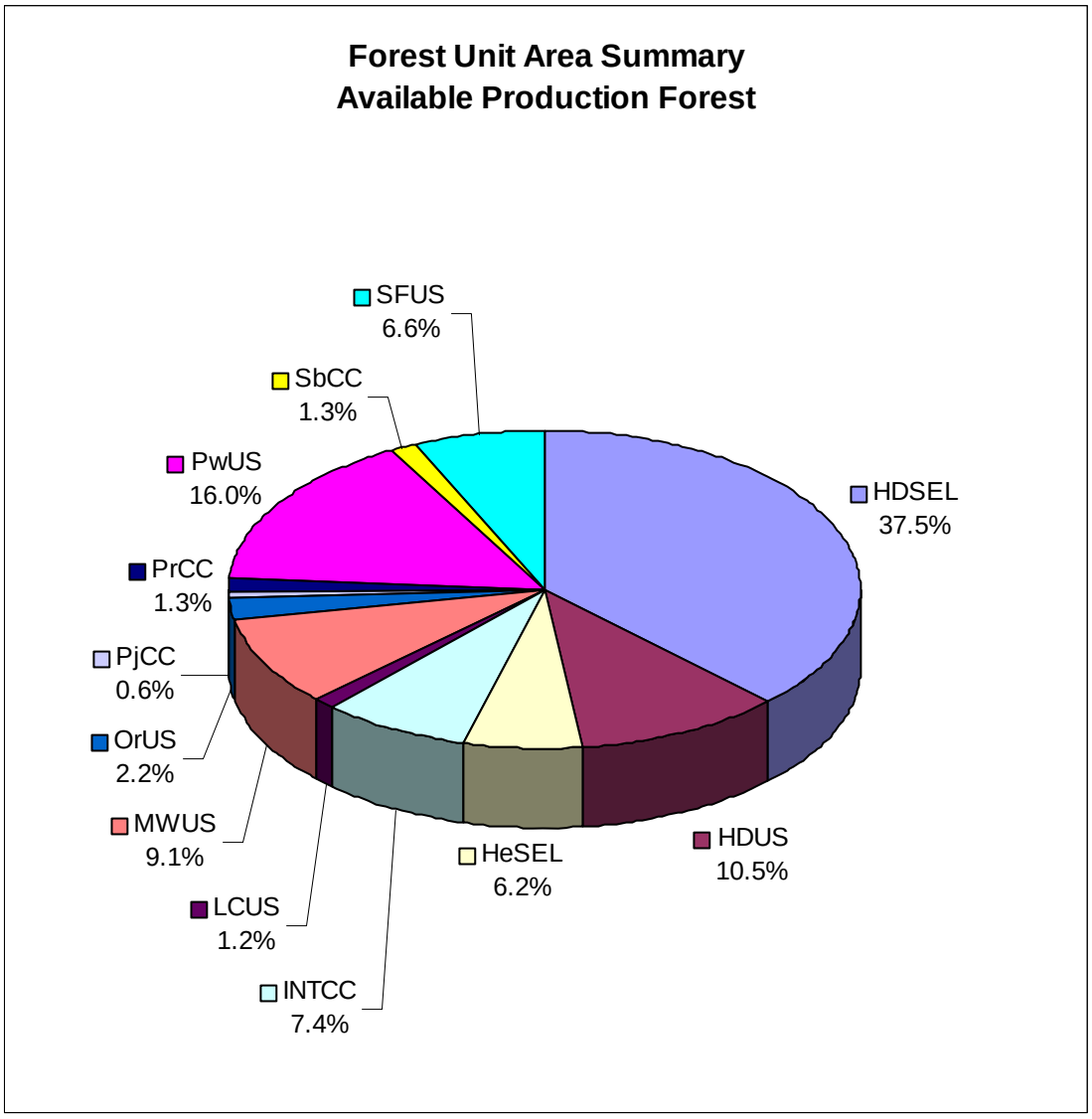


Table FMP-3 describes how the forest units were derived. FMP-3 also correlates the Algonquin Park forest units to the newly developed Provincial Forest Types (Forest Resource Assessment Policy, 2003). There are a total of 12 forest units; 2 selection forest units, 6 uniform shelterwood forest units and 4 clearcut forest units. The same forest units are being used as the 2005-2025 FMP. For recent depletion update areas (harvest and natural) forest units have been recalculated based on FMP-3 criteria. For the remaining area the forest units have not been changed from the 2005 FMP.

Table FMP-4 details the productive forest area by stage of management and 20-year age classes for each forest unit in the recreation/utilization zone of the Park to which this Forest Management Plan applies. The production forest area that is unavailable is identified separately and consists of bypassed areas (i.e. step slopes, inoperable areas) and AOC reserve areas that are unavailable for harvest and set aside for the protection of non-timber values. This classification of AOC reserves into the unavailable forest is new to this FMP (as opposed to classifying them as accumulating reserves in SFMM) and accounts for the loss of available production forest when compared to the 2005 FMP.

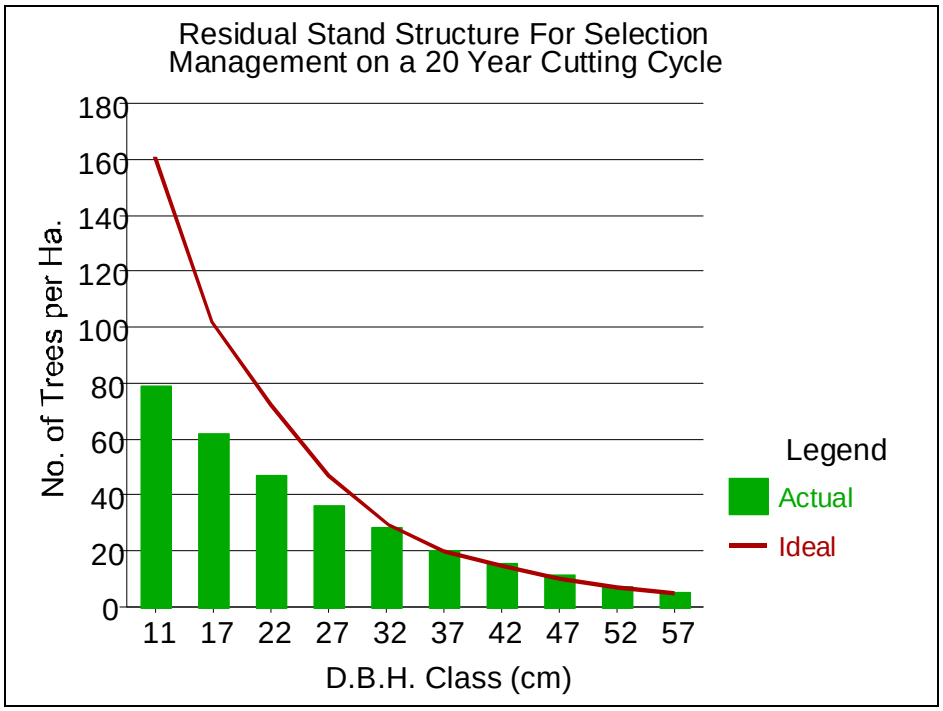
Figure 9 Forest Unit Area Summary



3.2.1.1 Hardwood Selection Forest Unit

The hardwood selection forest unit is the largest forest unit and comprises 158,150 hectares of the available production forest land base in the recreation-utilization zone. The forest unit is uneven-aged, but many stands still lack a sufficient polewood component. Quite often what is available in polewood has a significant portion with major tree defects. Figure 10 illustrates the ideal residual stocking levels versus estimated actual in the Algonquin forests.

Figure 10 Residual Stand Structure for Selection Management



This lack of polewood component is a result of previous highgrading harvests in the 1940s and 1950s. Because these harvests were generally light in nature, the canopy would close too fast, thereby restricting development of the sapling and polewood component. Many of the tolerant hardwood stands harvested in the 1960s were cut to a heavier extent, due to the development of markets for sugar maple and the use of diameter limits which allowed the cutting of many of the good quality trees.

The species that comprise this forest unit are shade tolerant to various degrees and allow for management by the selection (individual or group) management system. This silvicultural system retains forest cover at all times and provides the opportunity to develop quality hardwood in a relatively short term (20-40 years).

The hardwood selection forest unit is comprised of forest stands in the following working groups which do not meet the criteria for uniform shelterwood: sugar maple, other hardwood and beech.

The selection system is applied to those stands which have the potential to achieve an ideal selection structure over a period of 2 cutting cycles. This period of development is analogous to the process in even-aged management, whereby age classes are balanced, or idealized over a rotation. Identification of these situations is complex and requires consideration of site, stand structure, quality, access, economics and other potential uses of the area. Not all of these factors are quantifiable, but some objective criteria is used to guide the manager. Criteria used to identify the candidate areas for selection management: the stand or area must

have as a minimum, 6.9 square metres per hectare of good quality, tolerant species in 25 cm. diameters and up or 9.2 square metres, 10 centimetres and up.

This particular combination is chosen because it can be demonstrated that with this basic minimum the growth potential is sufficient to develop a stand which has 20 square metres per hectare of good quality, tolerant species in diameters 10 cm. and up (the ideal) by the end of the 2 cutting cycles, which is the development period. The growth also provides a minimum cut of 35 m3/hectare at each cycle.

The cutting cycle of twenty-five years is based on MNR and AFA growth data and estimated growth of current hardwood stands that have a more ideal diameter class distribution. This cutting cycle is the average expected, but it is also expected that some situations will warrant a fifteen year cycle and others as much as thirty to thirty-five years. Ongoing projects such as Forest Ecosystem Classification and hardwood growth and yield plot establishment will provide data which will be analyzed, in order to confirm or alter the current information on growth rates and cutting cycles.

This basal area growth (.4 m2/ha/yr) equates to approximately 1.6-2.0 cubic metres per hectare per year volume growth or 40-50 cubic metres per hectare over 25 years. Current yields in the tolerant hardwoods are averaging approximately 35-40 cubic metres per hectare. Therefore, current harvest levels are close to the 25-year growth in the selection forest unit.

Cutting in the first cycle is concentrated on the poorest quality trees, trees that interfere with the growth of crop trees and trees which have reached a maximum size. All trees will be designated for cutting or retention by marking them with paint. A quality class system which classifies trees as having crop tree potential or declining stock is used in both operational cruising and tree marking to direct the designation of residual versus harvest portions of a stand.

The best quality trees are left for the residual stand and in order for these trees to grow at projected rates, trees marked for removal must be harvested. The cutting of the stand is done in a way which minimizes damage to the residual forest.

Regeneration of hard maple is by natural means. The species reproduces aggressively from seed and also from stump sprouts. Marking of the stand will ensure openings are no greater than the height of the surrounding stand, to maintain the balance needed between light and shade.

Where yellow birch or red oak regeneration is desired, marking follows the group selection method which produces the additional light needed for regeneration of these mid-tolerant species. Yellow birch seed requires a seedbed of mixed mineral soil and humus for good germination. If this does not result from logging, supplementary scarification is necessary. Additional seed may also be sown where necessary to insure the establishment of yellow birch. Where practices for regeneration of mid-tolerant species in the HDSEL forest unit are undertaken, the HDSEL-MID silvicultural ground rule will apply.

3.2.1.2 Hardwood Uniform Shelterwood

Forest stands which do not have the minimum requirements of quality growing stock, as outlined for the selection system, and mid-tolerant hardwood stands, are managed under the uniform shelterwood system. This system involves the removal of the entire stand in two cuttings. Natural regeneration is established under the protection of the older stand and is released when the new crop is ready to fully occupy the growing space. The predominate working groups that make up this forest unit are red maple, ash, yellow birch and site class 3 maple. The hardwood uniform shelterwood forest unit accounts for 44,299 ha of the available production forest area or 10.5% of the total.

The first cutting concentrates on removing the most defective and less vigorous trees and leaves the best quality as the residual to furnish seed, protect the seedlings that will develop, and continue to grow at an improved rate. This first cutting removes approximately sixty percent of the stand volume. The most important factor is to leave a residual canopy which admits about 40 per cent of full sunlight (60% crown canopy closure).

The second cutting takes place after regeneration is established and before it shows the effects of suppression. Generally there is twenty years between the first and final felling.

It is important to note that some hardwood uniform shelterwood stands have between 4.6 and 6.9 m2 of basal area per hectare, 25 cm + of crop quality trees. Most of these forest stands will be moved into the selection forest unit in future forest management plans.

The hardwood uniform shelterwood forest unit presents opportunities for immediate cuttings such as thinning and release work.

Thinnings are applied in polewood stands when they reach 70-90 years and are used to adjust stand densities in order to maximize growth. The present age class distribution indicates a relatively small area in this age class. Stands that benefit from thinning are treated where the cut material has a commercial value at least equal to the cost of removing the trees. It is expected that fuelwood, boltwood and pulpwood will provide the necessary markets. This is referred to as commercial thinning and is represented in SFMM as such.

Release cuttings are applied to younger stands to regulate species composition and improve the quality of the remaining stand. Limited area available in these age classes makes this type of tending a low priority in this period.

Improvement cuttings are made in older stands for the purpose of removing undesirable species or qualities. In the present situation, this type of cutting is so similar to the first cuttings being made as harvest cuttings under the selection system, that distinguishing between the two becomes difficult. The only distinction that can be made at this time is to label as improvement, those cuts which do not generate marketable material with a value equal to the cost of removing and delivering it to a buyer.

These situations change with time. Areas which would have met this definition five years ago are now subject to commercial logging operations which pay for themselves. Areas which meet the thinning definition in 2010 will possibly be commercially viable in the future as markets develop and the value of fibre increases.

3.2.1.3 Red Oak Forest Unit

This forest unit is comprised of all red oak working group stands, except for those that have a 40% component of white and red pine which are classified under the white pine forest unit. The red oak forest unit accounts for 9,372 ha of the available production forest area or 2.2% of the total.

Similar to the hardwood uniform shelterwood forest unit, the red oak forest unit will be managed under a two cut uniform shelterwood system. The intent is to establish a high component of oak regeneration which is best accomplished under the uniform shelterwood system. Once established, oak regeneration does not survive well in a suppressed environment and requires quick release. It is often desirable to accelerate the timing of the final removal cut to accomplish this. This has been represented in SFMM by using a 10 year delay period from first to final removal cut and has been represented as a disturbance patch after the final removal in the NDPETool model.

3.2.1.4 Hemlock Forest Unit

This forest unit consists of all stands in the hemlock working group where the hemlock component is greater than or equal to 40% of the species in the stand. The hemlock forest unit accounts for 25,990 ha of the available production forest area or 6.2% of the total and is managed using the group selection silvicultural system. In all tolerant hardwood stands, (selection and hardwood uniform shelterwood forest units), patches of hemlock .04 hectares and greater will be managed this way.

The dense canopy formed by concentrations of hemlock causes less snow to accumulate on the ground and provides good winter shelter for deer and moose. Recent deer inventories, however, indicate little over-wintering by deer in the park and this is providing some relief to the browsing pressures of the past on this species.

This forest unit can be managed under the group selection or uniform shelterwood systems. The group selection approach will be used in this Forest Management Plan as it was in the previous FMP. This approach allows for more frequent entries into the stand over time, in order to ensure that regeneration is established and is released to allow for rapid recruitment into the upper canopy above ungulate browsing height. Sporadic, small openings in a mature forest canopy leads to an uneven-aged structure and favours hemlock to an extent that it becomes the dominant species in the stand if it is not already.

To maintain the same proportion of hemlock on the landbase, the group selection method is preferred. The maintenance of hemlock is consistent with the policy of maintaining the diversity of vegetation types and the need to maintain hemlock for wildlife habitat. The

advantages of the group selection system in hemlock include maintaining the hemlock forest in a mature condition and fostering structural features important for biological diversity, such as canopy gaps, vertical foliar stratification and large snags and logs. Both single tree and group selection can promote these characteristics. Small group selection openings are preferred because they more adequately stimulate regeneration. Large group openings may result in hemlock seedlings being overtopped by yellow birch which responds much more vigorously to increased light availability.

Harvesting will discriminate against hardwoods and leave high levels of hemlock basal area (32 square metres per hectare). Scarification is desirable to prepare seedbeds and destroy advance hardwood regeneration. Good seedbeds are mixed mineral soil and humus. Hemlock is normally a prolific seed bearer every two to three years in mature stands. If required, hand seeding at 1.1 kilograms per hectare will improve the stocking. If seeding is done in the spring, the seed requires 90 days of cold, moist stratification. If fall seeded, stratification is not necessary. The optimum germinating temperature for hemlock seed is approximately 15° celsius.

Subsequent harvests will occur in about 25 five years time once the regeneration is well established. The irregular composition and structure of many hemlock stands may allow for a shorter cutting cycle as long as overall hemlock shelter is not reduced. A cutting cycle of 25 years and a growth rate of .35 m2/ha/yr have been used in the SFMM model.

Tending is not a priority in this planning period, because of low levels of sapling and polewood stands. The priority for silvicultural program in this forest unit is to establish regeneration and have it recruited into the sapling stage and beyond browsing size.

Newly germinated seedlings are easily smothered by the leaf fall of tolerant hardwoods and shallow rooting leaves the seedlings susceptible to drought. The best seedbed is mixed mineral and organic soil. Scarification will occur where hemlock regeneration is not satisfactory. Care must be taken to stay far enough away from residual trees so as not to damage the shallow root systems of hemlock. In areas with a higher residual stocking, small equipment will be used to pull drags for site preparation.

The species is quite tolerant of shade and seedlings can survive with only 20% of full light. Saplings also tolerate shade, but grow much better in light to medium shade or even full sunlight. Suppressed saplings respond well to release even at advanced ages.

Hemlock is sensitive to sudden changes in the density of the stand which cause soil drying and attack by wood borers on weak trees. The cutting method must leave high levels of basal area to provide sufficient seed source, shade and moisture.

3.2.1.5 White Pine Forest Unit

The white Pine forest unit occupies 67,381 hectares of the available production forest area (16.0%) and is the second largest forest unit. This forest unit is comprised of all the white pine working group, red pine stands that are less than 60% stocked to red pine with a high white

pine component and other working groups with a white and red pine component greater than or equal to 40%.

Ninety percent of the area is in the age classes eighty-one years and greater and many of these stands have received a seeding harvest or a first removal. As these areas receive a final removal harvest they will be re-classified into the younger age-classes.

White pine is found on a wide variety of sites in association with red pine, white spruce, jack pine, red oak, aspen and white birch. The majority of this forest unit is located on the Ottawa lowlands in the eastern portion of the unit. Fine sands and silty sands are the preferred soil types. On the western Precambrian Uplands, the species is more intermittent, growing in association with tolerant hardwoods on moist tills and loams where it often achieves its largest diameters, heights and best quality.

Information on the growth of white pine managed under the uniform shelterwood system in Algonquin Provincial Park is illustrated in Table 5. This data comes from the publication White and Red Pine Volume Growth Under Uniform Shelterwood Management in Algonquin Park, (Puttock G.D. and Bevilacqua E., 1994). Results from the study indicate that an average white pine stand (composed of 70% pine after harvesting and on Site Class II), the periodic annual increment (P.A.I.) for the first 15 years after harvesting is .65 square metres/hectare of basal area per year. This basal area growth of pine equates to 4.58 gross merchantable cubic metres per hectare per year volume growth (4.4 net cubic metres) or 66 net cubic metres per hectare over 15 years.

Table 5 Growth of an Average White Pine Stand Managed Under the Uniform Shelterwood System in Algonquin Park

Site Class	Gross Merchantable Volume			Basal Area		
	P.A.I. (for 15 years after harvest) m^3/ha/year			P.A.I. (for 15 years after harvest) m^2/ha/year		
	Total	Pine	Other	Total	Pine	Other
I	6.33	4.77	1.56	0.59	0.59	0.00
II	6.07	4.58	1.49	0.65	0.65	0.00
III	5.66	4.28	1.38	0.73	0.75	0.00

Overall the results suggest "that red and white pine stands in the park experience continually increasing volume growth following uniform shelterwood harvesting over the 40 to 130 age range". (Puttock and Bevilacqua, 1994)

The uniform shelterwood system has been applied to this forest unit since 1975.

Regeneration of white pine using the uniform shelterwood system will include provisions to deal with two major requirements of the regeneration process - availability of seed and management of sunlight and shade.

Characteristics of an "average white pine stand" are:

i) composed of 70% pine (based on basal area) after harvest
ii) average age of residual pine is 90 years
iii) residual basal area of all species is 20 m^2/ha

When stands reach the 61-80 age class the first of four uniform shelterwood cuts is applied. The purpose of this cut is to provide space for the development of large seed producing crowns on the residual pine. Intolerant hardwoods, defective pine, some spruce and balsam and pine competing with other pine having greater potential to produce seed are removed. This cut also helps to develop favourable seed beds by allowing more sunlight and moisture to reach the forest floor which tends to accelerate the decomposition of thick humus layers.

The second cut occurs about twenty years later when the stands are 81-100 years old. Its primary purpose is to leave a residual pine stand that provides seed to establish the new stand. This seeding cut favours the retention of high quality seed bearers and opens up enough growing space for a new crop to establish. Volumes removed will vary with the basal area in the stand. Current practice usually removes 30 - 50% of the basal area and up to 50% of the volume. The cut should, where practical, occur during a good seed year and site preparation is needed on some sites to ensure a proper seed bed. The requirement to return to such areas when seed crops appear is a major reason for maintaining a road system which permits this.

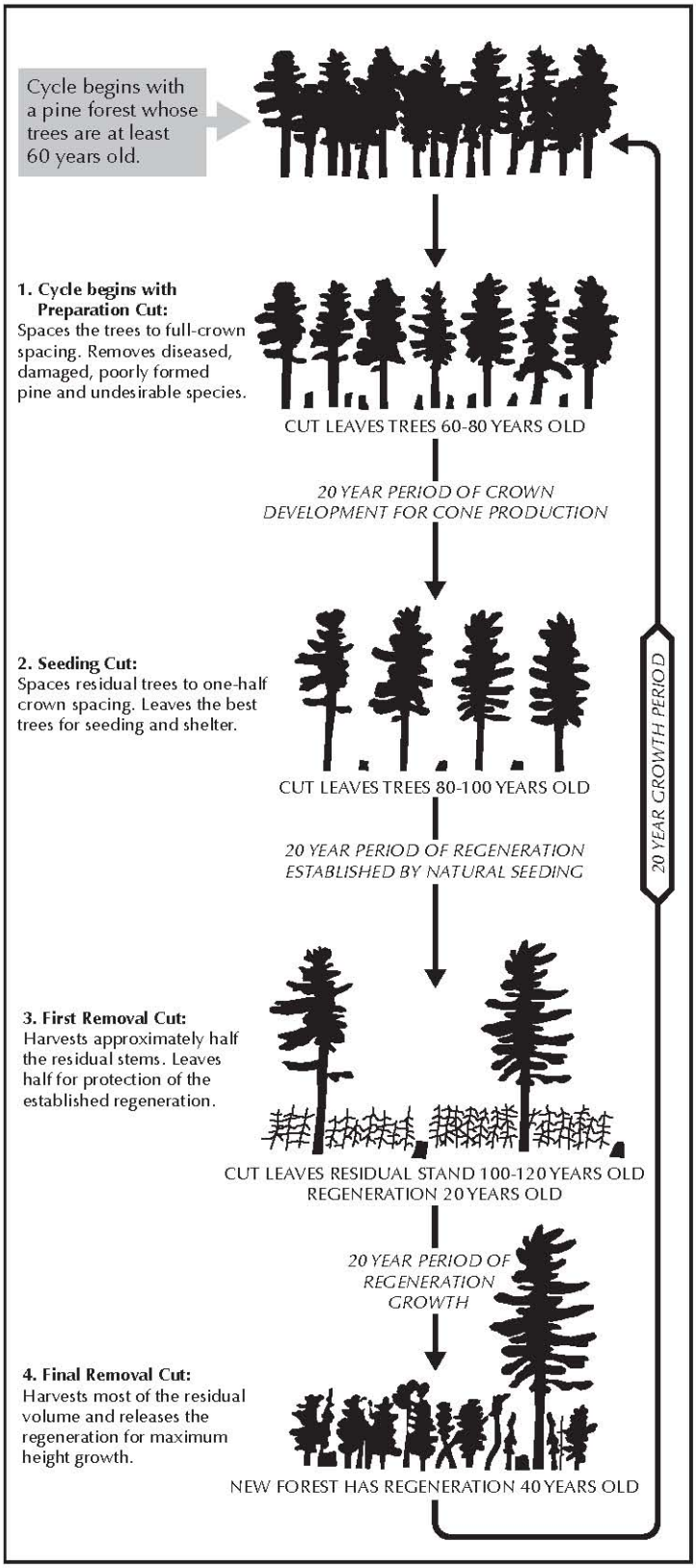
The seed producing residual stand also provides the necessary shade to control the incidence of white pine weevil and moderates the drying effects of sun and wind on the seed bed. Shade also helps to control the growth of vegetation such as intolerant hardwoods which compete strongly with new pine seedlings.

Under ideal circumstances white pine regenerates naturally following a seeding cut as described. Ideal circumstances do not exist in all cases. For these less-than-ideal situations, some combination of site preparation, hand seeding, planting, and control of competition is required. Whether it is established naturally or artificially, the pine regeneration must be established before proceeding to the next step of harvest or removal cuts.

The first removal cut normally occurs when the pine stands are 100-120 years of age and the advanced pine growth is between 30 cm and 1 metre in height. The final felling occurs about twenty years later when the new stand is established (total height of 5-6 metres) and ready to fully occupy the stand.

Logging activities for the last two cuts have to pay particular attention to minimizing damage to the new stand. This is done with careful planning and if adequate regeneration is present, some losses are bearable. In some cases, dense clumps of pine benefit from a thinning of their numbers. Figure 11 below illustrates the 4 cut uniform shelterwood system used in the PWUS forest unit.

Figure 11 Uniform Shelterwood Management of White Pine



It is important to note that although the four cut uniform shelterwood system is based on age groupings for each stage of harvest, the forest structure based on stocking and height of the advanced growth determines when a given harvest should occur. For example, a 90 year old pine stand that has 60% stocking and the white pine regeneration is between 30 cm and 1 metre is eligible for a first removal cut.

The white pine forest unit has ninety percent of its area in the age classes 81 years and up. Because of this age class distribution the forest has gone past the preparatory cuts and is in the seeding cut stage. For this reason a three cut uniform shelterwood system is often used.

Tending operations such as cleaning, clipping, pruning, and thinning are procedures which may be used to obtain the maximum growth and quality of pine possible. Presently, clipping and pruning are not performed here.

Cleaning may be applied to those young stands of pine which are overtopped by species such as poplar and white birch.

Where white pine weevil infests the leaders of young

white pine, clipping off these leaders can provide a measure of control. This is a labour intensive process, however, and is practical only for small areas.

Pruning is most effective on trees averaging 10-15 centimetres in diameter, confined to the first 4.9 metre log of the tree, and concentrated on no more than 615 crop trees per hectare.

Barren and scattered areas have been examined and where necessary, will be planted, to bring them up to the stocking standards for the white pine forest unit. All white pine areas of heavy blowdown from the July 2006 wind storm have either been naturally or artificially regenerated.

The silvicultural system outlined for this species uses a rotation age of 140 years and intervals between cuts of 20 years. These figures are used with the knowledge that a shorter rotation and fewer years between cuts could be adequate in many cases. The 140 year rotation and 20 year intervals are used to provide the maximum of opportunities for seed fall, germination, and early growth under the protection of a residual stand. If regeneration can be obtained and become established in shorter periods of time, a revision should be considered for both rotation age and cutting intervals. Such a revision should only be made on the basis of established results.

3.2.1.6 Red Pine Forest Unit

The red pine forest unit occupies 5,586 hectares or 1.3% of the total available production forest area. This forest unit is comprised of all stands in the red pine working group that have 60% or greater stocking to red pine.

Red pine is found in association with the same species noted for white pine except tolerant hardwoods. It has a greater tendency than white pine to occur in pure stands. The species occupies generally drier and coarser soils than white pine. The soil PH it prefers is 5.0-6.5 which is a narrower range than white pine.

In areas of relatively pure red pine, the seed tree system is employed, leaving windfirm red pine, either singly or in groups, on each hectare. Ideally, logging should be conducted before the ground is frozen to provide some seed bed preparation. Care must be taken to avoid damage to the root systems of seed trees which would make them more susceptible to wind throw.

Scarification will be required in many instances with drag type equipment or straight blading with bulldozers. When seed crops fail, or germination is not adequate to properly stock the area, planting with good quality nursery stock is done before the site prepared areas are lost to competing brush. Planting is recommended rather than seeding because it is more certain of success than seeding.

Tending operations such as thinning and pruning are applicable in some cases. Pre-commercial and commercial thinning have been represented in SFMM for the red pine forest

unit. Commercial thinning areas are identified in FMP-15 and pre-commercial thinning area is identified in FMP-21.

The barren and scattered areas have been examined and where feasible planted to bring stocking levels up to the standard for the forest unit.

3.2.1.7 Jack Pine Forest Unit

This forest unit occupies 2,399 hectares or 0.6% of the production forest land in the recreation-utilization zone. All jack pine working group stands comprise this forest unit.

Jack Pine grows on dry, sandy soils in pure stands and in association with the spruces, balsam fir, poplar, white birch and red pine. White pine is often present as advanced regeneration under pure jack pine stands.

Jack pine is very intolerant to shade and regenerates and grows best in open sunlight. The clear cutting system is used with the shape of the cut boundary tailored to terrain, surrounding stand configuration and natural disturbance pattern emulation (fires). Jack pine historically evolved as a fire dependent species with natural fire cycles of approximately 70 years. Prescribed burning has been identified in this Plan as a silvicultural option to treat this forest unit.

Regeneration is most often obtained by site preparing areas (mechanically) of cone bearing slash. On dry or fresh sites, planting of jack pine is done to insure restocking to pine.

Thinning of young stands (21-40) may be carried out on the better sites, particularly where the thinning have some commercial value to offset the cost of the operation. Barren and scattered areas will be regenerated where feasible. The uniform shelterwood system will be applied, in some instances, where there is a well established white pine understory and there is no hope of maintaining the site as jack pine.

3.2.1.8 Intolerant Forest Unit

This forest unit occupies 31,343 hectares of the production forest area or 7.4% of the total. Poplar and white birch working group stands with a stocking of 70% and greater poplar and white birch make up this forest unit.

Age class distribution for the intolerant forest unit shows that 75% of the area is 81 years of age and greater. The poplar stands are well past rotation age. Site class one and two are expected to produce white birch veneer, sawlogs, pulpwood and a rotation of 65 years. Site class three produces primarily pulpwood on a rotation of 65 years.

Clearcutting is the most effective method to manage this forest unit. Poplar and white birch are intolerant to shade and regenerate vegetatively from root suckers, root collar sprouts, and stump sprouts to produce new even-aged stands. Supplementary regeneration is not normally necessary.

The size and shape of clearcuts will be planned to emulate natural disturbance patterns and controlled to avoid the creation of large open areas which are undesirable for regeneration, wildlife and aesthetics. Experience indicates that large clear cuts do not happen. Other forest units being managed with the uniform shelterwood system intersperse these stands. Residual pine and spruce are left as a seed source and maintain tree cover within the poplar areas. In areas with significant white pine regeneration present in the understory, a shelterwood canopy of poplar is maintained for shade, and also for protection during harvest. Stands of concentrated pure poplar or white birch also maintain a residual forest component after harvest, as per the Natural Disturbance Pattern Emulation Guide. Adjacent areas of a similar nature are harvested, only when the previous cut has regeneration established to a height of three metres. Clearcutting will generally not occur within the modified area on an Area of Concern. Tending is not planned in this forest unit.

3.2.1.9 Spruce-Fir Forest Unit

The spruce-fir forest unit includes stands from the spruce, black spruce, white spruce and balsam fir working groups and excludes those stands that are included in the white pine and black spruce forest units. Balsam Fir is adaptable to a variety of soils and occurs throughout the unit occupying lower slopes where moisture is plentiful, and upper slopes where soils are sandy and relatively dry.

This forest unit occupies 28,010 hectares or 6.6% of the production forest area. Eighty-seven percent of the area is in the age classes 61 years of age and older.

This forest unit will be managed under a two cut uniform shelterwood system. White spruce is found in association with yellow birch, white and red pine, balsam fir, black spruce, and maple. When species such as white spruce, white and red pine are growing within balsam fir stands within this forest unit, and where they have better potential than balsam on the site, they are retained rather than balsam fir, as a seed source. Where the establishment of natural regeneration appears doubtful, because of an early invasion of grasses and shrubs, planting of white spruce and red pine is necessary. Maintenance of this diversity is the aim of management.

Where natural regeneration does not develop in five to seven years, planting of vigorous nursery stock is required. This option is exercised first on those deep, well-drained soils where the species has demonstrated the ability to perform well.

Tending is not a priority in this forest unit. Barren and scattered areas are to be planted with white spruce and red pine.

3.2.1.10 Black Spruce Forest Unit

Black spruce most frequently occupies the lower elevations where water tables are high, such as along waterways, lower slopes, and sphagnum bogs. It grows in relatively small, pure stands or in association with balsam, tamarack, cedar and black ash. Black spruce accounts

for 5,515 ha of the available production forest in the recreation/utilization zone or 1.3% of the total production forest area.

Black spruce will be managed under the clear cut silvicultural system. Natural regeneration should be obtained in five to seven years. If adequate regeneration is not apparent after this time, supplementary planting will be required.

3.2.1.11 Lowland Conifer Forest Unit

This forest unit occupies 5,169 hectares or 1.2% of the production forest area. It is comprised of stands from the cedar and tamarack working groups.

White cedar is the predominant species. The species grows in wet, low-lying areas and also on very shallow dry soils that are underlain with limestone. Cedar prefers neutral to alkaline soils, but soils of this nature are not abundant in the area.

White cedar grows in association with tamarack, black spruce and balsam fir on the very wet areas and with white pine, yellow birch and hemlock on the moist, but better drained soils.

A two cut uniform shelterwood system is applied, where the regeneration cut reduces crown closure to 60%. Regeneration is natural. Tending is not anticipated.

3.2.1.12 Mixedwood Forest Unit

This forest unit is comprised of a mixture of species such as poplar, white birch, white and red pine and tolerant hardwoods. It occupies 38,172 hectares or 9.1% of the available production forest area in the recreation/ utilization zone. Stands in poplar and white birch working groups that do not meet the criteria for either of the tolerant hardwood forest units, white pine, or intolerant forest units make up the mixedwood forest unit. A two-cut uniform shelterwood system is used to maintain this species diversity. Regeneration is natural and tending is not anticipated.

3.2.2 Habitat

Habitat suitability models for forest dependent wildlife species (Holloway et al 2004) are incorporated into SFMM and are used to predict the effects of the Proposed Management Strategy on the habitat supply for provincially and locally featured species and the selected wildlife species (see Section 2.2.4 for a discussion of these wildlife species and their habitat requirements). These models are based on ecosites in the Great Lakes-St. Lawrence Forest. Ecosites are mapping units, which represent a consistent set of vegetation and site conditions; the ecosites used are according to the Field Guide to Forest Ecosystems of Central Ontario (Chambers et at 1997). SFMMTool is used to assign an ecosite to each stand based on species composition from the Forest Resources Inventory.

The habitat suitability matrix in SFMM (from Holloway et al 2004) assigns a suitability rating of value of not used, used or preferred for any given modelled wildlife species based on stage of development (e.g. presapling, sapling, immature, mature, old, two-aged or uneven-aged) and ecosite. Forest units are comprised of a number of ecosites, some of which provide preferred habitat for a given species while others do not. SFMM identifies the portions of each forest unit that are comprised of ecosites that are preferred habitat for a given wildlife species. These models are non-spatial, that is, they do not take into account habitat interspersion, heterogeneity, fragmentation and special habitat components.

The natural benchmark scenario was created and used to establish desirable levels and associated targets in the setting of long-term wildlife habitat objectives, as presented in Table FMP-8 and FMP-13, and as discussed in Section 2.2.4. A number of scoping investigations were completed looking at the impact of wildlife targets on the long-term management direction. The associated targets for wildlife habitat (FMP-13) were established as constraints in the SFMM model to ensure that preferred habitat levels were maintained throughout the 100-year planning horizon. The scoping investigations completed for preferred wildlife habitat are presented in Supplementary Documentation Section 6.1.6 (Analysis Package – section Checkpoint #4). The preferred habitat projections for these and the other wildlife habitats identified above are detailed in Table FMP-8 and graphically in Appendix I of the Analysis Package.

A further test of objective achievement is done through the use of Ontario Wildlife Habitat Analysis Models (OWHAM), a package of spatially-explicit habitat suitability models available for 5 wildlife species in the Great Lakes-St. Lawrence Forest. The species modelled for this Forest Management Plan are pileated woodpecker, red-shouldered hawk and moose. OWHAM runs as an extension to ArcView which uses a shapefile of the FRI as well as other shapefiles (e.g. roads). OWHAMTool modifies the database attached to the shapefile in order to prepare it to run OWHAM and is used to “grow” the forest as well to make changes to forest parameters such as age, stocking and height. This is done so that comparisons can be made between the current forest condition and the condition of the forest at the end of the planning period.

For pileated woodpeckers and red-shouldered hawks, comparisons were made between estimates of used and preferred habitat between what is currently available and what is projected to be available after planned depletions are made between 2010 and 2020. For pileated woodpeckers, a spatial desirable level and target were set based on SFMM trends and projections. For red-shouldered hawks, a spatial habitat desirable level and target of no net loss of preferred habitat were set. For moose, comparisons were made between the total carrying capacity (K) between 2010 and 2020 and a desirable level and target of no net loss were set based on social considerations. OWHAM was not used for white-tailed deer in this FMP because aerial inventories have confirmed that there are no winter deer yards in the Park and deer is no longer a featured species in Algonquin Park.

Refer to Appendix K in the Analysis Package (supplementary documentation section 6.1.6) for an overview of the spatial habitat supply analysis completed, including modeling assumptions made, results and discussion, and maps showing spatial arrangements for 2010

and 2020. Maps showing habitats of special interest, including moose aquatic feeding areas, nesting sites and other wildlife values are located in Supplementary Documentation 6.1.2.

3.2.3 Forest Landscape Pattern

Forest management planning and the Forest Management Guide for Natural Disturbance Pattern Emulation (NDPEG), requires that the forest practices proposed in this management plan should attempt to emulate or follow the landscape pattern that would have been created naturally through events such as forest fires. This pertains primarily to those stands proposed for the clearcut and shelterwood silvicultural systems within the plan. Implementation of the NDPEG requires an evaluation of the frequency and size of historical fire events using the best available information available. This is done using historical fire data collected by the Ministry of Natural Resources (refer to section 2.2.6). Where possible, forest management activities will be proposed that attempt to create a landscape pattern (through harvesting) that move towards what would occur naturally.

Evaluating Landscape Patterns - Determining Size and Frequency of Disturbances

An analysis of forest disturbances over the landscape was completed comparing the current condition at planning term start (2010) to the end of the planning term (2020). This analysis looked at how the size and frequency of planned disturbances at the end of the planning term approached the Natural Disturbance Frequency Template.

The analysis was carried out through the use of the NDPEGTool made available to the Planning Team by the Ministry of Natural Resources. This tool analyses the landscape and evaluates previous harvested area and fire events based on minimum distance, stocking, height and age criteria (see below) between each event. Based on these criteria, these events are grouped together and classified according to size. The tool then incorporates planned harvest activities and compares past fires and harvest areas to areas proposed for harvest during the plan term. “Forest disturbance perimeters” are then determined by NDPEGTool using rules that evaluate whether groups of past fires and harvest areas are collectively considered a disturbance. These rules are summarized below in Table 6.

Table 6 Calculating Forest Disturbances

Planning Period	Calculating a Forest Disturbance Perimeter	Calculating a Planned Forest Disturbance
Plan Start (2010)	• Past harvest and burned areas • Areas <200m apart, <3m in height & <0.3 stocking • <20 years old • includes all non-forest (water, meadow, etc.) • includes forested areas that are sufficient in age, height and stocking to not be considered a disturbance	Not Applicable (at plan start the current forest condition cannot be changed)

Plan End (2020)	• Past harvest and burned areas • Areas <200m apart, <3m in height & <0.3 stocking • <10 years old and harvest areas as planned in the FMP • includes all non forest (water, meadow, etc.) • includes forested areas that are sufficient in age, height and stocking to not be considered a disturbance	• Past harvest and burned areas • Areas <200m apart, <3m in height & <0.3 stocking • <15 years old and harvest areas as planned in the FMP • does not include non forest • includes forested areas that are sufficient in age, height and stocking to not be considered a disturbance

The new planning inventory was used as a basis for the disturbance analysis and reflects all updates as described in supplementary documentation section 6.1.5. All of the areas proposed for harvest under clearcut forest units including the PJCC, PRCC, INTCC and SBCC forest units were considered forest disturbances in the analysis for Plan Start. As well, ORUS final removal shelterwood cuts were also considered forest disturbances as it is expected that removal cuts will occur sooner than shelterwood forest units (and thus oak regeneration will be less than 6m tall) due to the light demands of oak and need to release at a younger age.

The specific forest disturbance perimeters generated through the use of the NDPEGTool for Plan Start and Plan End are identified on a composite scale map by a unique disturbance number in Supplementary Documentation 6.1.2. The analysis package supplementary documentation (section 6.1.6) Appendix K, provides a summary of the NDPEGTool results indicating the frequency distribution for the Algonquin Park Forest Template at Plan Start (2010) and Plan End (2020). A Disturbance Areas Summary Map for Plan Start and Plan End is included in supplementary documentation section 6.1.2.

Movement towards the regional template was accomplished in five of the six size classes. The frequencies of the two smallest size classes are very close to the median template values. The next two size classes are above the median template value, with the 71 to 130 hectare size class showing a slight movement away from the median template value. The two largest size classes have frequencies below the median template value, but both show movement toward the median. Overall this forest diversity objective and target has been met. The results of this assessment are also presented in table FMP-12.

Implications of Forest Landscape Patterns on Forest Management

Movement of disturbances in terms of size and frequency towards the Algonquin Park Forest template was achieved primarily through allocation planning. Efforts were made to increase in the number of larger sized disturbances created although opportunities were limited due to the limited amount of planned clearcutting. Amalgamation of smaller disturbances with new occurred where possible in order to increase the size of disturbance patches and move towards the template. However many of the smaller disturbances (0-10 ha size class primarily) occur in landscapes dominated by forest units where harvesting is not considered as disturbance according to NDPEG parameters, so amalgamation is not possible.

Operational and planning constraints also limited the ability to plan in such a manner as to move the % frequency of disturbances towards the template in all size classes. These constraints included heterogeneity in terms of location, size and type of stand types/forest units, the objective of allocating as much of the AHA as possible based on appropriate age class/ stage of management by forest unit and planning logical harvest blocks and distributing the AHA throughout the forest proportional to traditional woodshed areas.

Spatial Landscape Pattern – Sliding Scale Assessment

A sliding scale assessment was required to ensure that the separation distance of harvested and natural forest disturbance areas are greater than the average separation distance requirements by size class. This assessment was carried out using NDPEGTool and the results are identified in supplementary documentation 6.1.6, Appendix K, section 3. The sliding scale objective has been met by the end of Plan Term.

3.2.4 Other Forest Classifications

There were several other forest classifications that were considered in the development of the strategic direction of the Plan.

The most prominent was the ecosite classification of the forest by SFMMTool Version 3.0.13. This classification formed the basis for the connection between the forest units and the habitat for species modelled in the SFMM. Details regarding this relationship can be found in the analysis package, section 6.1.6. Ecosite distribution across the Algonquin Park Forest is also displayed on Map 8 in section 2.2.1.4.

Cultural heritage resources information, including archaeological potential areas and a summary of Aboriginal Background Reports, are located in Section 2.2.5 and Section 2.6. Archaeological potential areas can be found on the operational scale harvest maps in section 6.1.2. These areas influenced some of the decision making related to the selection of harvest operations on the Forest.

3.3 Silvicultural Ground Rules

Silvicultural Ground Rules (SGRs) have been developed that identify the current forest condition, silvicultural system, future forest condition, development information, management standards, regeneration standards, as well as the most common and acceptable alternative silvicultural treatments for each specific forest unit - ecosite combination on the Algonquin Park Forest. All of the most common and acceptable alternative silvicultural treatments included in the SGRs are consistent with recommendations in the appropriate provincial silviculture guides. SGRs will serve as the prescriptions for areas of operations and naturally depleted areas. SGRs have been documented in table FMP-5 and applicable SGRs are identified on operations maps prepared for the first five-year term.

The information on operations maps represents the best estimate of the site conditions that are likely to be encountered, based on information available during the planning of operations. Appropriate alternative SGRs and treatments may be selected during the implementation of operations, in the event that actual conditions encountered differ from those anticipated.

Strategic silvicultural options used in the development of the SGRs were determined through the preparation of the Proposed Management Strategy and are documented in supplementary documentation 6.1.6 in the Base Case Analysis Package.

Section 2.1 of the Analysis Package describes the forest units and management intensity by silvicultural intensity used to differentiate each SGR. Table FMP-3 describes the forest units and Section 2.2 of the Analysis Package describes the forest inventory composition of forest units, which was used as the basis of the 'Additional Information' used under the 'Current Condition' section for each SGR.

The 'Yield curve forest unit statistics' described in Figure 1, Section 3.4 of the Analysis Package were used as the 'Stand Characteristics' for the 'Future Condition' section of each SGR, with the exception of the selection forest units and the Hardwood Uniform Shelterwood for Yellow Birch (HDUS-BY) SGR. Unlike the other forest units, SFMM does not use a future species composition in the modeling of these forest units. The future forest condition of the selection forest units was estimated based on the improvement in species composition expected as a result of management practices intended to meet management objectives. Similarly, the yellow birch site specific SGR is expected to result in a higher percentage of yellow birch and desirable associate species in the future forest species composition, relative to the average future forest condition expected for the application of the more general Hardwood Shelterwood (HDUS-HD) SGR that was used in SFMM.

Section 4.4 and Section 4.7 of the Analysis Package include the post harvest succession rules for clearcut and shelterwood forest units respectively, and were used to complete the 'Post-Renewal Succession' portion of the even-aged SGRs.

3.4 Management Considerations

Forest management on a given tract of Crown land in Ontario is subject to decisions and policies established at provincial, regional and district levels of the Ministry of Natural Resources. Forest management in Algonquin Park is unique for a number of reasons. Algonquin Provincial Park is administered by Ontario Parks, a branch of OMNR. Forest management in Algonquin is dominated by a need to operate in a manner that meets high operational standards and a high level of public scrutiny. Algonquin Park is often described as "the Crown Jewel" of Ontario parks.

This Forest Management Plan is a resource management plan and as such is subject to the land use policies contained in the Crown Land Use Policy Atlas and the Algonquin Provincial Park Management Plan. One of the major provision of the 1974 Algonquin Provincial Park Management plan was the establishment of the Algonquin Forestry Authority, which is a Crown Agency established to harvest timber and produce logs and to perform such forestry,

land management, and other programs as authorized. The APP Management Plan states the Algonquin Forestry Authority "…shall conduct its operations in conformity and harmony with the provisions of the true intent and spirit of the park management plan…".

This Forest Management Plan is consistent with higher order direction such as provincial legislation and provincial and regional policies and strategies. The major direction regarding production of a FMP is from the Crown Forest Sustainability Act and the Decision on the Environmental Assessment of Timber Management on Crown Lands in Ontario. Direction from these sources is incorporated primarily through requirements in the FMPM, 2004. The FMPM also complies with the Policy Framework for Sustainable Forests. The introduction of this plan describes how MNR's Statement of Environmental Values and the Environmental Bill of Rights are addressed in the plan.

Several provincial guides were used for direction during the development of the Plan. A completed listing of all guides available to the planning team is available in section 6.1.1 of the supplementary documentation. Refer to the following Section 3.4.1 for a complete description of direction for other sources that were used and became management considerations during the production of this FMP.

Management considerations are also developed by the planning team, the Local Citizen's Committee and input opportunities for the public. Provincial policy helps to guide or prescribe some management considerations. Provincial guidance also specifies some indicators that must be considered (e.g. prescribes some wildlife species for which habitat must be modelled including lynx, black-backed woodpecker and ruby-crowned kinglet to name a few).

Management considerations have been the topic of many discussions for the development of past management plans and the intent was not to necessarily change those management considerations. Instead, the process in this plan was to confirm the validity of existing management considerations from the development of the 2005 plan while considering any necessary changes or additions to those considerations. The report of past forest operations and the most recent independent forest audit were also considered in setting the strategic direction for this plan.

A Desired Forest and Benefits meeting between the LCC and Planning Team was a significant factor and event in identifying management considerations. A summary of the changes made in this FMP that reflect the desired forest and benefits is presented in Section 3.5.

Old Growth objectives were a consideration in previous plans, mainly for white/red pine. These objectives have been significantly expanded in this FMP to include all even-aged forest units to emulate natural benchmark trends over the entire planning horizon.

In February 2008 the Algonquin Forestry Authority was registered to the CAN/CSA-Z809 Sustainable Forest Management Standard to demonstrate to the public and its customers that the Algonquin Park forest is managed in an ecologically sustainable manner. The Sustainable

Forest Management Standard gives AFA the opportunity to continually improve its forest management performance while engaging interested parties in a focused public participation process. The Values, Objectives, Indicators and Targets identified during this process were used as a management consideration during the development of this FMP.

There were no major landbase changes since the development of the 2005 FMP. A process referred to as "Lightening the Footprint" of logging has been ongoing in Algonquin Park since 2005. Refer to section 4.3.1.17 for details on this initiative. The planning direction provided by MNR to address this initiative has been a significant management consideration throughout the development of the plan.

3.4.1 Direction for Other Sources

3.4.1.1 Crown Forest Sustainability Act

The CFSA is the legislation that governs forest management on Crown lands in Ontario. The purpose of this Act is 'to provide for the Sustainability of Crown forests and, in accordance with that objective, to manage Crown forests to meet social, economic and environmental needs of present and future generations.' (CFSA, 1994) This source of direction of legislation is incorporated primarily through requirements in the FMPM, 2004.

3.4.1.2 Declaration Order regarding MNR's Class Environmental Assessment Approval for Forest Management on Crown Lands in Ontario

MNR is committed to balancing environmental protection with sustainable forest management. Sustainable forest management is based on considering social, economic and environmental values when planning and implementing forest management activities.

The Declaration Order regarding MNR's Class Environmental Assessment Approval for Forest Management on Crown Lands in Ontario sets out the conditions for carrying out forest management activities on Crown lands in Ontario in a sustainable manner. These activities include the construction of roads, and forest harvest, renewal and maintenance operations.

This Declaration order was released in July of 2003 by the Ministry of the Environment. Revised terms and conditions under this new declaration order were implemented with the 2004 Forest Management Planning Manual, which was used for the preparation of this Forest Management Plan.

3.4.1.3 Environmental Bill of Rights

The Environmental Bill of Rights (EBR) is a law that gives everyone in Ontario the right to participate in environmental decision-making. The purposes of the Act are to protect, conserve and restore the environment; to provide environmental sustainability; and to protect peoples' right to a healthful environment.

The EBR requires that a Statement of Environmental Values (SEV) be developed by 14 government ministries that are subject to the law.

3.4.1.4 Statement of Environmental Values

The Ministry of Natural Resources "Statement of Environmental Values" (SEV) explains how the ministry considers the environment when it makes decisions and how the MNR applies the EBR when it makes decisions. Supplementary documentation section 6.1.21 contains the Algonquin Park FMP Statement of Environmental Values briefing note that outlines how the MNR's SEV was considered during development of this Forest Management Plan.

3.4.1.5 Provincial Parks and Conservation Reserves Act

The new Provincial Parks and Conservation Reserves Act came into effect on September 4, 2007. This legislation was drafted after extensive consultations, using input from the public, stakeholder groups, Aboriginal communities and organizations, and the Ontario Parks Board of Directors. Under this new Act, ecological integrity will have first priority when planning and managing provincial parks and conservation reserves. The Act also includes an exception for commercial timber harvesting in Algonquin Provincial Park, in accordance with the Algonquin Forestry Authority Act, the Algonquin Provincial Park Management Plan and the Crown Forest Sustainability Act.

3.4.1.6 Ontario's Biodiversity Strategy

Ontario's Biodiversity Strategy (OBS) was released in 2005. The strategy, after briefly describing Ontario's four major ecological regions, sets out goals and a vision for Ontario's biodiversity, and discusses threats and opportunities. The strategy highlights 37 actions that will work to achieve its biodiversity conservation goals, through education, prevention and engagement. A key principle of this strategy is that an ecological approach to resource management is central to conserving biodiversity and using our biological resources in a sustainable manner.

3.4.1.7 Our Sustainable Future

Since the completion of the previous FMP, Our Sustainable Future was released by the MNR in 2005. In addition to confirming its vision of sustainable development and the mission of ecological sustainability, this document added a new focus to work through a Commitment to the Conservation of Biodiversity. Our Sustainable Future sets the stage for continued support of sustainable resource development, while maintaining a strong emphasis on protection of the natural environment. The focus is supported through stronger policy development, enhanced science, information, assessment and reporting.

Our Sustainable Future replaces Beyond 2000, becoming the forth in a series of strategic directions documents. It builds on many of the principles outlined in earlier strategic plans. For the first time, it includes specific strategies and proposed actions to help plan activities and deliver results that are aligned with strategic direction. These strategies and actions

recognize the opportunity to strengthen our cooperation with all levels of government. The strategic directions framework also emphasizes the importance of assessing and reporting on the state of our natural resources to ensure the effectiveness of our actions and provide transparency and accountability for the results.

3.4.1.8 Forest Resource Assessment Policy

The Forest Resource Assessment Policy (FRAP version 2, 2003) provides the principles and technical requirements for the determination of forest sustainability at the management unit level. The Forest Resource Assessment Policy (FRAP) also provides provincial direction for the preparation and use of assessments of Ontario's Crown forest resources - locally, regionally, and provincially. It states that the long-term sustainability of the forest is the first priority, and that timber harvest levels are decided locally as part of the forest management planning process. The Strategic Forest Management Model has been used to determine sustainable timber production levels on the Algonquin Park Forest.

3.4.1.9 Policy Framework for Sustainable Forests

The goal for Ontario's forests as outlined in the Policy Framework for Sustainable Forests is 'to ensure the long-term health of our forest ecosystems for the benefit of the local and global environments, while enabling present and future generations to meet their material and social needs.'

3.4.1.10 Old Growth Policy for Ontario's Crown Forests

This policy came into effect in 2003 and provides provincial directions for the identification and conservation of old growth conditions and values for major tree species or forest community associations (forest communities) present in Ontario's Crown forests.

3.4.1.11 Forest Compliance Strategy

The Forest Compliance Strategy guides policy development, provides direction for compliance and describes how compliance will be achieved. The Strategy encompasses all legislation and policy pertaining to operations in Crown forests.

3.4.1.12 Crown Land Use Policy Atlas

The Crown Land Use Policy Atlas is the official source of MNR's area-specific land use policies for Crown lands in about half of Ontario. All of the Ministry's approved land use policies, including those that are found in park management plans, have been consolidated into the Atlas. In the Atlas, land use areas are divided into two land use designations, primary and overlay. Primary land use designations provide the principle direction for land and resource use in specific areas. Overlay designations provide supplementary direction. All provincial parks, including Algonquin Park, within the area covered by the Atlas are designated as "Provincial Park", a primary land use designation. An overlay designation has been used to depict the Recreation/Utilization Zone within the Park. The land use policies that

correspond to each of these designations are reflected in Appendix 6.2.1 - Management Guidelines for Land Use Areas and Strategies for General Resource Areas.

3.4.1.13 Algonquin Provincial Park Management Plan

Algonquin Provincial Park contributes to the Beyond 2000 goal by protecting values such as plant communities and wildlife while providing a variety of recreational opportunities. As well, Algonquin serves to maintain the economic base of many local communities and continues to contribute to resource production activities in the Region.

The goal of Algonquin Provincial Park is 'to provide protection of natural and cultural features, continuing opportunities for a diversity of low intensity recreational, wilderness and natural environment experiences; and within this provision continue and enhance the Park's contribution to the economic, social and cultural life of the region.'

The Algonquin Provincial Park Management Plan is the umbrella document that governs all land use activities in Algonquin Park. Direction provided from the Management Plan laid the foundation for the development of the land use guidelines in Algonquin Park as described in Appendix 6.2.1 (Management Guidelines for Land Use Area and Strategies for General Resource Areas). This table summarizes land use intent, acceptability of forest management and roads, and strategies for forest management within the various Park zones. Refer to Map 2 for location of zones.

3.4.1.14 Algonquin Forestry Authority Sustainable Forest Management Policy

AFA's Sustainable Forest Management Policy guides its overall management practices in Algonquin Provincial Park. A copy of the AFA's Sustainable Forest Management Policy can be found in Appendix 6.2.2.

3.4.1.15 Forest Fire Management Strategy for Ontario

In May of 2004, the Ministry of Natural Resources released a Forest Fire Management Strategy for Ontario. The Strategy balances the protection of human values with the positive effects of fire as a management tool to meet silvicultural and ecological objectives. Algonquin Park is situated in the Great Lakes / St. Lawrence forest, East Fire Region.

There are six Fire Management Zones across the province. Algonquin Provincial Park is located in the Parks Zone. The Parks Zone recognizes that fire is an essential ecological process fundamental to ecosystem health and sustainability. As with all parks and protected areas, the safety of Algonquin visitors and Park infrastructure is a priority.

A Fire Management Plan will be developed for Algonquin Park consistent with objectives contained in the Park Management Plan, Algonquin Park FMP, and provincial forest fire management strategy. Until a Fire Management Plan is prepared for the Park, the following fire management direction will apply:

1. Fires in the Park will generally receive Full Response and sustained action until extinguished;
2. Modified and/or Monitored Response will be used in consultation with the Park Superintendent (i.e. Wilderness and Nature Reserve Zones)
3. Prescribed burning and prescribed fire are recognized as a management tools with which to meet ecosystem management or hazard reduction objectives within the Park;
4. Fire suppression resources will be positioned within this Zone according to the anticipated fire load.

In summary, the current forest fire management objectives for Algonquin Park are to protect Park visitors; prevent socio-economic disruption through the loss of forest products; promote the ecological role of fire to approximate a natural forest and wildlife habitat condition; and minimize loss to Park infrastructure and significant Park values. Any applicable new forest management direction resulting from the Fire Management Plan will be incorporated into the FMP through the FMP amendment process.

3.4.1.16 Provincial Wood Supply Strategy

Regional Wood Supply Strategies have been developed by the Ministry of Natural Resources in order to identify wood supply issues and provide strategies for managing those issues on a regional basis. In June 2004 the Provincial Wood Supply Strategy was published and this replaced the previously developed Regional Wood Supply Strategies. Issues and strategies within this document that are applicable to AFA have been considered and addressed within this Plan. Examples of this are the updating of forest resources inventory information prior to modelling, improvement in modelling practices, the inclusion of logging damage standards, tree marking prescription directions with respect to high quality stems with high mortality risk potential and silvicultural ground rules directed at improving growing stock quality and ensuring that regeneration standards are met.

3.4.1.17 Lighten the Footprint

A process referred to as “Lightening the Footprint” of logging has been ongoing in Algonquin Park since 2005. The Ontario Parks Board of Directors produced a report in December 2006 on this topic. Since then, the Minister of Natural Resources has asked the Ontario Parks Board of Directors and the Algonquin Forestry Authority Board of Directors to produce joint recommendations on how to ‘lighten the footprint”. This involves discussions with key stakeholders. A joint report to the Minister is expected sometime in 2009. Clarification regarding the impact of this process was also requested by the planning team at the outset of the planning process. Direction was provided by MNR to prepare the 2010-2020 FMP using the existing land base; however, to defer the planning of operations within certain higher priority areas until this process unfolds. This direction has been followed.

3.4.1.18 Endangered Species Act

In 2007 the Endangered Species Act (ESA 2007) was passed in Ontario. The purposes of this Act are: to identify species at risk based on the best available scientific information, including

information obtained from community knowledge and aboriginal traditional knowledge; to protect species that are at risk and their habitats, and to promote the recovery of species that are at risk; and to promote stewardship activities to assist in the protection and recovery of species that are at risk. Species at risk protection has been incorporated into the FMP through the inclusion of objectives in Tables FMP 6 and FMP 13 to "Protect the habitat of forest dependent species at risk". Associated indicators and targets speak to complying with Area of Concern prescriptions for species at risk habitat and reducing road densities within habitat. The detailed Area of Concern prescription for each species at risk in the Algonquin Park Forest is contained table FMP-14. Refer to section 2.2.5.1 for a complete description of species at risk in Algonquin Provincial Park.

3.4.2 Algonquin Provincial Park Forest Management Goal

The goal of forest management for the Algonquin Park Forest is: *`To produce a continuous supply of forest products to the forest industry of the region through environmentally sound forest management practices and in harmony with other Park uses and goals'*. It is the intent of this Forest Management Plan to provide a link between the above Goal and provincial policy.

3.4.3 Summary of Issues

A summary of major issues encountered and addressed during the preparation of this Forest Management Plan are described in supplementary documentation section 6.1.17.

Recommendations from the Year 10 Annual Report are contained in supplementary documentation section 6.1.9.

The most recent Independent Forest Audit on the Algonquin Park Forest was completed in the fall of 2007. This audit covered the 5-year period from April 1, 2002 to March 31, 2007. The final report for this audit was submitted in June 2008 and the action plan was approved in April, 2009. At the time of Forest Management Plan production, the IFA report had not yet been tabled in the legislature, and was therefore not a matter of public record. As a result, the action plan could not be summarized in the FMP. Regardless, all of the recommendations that could be addressed through the 2010 FMP have been incorporated.

Negotiations are currently ongoing with respect to an Aboriginal land claim that affects most of the Algonquin Park Forest. The outcome of this process and its potential affect on this FMP is uncertain at this time. The Algonquin communities associated with this claim are well represented on the planning team and have participated in the development of this FMP from the beginning. Road access within the Algonquin Park Forest is a significant topic for the communities. Roads provide access for hunting, fishing and other traditional activities. The planning team representatives from each community have been involved in all aspects of road planning and discussions are ongoing to ensure access is available while protecting Park values.

3.5 Desired Forest and Benefits

On May 21, 2008 the Desired Forest and Benefits Workshop was held in Huntsville. It was hosted by the MNR (Ontario Parks – Algonquin Park) with assistance from AFA, and facilitated by local and regional MNR staff. The meeting was intended to provide input into the LTMD of the Plan. The planning team along with members of the Algonquin Park Local Citizen Committee (LCC) and staff of MNR and AFA participated in the meeting. The objective of the meeting was to identify the forest structure and composition, and the goods and services, which are desired from the forest to achieve a balance of social, economic and environmental needs.

Participants contributed to a main session followed by breakout group sessions representing each Crown Forest Sustainability Act objective category (i.e. forest diversity, silviculture, forest cover, social and economic). The results of this exercise were displayed on sheets and mounted to the walls of the meeting room. At the end of the day the results of the breakout group sessions were summarized with the entire group.

It was concluded that the objectives from the current FMP for the Algonquin Park Forest were comprehensive and provided for many of the desired forest and benefits communicated by the group. Existing FMP objectives have been carried forward in most cases. In some cases objectives have been dropped and in other cases objectives have been added. Below is a summary of the changes made that reflect the desired forest and benefits discussed:

- **Conserving Biological Diversity** – landscape pattern objectives (spatial arrangement) have been introduced for even-aged old growth forests. Landscape classes have been introduced as a new measure for assessing forest structure, composition and abundance. Old growth targets have been introduced for all even-aged forest units, relative to natural benchmark levels. Objectives have been introduced for the maintenance of mid-tolerant hardwood tree species. The list of featured wildlife species has been modified based on input received from the group and requirements of the provincial old growth policy. Objectives have been introduced for the protection of species at risk habitat and for other sensitive ecological areas. Objectives have also been introduced regarding the maintenance of tree species diversity and uncommon tree species on the landscape.

- **Maintaining and Enhancing Ontario's Framework for Sustainable Forest Management** – access objectives has been introduced for the maintenance of traditional Algonquin cultural activities, to limit access to significant Park interior values and to minimize aggregate use.

- **Maintaining and Enhancing Forest Ecosystem and Productivity** – objectives have been maintained to ensure the successful renewal of harvested stands and have also been introduced for opportunities to enhance the productivity of unproductive forest stands.

- **Providing for a continuous and predictable flow of economic and social benefits from Ontario's forests** - objectives have also been introduced for the maintenance and improvement of back-country recreation opportunities, the protection of natural and cultural heritage values found on the unit and the maintenance of the quality of the cottage leasehold experience within the RU zone. Objectives have been maintained and enhanced with respect to forest product harvest levels, community well being and the maintenance of ministerial wood supply commitments from the Algonquin Park Forest.

- **Protecting and conserving Ontario's Forest Soil and Water Resources** – objectives have been maintained for the protection of the productive capacity of the soil and water on the management unit. An objective has been added with respect to the conservation of water quality and quantity of interior water features.

- **Accepting social responsibility for sustainable development** – objectives have been added to provide for aboriginal involvement in forest management planning activities and in economic opportunities provided by forest management. Objectives have also been added to increase knowledge of ecosystem processes and encouraging Local Citizens Committee involvement in the Forest Management Plan.

In addition to the Desired Forest and Benefits Workshop, input received from the Algonquin Park sustainable forest certification process (CSA Z809) was also considered during the development of new plan objectives and targets. Objectives from the 2005-2025 FMP were also circulated to the Desired Forest and Benefits Workshop participants prior to the meeting and were significant inputs into the workshop discussion.

The results of Desired Forest and Benefits Workshop were compiled by Ontario Parks and circulated to all of the participants. The results of this work were reviewed by the planning team and used during the process of developing objectives for the Plan. Where possible, the planning team developed indicators and targets associated with proposed objectives. Objectives were organized into quantitative and qualitative categories and documented in table FMP-13. Where the planning team was unable to develop meaningful forest management indicators and targets, proposed objectives were deleted.

The results from this workshop formed the basis for FMP-6, a Summary of Management Objectives, and FMP-13 Assessment of Objective Achievement. Refer to supplementary documentation section 6.1.24 for a summary of the results of the Desired Forest and Benefits Workshop.

3.5.1 Scoping Analysis

The FMPM outlines the scoping analysis as the examination of the range of possibilities for management, to provide insight into what the forest is capable of producing and the investigation of potential management considerations. This analysis was conducted to determine the extent to which the desired forest and benefits can be realized over time. Each investigation was comprised of a series of modeling runs, designed to assess the impact of

different management options on wood supply, forest condition, preferred wildlife habitat and other non-timber resources.

To help organize the number of investigations required the MNR Southern Region office provided a draft Scoping Summary template. Each initial scoping run (1-6) has been compared to the Scoping Base Model in order to evaluate the impact of the constraints applied. The scoping base model is the Base Case submitted at progress checkpoint #3.

Scoping run #7 is referred to as the Maximum Ecological Run and is designed to assess the cumulative impact of the achievement of important ecological objectives. This scoping run also served as the new baseline from which other scoping runs were evaluated, and as the baseline for the development of the Proposed Management Strategy (PMS7).

The scoping analysis (checkpoint #4) explored options of achieving 75% and 100% of natural benchmark levels for all ecological indicators (preferred wildlife habitat, landscape classes and old growth). After review of the scoping analysis results, it was concluded by the planning team that the achievement of 100% of natural benchmark levels for each ecological indicator did not provide a balance of social, environmental and economic considerations. For example, the achievement of 100% of natural benchmark levels for old growth for all terms resulted in a 29% reduction in total harvest volume (term 1- term 5 average), which was considered to be too severe an economic impact.

The planning team also felt that a consistent level of ecological target setting was the most prudent approach for the 2010 FMP. In many cases, levels greater than the 75% of the natural benchmark level have actually been achieved, however the desired levels and targets have been maintained at the 75% level.

Full details of the scoping analysis conducted are outlined in the supplementary documentation section 6.1.6 in the Scoping Analysis Package submitted at progress checkpoint #4.

3.6 Objectives and Indicators

Plan objectives, indicators of objective achievement, desirable levels and targets were developed based on input during meetings to discuss desired forest and benefits, past management plans for the Algonquin Park Forest, MNR sources of direction including the Crown Forest Sustainability Act and the Forest Management Planning Manual for Ontario's Crown Forests (especially Figure A-5), and professional advice from foresters and biologists.

The Forest Resource Assessment Policy helped determine objectives for wood volume along with Current Industrial Demand volume figures developed by MNR for various wood supply commitment holders on the Algonquin Park Forest.

The Provincial Wood Supply Strategy, that replaced the previously developed Regional Wood Supply strategies in 2004, was used as a guiding document relative to several considerations

including identifying wood supply benchmarks, issues and strategies. These include developing silvicultural ground rules that are aimed at improving quality in tolerant hardwood stands while recognizing the need to minimize logging damage.

The 2003 Old Growth Policy for Ontario's Crown Forests, the 2003 Old Growth Forest Definitions for Ontario, and the November 7, 2007 Old Growth FMP Note provided the context for forest unit/development stage objectives. "A Conservation Strategy for Old Growth Red and White Pine Forest Ecosystems for Ontario" was also used in setting objectives for the maintenance or increase in the amount of white pine/red pine forest as compared to 2000 levels and provide direction for an increase in old white pine/red pine forests.

For each CFSA objective category, one or more management objectives were developed, and for each management objective, one or more indicators of objective achievement were identified. A desirable level and target were also developed for each indicator. A desirable level is a specific number, range or trend for an indicator, to be achieved and maintained over time. A target is a specific number, range or trend with a timeframe for achievement. The desirable levels were established locally by planning team members with advice from professionals. The scoping analysis (section 3.5.1) also provided input into the establishment of desired levels. Targets for each objective reflected the necessity to balance management objectives as well as other considerations, and therefore may be the same or different than the desirable levels.

The Strategic Forest Management Model (SFMM) was used to develop a Management Strategy that balanced the achievement of management objectives over time. Objectives balanced in the Management Strategy include forest composition and age class structure, old growth forest, available forest area, wildlife habitat for provincially and locally featured species, species at risk and selected species, harvest areas, harvest volumes and others.

The desirable levels for certain indicators were determined after analysis of the natural benchmark runs (section 3.6.1). Other factors that enter into the desirable level determination include consideration of background information (including the historic and present forest condition and sources of direction), results of the scoping analysis and the identified desired forest and benefits. The natural benchmark trend for the next 100 years was used for setting desired levels for many ecological indicators.

Indicators for forest composition, age class distribution and wildlife habitat for selected species are examples of indicators for which desirable levels were determined in relation to natural benchmark runs through time. Targets for these indicators were established based on this information as well as consideration of other factors such as social considerations. In order to assess objective achievement, SFMM investigations of various management options were compared to benchmark runs to see how the forest would be expected to develop.

Some indicators, including harvest area, harvest volume and available forest area through time were determined through multiple scoping investigations and the balancing of management objectives to maximize achievement of all strategically modelled objectives at

the same time. For some indicators, analysis of the quantity that was currently or historically in the forest (for example, landscape pattern) and social considerations (for example, compliance reporting, harvest volume, road densities) influenced the desirable level.

For each management objective, the associated indicators and the time when each indicator is will be assessed is documented in FMP-6.

3.6.1 Development of the Natural Benchmark (Null) and Base Model

Throughout the development of the Proposed Management Strategy, the natural benchmark was used to determine appropriate desired levels and targets for objectives designed to represent natural features of the Forest. Initial inputs for the natural benchmark were based on the best available ecological scientific knowledge, data and the professional and technical experience of the planning team members. The development of the inputs related to yield, succession and disturbance form the foundation of the natural benchmark, or null scenario. The model was executed assuming no human intervention on the forest through the 160-year planning horizon, and development of the forest was left to natural disturbance and succession.

This model was then used as the foundation for the base model (introducing human intervention) as a starting point for exploring the range of possibilities for management and providing insight into what the forest is capable of producing under specific management regimes. This stage of analysis is referred to as scoping, and is summarized in section 3.5.1. The base model differs from the natural benchmark in two ways. First, modifications to the fire cycle are made to recognize the current level of fire suppression on the management unit (lengthening burn cycles to very long intervals compared to the natural benchmark). And secondly, strategic silviculture options are introduced. The silviculture options reflect various growth responses depending on the treatment applied (by forest unit), as well as the silvicultural success rates. Silvicultural success rates are based on evolving silviculture effectiveness monitoring (SEM) data compiled by AFA. Estimates of cost are also built into the model in order to create a realistic spending scenario.

3.7 Management Strategy

The Management Strategy is a balance in the achievement of management objectives. It was endorsed by MNR's Southern Regional Director on June 30, 2009. The Management Strategy was then used to direct the detailed planning of operations on the Forest.

The base model was used as the starting point for exploring the range of possibilities for management. Through the process of scoping, and the implementation of developed management objectives in SFMM, the planning team considered trade-offs in an attempt to balance the achievement of a range of desired management objectives.

The available harvest area generated by the management strategy, in combination with other spatial considerations such as wildlife habitat, natural disturbance pattern emulation and area

of concern prescriptions, was used to drive the selected allocations for the Plan. The Management Strategy and the preliminary determination of sustainability were presented to the Algonquin Park LCC and endorsed by the planning team.

The Management Strategy SFMM model run is included in digital format in the Analysis Package. The modeling outputs project how the forest will develop through time, in terms of its structure and composition, and the projected types and levels of activities required to achieve the management objectives. The model outputs include:

a) Projected forest condition for the Crown productive forest (FMP-7)
b) Projected habitat for selected wildlife species (FMP-8)
c) Projected available harvest area by forest unit (FMP-9)
d) Projected available harvest volume by species group (FMP-10); and
e) Projected operations, revenues and expenditures (FMP-11).

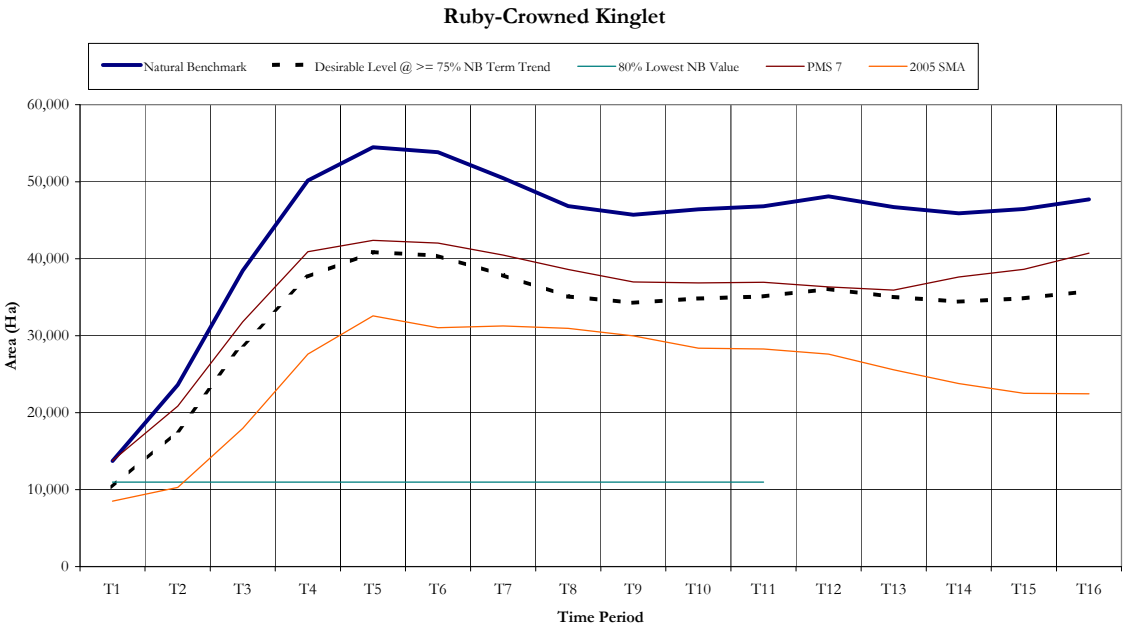
These tables can be found in section 9.0.

The consideration of the natural benchmark was used to determine appropriate desired levels and targets for objectives designed to represent natural features of the Forest. The desire of the team was to follow the trend of the natural benchmark and attempt to achieve maximum levels of non-timber objectives (as examined from a natural condition) within a management scenario. The most critical concept with any natural trend is the cyclical nature in which it is perceived. Natural conditions on the Forest have and will continue to rise and fall through time, and the team felt this was an important trend to mimic in the Proposed Management Strategy.

Inputs for the natural benchmark were based on the best available ecological scientific knowledge, data and the professional and technical experience of the planning team and MNR regional forest management planning specialists. The model was executed assuming no human intervention on the forest through the 160-year planning horizon with the development of the forest left to natural disturbance and succession. Results of this model were used to build targets reflecting this natural condition by plan term for forest composition and structure (landscape classes), mature and over-mature (old growth) levels as well as preferred wildlife habitat.

Figure 12 below is an example of the Proposed Management Strategy (PMS7) in relation to the natural benchmark trend for a selected wildlife species. Note that the natural benchmark line for the Ruby-crowned kinglet shows an initial increase in habitat at the start of the planning horizon, followed by a slight decrease and stabilization of preferred habitat towards the end of the planning horizon. When comparing this to the Proposed Management Strategy (PMS7) it is clear that similar pathways have been created for this ecological indicator. This process of comparisons was followed for all ecological indicators on the Forest within the Proposed Management Strategy.

Figure 12 Ruby-Crowned Kinglet Preferred Wildlife Habitat



Also displayed on this graph are the forecasted habitat levels from the current plan (2005 FMP). The new forecast of preferred habitat levels for this species (PMS7) is greater than that forecasted in the 2005 FMP (2005 SMA). This is a direct result of the new methodology of emulating natural benchmark for each term over the modeling horizon. This has produced a more effective emulation of natural conditions than ever used before on the Forest, and an increase in projected levels of all ecological indicators.

Figure 13. Pileated Woodpecker Preferred Wildlife Habitat

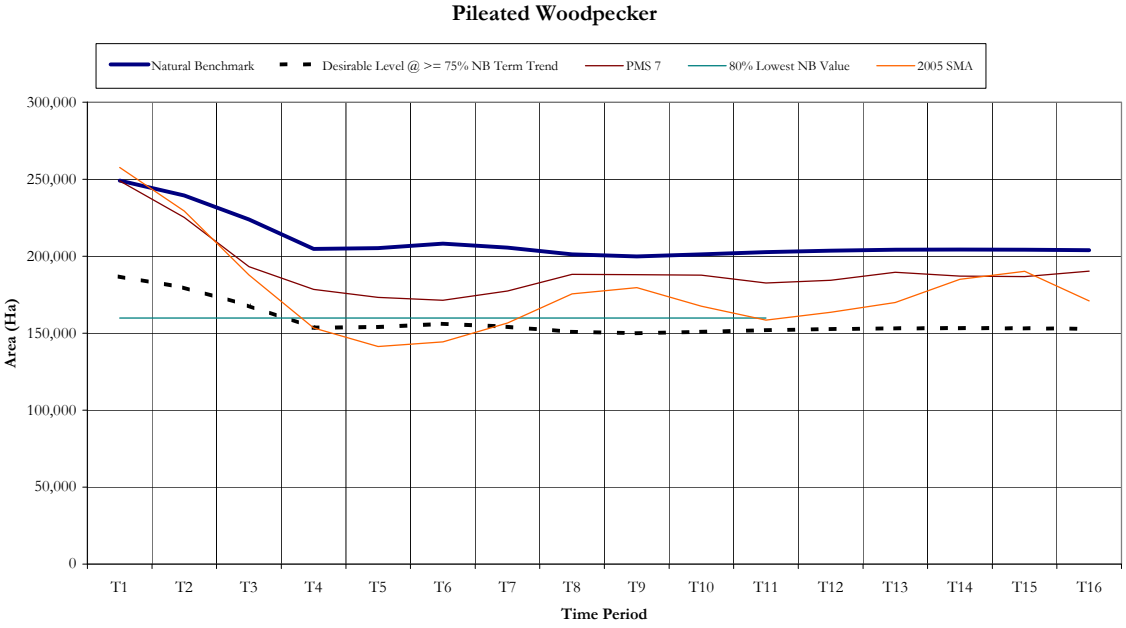


Figure 13 above depicts the 2010 Proposed Management Strategy (PMS7) in relation to the natural benchmark trend and the 2005 FMP forecasted level (2005 SMA) for the pileated woodpecker, a provincially featured wildlife species. For this species, the natural benchmark trend is projected to decrease over the first 40 years and then stabilize, with a slightly increasing trend over the long term. The projected short-term decrease in the natural habitat level for this species is a result of natural disturbances, which result in mature and old forests moving to a presapling forest condition that is not preferred habitat for pileated woodpecker. The 2010 Proposed Management Strategy (PMS7) is emulating this natural trend, stays above the target level of 75% of the natural benchmark trend, and is projecting higher levels of preferred habitat than the 2005 FMP.

An assessment of achievement for the ecological objectives was completed. Targets were set in the model and infeasible solutions were provided if any term was violated. As discussed in section 3.5.1, 75% of the natural benchmark trend for each term was established for the majority of the ecological indicators. In many cases, significantly higher levels of achievement beyond 75% were realized. Graphical details of all ecological indicators are presented in Appendix I of the Analysis Package in supplementary documentation section 6.1.6.

The desired levels and targets established were achieved for all mature and over-mature forest conditions (old growth). Two of the 6 desired levels established for young forest (pre-sapling forest condition) were not achieved. There is not enough clearcut silviculture being represented in the model to generate natural benchmark levels of the presapling forest condition. Due to the tolerant/mid-tolerant nature of the Algonquin Park Forest, most harvesting is shelterwood or selection, which maintains continuous forest cover and does not create a presapling forest condition in the model. There is also significant area prescribed as 'modified' area of concern (AOC) in Algonquin Park that requires partial cutting, which limits options for clearcutting. The pre-sapling target has been set to a level that is achievable based on the Proposed Management Strategy and the achievement of all other ecological indicators.

The FMPM (2004) requires that each forest unit have only one silvicultural system associated with it. For the MWUS and SFUS forest units in Algonquin Park, the dominant silvicultural system is the uniform shelterwood system and this is how it has been modelled. Many of these mixedwood and spruce-fir stands contain a component of advanced desirable regeneration that is protected and promoted through uniform shelterwood as opposed to clearcutting. These forest units are however, very mixed in composition and often contain patches of shade intolerant species that are more suitably managed using a group shelterwood approach.

The group shelterwood system is used where appropriate to create openings to facilitate the regeneration of patches of shade intolerant tree species. Unfortunately these conditions are not represented in the SFMM model and as a result, the pre-sapling condition is underestimated during forest management planning. Mapping and tracking of these individual groups is unrealistic, however the inclusion of these areas would result in movement towards the pre-sapling forest condition desirable level. Tree markers will be encouraged to actively identify group shelterwood opportunities in mixedwood conditions and mark these accordingly. Other

forest management practices that create presapling forest conditions include hardwood group selection and group shelterwood for the establishment of mid-tolerant regeneration.

The desired levels and targets were achieved for all provincially and locally featured species except for black bear summer habitat (BLBE). In this case, desirable levels have not been achieved in the short, medium or long term. This declining habitat tend is directly linked to the projected declines in the presapling forest condition, as the preferred BLBE habitat is presapling forest. The modelling of the MWUS and SFUS forest units as uniform shelterwood limits the ability of the model to create this habitat condition. These forest units do contain preferred BLBE habitat, however this is not being created in the model because following the final removal cut, a sapling condition is created. As discussed above, using the group shelterwood approach for intolerant tree species within these forest units will increase the presapling habitat on the forest, benefiting black bear foraging and result in movement towards the desirable levels of this pre-sapling habitat condition. The BLBE target was set at the highest level possible that can be sustained by the Proposed Management Strategy which balances social, environmental and economic objectives.

The proposed LTMD (PMS7) was presented to the public at Stage 2 “Review of Proposed LTMD”. During the preparation of the draft plan, further alterations to the management strategy were made to extend ecological constraints in the SFMM model to the end of the modeling horizon (from 100 years to 150 years in duration). This change was made in order to ensure that the long-term trends for ecological indicators (such as wildlife habitat and old growth) were consistent with the natural benchmark trend for the full modeling horizon. While this did affect long-term projected levels for some ecological indicators, the impact on the short-term harvest levels was insignificant. These changes have been incorporated into the draft plan and this revised SFMM management strategy has been labeled PMS 7.1.

Table FMP-7 shows how the projected forest area by FU and age class changes over time. The source data for this table is from the Management Strategy (SFMM). The forest area is the SFMM value for total productive forest in the available forest and all park (wilderness/natural zones) and reserve area (AOC reserves). A 0.9% reduction in the productive forest has been noted in the overall landbase over the course of 100 years. This is the effect of a small amount of the landbase required for roads, aggregate pits and landings over time. In reality these losses are expected to be less than those identified by the model as roads and landings from previous cutting cycles are re-used wherever possible. This decrease has been accounted for in the model and has resulted in an impact to harvest levels, preferred habitat and forest composition reductions.

Forest unit stability and transition was addressed during the development of the LTMD. In some cases constraints were added to the SFMM model to ensure the stability of forest unit area over time for the available forest. It is not possible to apply these constraints for the reserved portion of the forest, as this area is completely controlled by natural forest successional patterns. Refer to the LTMD Main Text in Appendix G of the analysis package in supplementary documentation section 6.1.6 for details. A complete set of forest unit transition graphs are presented in section 15 of this Appendix.

The INTCC forest unit shows a reduction over the 100-year period of approximately 58%. The most significant decline of area in this forest unit occurs in the reserved portion of the landbase (88% reduction in INTCC reserved area over 100 years). This is a reflection of the current ageclass structure succeeding on the forest (a combination of natural and post-harvest succession). This is an acceptable trend as it is consistent with the NULL trend and Po/Bw species are still expected to occur in significant quantities in the MWUS forest unit that the INTCC area succeeds into. This change has an effect of the projected available poplar and birch volumes in the long-term, as had been forecasted in the last two FMP's.

The PJCC forest unit shows a reduction over the 100 year period of approximately 50%. The most significant decline of area in this forest unit occurs in the reserved portion of the landbase (78% reduction in PJCC reserved area over 100 years). This is a reflection of the current ageclass structure succeeding on the forest. In the absence of fire, natural succession moves area out of the PJCC forest unit in the reserved portion of the forest. The managed or "available" PJCC area remains stable for the next 90 years. This change in forest unit area has an effect of reducing Kirtlands Warbler habitat in the in the reserved portion of the forest and a reliance on the managed portion of the forest for provision of this habitat over time.

The other two clearcut forest units (PRCC and SBCC) maintain a relatively stable forest area for 100 years into the future.

The uniform shelterwood forest units all display an increase in total area for 100 years into the future, with the exception of the ORUS forest unit. The ORUS forest unit is projected to decrease in size by 3,351 ha (20%) over the next 100 years. This decrease is shared between the available forest and the reserved forest with the majority of the reduction occurring in the reserved forest. This is a reflection of the current ageclass structure succeeding on the forest (a combination of natural and post-harvest succession). The area available for timber production (managed forest) is increasing in all of the other uniform shelterwood forest units.

There is little change expected in the long-term projections for the hardwood and hemlock selection forest unit, due to its uneven-aged cyclical nature.

The projected habitat for the selected wildlife species is presented in FMP-8, and graphically in Appendix I of the Analysis Package. Refer to section 2.2.4.2 for detail regarding the selected wildlife species and the implications of the projected changes in habitat over time.

Table FMP-11 shows projected levels of operations, revenues and expenses over the ten-year plan. It shows a total harvest volume of approximately 7.84 million m3, forest renewal account revenues of approximately $22.1 million, and silvicultural expenditures of approximately $15.8 million. There is a difference in the annual harvest area and the renewal area of 3,957 hectares. This can be accounted for in the areas managed under the shelterwood silvicultural system that are not in renewal stage of management (e.g. preparatory and removal cut stages) as well as area used for roads and landings.

The management strategy forecasts revenues to exceed expenditures in all terms. The projected average cost for renewal and tending treatments outlined in table FMP-11 are in line with anticipated costs and are consistent with the SFMM model inputs.

Stumpage values used represent a blend of the current renewal trust account contribution rates at the time of plan development and forecasted future rates. Current rates are low in an effort to reduce surpluses that exist in the account. Future rates will be higher, and a blended rate has been used in the Proposed Management Strategy.

Gordon Cumming, R.P.F. has reviewed the silvicultural components of the management strategy, including the clear-cut post renewal succession rules, the amount of intensive regeneration required, term 1 activities by forest unit and treatment intensity, treatment cost estimates, and forecast silvicultural expenditures. Forecast treatment regimes and expenditures are consistent with silvicultural programs that have been applied on the Algonquin Park Forest in the past and are expected to achieve the desired future forest condition.

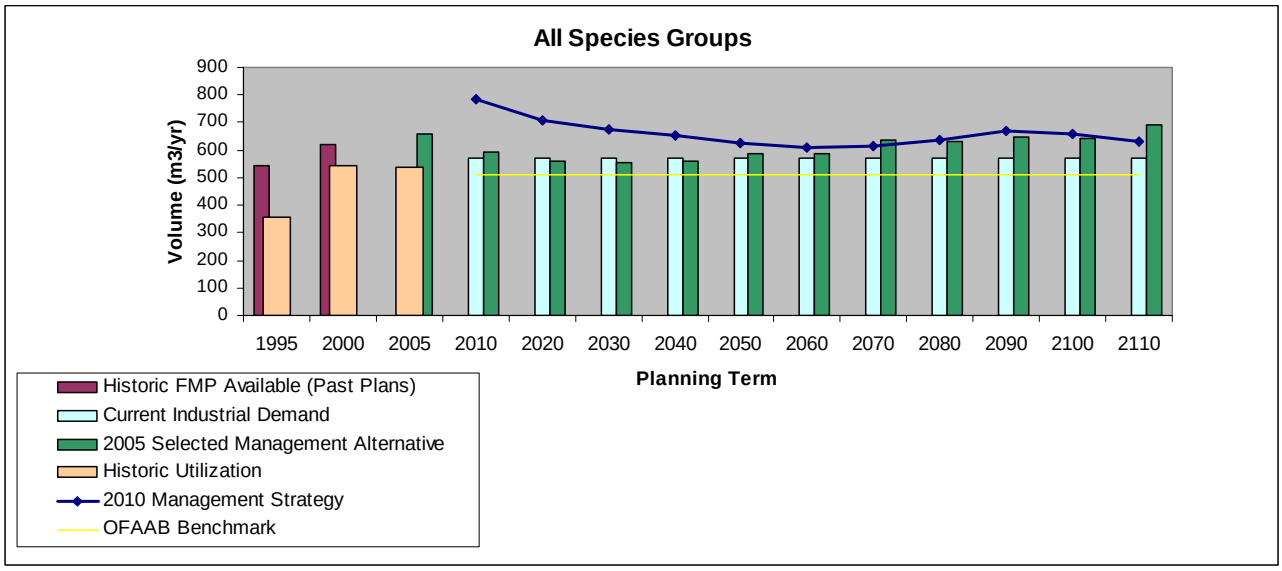
3.7.1 Wood Supply

The projected level of available harvest area is presented in FMP-9 and the projected available harvest volume in FMP-10. These projections are also displayed on the following graphs, and in Appendix J of the Analysis Package.

The planning team developed the desired levels consistent with the current industrial demand on the Forest (existing wood supply commitments from the Forest), as well as open market and commercial fuelwood demand based on historical trends. Wood supply volume targets were then established based on the highest sustainable volume achievable over the 100 year modeling horizon (i.e. available volume in the lowest term) while balancing social, environmental and economic objectives.

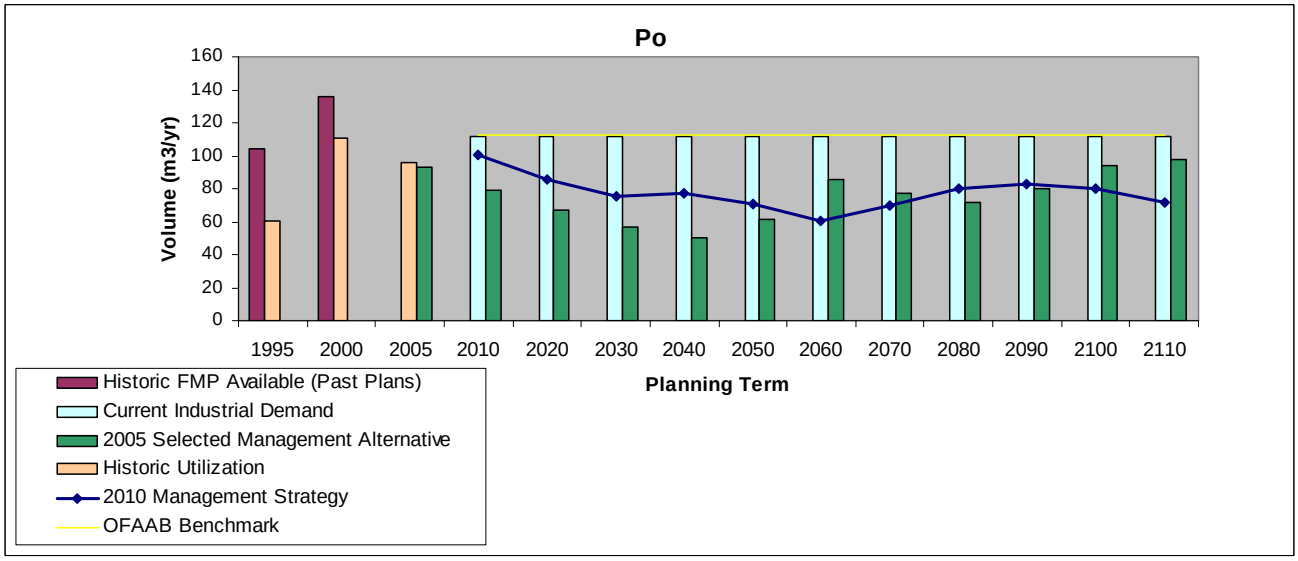
Figure 14 below illustrates the modeled long term annual wood supply volume compared to historic utilization, FMP projections, Ontario Forest Accord Advisory Board benchmark harvest levels and current industrial demand for all species groups combined. The Proposed Management Strategy is successful at achieving the desired volume level (current industrial demand) over the full modeling horizon at the All Species Group level.

Figure 14 Modeled long term annual wood supply compared to historic utilization, FMP projections and current industrial demand – all species groups.



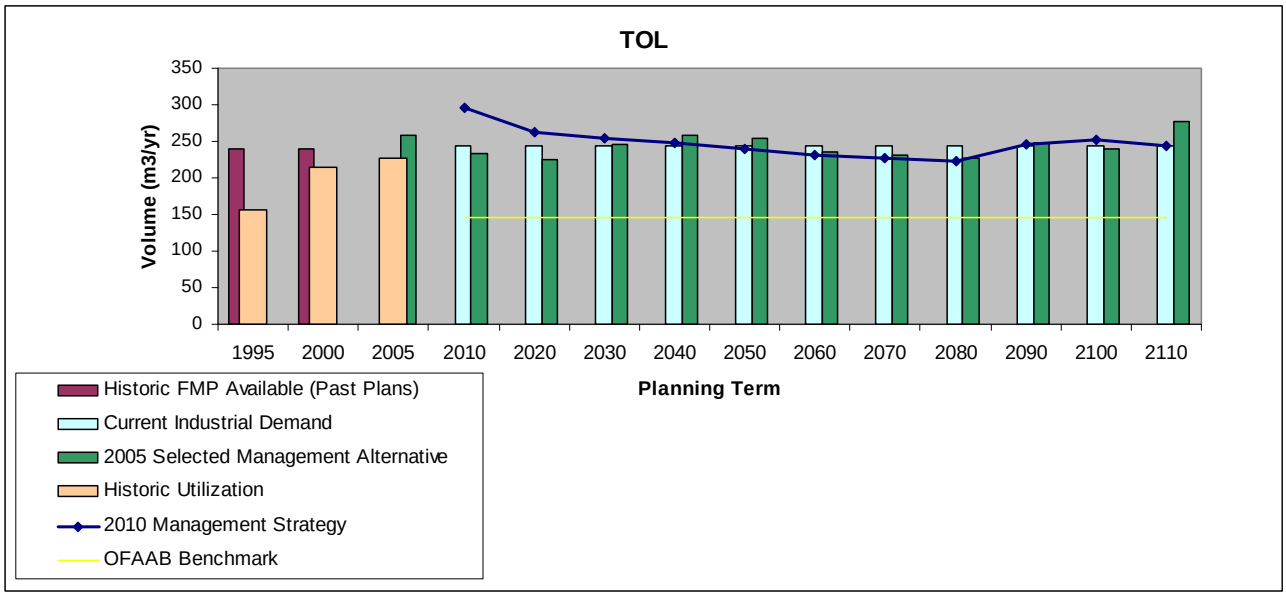
At the individual species group level, desired volume levels have been achieved in all but two species groups, poplar and tolerant hardwood. The Proposed Management Strategy is unable to achieve short, medium and long term desired levels for the poplar species group (average 69% achievement of desired volume over 100 years, 89% for T1). This is a result of the current forest condition (ageclass distribution, skewed to older age classes) and balancing multiple objectives. However, when the planned harvest area (2010-2020 allocation) is run back through the SFMM model, the short term (T1) target of 111,800 m3/year is almost achievable and is only 2.7% short of the desired volume. As discussed in the section 4.3.8 (1.3.10 run), higher amounts of poplar in the stands selected for harvest in term 1 contributes to this higher T1 forecast harvest volume.

Figure 15 Modeled long term annual wood supply compared to historic utilization, FMP projections and current industrial demand - poplar species group.



The Proposed Management Strategy is able to achieve short, medium and long term desired levels for the tolerant hardwood (TOL) species group (T1, T2, T10 as documented in FMP-13), however, is unable to achieve desired level in terms 5,6,7,8 (average 95% achievement of desired volume levels over these terms).

Figure 16 Modeled long term annual wood supply compared to historic utilization, FMP projections and current industrial demand - tolerant hardwood species group



At the product level, desired levels and targets have been met for total sawlog and total pulp volume. Desired levels have not been achieved for white/red pine (PWR) sawlog in term 11 (97% average achievement in this term), red pine poles/treelength in terms 4 through 11 (85% average achievement in these terms) or hardwood sawlogs in terms 3,4,5,6,7,8 (94% average achievement in these terms).

Figure 17 White/red pine product modeled long term annual wood supply compared to desired levels (current industrial demand)

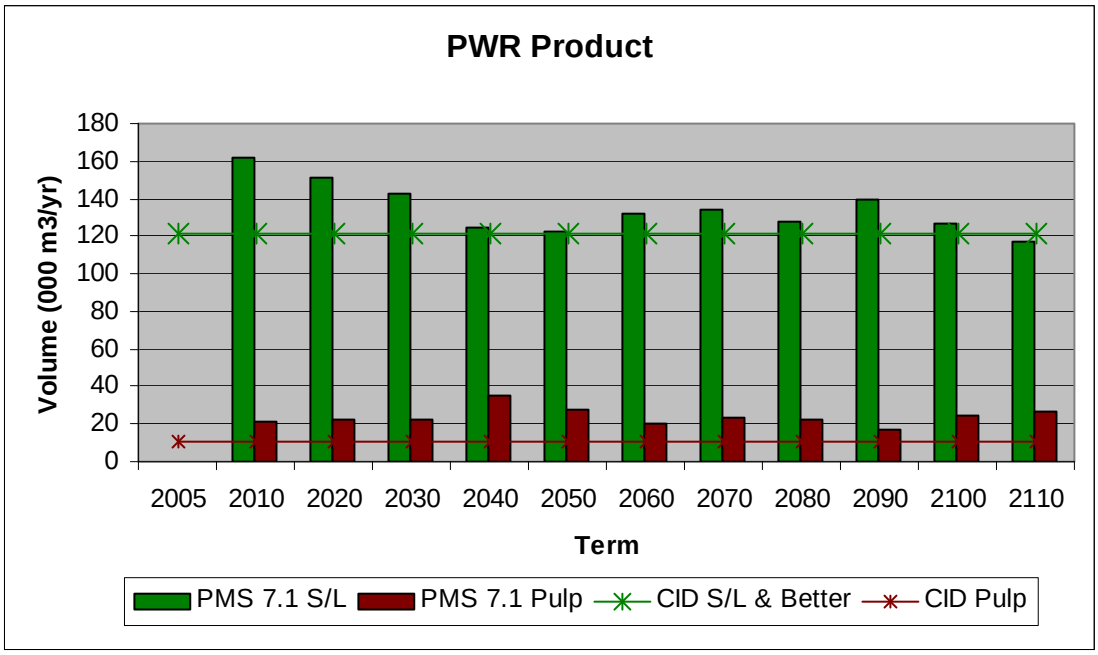


Figure 18 Red pine poles/treelength product modeled long term annual wood supply compared to desired levels (current industrial demand)

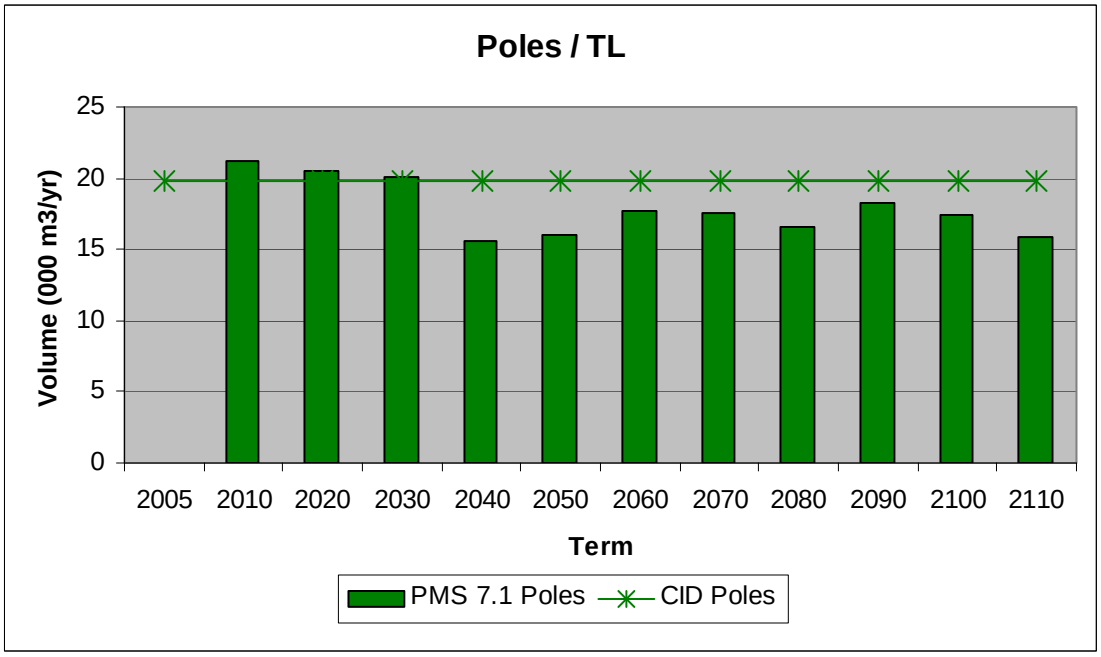
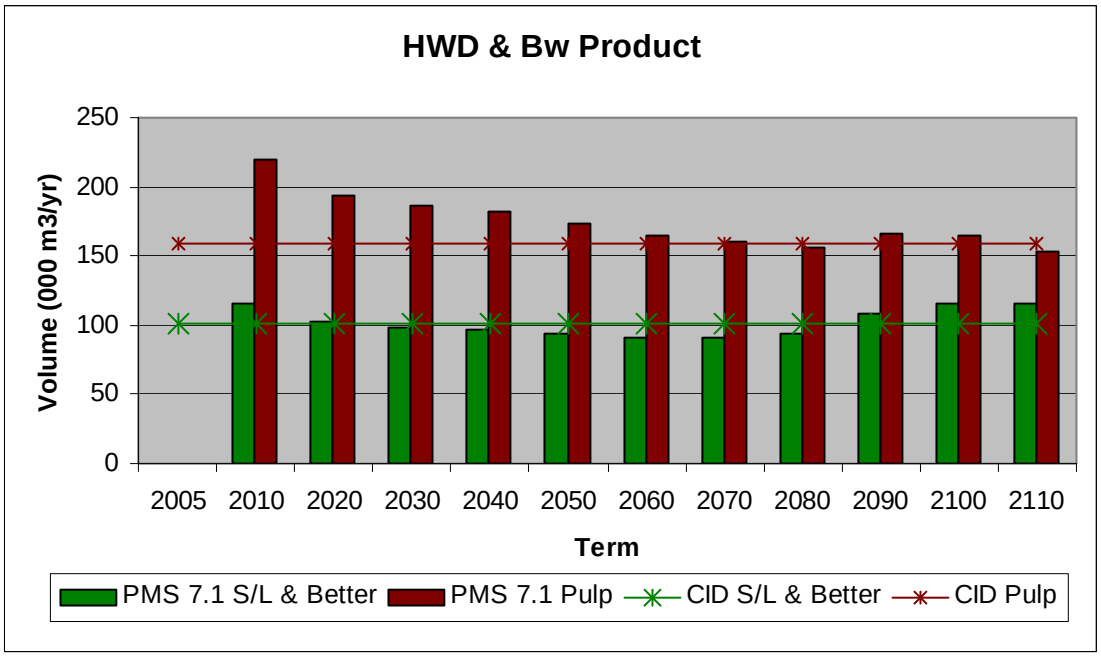


Figure 19 Hardwood product modeled long term annual wood supply compared to desired levels (current industrial demand)



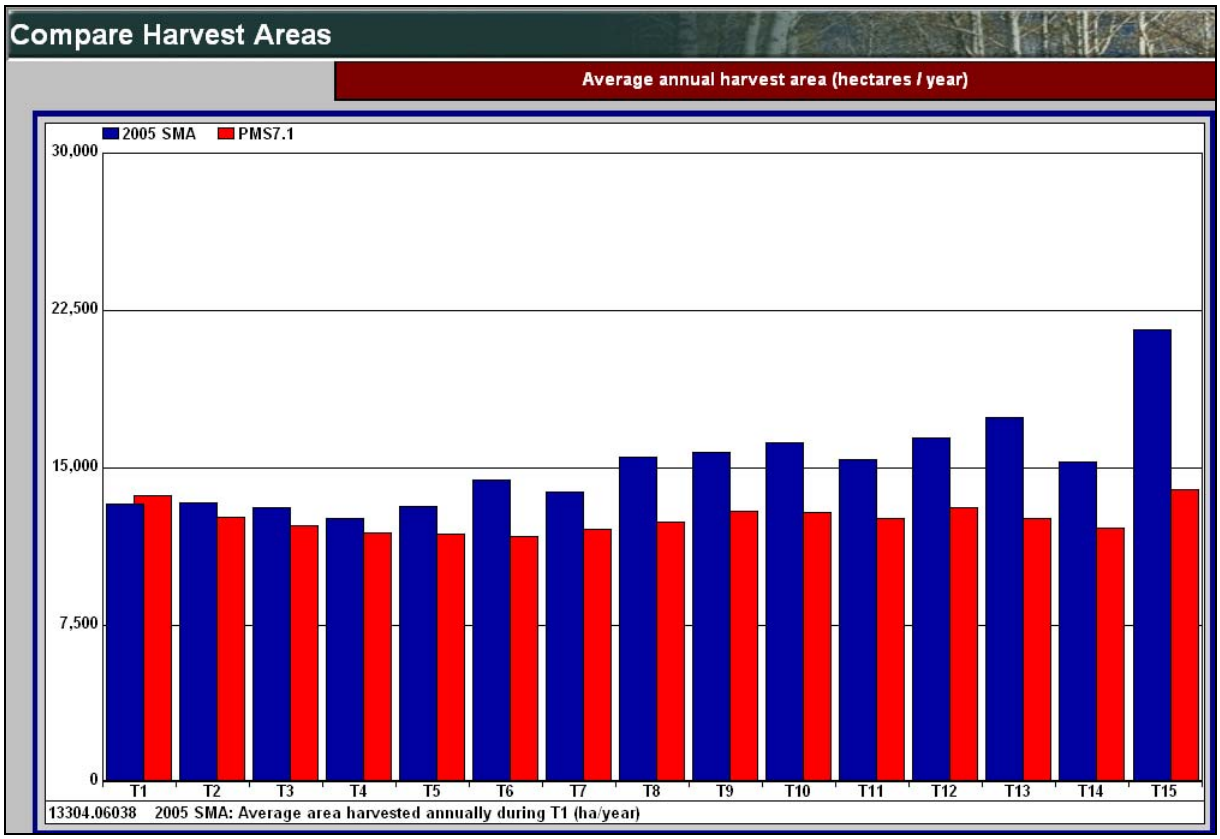
The inability to achieve desired levels for these two species groups and three product categories is a result of balancing the achievement of multiple objectives. Graphical projections of wood supply for all species groups and product categories are presented in Appendix J of the Analysis Package in supplementary documentation 6.1.6.

3.8 Available Harvest Area and Volume

The projected available harvest area by forest unit over the short, medium and long term is presented in FMP-9. The total available harvest area for the 2010-2020 term is 136,766 hectares, or 13,676 hectares per year.

The following graph illustrates the difference between the projected available harvest area (AHA) from the 2005 FMP to the 2010 FMP.

Figure 20 Forecasted available harvest area of the 2010 Proposed Management Strategy compared to the 2005 selected management alternative



Over the short term the 2010 FMP projected AHA (PMS7.1) is similar to projections from the 2005 FMP. The term 1 projected AHA is 2.8% greater than the 2005 FMP, while all subsequent terms are less. The reduction in AHA over time is a result of new constraints that have been applied to the model in order to implement new policy and planning direction (i.e. 2003 old growth policy and the emulation of natural benchmark trends over time for all ecological indicators).

The following table illustrates the change in available harvest area from the 2005 FMP (2005 SMA) to the 2010 FMP (PMS7.1) for each forest unit.

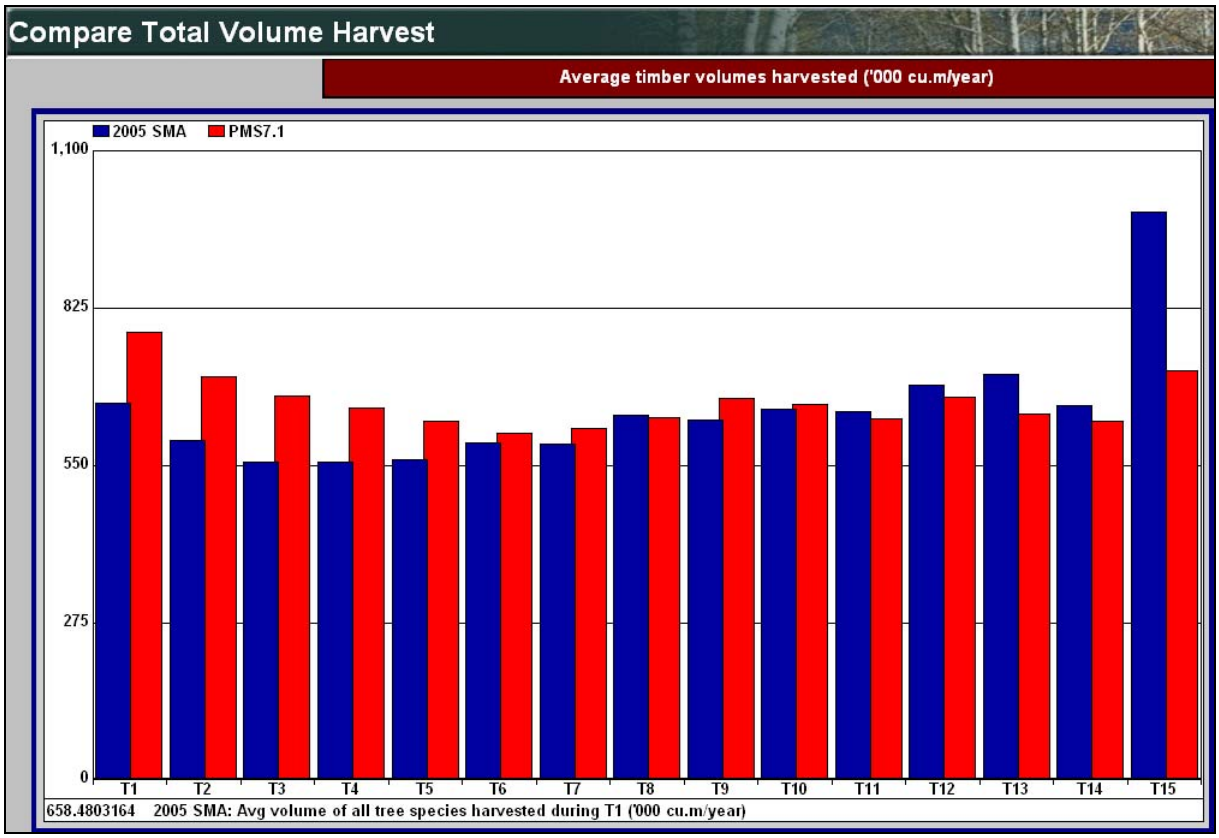
Table 7 Annual Available Harvest Area Comparison 2005 FMP to 2010 FMP by Forest Unit (hectares/year)

Forest Unit	2005 SMA	PMS 7.1	Difference	% Difference
INTCC	578	556	-21	-3.7%
PjCC	75	50	-25	-33.3%
PrCC	62	62	0	0.0%
SbCC	50	50	0	0.0%
HDUS	750	888	138	18.4%
MWUS	1,100	1,210	110	10.0%
LCUS	90	55	-35	-39.2%
OrUS	150	200	50	33.0%
PwUS	2,182	2,296	114	5.2%
SFUS	963	947	-16	-1.6%
HeSEL	1,024	1,038	14	1.4%
HDSEL	6,281	6,325	45	0.7%
Total	13,304	13,677	373	2.8%

Similar available harvest areas are being projected for most forest units in the 2010 FMP as in the 2005 FMP with slightly less available harvest area in the INTCC, PJCC, LCUS and SFUS forest units and slightly more available harvest area in the HDUS, MWUS, ORUS, PWUS, HESEL and HDSEL forest units. No change in available harvest area is projected for the PRCC and SBCC forest units. These changes in short term available harvest area from the previous plan are a result of balancing multiple objectives and the utilization of a revised approach to assessing the sustainability of ecological indicators. There are no significant management implications anticipated with this change in projected short-term available harvest area.

The projected available harvest volume over the short, medium and long term is presented in FMP-10. Table FMP-10b provides a similar available volume projection specifically for unmerchantable volume (undersize and defect volume). A description of the methodology for the calculation of unmerchantable volume is provided in section 4.3.6.1. The following graph and chart illustrate the difference between the projected available harvest volume (AHV) from the 2005 FMP to the 2010 FMP.

Figure 21 Forecasted available harvest volume for the 2010 Proposed Management Strategy compared to the 2005 selected management alternative



Over the short and medium term the projected AHV (PMS7.1) is greater than projections from the 2005 FMP. This is a direct result of the revised yield curves being used for the 2010 FMP (refer to analysis package for details). The term 1 projected AHV is 19.0% greater (125,133 m3/yr.) than the 2005 FMP. This trend of higher available volume decreases over time as the projected 2010 AHA becomes less than the 2005 FMP projected AHA. By term 8 the additional volumes associated with the new yield curves is nullified due to the decrease in available harvest area compared to the 2005 FMP.

The following table illustrates this available harvest volume comparison by species group for term 1 (2010-2020). At the species group level, projected volume increases range from 14.5% in the tolerant hardwood species group to 53% in the other conifer species group.

Table 8 Available Harvest Volume by Species Group- Term 1

Annual Available Harvest Volume by Species Group ('000 m3/yr)

	Spp Group	2005 SMA	PMS 7.1	Diff	% Diff
Term 1	Pwr	167.945	203.813	35.868	21.4%
Annual	SPF	64.784	79.785	15.001	23.2%
Volume	TOL	258.288	295.716	37.428	14.5%
	OC	42.742	65.381	22.639	53.0%
	Int	124.721	138.918	14.197	11.4%
('000 m3)	Total	658.480	783.613	125.133	19.0%

3.9 Selection of Areas for Operations

Once the Proposed Management Strategy was finalized and had considered the balance of numerous management objectives, the non-spatial projection of harvest area by forest unit, ageclass and silviculture intensity was identified on the landscape. The FMPM requires that the identification of preferred harvest areas consider MNR's applicable Forest Management Guide for Natural Disturbance Pattern Emulation. Several additional criteria were considered in the identification of preferred and optional harvest areas, including, but not limited to:

a) Maturity of forest stands (ageclass)
b) Time since last harvest (Selection Harvest Prescriptions)
c) Stage of Management (Shelterwood Harvest Prescriptions)
d) Operability and accessibility
e) Areas of Concern
f) Wildlife Considerations
g) Distribution of area across working circles
h) "Lighten the Footprint" preliminary proposed areas.

The majority of harvest operations in the Algonquin Park Forest are either selection or shelterwood. These systems are based on partial cuts with a return cycle in most cases of 20 to 25 years. The end result is a selected and optional harvest areas map (supplementary documentation section 6.1.2), which shows most of the management unit eligible for harvest over the next 10-year period. The selection system makes up the largest percentage of the productive crown forest, followed by the shelterwood system. Historically, clearcuts occur on only a small percentage of the landbase.

3.9.1 Harvest Eligibility Criteria

The following criteria was used to identify harvest eligibility:

- All stands coded as available forest in the Recreation/ Utilization zone of Algonquin Provincial Park.
- Forest stands classified by the Forest Resources Inventory (FRI) as site class X, 1,2 or 3.

- Site class 4 stands may be eligible for depletion but have not been included in the AHA calculation and are not showing as eligible on the selected and optional areas map. Field surveys may determine that the estimated stand height and/or age is in error and that the actual class is higher (1, 2 or 3) making the stand eligible.
- All tolerant hardwood stands and hemlock stands managed under the selection system are eligible.
- Protection Forest Reserve (PFR) areas are eligible. If these allocated stands are truly site limited they will be bypassed and coded as unavailable for future planning.
- Component zero areas identified during round 1 of the Lighten the Footprint (LTF) process are included in the available landbase but have not been coded as eligible.
- Other LTF areas identified on the Oct 2008 draft Parks Board/AFA Board map are eligible for harvest but have not been selected. LTF areas adjacent to selected areas have been identified as optional on the Selected and Optional Harvest Areas Map. These areas will be identified as contingency area, making them available for harvest through a future amendment process if this area remains available for management. An additional 1 year of contingency area (above and beyond the LTF contingency area) has been identified in the plan to allow for adequate contingency area if the LTF contingency area becomes unavailable.

The balance of the eligibility criteria is based on rotation ages and delay periods for individual forest units, as defined below in Table 9.

Table 9 Criteria for Preferred and Optional Harvest Areas

Forest Unit	Plan Term *	Plan Yrs	Eligible Age by Term	Min. Age	Delay Period: Years Since Previous Depletion **	Eligible Depletion Years (Less than)	Commercial Thinning Minimum Age
IntCC	T1	5	60	65			
	T2	10	55				
PjCC	T1	5	75	80			40
	T2	10	70				35
PrCC	T1	5	75	80			40
	T2	10	70				35
SbCC	T1	5	95	100			
	T2	10	90				
HDUS	T1	5	85	90	10	2005	60
	T2	10	80			2010	55
MWUS	T1	5	75	80	10	2005	
	T2	10	70			2010	
LCUS	T1	5	75	80	20	1995	
	T2	10	70			2000	
OrUS	T1	5	85	90	5	2010	60
	T2	10	80			2015	55
PwUS	T1	5	55	60	10	2005	
	T2	10	50			2010	
SFUS	T1	5	55	60	20	1995	
	T2	10	50			2000	
HDSEL	T1	5	0	None	0		
	T2	10	0				
HeSEL	T1	5	0	None	0		
	T2	10	0				

* 5 - First five year term (2010-2015); 10 – Second five year term (2015-2020)
** Stands with no harvest history also eligible

Table 9 provides a summary of the minimum suitable age of stands (rotation ages) and for partial cutting systems, the time delay between previous harvest entries. The information is broken down by each 5-year term by forest unit and shows the suitable ages of stands based on plan start 2010. This criteria is consistent with the criteria used in the Proposed Management Strategy in SFMM. For example, a 60 year old INT stand (at plan start 2010) is suitable for harvest during the first 5 year term as it will meet the minimum harvest age of 65 years old by year 5 of the term. In turn, a 55 year old INT stand will meet the minimum criteria by the last year (2020) of the 10 year term. For partial cuts, a list of suitable depletion years is also identified to reflect time delay. For example, a PWUS stand cut prior to 2005 may be suitable for its next harvest entry in the first 5-year term, while stands cut prior to 2010 may be suitable in the second 5-year term.

3.9.2 Selection Criteria

The selection criteria for harvest areas were chosen based on eligibility and past cutting history as outlined in Table 9. The selection criteria are consistent with the operability criteria

used in the Proposed Management Strategy. Criteria related to rotation age for clearcut forest units, age for various stages of shelterwood management and cutting cycle for the selection forest unit are inputs into SFMM for the Proposed Management Strategy. Refer to sections 4.1, 4.5 and 4.9 the Base Model Analysis Package (supplementary documentation section 6.1.6) for details of the operability criteria used.

The following criteria were used in selecting preferred areas for harvest in the 10 year term:

- The preferred harvest areas for the 10 year period will normally be equally balanced between the two five year terms and will not exceed the available harvest area for each forest unit. An allowance of +/- 10% of the AHA by forest unit was used for the LTMD stage of the planning process.
- Stands had to meet the criteria for preferred and optional harvest areas (Table 9) to ensure they were silviculturally ready for harvest.
- For shelterwood removal cuts, stands must have regeneration in the understory that is Free-to-Grow.
- The preferred harvest areas match, as closely as possible, the projections of forest operations in the Proposed Management Strategy, in terms of age class and/ or stage of management.
- Allocations are based primarily on the pattern of past harvesting practices. This means that those forest stands that have the longest period of time since the last cut may be allocated first, while considering the achievement of other forest management objectives. This is the main criterion for selecting forest stands because of the partial cutting systems employed.
- Create operating units and use natural boundaries where possible. This is an important criterion for selecting areas as it can be used to create disturbance patterns of various sizes.
- Selection stands were allocated on past cut history. Those that were not previously cut were considered for allocation first, next, stands that had the oldest past cut years were allocated. All selection stands were allocated that had past cut years indicating that at least 20 years will have passed prior to the end of each phase of the plan.
- For clearcut stands, consideration was given to allocating some clearcuts in close proximity to other clearcuts or past clearcuts to increase the frequency of large disturbances as defined by the Natural Disturbance Pattern Emulation Guide in order to move disturbance pattern towards the regional template.
- Because of the interspersion of forest units and age classes in the management unit, allocation will not be based on the principle of allocating the "oldest first". This will allow the achievement of old growth objectives and the maintenance of mature forest for those wildlife species that require it.
- Stands in the PrCC, HDUS, ORUS and PJCC forest units may also be selected for commercial thinning based on the commercial thinning minimum ages identified in Table 9.
- Meetings also took place with adjacent SFL’s to identify common boundary allocations and in consideration of roads use strategies

- In terms of insect pest management and salvage operations, no areas currently exist that would meet the criteria for such operations, however unforeseen circumstances and new events would likely be dealt with via amendments to the plan.

Component zero areas identified within the Ontario Parks Board 2006 Report on Lighten the Footprint (LTF) are included in the available landbase but have not been coded as eligible. Other LTF areas identified on the Oct 2008 draft Parks Board/AFA Board map are eligible for harvest but have not been selected as preferred. LTF areas adjacent to preferred areas have been identified as contingency area, making them available for harvest through a future amendment process if this area remains available for forest management.

To ensure operationally feasible allocations on the landscape, a certain level of ageclass/stage of management substitution was required. The selected allocation result has been simulated in the SFMM to project any effect of this variation on the achievement of the long term management direction (section 4.8).

Selected harvest areas for the ten-year period, by each five-year term, and the optional harvest areas are identified in supplementary documentation section 6.1.2 – Selected and Optional Harvest Areas Map. As portrayed in FMP-13, 98.1% of the total available harvest area has been identified as forecast harvest area, with no forest unit exceeding the strategic available harvest area. The selected harvest area by forest unit is also closely balanced between the two five-year terms.

3.10 Assessment of Objective Achievement

Work completed by the planning team, based on input from the Desired Forest and Benefits Workshop, as well as the FMPM and all other applicable forest management guides and guidelines, yielded 39 objectives and 66 indicators, providing over 300 measures of sustainability. The planning team set a desired level, or a specific number, range or trend for an indicator, to be achieved and maintained over time. Accompanying the desired level is a target, with a specific number, range or trend and a timeframe for achievement. One or more desired levels and targets have been identified for each indicator. The desired level is intended to reflect the planning team's interpretation of moving towards the emulation of natural processes on the landscape, or meeting a series of environmental, economic or social values. The target may be the same as, or different from, the desirable level of the indicator, but it has remained consistent with or established movement toward, the desired level wherever possible.

A subset of objectives and indicators that required measurement through time was assessed using SFMM, and balanced as part of the requirements of the Proposed Management Strategy. A total of 251 desired levels and targets have been established that can be assessed at the plan approval stage of the planning process. Of these 251 targets, 133 (53%) are ecological targets and 118 (47%) are wood supply related targets. In addition, seven other objectives were assessed, outside of the SFMM model, to evaluate spatial disturbance pattern and preferred wildlife habitat as a result of selecting the planned allocation on the landscape. The

remaining objectives will be assessed through the implementation of the Plan, in the year 7 and 10 Annual Reports for the Forest.

The achievement of individual management objectives was assessed using the results of the forest modeling for the management strategy, spatial assessments, and other plan components. Management objectives and indicators are identified in table FMP-13. Further detail on the assessment of objective achievement is provided in Section M of the analysis package in supplementary documentation section 6.1.6.

Of the 251 desired levels established, 236 have been achieved, resulting in an overall 94% level of objective achievement.

The Strategic Forest Management Model (SFMM) version 3.8.4 was used as the primary tool for strategic planning analysis and assessment of objective achievement. SFMM is an aspatial model based on linear programming and is used to model timber production capabilities for various levels of management intensity. It is an effective tool to evaluate the potential of the forest to provide various resource benefits, (including wood products), non-spatial measurements of wildlife habitat and forest diversity; and to explore alternative forest management strategies and tradeoffs. SFMM projects changes in forest cover and age-class structure on the land base with and without the implementation of forest management operations for 160 years into the future. The projections of the forested land enable the evaluation of forest types and ages, wildlife habitats and timber production. Detailed information on the development of inputs and the use of SFMM during the preparation of the Plan can be found in supplementary documentation 6.1.6 – Base Case Analysis Package.

Information requirements for the model are: land base definition, forest dynamics information, and silvicultural options. The land base information, contained in the planning inventory, was originally built on 1987 aerial photography. The Forest Resource Inventory (FRI) has been updated to 2010 using annual reporting data and forecasted depletions for the remaining years in the current 2005-2010 FMP. The Forest was first categorized into Forest Units, and SFMM Tool (Version 3.013) was used to generate average stand conditions (stocking, site class and species composition) within the planning inventory. For each of the forest unit conditions, SFMMTool (Empirical or Plonski Modified) generated the benchmark yield estimates for unmanaged conditions on the Forest. Managed conditions were then refined, taking into account management practices and the level of anticipated intensity of each forest unit. Yield curves have been revised for the 2010 FMP. Yield forecasts have been increased to more closely align with actual yields. A more detailed description of the development of yield curves is also available in supplementary documentation 6.1.6 – Yield Curves Analysis Package.

In addition to the base data for the model, inputs describing forest dynamics, namely disturbance levels and rates of natural succession, were developed. These inputs were based on the previous model inputs as well as some new direction from the development of the Landscape Guide. Silviculture options were created using the most appropriate science and silviculture effectiveness monitoring data available. Descriptions of all modelling inputs can be found in the Analysis Package in supplementary documentation 6.1.6.

In addition to aspatial analysis, a series of spatial tests were completed using the planned harvest areas developed within the Proposed Management Strategy (PMS 7.1). The strategy considered the direction provided by the Forest Management Guide for Natural Disturbance Pattern Emulation (NDPEG) (OMNR 2001), regarding the spatial arrangement of harvest areas and how they contribute to disturbance patterns on the Forest. Results of these spatial tests are discussed below, and in more detail in supplementary documentation 6.1.6 - Appendix K. Measures resulting from this analysis were tested against desired levels and targets in the objective suite (Table FMP-13).

Another set of spatial analysis was performed and used to measure the impact of the planned harvest areas on preferred wildlife habitat. Moose, Red-shouldered Hawk and Pileated Woodpecker are provincially featured species in the Great Lakes/St. Lawrence forest region, and the current guides give direction on how to provide habitat for each species, while continuing to manage the forest for other values. Detailed spatial analysis has been completed and tested against each objective for these featured species, in addition to the analysis performed in SFMM.

All of the spatial wildlife analysis was performed using the Ontario Wildlife Habitat Assessment Model (OWHAM) version 4.0. OWHAM is a spatial model used to determine habitat availability. Wildlife habitat availability is assessed on the current landbase and on the projected landbase, given the planned level of harvest operations.

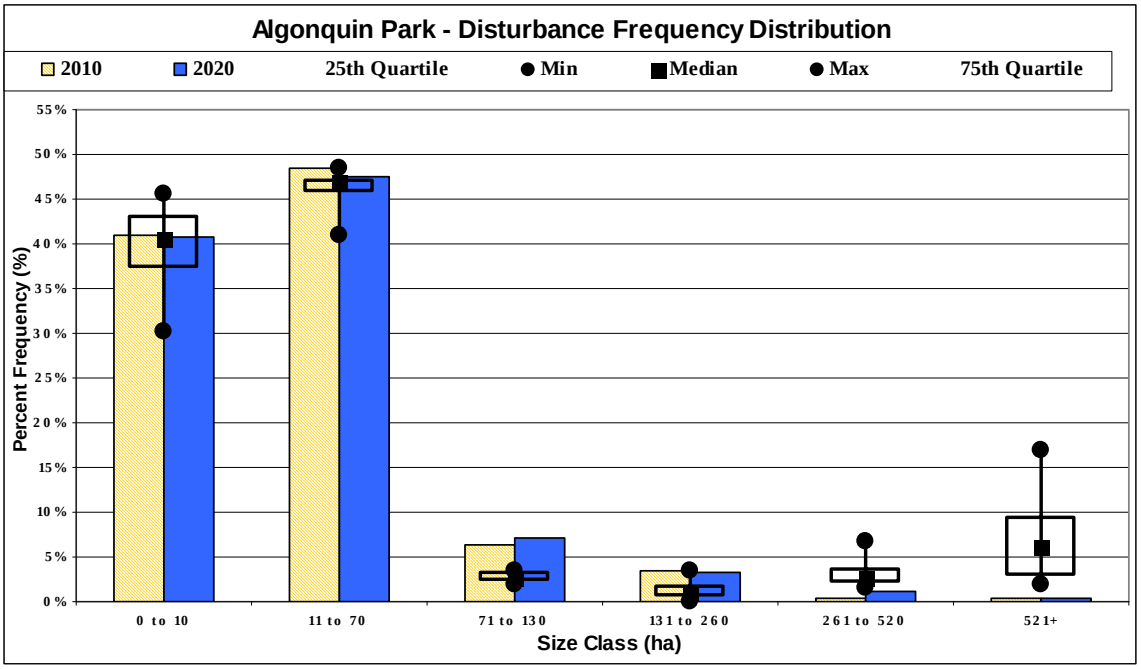
The Forest Management Planning Manual (FMPM) for Ontario's Crown Forest (OMNR 2004) requires that an assessment be prepared to identify the potential social and economic impacts of implementing the Proposed Management Strategy (PMS). A quantitative assessment was conducted using the socio-economic impact model (SEIM). A summary of each of these assessments are detailed in section 3.11.

3.10.1 Natural Disturbance Pattern Emulation (NDPE)

There were two main spatial considerations associated with the emulation of natural disturbance at this stage of plan development. The first assessment determined how well the planned allocation contributed to movement towards the natural disturbance template, in terms of disturbance size classes. The second assessment was related to the planned harvest areas possessing the requirement to have at least 90% of the planned clearcuts less than 260 ha in size. Figure 22 below shows the frequency distributions of the regional template, 2010 Disturbances and 2020 Disturbances.

Figure 22 Summary of disturbance frequency distributions by size class

Disturbance Frequency	Size Class Range (ha)							
	0 to 10	11 to 70	71 to 130	131 to 260	261 to 520	521+		
25th percentile	37%	46%	2%	1%	2%	3%		
minimum	30%	41%	2%	0%	2%	2%		
median	40.55%	46.90%	2.66%	1.01%	2.66%	6.16%		
maximum	46%	48%	4%	3%	7%	17%		
75th percentile	43%	47%	3%	2%	4%	9%		
2010 (NDPEGTool)	40.94%	48.54%	6.43%	3.51%	0.29%	0.29%		
2020 (NDPEGTool)	40.75%	47.48%	7.10%	3.18%	1.12%	0.37%		
Green=towards, Red=away								



The results show movement toward the regional template in five of the six size classes. The frequencies of the two smallest size classes are very close to the median template values. The next two size classes are above the median template value, with the 71 to 130 hectare size class showing a slight movement away from the median template value. The two largest size classes have frequencies below the median template value, but both show movement toward the median. Overall this forest diversity objective and target has been met. The results of this assessment are also presented in table FMP-12.

The NDPE Guide contains a standard requiring that 90% of clearcuts in the GLSL forest region must be less than 260 ha in size, determined by frequency. An analysis of planned clearcuts identified that 98.5% of the clearcuts are less than 260 ha, meeting the standard.

3.10.2 Old Growth

In response to the Desired Forest and Benefits meeting, and consistent with the requirements of the 2003 MNR Old Growth Policy, the planning team set targets around the maintenance and spatial distribution of old growth across the Forest.

The 2003 MNR Old Growth Policy states "old growth forest in parks and conservation reserves (that are situated within a management unit) can contribute to meeting objectives for maintaining old growth conditions and values for the forest management unit". The approach used in the 2010 FMP for the Algonquin Park Forest is consistent with this old growth policy direction. Old growth levels have been calculated and projected across the entire forest, including the managed forest (R/U zone) and the unmanaged forest (wilderness zones, nature reserves, and AOC reserves within the R/U zone). Old growth definitions for even-aged forest units are a combination of age of onset and silvicultural intensity (stage of management) for uniform shelterwood forest units.

Table 10 below depicts the amount of even-aged old growth forest at plan start (2010) and plan end (2020) with depletions factored in (i.e. 2010-2020 planned harvest areas depleted).

Table 10 Short Term Old Growth Projections by Forest Unit (hectares)

Forest Unit	Old Growth 2010	Old Growth 2020	% Change
HDUS	20,815	19,786	-4.9%
INTCC	26,465	32,222	21.8%
LCUS	1,638	2,278	39.0%
MWUS	19,484	22,839	17.2%
OrUS	6,024	9,052	50.3%
PjCC	784	814	3.8%
PrCC	58	152	160.0%
PwUS	15,532	30,470	96.2%
SbCC	3,128	3,984	27.4%
SFUS	2,546	3,803	49.3%
Total	**96,476**	**125,400**	**30.0%**

The total amount of old growth across the Algonquin Park Forest is projected to increase by 30% over the duration of the plan. This is mainly a result of natural aging of the forest in both the available and unavailable forest. The maps in Appendix 1 and 2 of the Old Growth Forest Supporting Documentation (Appendix L of supplementary documentation section 6.1.6) illustrate the increasing amount and distribution of even-aged old growth forest at plan start (2010) and plan end (2020).

Graphs were developed for each even-aged forest unit depicting the long-term projected levels of old growth forest for the Proposed Management Strategy in relation to the natural benchmark levels and targets (Appendix L – section 2.2). A target of 75% of the natural benchmark level of old growth for the next 100 years has been set for each forest unit. This target has been achieved for all forest units in the Proposed Management Strategy, thus ensuring the maintenance of old growth forests in Algonquin Park that is consistent with

natural benchmark tends, and the provision of old growth wildlife habitat for those species that require it.

Section 3.0 of Appendix L depicts the projected old growth area in the 2010 Proposed Management Strategy in relation to the total projected forest unit area and the 2005 FMP projected levels (2005 SMA). As portrayed on these graphs, significantly higher levels of old growth than the 2005 FMP are now being projected for most even-aged forest units. This achievement is a result of the new methodology for emulating natural benchmark levels for all even-aged old growth forests.

Figure 23 is the long term old growth projection for the white pine uniform shelterwood (PWUS) forest unit, in relation to the total forest unit area and the 2005 FMP projected old growth area. The level of old growth area fluctuates with the natural benchmark trend and reaches a high of 40% of the total forest unit area in old growth by term 4. This new forecasted level of old growth exceeds the 2005 FMP projections for all terms: by 14,295 ha. in term 4, or a 60% increase.

Figure 23 PWUS Forest Unit Old Growth Projection and Comparison

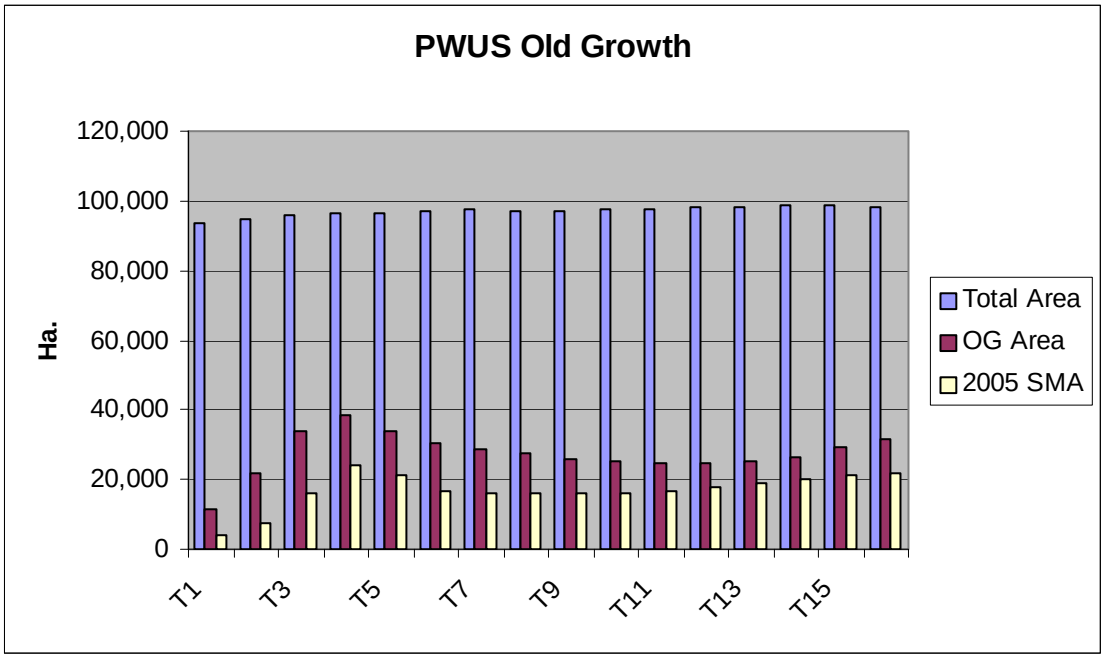


Table 11 Long Term Old Growth Projections – % of Total Forest Area (hectares)

	Total Even-aged Area (ha.)		
	Total Area	OG Area	OG %
Term 1	357,937	83,001	**23.2%**
Term 2	362,165	111,637	30.8%
Term 3	361,881	135,087	37.3%
Term 4	361,514	143,887	39.8%
Term 5	361,427	137,204	38.0%
Term 6	361,352	129,652	35.9%
Term 7	361,281	120,971	33.5%
Term 8	361,263	113,577	31.4%
Term 9	361,246	109,881	30.4%
Term 10	361,243	107,410	29.7%
Term 11	361,241	111,619	30.9%

Total even-aged old growth area (Table 11) is projected to increase from a plan start level of 23.2% to a high of 39.8% of the total even-aged productive forest area in an old growth stage in term 4. Note: the differences in T1 and T2 old growth area between Table 10 and Table 11 are due to rounding. Table 10 is a stand-level database summary that used actual ages of onset, while Table 11 is a summary from SFMM which is based on rounded ages (L-stage ages of onset).

A spatial assessment of old growth was also conducted using the Patch Analyst model as part of the objective achievement process (FMP-13). A series of landscape metrics were calculated for 2010 (plan start) and re-calculated for 2020 (plan end) in order to assess the spatial distribution and progression of old growth patches across the landscape. These metrics were compared, and an assessment of objective achievement was conducted. Targets have been met for all designated landscape metrics as presented in table FMP-13. Refer to table FMP-13 and Appendix K of the Analysis Package – Spatial Analysis for complete details.

3.10.3 Wildlife Spatial Assessment

A spatial assessment was completed using the OWHAM model (Ontario Wildlife Habitat Assessment Model) to determine the impacts of the proposed allocations on the habitat availability for provincially featured species. These species are Moose (*Alces alces*), Pileated Woodpecker (*Dryocopus pileatus*) and Red-shouldered Hawk (*Buteo lineatus*). The assessment is for the ten-year term of the plan. Plan start and projected plan end results were compared and assessed in relation to set objectives and targets. Complete details of the wildlife spatial assessments are contained in Appendix K of the Analysis Package.

3.10.3.1 Moose

A spatial objective for moose was to monitor the total carrying capacity for moose across the Forest. The intent is to maintain a Crown forest landscape that provides suitable moose summer and winter habitat.

A spatial objective for moose was set to monitor the total carrying capacity for moose across the Algonquin Park Forest to ensure the long term sustainability of suitable moose summer and winter habitat as projected in OWHAM. Total carrying capacity was used as the indicator for this objective to assess the level of achievement. OWHAM for moose estimates carrying capacity based on food and cover relationships during spring, summer and winter.

The tests of sustainability for the planned harvest areas as projected in OWHAM indicates that the 2010-2020 FMP is creating and maintaining a landscape that ensures the long term sustainability of suitable moose summer and winter habitat on the Algonquin Park Forest. Results indicate movement towards the desirable level of moose habitat with a 7.7 % increase in overall carrying capacity on the forest, or an increase of 0.04 moose/km2.

3.10.3.2 Pileated Woodpecker

A spatial objective was set to manage Pileated Woodpecker feeding, nesting and roosting habitat on the Forest with a target of >=217,221 ha by plan end (2020).

The spatial habitat for this species is projected with an overall level of 219,637 ha. of preferred habitat at plan end (2020). The amount of total used habitat is increasing over the duration of the plan. The selection of the preferred harvest area resulted in the successful achievement of this spatial objective.

3.10.3.3 Red Shouldered Hawk

A spatial objective was set to manage Red-shouldered Hawk feeding and nesting habitat with a desired level to maintain or increase the current amount of preferred habitat on the landscape throughout the planning term (>=10,026 ha).

The target for Red-shouldered Hawk preferred habitat was met by the end of the planning period. The test of sustainability revealed an overall increase in preferred habitat of 4.4%.

3.11 Social and Economic Assessment

The complete results of the social and economic assessment of the management strategy and discussion of the methodology used can be found in Appendix N of the Analysis Package in supplementary documentation section 6.1.6. The following is a summary.

A social and economic assessment was completed on the Proposed Management Strategy to identify potential impacts on communities receiving wood from Algonquin Park. The provincially-approved Socio-Economic Impacts Model (SEIM) was used for a quantitative assessment. The SEIM model is used to trace how each dollar spent on the provision of forest products will circulate and re-circulate within the economy, multiplying the effects of the original expenditure on overall economic activity. The outcome of SEIM is a listing of estimated social, economic, and environmental impacts (i.e. employment, average salary,

value added, and green gross domestic product (GDP). This SEIM analysis basically compares the 2010 FMP to the 2005 FMP.

Within SEIM, three main elements are used in determining social and economic impacts: logging, resource management (silviculture), and processing/ manufacturing of harvested wood In the 2005 FMP the total planned harvest was 662,108m^3, but projections of 131,517m^3 of pulp going unutilized and wood going to Quebec resulted in only 438,532m^3 being used in the processing/manufacturing portion of the SEIM analysis. The total planned harvest in the 2010 FMP is 788,531m^3; a 19% increase from the 2005 plan. It is expected that 100% of the planned volume will be utilized, therefore a larger volume was entered into SEIM for this FMP compared to the 2005 FMP.

The outputs selected from SEIM were employment, average salary, value added, and green gross domestic product (GDP) at the provincial level.

Employment shows the direct person years of employment resulting from logging, silviculture, processing/manufacturing, and forest management. The salary amount is the estimated total expenditures on staff for local contractors, processing facilities, forest management, and government. Value added is a measure of the net output, which accounts only for the final goods produced (not primary processing). Green GDP is a quantification of income (GDP) corrected for the costs of environmental mitigation. These selected outputs for the 2010 management strategy all show increases when compared to the values from the selected management alternative (MA4) from the 2005 plan.

Table 12 Comparison of SEIM outputs for 2005 and 2010 Algonquin Park FMPs.

Province-level Impacts	**2005 FMP***	**2010 FMP**
Employment (direct – person years)	301.1	468.3
Salary (direct - $/yr)	$16,392,463	$28,437,018
Value Added (direct - $/yr)	$23,799,832	$44,046,201
Green GDP (% of GDP)	95.6	91.6
Total planned harvest volume (m3/yr)	662,108	788,531
Volume utilized by ON mills (m3)	438,532	700,031

***** Note: the 2005 outputs reported here are slightly different from those reported in the 2005 FMP due to the correction of an input error in SEIM.

If the full volume is harvested and markets remain open, the economic impact of logging in Algonquin is quite favourable and a definite increase compared to the 2005 FMP levels. It appears that the sustainable management of the Algonquin Park forest provides a stable economic base and overall positive impact on the social and economic well-being of the surrounding dependent communities in terms of employment and the value added opportunities in production.

4.0 PLANNED OPERATIONS

4.1 Introduction

The focus of this section is the actual planned activities for the period of this Forest Management Plan. It describes the methodology used to select actual areas for forest management activities and discusses the prescriptions developed for operational areas, areas of concern and all other areas. The forecasted harvested areas and volumes are presented, as are comparisons to the modeled areas and volumes. The amount of area and expected volumes from contingency areas is also presented. This section also includes a discussion of wood utilization forecasts as well as renewal and tending operations and the support required to deliver these operations. Discussions on access roads as well as on the financial balance between revenues and expenditures are included.

Operational planning is detailed for Phase I (2010-2015 planned harvest areas) with Phase II (2015-2020 planned harvest areas) being also identified but with less detailed planning. Area of Concern planning, however, was applied to both Phase I and Phase II areas although changes may occur during Phase II planning expected to begin in 2014 as AOC prescriptions will likely be changed to reflect newer guidance on values protection.

The preferred silvicultural treatment packages in the silvicultural ground rules serve as preliminary prescriptions for operations and these may be updated annually during the 5-year term of the plan. Detailed prescriptions to protect other forest values are incorporated through "area of concern" planning. New primary and branch roads are identified in section 4.5 of the FMP.

Tables that summarize planned harvest, renewal and tending operations, as well as estimate revenues and silvicultural expenditures are located in section 9, starting with table FMP-15.

The forecast of operations are also compared to the type and level of activities identified in the Proposed Management Strategy to ensure the intent of the management strategy is met (section 4.8).

Appendix 6.2.10 contains standard operating conditions related to the following operational practices:

- Road Construction, Maintenance, Monitoring, Access Control and Decommissioning
- Water Crossings
- Piling Wood Outside of Landings
- Temporary Trailer Sites
- Aggregate Site Requirements
- Salvage of Incidental Blowdown

4.2 Prescriptions for Operations

4.2.1 Operational Prescriptions for Areas of Concern

An Area of Concern (AOC) is a defined geographic area within an area of operations which is adjacent to an identified natural resource feature, land use or value that may be affected by forest management operations. The extent to which forest management operations may or may not occur within an AOC is determined by the development of prescriptions by the planning team. These prescriptions are prepared based on MNR's approved implementation manuals and Park management policies contained in the Algonquin Provincial Park Management Plan. AOC prescriptions may include reserves, modified or normal forest operations and conditions on access.

Where a forest management guide provides specific direction or recommendations (standards or guidelines) as to the appropriate prescription to be used for a particular AOC, it is documented in FMP-14. Many of the older forest management guides do not provide specific direction, and for those the decision-making process is documented contained in the AOC Supplementary Documentation in section 6.1.13.

During July, 2009 the *Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales* was released by MNR for planning purposes. This "Stand and Site" Guide replaces a suite of older guides and provides updated standards and guidelines for many AOC's. In August 2009 the planning team decided to adopt many of these updated AOC prescriptions for the values that were not dependent on the use of the Landscape Guide during strategic planning. This ensures that the most recent science has been used in Algonquin Park to protect non-timber values going into this 10-year Forest Management Plan.

In order to provide further protection to values, specific locations for sensitive values are confidential and are not displayed on the operations maps or stand lists. AOC's for sensitive values will be portrayed on operational maps and stand lists used for actual operations and are provided to the MNR district in electronic format.

AOC prescriptions are also applied to protect values which recur throughout the forest, as well as values which have not previously been identified and are encountered in the field (ie. stick nests).

Tree markers who are trained in dealing with a multitude of values implement the operational prescriptions for an Area of Concern as described in FMP-14. Adherence to the guidelines is monitored by AFA personnel responsible for the tree marking program, and audited by the Ministry of Natural Resources. Implementation and monitoring of Area of Concern prescriptions in Algonquin Provincial Park has been ongoing since the early 1970s.

In the event that any unmapped cultural heritage sites are identified in areas of operations, the direction from the Forest Management Guide for Cultural Heritage Values will be implemented and the appropriate AOC prescription from FMP-14 will be established.

Individual AOC's are identified on the operations maps in supplementary documentation section 6.1.2. Each AOC, or group of AOC's, has a unique identifier code that is labeled on the operations maps and can be linked to the prescriptions in FMP- 14 and to the supplementary documentation forms (supplementary documentation section 6.1.12 and 6.1.13). Where AOC's overlap, the most restrictive AOC is portrayed.

4.2.1.1 Conditions on Regular Operations

Conditions on regular operations have been developed to maintain general habitat features and protect values that do not require a significant deviation from regular operations. Conditions on regular operations may apply to areas of harvest, renewal and tending as well as roads, landings and aggregate pits.

The following table lists Conditions on Regular Operations developed for the Algonquin Park Forest.

Table 13 Conditions on Regular Operations

Value	Description
Woodland Pools	• Recognizable temporary bodies of open water encountered during operations that have a surface area >= 500 m2 (i.e. about 25 m in diameter if circular) and are not ponds and are not connected to a stream or mapped forested wetland **Conditions on Regular Operations, Roads, Landings and Aggregate Pits** • No harvest, renewal or tending operations are permitted that will result in deposition of sediment within, or reduction of the water-holding capacity or woodland pools. • Trees will be retained within 3 m of high water mark to provide 70 % canopy cover. Residual forest (>= 35 yrs of age or 10 m height; > 50% stocking) will be retained within 15 m of high-water mark. • Within 3m of high-water mark of pools: o No machine travel during the frost free period. o No excessive removal or damage of sapling sized trees and shrubs o No felling of trees into or within 3m of pools during the frost free period. Trees accidentally felled into pools will be left where they fall • Within 15 m of high-water mark of pools o No disturbance of the forest floor that leaves ruts or significant areas of exposed mineral soil. Such occurrences will be promptly rehabilitated o No equipment maintenance (e.g. Washing or changing oil) o New roads are not permitted unless there is no practical or feasible alternative and appropriate mitigative measures are taken to minimize the risk of sediment entering pools and disruption of hydrological function.
Intermittent Streams	• Streams meeting the definition of Intermittent streams as per *The Stream Permanency Handbook*. Intermittent streams flowing into brook trout

Value	Description
	lakes are surveyed by Ontario Parks prior to operations. Those containing brook trout are protected using the CFH AOC prescription. **Conditions on Regular Operations, Roads, Landings and Aggregate Pits** • No harvest, renewal or tending operations are permitted that will result in damage to stream channels or banks and stabilizing vegetation, or deposition of sediment within streams. • Within 3m of active channel: o No machine travel during the frost free period. o No excessive removal or damage of sapling sized trees and shrubs o No felling of trees into streams or within 3m of active channel. Trees accidentally felled into streams will be left where they fall • Within 15 m of active channel: o No disturbance of the forest floor that leaves ruts or significant areas of exposed mineral soil. Such occurrences will be promptly rehabilitated o No equipment maintenance (e.g. Washing or changing oil) o New roads are not permitted unless there is no practical or feasible alternative and appropriate mitigative measures are taken to minimize the risk of sediment entering pools and disruption of hydrological function. • Extraction trails may cross intermittent streams, however crossings will be minimized and will follow operating practices which minimize rutting, compaction and mineral soil exposure that could lead to erosion and deposition of sediment in streams. Temporary crossing structures will be used when appropriate.
Occupied nests of waterfowl, grouse or wild turkeys	• Known nests of waterfowl, grouse or wild turkeys containing eggs encountered during forest management operations **Conditions on Regular Operations, Roads, Landings and Aggregate Pits** • Nests will not be destroyed and reasonable efforts will be made to minimize disturbance of breeding activities (egg laying, incubation, feeding of young). • Best Management Practice – avoid operations within 10 m of nests where possible (tree felling, road construction, heavy equipment travel).
Occupied nests of songbirds or other small birds	• Known nests of songbirds or other small birds containing eggs or young encountered during forest management operations **Conditions on Regular Operations, Roads, Landings and Aggregate Pits** • Nests will not be destroyed and reasonable efforts will be made to minimize disturbance of breeding activities (egg laying, incubation, feeding of young). • Best Management Practice – avoid operations within 3 m of nests where possible (tree felling, road construction, heavy equipment travel).
Dens of furbearing mammals in caves, excavations,	• Dens in caves, excavated burrows, under large piles of coarse woody material or other enduring features that are known to have been occupied by furbearing mammals (other than red foxes, skunks, wolves and wolverines) at least once within the past 5 years. **Conditions on Regular Operations, Roads, Landings and Aggregate Pits**

Value	Description
large piles of coarse woody material or other enduring feature	• Harvest, renewal and tending operations are not permitted within 20 m of the den entrance • New roads, landings and aggregate pits are not permitted within 20 m of the den entrance • Road construction and aggregate extraction are not permitted within 20 m of occupied dens except in extraordinary circumstances with Ontario Parks approval. • Hauling and road maintenance operations are not permitted within 20 m of occupied dens unless the road predates the den, is required for safety reasons or environmental protection or except in extraordinary circumstances with Ontario Parks approval
Dens of furbearing mammals in tree cavities, hollow logs, brush piles or other transitory features	• Dens in tree cavities, hollow logs, brush piles or other transitory features that are known to be occupied by furbearing mammals (other than red foxes, skunks, wolves and wolverines) and that are encountered during operations. **Conditions on Regular Operations, Roads, Landings and Aggregate Pits** • Known occupied dens will not be destroyed. • Reasonable efforts will be made to minimize disturbance of furbearers occupying known dens • Best management practice – avoid operations within 3 m of dens known to be occupied.
Beaver Habitat	• Suitable sites for small patch clearcuts (approx. 1 ha) intended to increase intolerant hardwood component adjacent to potential beaver habitat. **Conditions on Regular Operations, Roads, Landings and Aggregate Pits** • Sites will be selected using the following criteria: o Slope will be on average < 15% o No other identified values are present within or adjacent to water body (egg MAFA, heronry, canoe route, campsite) o Site will be adjacent to warm water fishery, intermittent creek, or warm water creek or wetland OR o Site will be adjacent to CW fishery were there is at least 30 m of trees or woody shrubs from the high water mark to the site OR o Site will be adjacent to dry beaver pond where there is at least 30m of riparian vegetation from the high water mark to the site • Patch will be approximately 1 ha (50 m deep x 200 m long) measured from the treed edge; maximum of 50% of pond's shoreline. Where possible emulate natural disturbance (irregular boundaries) while increasing intolerant hardwood component. • Regenerate using natural regeneration. Fall and winter harvesting is encouraged to promote poplar suckering. • Overstory harvest should be as complete as possible. Skidder operators are encouraged to knock down undesirable regeneration and unmerchantable stems. • The Code of Practice for Timber Management Operations in Riparian Areas applies to all work near the water's edge. • No harvesting in patch from April 1 to June 30.

4.2.2 Prescriptions for Harvest, Renewal and Tending Areas

Silvicultural ground rules, which were developed for all forest unit - ecosite combinations on the management unit, are documented in FMP-5. The prescriptions for harvest, renewal and tending presented in FMP-5 serve as the prescriptions for operations for the ten-year period of the Forest Management Plan.

The forest units and silvicultural ground rules for each area of operations are identified on the operations maps for the first five-year term (supplementary documentation section 6.1.2). The digital database that accompanies those maps (supplementary documentation section 6.1.14) serves as the stand list for harvest, renewal and tending operations. The most common treatment package(s) in each silvicultural ground rule is the most likely treatment. This information represents the best estimate of proposed operations at the time of plan preparation, and does not limit the selection of any acceptable alternative silvicultural treatments in the silvicultural ground rules at the time of implementation of operations.

There are no proposed candidate prescribed burns, aerial application of herbicides or areas eligible for insect pest management identified in this FMP.

There are no fuelwood sites in the Algonquin Park Forest. Fuelwood will be made available for purchase from the Authority's processing yards in Pembroke and Madawaska and these sites are indicated on the composite scale map of areas selected for operations in supplementary documentation section 6.1.2. Additionally, fuelwood is available for purchase directly from AFA contractors who provide delivery services. Limited gathering of fuelwood also occurs by First Nations peoples.

4.3 Harvest Operations

The areas planned for harvest operations for the first five-year term and the areas proposed for harvest operations for the second five-year term are identified on the operational maps in supplementary documentation section 6.1.2. A digital list of all planned harvest areas is also provided in the supplementary documentation section 6.1.14.

4.3.1 Harvest Areas

The available harvest area and the forecast harvest area for the ten-year period, and the planned harvest area for the first five-year term are identified in FMP-15. There is an even distribution of harvest area between the two five-year terms. Table FMP-15 indicates that the planned harvest area for the first 5-year term represents 49% of the total available 10-year harvest area.

In general the age class distribution of the forecast harvest area is more widely distributed among age classes and younger on average than the available/projected harvest area. This is

necessary in order to achieve an allocation that is operationally feasible and consistent with historical cut cycles, as per the selection criteria. As per section 4.8, the SFMM model continues to be feasible when solved with the forecast harvest areas entered into the model as term 1 values, and objectives continue to be met.

The total forecast harvest area is 1.9% less than the available harvest area. It was not possible to fully allocate the total available harvest area in some forest units for the following reasons:

- Lighten the Footprint – there was approximately 13,000 hectares of unavailable area due to the Lighten the Footprint initiative within the proximity of planned harvest areas. This area was placed in a contingency category pending resolution of this process. As result, this area was unavailable to select for operations making it impossible to fully allocate some forest units. The hemlock forest unit was most affected by this issue.
- AOC revisions just prior to draft plan submission. After the submission of the Long Term Management Direction, and prior to draft plan submission, a number of AOC revisions were made. The two main sources of revisions were to incorporate the new Stand and Site Guide direction wherever possible (i.e. nest AOCs), and to incorporate new values information received from Ontario Parks for the planned harvest areas. There was a significant increase in moose aquatic feeding areas which resulted in a loss of approximately 250 hectares just prior to draft plan submission.
- Challenges meeting the spatial pileated woodpecker targets.

The LTMD assumes that 100% of the AHA will be harvested each term. This results in a forest condition that meets non-timber objectives and should meet wood supply estimates in the model. When significant undercutting of area occurs, the future forest will be different than modelled. Supplementary Documentation section 6.16 presents scoping runs that explore the future forest condition based on lower levels of harvest that are reflective of recent area utilization patterns. Changes observed in the future forest condition were not considered to be significant. While volumes will not be achieved, there will be higher levels of old growth and habitat relying on old forest. Conversely, wildlife species habitats that prefer young, uneven or two-aged forest will be lower.

Natural depletions have occurred on the Algonquin Park landscape in the past and most of these have been the result of high winds or “downbursts”, as they are sometimes called, and tornadoes. Most fires are small in nature and generally affect just the understory. Efforts will be made to salvage timber from natural depletions if they can be conducted in a safe manner and are economically viable. Because of the impacts of stain and insects (especially during the summer months) on areas affected by these natural events it is of the utmost importance to salvage this material as soon as possible. Normally, an administrative amendment to the existing Forest Management Plan is processed to facilitate the quick start up of salvage operations.

Refer to Appendix 6.2.10 for standard operating conditions related to areas of incidental blow-down, (individual trees and/or scattered patches) within selected harvest areas in this FMP.

In situations of larger fires or windthrow areas where the overstory is affected, salvage logging will be avoided in some areas in an effort to emulate natural disturbances and retain standing and down woody debris. Also, harvesting of unburned area (residual area) within the disturbance boundary will be kept to a minimum.

Allowance for natural depletions was incorporated in forest modelling and were thus considered in the determination of the area available for harvest for the five-year term.

Insect infestations are generally small in scale and localized to one section of the Park. The most serious has been spruce budworm infestations in the northwest corner of Algonquin Provincial Park since the early 1990s. This infestation peaked at 57,405 gross ha of moderate to severe defoliation in 1994, was reduced to 10,234 ha by 1996 and no area was reported as infested in 1999. The infestation was scattered in the identified areas and affected primarily balsam fir and black spruce. The infestation was left to run its course and salvage operations did not occur. Where required these insect infestations have been accounted for in the updated forest inventory. Most insect infestations have a minor impact on available harvest volumes.

Residual Stand Structure

A summary of residual stand structure for each planned forest disturbance is presented in supplementary documentation 6.1.4. For planned clearcuts within a planned forest disturbance, areas will be retained as residual stand structure (i.e., insular and peninsular residual) according to this table. This total residual consists of target, mapped and projected insular and peninsular area. The target area is the total area of insular and/or peninsular area required to be left as residual area upon completion of harvesting within that disturbance patch (NDPEG, 2001). The mapped area is the area of insular or peninsular that has already been identified during forest management planning. If this area falls short of the target area, a projected area has been identified for that disturbance patch. This projected area is the amount of additional residual area that is required to be left. This area has not been mapped and will be identified at the forest operations prescriptions stage as required.

During the FOP process it may be determined that the FMP planned residual area should be revised based on field conditions encountered. This revision of planned insular and peninsular area will be permitted provided that the total residual area identified for that disturbance patch is consistent with the residual area targets identified in supplementary documentation 6.1.4. Residual targets are based on a weighted average of forest types within that disturbance patch. Any recalculation of residual targets during plan implementation will be consistent with the direction provided in the NDPE Guide. The AFA Tree Marking Prescriptions in Appendix 6.2.5 provide specific direction with respect to residual requirements as per the NDPE Guide.

The stand level requirements of the NDPE Guide will apply to all stands with clearcut prescriptions and to stands with shelterwood final removal prescriptions where the regenerated new stand is < 6 m height. These requirements include the retention of internal and peninsular patches, individual living trees, snags and downed woody debris. For final

removal shelterwood cuts where the regenerated new stand is > 6 m height, there will be no requirement for the maintenance of internal and peninsular patches.

As per subsequent direction from MNR following the release of the NDPE Guide, clearcuts less than 100 hectares in size do not require the prescribed residual patches to be retained. The requirement to leave an average of 25 trees per hectare will always be met.

The calculation of insular and peninsular patches in final removal shelterwood areas will be conducted at the forest operations prescriptions stage. In addition, for shelterwood harvest areas where the final harvest cut will result in a young forest that is less than the required height for an acceptable break (see table 2 in the NDPE Guide) the landscape level requirements of the NDPE Guide will apply. This includes the application of the spacing rules outlined in Table 2 of the NDPE Guide. It is anticipated that this will only occur in the red oak forest unit, and this has been represented in NDPE modeling.

The NDPE Guide generally does not affect selection stands. Tree markers may sometimes encounter situations where small portions of selection harvest managed stands are more suitable to be managed as a clearcut. In these cases, the single tree residual targets in the guide will be followed. If it is felt that leaving one or two insular patches would best meet the intent of the guide, then this may be done as well. In most cases, the area of clearcut operations will be small with surrounding selection and/or shelterwood harvest operations and area of concern reserves providing necessary residual patch requirements.

4.3.2 Surplus Harvest Area

There is no surplus harvest area. While not all area is likely to be harvested due to poor markets, access challenges and restrictions, inclement weather requiring operations to shut down, poor quality stands and a combination of these factors, surplus has not been declared. Harvest volume in excess of currently projected industrial wood requirements and wood supply commitments has been classified as utilized in FMP-18 and placed in the open market category in FMP-19.

4.3.3 Completion of On-going Harvest Operations from Previous Plan

The FMP Manual allows for bridging operations and second-pass harvest operations to occur in the plan being developed from areas where operations began in the plan currently being implemented. For this plan, it would mean that areas that were initiated in the 2005-2010 plan but not completed could be brought forward for completion in the 2010-2020 plan.

However, the requirement for bridging and second pass harvest to occur is that these operations would have to be completed by June 30 of the first year of the plan. For the most part, harvest operations do not begin in Algonquin Park unit until July 1, which is past the date when operations would have to be completed. Further, areas not completed are often harvests initiated in winter that would require frozen ground conditions to complete.

4.3.4 Planned Clearcuts

The planned clearcuts for the 5-year term are identified in FMP-16 and are presented on the operations maps in supplementary documentation section 6.1.2 (clearcut forest units within planned disturbances). For the 2010 FMP there are 169 separate clearcuts planned for the 5-year term. These average 21 ha in size and range in size between 0.1 and 258 ha. There are no planned clearcuts greater than 260 hectares in size.

Planned clearcuts include both the forecasted harvest area and may also include harvest area from previous plans. For an older clearcut to be considered additive to a proposed clearcut, certain parameters such as distance between cuts (less than 200m apart), height of regeneration (less than 3m) and stocking (0.3) in older cuts, and age (less than 20 years) of these older cuts is considered.

Historically, clearcuts have tended to be relatively small in the Algonquin Park Forest. The forested landscape is dominated by tolerant hardwood and white pine stands. Because single tree selection and uniform shelterwood are used to manage these forest types, respectively, clearcuts are thus limited to other forest types that tend not to occur in large extensive areas. Often the forest types that are best managed by clearcutting are limited to pockets within large areas of white pine or tolerant hardwoods.

In recognition of the requirements of NDPEG and the objective to move towards the natural disturbance template for the Algonquin Park Forest (also refer to discussion under 3.2.3. Landscape Pattern), efforts were made to plan for larger clearcuts to more closely emulate a frequency distribution that would be found under natural conditions. Given the limited opportunities to achieve this, movement towards the regional disturbance template has been achieved in the three largest size classes.

Stand level residual targets for clearcuts to meet the requirements of NDPEG are identified in supplementary documentation section 6.1.4.

4.3.5 Harvest Volume

The available harvest volume, and an estimate of the harvest volume for the forecast harvest area for the ten-year period is presented in FMP-17.

The Algonquin Forestry Authority is the Ontario Crown agency responsible for forest management and logging in Algonquin Provincial Park and is the sole licensee. Harvest area disposition in FMP-18 is therefore summarized by AFA only. Product breakdown in FMP-18 is derived from harvesting records that the AFA has kept for almost 30 years. These product breakdowns have been entered into SFMM and can be found in the Base Case analysis package in supplementary documentation section 6.1.6.

The SFMM model was used to estimate the volume for the forecast harvest area. The area by forest unit/age class/stage of management for each phase of the plan was entered separately

into the “Simulate Harvest Operations” module of SFMM. The resulting term 1 volumes provided the estimate for tables FMP-17 and FMP-18. The term 1 SFMM results were also post-processed to add in the available commercial thinning volumes. An adjustment was also made to the uneven-aged forest unit volumes to ensure consistency with the selection system yields in the Proposed Management Strategy. The end result is a term 1 volume forecast that uses the same yield curves as the Proposed Management Strategy and is consistent with planned harvest volumes.

4.3.5.1 Calculation of Unmerchantable Volume

Following is a description of the estimation methodology used for the calculation of unmerchantable volume in tables FMP-10b, 17b 18 and 19.

Undersized and defect volumes, also known as unmerchantable volume, represent all of the volume that is not merchantable by the minimum utilization standards defined in the scaling manual. In general, this includes components of the tree that have not traditionally been utilized (i.e. stem tops (below minimum diameter limit), defect or cull, branches, leaves, twigs and bark).

Several different science based estimation techniques for unmerchantable volume have been developed and continue to be developed by the Ministry of Natural Resources with FP innovations and various sponsored trials across the province to substantiate and calibrate the resulting forecasts. The approach used in this plan is based on the development of volume factors that can be applied to the net-merchantable forecasted or planned harvest volumes.

Volume factors were developed using individual tree biomass equations based on Alemdag (1983, 1984). These individual tree biomass equations relate mensurational variables for the average tree (i.e. diameter at breast height (DBH) and tree height) to oven-dry mass for each biomass component of the tree. Tree biomass components predicted using these equations include: whole tree, stem wood, branches, bark, twigs and leaves.

Average tree attributes (DBH, eight) were selected using normal yield tables for site class two and an estimated average harvest age for each species (generally selected to reflect the mid-point of the operability range). Biomass predictions for the stem wood components (stem wood and bark) were divided into merchantable (bole) and unmerchantable (top) sections using Honer’s equation of stem form using top diameter limits and stump height limits from the minimum utilization standards defined in the scaling manual.

Volume factors were calculated using the predicted oven-dry weight of tree components relative to the merchantable stem wood component.

Since not all of the predicted biomass associated with each tree is recoverable due to site, variability and operational factors, the volume factors were reduced by 49%. The 49% reduction accounts for post harvest residual stand structure requirements, operational losses at the stump, inaccessible stem volume, and roadside operational recovery losses associated with

collection, grinding and loading operations. This operational net down is consistent with recovery information observed in trials and biofibre operations in various jurisdictions.

The resulting volume factors have been discussed with FP innovations, and some members of industry with experience in biofibre operations. The results approximate the unmerchantable volume recovery information from biofibre operations and are consistent with the results of SFL holder surveys conducted as part of the biofibre supply strategy. As more experience is gained with operations in Ontario and more information is available, volume estimates will be adjusted as well to reflect the most current knowledge.

4.3.6 Wood Utilization

The Algonquin Park Forestry Agreement between the Minister of Natural Resources and the Algonquin Forestry Authority stipulates the mills that have wood supply commitments from Algonquin Provincial Park. In addition to these wood supply commitments the Authority annually has open market sales for some sawlog and pulp quality material as identified in FMP-19. Open market material has traditionally been sold to mills such as Ben Hokum and Son Ltd., Gulick Forest Products Ltd, E.B Eddy Forest Products Ltd., Stein Ltd., St. Mary's Paper Ltd., Freymond Wood Products Inc., Lavern Heideman & Sons Ltd., Normapac Trenton and Fraser Papers in Thurso. Open market pulpwood is available for traditional customers and for firewood markets. Firewood markets have played an important role in utilizing merchantable volumes of pulpwood during market downturns.

Mills in the vicinity of Algonquin Park are primarily in the sawlog sector and their demand is for sawlog and better material. Demand for poles, sawlog and veneer quality products has always been high, but the ability to generate these volumes is dependent on selling all of the pulp quality material. The supply of pulp quality products exceeds demand in this area of the province. Traditional pulp wood markets are going through some structural changes as a result of the 2008/2009 global market downtown. As the market place for the pulp and paper business rationalizes the bio-economy demand for low-end fiber is expected to increase. A discussion of current markets and challenges for mitigating potential impacts to silviculture and forest sustainability objectives is included at the end of this section.

The planned harvest volume and wood utilization by species and product for the fist 5-year term is illustrated in FMP-18. The subsequent forecast of wood utilization by commitment type is summarized in FMP-19. As illustrated in FMP-19, it is projected that all merchantable volumes will be utilized, assuming that market conditions improve and open market demand is strong. At the time of FMP submission, two of the mills that receive commitments from the Park (Tembec Mattawa and Smurfit-Stone- Pontiac Division) have announced permanent shutdowns in 2008. As these mills may still change ownership and resume production, the wood supply commitments have been maintained for these facilities. The extra volume of hardwood sawlogs and pulpwood beyond commitment levels has been put into the open market category in FMP-19. The province is also undergoing a tenure review process, which may result in changes to how wood is allocated in Ontario.

Section 4.3.6.1 provides detail on the methodology for the calculation of unmerchantable volume (undersize and defect) that is identified in the various FMP tables. This volume has been classified as unutilized volume in FMP-18, and placed in the open market category in FMP-19, to be available for potential future bio-fibre facilities. In Algonquin Park it is anticipated that the use of unmerchantable volume will consist primarily of utilization of tree length to smaller top diameters and utilization of previously unmerchantable landing material. Increased utilization of tops and limbs that are normally left at the stump during tree length logging is not anticipated.

Approximately 90% of the wood harvested in the Park is conducted by contractors employed by the Authority to cut and deliver forest products to the mills. The remaining 10% is cut by mills with wood supply agreements (Tembec Industries Inc.) from the Algonquin Park Forest. These wood supply commitments are updated every ten years based on the new approved Forest Management Plan. In table FMP-19, Dament and Charles Mfg. Ltd. is the sawmill associated with the Herb Shaw and Sons Ltd. operation in Pembroke, while volumes identified under Herb Shaw and Sons Ltd. are for the pole plant. Tembec Industries Inc. volumes for the Temiscaming complex have been identified separately (not included with the Mattawa and Huntsville volumes). The locations of mills with wood supply commitments and agreements are detailed in Map 3.

The forecast wood supply commitments for the above mills are presented in FMP-19. In addition to their regular commitment, Tembec Mattawa has an 11,000 m3/year open market white and red pine sawlog commitment. Although sales for the open market wood are not known at this time, these volumes not directed by the Minister may be offered to the commitment holders, traditional users and area mills.

Not all of the currently committed volumes can be met in the 2010 FMP. Specifically, poplar volumes for Grant Forest Products, poles to Herb Shaw and Sons and veneer for Columbia Forest Products and Commonwealth Plywood cannot be met. Grant has a conditional commitment letter for non-veneer quality poplar volume of 58,900 m3 that should also be reviewed by the Minister. The shortfall of poles to Herb Shaw and Sons, and veneer to Columbia and Grant Forest Products will have an impact on these facilities. One possible mitigation strategy for these shortfalls will be to look at adjusting the product and species specification.

The phase 1 forecast utilization in this plan has increased by 491,067 m3 from the last Forest Management Plan, and is in excess of current levels of harvest by approximately 300,000 m3/yr. This increase in forecast available volume is mainly attributed to the enhanced yield curves used in this FMP. As discussed in section 4.3.1, the available harvest area is only slightly greater than the previous plan (363 ha. per year). All of the available harvest volume is being forecast as utilized, with the exception of the undersized-defect volume, which is forecasted as being unutilized.

In this FMP there is a total (10 year) open market volume forecast of 2,212,366 m3 (not including undersize/defect), compared to the 2005-2010 FMP which was 637,200 m3. This

1,575,166 m3 difference in volume is also mainly a result of the adjusted yield curves used in this FMP and the additional 5 years of forecast volume associated with a 10 year plan.

Differences in volumes from the forecasted harvest area and the Proposed Management Strategy are discussed in section 4.8.

The approval of this Forest Management Plan is not an agreement to make areas available for harvest to a particular licensee, or an agreement to supply wood to a particular mill.

Strategies to Minimize Production of Low-End Fibre

Since the market downturn in late 2008, AFA has been doing what it can to minimize the production of low-end fiber, while at the same time ensuring that silviculture objectives are met. This approach is critical to achieving FMP objectives and AFA's mandate to produce a sustainable supply of forest products for the industry of the region. The following strategies will allow the harvest of sawlogs to continue while mitigating negative impacts from reduced utilization of pulp. These strategies are designed to ensure the regeneration and management standards set out in the Silvicultural Ground Rules (FMP-5) are not compromised and are to be considered only while poor markets for pulp quality timber prevail.

During cyclical market downturns, stands with a high component of low-end fiber may have to be set-aside until the market place for low-end fiber improves. When demand improves, creating viability for harvest, AFA will return to these stands to complete the planned forest management program. In stands where AFA undertakes harvest operations, unmerchantable material (cull logs) may be left, along with merchantable material of pulp quality that cannot be utilized from silvicultural improvement projects (improvement even aged and uneven aged). Unmarketable standing trees may also be left where silviculture and habitat objectives are not adversely affected.

Residual stand composition and structure must also be consistent with the Ontario Tree Marking Guide and Marking Prescriptions. Tree Markers should not be put in a position that contravenes their Code of Ethics as outlined in the Tree Marking Guide, or the principles of Tree Marking that regulate partial harvesting systems. These principles stress that marking is not to be adjusted according to market conditions. If appropriate utilization and silviculture cannot be done, then operations are deferred.

1. The Algonquin Forestry Authority will prioritize harvest plans in all forest units as follows:
    a. Completely avoid harvest blocks (OPUs) dominated by unmarketable species and products; and
    b. Delineate and defer from harvest forest stands within OPUs dominated by unmarketable species and products.

    Forest units containing relatively higher components of poplar and softwood pulpwood and lesser amount of pine and hardwood sawlogs are the most likely to be

deferred from harvesting (INTCC, MWUS, LCUS, SFUS, SBCC forest units). Deferral from harvest on a harvest block or stand basis until markets improve is the preferred method of avoiding unmarketable volumes. However, all forest types include variable amounts of unmarketable timber that may need to be dealt with in order to achieve objectives of renewal and forest sustainability. As a guide, if 70% of the available volume of a stand cannot be utilized due to markets, a decision to defer from harvest should be automatic.

2. The following priorities and strategies will apply within stands where AFA elects to proceed with harvest, often in various combinations:

   a. Priority is to be given to selecting stands for harvest that have only minor amounts of unmarketable stems where silviculture objectives can still be met. Bypassed stems should be those showing the most evidence of cull, which will provide the best wildlife habitat potential in the short term and have the highest likelihood of dropping out on their own before the next cycle.

First and final removal cuts of the uniform shelterwood system (occurring in PWUS, ORUS and HDUS forest units) will normally yield higher volumes of marketable sawlogs since most of the undesirable species and defective stems have been harvested in the previous seeding cut stage of management.

Tolerant hardwood stands (HDSEL forest unit) typically yield a 35:65 ratio of sawlogs to pulp, however demand for heavy hardwood pulp and especially fuelwood may make these stands slightly more viable than remaining forest units. If fuelwood markets falter, tolerant hardwood operating areas will be reviewed on a case-by-case basis.

   b. Maximize the felling of all eligible stems regardless of species and product in white pine and red oak shelterwood seeding cuts and tolerant hardwood single tree or group selection cuts. Apply renewal treatments (site preparation, stand improvement) to achieve objectives where harvest operations on their own will not.

It is critical to securing regeneration at the seeding cut stage of management that appropriate crown closure and seed bed preparation is achieved. Supplemental treatments may be required to remove unmarketable and mid-canopy stems not otherwise removed during harvest operations. These treatments are anticipated to be either mechanical site preparation or stand improvement operations or a combination.

Objectives for tolerant hardwood stands managed with the single tree selection system include moving the stand, through a series of partial cuts toward ideal basal area and stand structure targets. The management standard is expressed by a certain level of improvement in acceptable growing stock. Stand improvement operations will be implemented where harvest operations leave stems that hinder achievement of movement toward the ideal basal area, stand structure and improvement in acceptable

growing stock. Stands of hemlock and individual hemlock trees will remain due to lack of economic markets and their importance for wildlife habitat. This situation has persisted for many years without compromising silviculture objectives for the HeSel and HDSel forest units.

c. Minimize the volume of unmarketable product forwarded to landings. This will be accomplished by adjusting operations to merchandize at the stump.

Over the last two planning terms, driven by demand, much of the defect in a stem has been forwarded to landings for processing. This has contributed to higher yields per hectare than planned and created pressure for AFA to increase yield forecasts for the 2010-2020 FMP. The increasing demand also had some biologists concerned with the loss of downed woody debris that presently would seem to have a higher value than that of pulpwood. End-butting of cull and topping at heavy branching will be practiced wherever harvest operations occur. Although it is not anticipated that merchantable material will be left intentionally, these practices often lead to questions requiring leniency on strict measurement against CFSA utilization standards.

d. Within all forest types concentrations of unmarketable species/products (patches and groups) may be bypassed where this will not compromise silvicultural plans (i.e. determine if the area will be included in artificial renewal).

By-passed areas within stands should be focused on clumps or groups of immature or undersize stems, concentrations of cull and/or proximity to sensitive sites and contribution to biological diversity values or landscape pattern targets (i.e., NDPEG residual patches). Effort will need to be put into delineating these sites from harvest and follow-up treatments.

e. Two-pass harvest operations will only be contemplated where a second pass can be assured by relatively easy access; residual tree, regeneration and site damage standards can be achieved; and deferral of silvicultural treatment is not likely to jeopardize achievement of targets.

This option will only be undertaken as a last resort, for example, at the end of the operating season in a portion of a harvest area that will be suspended until resuming operations in the following year. High volume PrCC and PjCC forest units typically receive more intensive treatment regimes of site preparation, tree planting and tending. It is conceivable to conduct harvest operations to utilize the better quality and marketable stems without compromising the objective of ensuring regeneration to the intended forest unit (PrCC, PjCC). Site preparation would be deferred until the site has been revisited to remove pulpwood quality trees in a second pass, or where residual trees do not impede renewal operations, those operations could proceed.

3. Harvest and deferral plans should be developed with good communication between AFA Foresters, Operations Supervisors, tree markers, logging contractors and Ontario

Parks. Unnecessary tree marking and road building should be avoided. In order to minimize overall logging costs, road decommissioning activities may also need to be deferred.

4. Harvest and deferral plans should remain flexible to market changes.

5. The AFA will endeavor to obtain Forestry Futures Trust funding for stand improvement to facilitate the utilization (at least felling) of stems below CFSA standard in priority seeding cuts and selection harvests.

6. Options to stockpile wood at roadside, holding yards, or mill yards in anticipation of market changes should be carefully considered and discussed with Ontario Parks. Factors include a) inventory costs relative to future economic returns; b) impacts on fibre quality of prolonged storage; and c) social (aesthetic) and economic impacts.

Implementation and Monitoring:

An important step in implementing this strategy is for AFA and Ontario Parks staff to conduct joint visits as operations proceed to calibrate an understanding of acceptable levels of proposed utilization practices. Deferred areas within individual operating units will be identified on harvest progress maps submitted with Forest Operation Inspection Reports to assist Ontario Parks staff with compliance monitoring and ongoing monitoring and assessment.

Identification of potential issues will be ongoing as AFA implements their harvest program. Formal review should occur when markets improve, but a timeline for this is unknown and unpredictable. Therefore, at the Annual Work Schedule development stage, AFA will meet with Ontario Parks to demonstrate the need to proceed with modified utilization standards and seek approval to include in the AWS. Second pass harvest areas will be identified at this time and a plan will be formulated for tracking in the Annual Report and/or Annual Work Schedule, if required.

Step 2 of Towards Resolving Utilization Issues: “A Process to Manage Unutilized Fibre” – Final Report, which involves determining the extent of the utilization issues, will be implemented on an annual basis. AFA will provide information in accordance with the 5 elements identified in the Final Report. Support in making the final determination will be sought from regional Wood Allocation and Measurement Section.

4.3.7 Salvage

There are no forecast salvage operations for the 2010-2020 term of this FMP.

4.3.8 Contingency Area and Volume

Contingency area provides flexibility in the Forest Management Plan to deal with unforeseeable circumstances, such as the effects of wildfire or weather on allocated harvest areas or significant impacts/conflicts with the management of park values. Contingency area which meets the selection criteria for the 2010-2015 term is identified on the operations maps in supplementary documentation section 6.1.2 and in the digital stand list in supplementary documentation section 6.1.14.

Contingency area has been split into two categories for this FMP; Lighten the Footprint (LTF) contingency and regular contingency. LTF areas adjacent to planned harvest areas have been identified as contingency area, making them available for harvest through a future amendment process if this area remains available for management. It is not possible to control the balance of forest unit area for this type of contingency. This area represents approximately 13,500 hectares and has not been scheduled for harvest in phase 1 of this FMP. The remaining contingency area is referred to as regular contingency. This area, and its associated volume, has been identified in FMP-20 for phase 1 of this FMP. Phase 1 of this FMP has identified sufficient contingency area to provide for approximately 1 year (10,530 ha. or 15% of the 5 year AHA) of harvest operations for the 2010-2015 term.

4.4 Renewal and Tending Operations

4.4.1 Renewal and Tending Areas

Silvicultural systems employed on this management unit are primarily selection and uniform shelterwood and are managed according to the silvicultural ground rules (SGR) identified in FMP-5. Both of these systems rely heavily upon natural regeneration and the first and most important aspect to implementation of these management systems requires trained tree markers to identify the trees to be retained and removed, while taking into account other resource values such as wildlife habitat, aesthetics and species diversity.

In some instances planting, spacing and releasing trees from competition is required. The majority of the artificial regeneration, site preparation and cleaning is carried out in the pine forest units. Artificial regeneration in the 2005-2010 plan has restocked the old harvested pine areas that did not meet the minimum regeneration standards.

Silvicultural treatments include:

1. Improvement work in tolerant hardwood stands. This includes releasing of good quality polewood from competition in hardwood uniform shelterwood forest units and the removal of class 3 and 4 quality trees (trees that will decline in quality over time) in the hardwood selection forest unit. Stand improvement in the HDSEL forest unit is anticipated on approximately 50% of the HDSEL planned harvest area. Many of the allocated HDSEL stands are being harvested for a second or third time and stand improvement has already been completed in previous cutting cycles. HDSEL stand improvement will continue to be completed on the better quality sites that exhibit

higher stocking levels of class 3 or 4 quality trees. This level of stand improvement has been reflected in the SFMM modeling and in table FMP-21.

2. Site preparation. This is primarily mechanical, but chemical and the use of prescribed burns are included in the silvicultural ground rules (FMP-5). Prescribed burns may be used in the regeneration of white pine and red oak, but are difficult to implement in partial cutting systems. Difficulties include extensive planning requirements for small prescribed burns, high costs and the narrow window in which burns may be carried out due to fire indices.

   During the 1989-1990 Algonquin Provincial Park master plan review. The Parks Council recommended `That the Algonquin Forestry Authority revise its site manual to identify the narrowest possible corridor of site types which absolutely require the use of herbicides to release desirable species, primarily pine, and further, that herbicides be used only as a last resort.' The Minister of Natural Resources agreed with this recommendation and stated that `In Algonquin Park we will look at viable alternatives to the use of herbicides for silvicultural purposes.'

   The main viable alternative to the use of herbicides is manual tending (i.e. brush saws). This treatment requires that access be maintained to competition prone sites for forest management operations until Free-to-Grow stage is achieved.

   Herbicides will be used only on those site types that have the potential competition rated from high to very high as described in the Pine Forest Ecosystem Classification for the Algonquin Region, Site Region 5e. Herbicide has been used on only a very small area in the Park.

3. Planting. Most planting is carried out in the white pine, red pine and jack pine forest units, but may occur in small portions of other forest units where pine is present. In these other forest units, areas greater than 4 hectares in size will be reclassified into the appropriate forest unit.

4. Cleaning. Manual cleaning is used to release pine regeneration from undesirable competition such as poplar, white birch and soft maple.

5. Spacing and thinning in plantations.

The forecast and planned levels of renewal and tending operations associated with harvesting and natural disturbances are summarized by treatment in FMP-21. The source of the information on the level of regeneration required is the output of forest modelling for the Proposed Management Strategy and is consistent with the levels presented in FMP-11. Specific details on planned treatment levels are contained in section 4 of the Base Case Analysis Package in supplementary documentation section 6.1.6.

Renewal and tending levels have been set based on full utilization of the available harvest area. In the event that full utilization of harvest area is not achieved, the renewal and tending

program will be impacted accordingly. Tree planting forecasts may also be reduced if it is determined that levels of natural regeneration are adequate to meet the regeneration standards identified in the silvicultural ground rules.

The levels of artificial regeneration and tending are in agreement with the Proposed Management Strategy, but differences do occur for some uniform shelterwood forest units under natural regeneration. This is the result of being unable to completely meet stage of management results for the selected management alternative during the selection process for harvest areas. Since the majority of the shelterwood forest units rely heavily on natural regeneration, the differences in the amount of seeding cuts, first and final removal harvests for a given forest unit will have little, if any impact on the future forest condition.

FMP-21 shows that 17,150 ha of the total 54,424 hectares of selected uniform shelterwood harvest stands are slated for seeding (regeneration) cuts. The balance of the area is in either in a preparatory, first or final removal cut stage of management. Approximately half of the allocated forest stands managed under the uniform shelterwood system have received seeding or preparatory cuts in a previous management stages, therefore it is expected that the majority of these harvests will now be first and final removal. The shelterwood forest units are progressing towards the future forest condition.

Due to the unpredictability of insect and disease outbreaks, areas are not normally allocated for protection treatments at the five year planning stage, and thus not entered in FMP-21. If protection treatments are necessary, the areas will be identified on an annual basis. If protection treatments are required they will follow applicable provincial guidelines and must also be in accordance with the Algonquin Provincial Park Management Plan.

The areas selected for renewal and tending operations are depicted on areas selected for operations maps in supplementary documentation section 6.1.2. These areas include: all of the areas selected for harvest; areas previously harvested during the term of the current or previous Forest Management Plan and not yet renewed; areas of natural disturbance that require renewal; and areas which require tending. These maps identify the forest unit and ecosite of each selected stand and can be cross-linked to the silvicultural ground rules in FMP-5.

4.4.2 Renewal Support

Seed required for nursery stock production will primarily be collected by contractors working in stands within the Algonquin Park Forest. In situations where seed is not available from within Algonquin Park, seed may be obtained from other locations within seed zone 29, or sources that are deemed to be genetically appropriate as per seed transfer guidelines and analysis of climatic based seed transfer models. Processing of cones and storage of seed occurs at the Ontario Tree Seed Plant in Angus, Ontario. The AFA maintains an inventory of white pine, red pine and jack pine for annual planting programs, as well as a small inventory of white and red spruce that may periodically be planted. Current seed inventories are sufficient to cover anticipated needs for nursery stock production during the first five-year

term. Cone collections will be undertaken as cone crops develop in order to maintain a five to ten year inventory of seed.

No seed is forecast to be used for direct seeding during the five-year term. The inventory of jack pine seed exceeds anticipated needs for nursery stock production by approximately 2.5 million seeds, in the event that a direct seeding project of this species is undertaken.

The production of nursery stock to be planted in the spring of 2010 has been contracted to NorthSun Nurseries Inc. and PRT Inc. An estimate of the number of seedlings to be planted in the first five years of the plan is listed in table 14.

Table 14 Seedling Requirements for First Five-year Term.

Species	Number of Seedlings for Harvest Areas	Number of Seedlings for Natural Disturbance Areas
White Pine	1,000,000	174,000
Red Pine	297,500	228,000
Jack Pine	308,700	
White Spruce		8,000

There are no tree improvement programs planned during the first five-year term of the FMP.

4.5 Roads

4.5.1 Roads and Road Corridors

Primary and branch road corridors are identified as 1 km wide as per the requirements of the FMPM. The corridors are shown on the operational maps in supplementary documentation section 6.1.2 and listed in Table FMP-22.

Details of environmental analysis of alternative corridors for each new primary road, the rationale for the selected corridor and associated use management strategy, and the rationale for each new branch road corridor and associated use management strategy are contained in the roads supplementary documentation section 6.1.12.

Four changes to the primary road system are proposed for construction during the term of the FMP.

- The Billy Lake Road will be extended to provide access to FAM area 25. At some time during the FMP term the existing dam/bridge over the Opeongo River at Annie Bay will be replaced with a non-drivable structure. This in conjunction with a permanent break in the road system at the south end of the Cameron Lake Road where it meets the Opeongo Lake Road will result in a loss of access to FAMA 25. Once the Billy Lake Road extension is constructed the existing Cameron Lake Road will cease to be designated as a primary road. Parts of it will be branch and/or operational road.

- In the last cycle the area bounded by Burntroot, Manta and Hogan Lakes (FAM Area 32) was accessed via the Hogan Lake Road and a crossing of the Hogan Lake marsh at the south end of Hogan Lake. This crossing no longer exists and for several reasons will not be rebuilt. Primary access to the area will be developed south from the Narrowbag Road via the new Manta Lake Road.
- In the last cycle the Three Mile Lake Road ran down the west side of Three Mile Lake, at some points along the shore. Access to the area south of Three Mile Lake (currently designated as FAM Area 2 or 3) was via this road. Access to this area will be via the Totem Lake Road. Parts of the old Three Mile Lake Road will be used as branch or operational road.
- In order to access FAM area 5 the Thompson Lake Road will be rebuilt.

Branch roads are roads that branch off of an existing or new primary or branch road providing access to through or between areas of operations. Due to the predominance of partial harvesting silvicultural systems on the management unit, many of the branch roads to be constructed are in fact roads from previous harvesting cycles, which are presently not drivable. Branch roads for construction are listed in Table FMP-22, and are described by FAM area in the roads Supplementary Documentation 6.1.12 Part B.

Operational roads are located by AFA/company supervisors as harvesting operations progress, and in most instances they also supervise the road construction. Roads outside of AOC's will follow provincial guidelines for access roads and water crossings and do not require Ontario Park's approval. In specific operating areas identified by Ontario Parks during AWS review, planned operational road locations will be approved by Ontario Parks prior to construction. This includes roads planned to be constructed within 120 metres of Life Science Nature Reserves. Operational roads within AOC's must be approved by Ontario Parks prior to construction.

Refer to supplementary documentation section 6.1.13 for operational road use management strategies. Refer to Appendix 6.2.10 for standard operating conditions related to road construction, maintenance, monitoring, access control, decommissioning and aggregate pits.

4.5.2 Roads and Areas of Concern

Road crossings of Areas of Concern will be required during the term of the FMP in order to access harvest allocations. The intent will be to minimize AOC crossings unless no feasible alternative exists. Road construction through an AOC must adhere to the direction contained in FMP-14 and FMP-23.

The primary and branch road locations and 100m wide crossings shown on maps are preliminary. The final location and any special conditions to minimize impact on an AOC will be finalized in the applicable Annual Work Schedule, consistent with the acceptable variations described in the FMP-23.

For operational road crossings of AOC's conditions on location and conditions of crossings are summarized in FMP-23.

Roads supplementary documentation is contained in sections 6.1.12/6.1.13 and maps are contained in section 6.1.2.

Portable bridges will be used on the majority of water crossings in order to minimize in-stream disturbance during installation and to minimize potential for longer-term risks associated with water crossings. These bridges will be removed when no longer required for forest management activities.

To ensure adequate flow area for culverts and bridges (to accommodate normal and seasonal peak flows of the drainage area) flow area calculations will be carried out on all water crossings that have been identified as areas of concern on the FMP maps. In addition, crossings of permanent streams encountered in the field that have not been previously identified will also receive flow calculations.

Refer to Appendix 6.2.10 for standard operating conditions related to water crossings.

4.6 Revenues and Expenditures

FMP-24 provides a summary of the forecast of revenues and expenditures, by silvicultural activity and funding source, for the first five-year term. Revenues are calculated based on tree species groupings and are split into three categories:

(1) Crown revenues are based on the fixed minimum stumpage and the residual value charges. These revenues go directly to consolidated revenues for the Province of Ontario. These revenues include the forest resource inventory currently paid to the Forestry Futures Fund. The following sawlog grade 1 / 2 splits have been used: white pine 70/30, red pine 50/50 and hardwood sawlogs 80/20.

(2) Forestry futures fund is a $0.48 charge for every cubic metre of wood harvested in the Province. These funds may be accessed by the forest industry to provide funding for forest regeneration projects that have resulted from items such as insect and disease and fire damage. Projects that result in enhanced growth of the forest may also be paid for out of the Forestry Futures Trust (i.e.tolerant hardwood polewood thinnings). The Independent Forest Audits are also funded out of the forestry futures fund.

(3) Forest renewal rates, which provide for the renewal and tending work on the Algonquin Park Forest go directly to a Forest Renewal Trust Fund that is used for eligible silvicultural work in Algonquin Provincial Park. Forest renewal rates used for FMP-24 are the same as those used in the SFMM model as detailed in section 4.13 of the Base Case analysis package in supplementary documentation section 6.1.6.

Silvicultural revenues have exceeded expenditures on the Algonquin Park Forest since the implementation of the current system of dedicated silvicultural funding. The Algonquin Park

Forest renewal fund has a surplus of approximately $2.5 million, which is maintained in order to ensure adequate coverage of potential silvicultural liabilities. Renewal rates will be continually monitored and updated as required to ensure funding is adequate to meet the needs of the forest management program.

Calculation of the Crown revenues is based on the forecasted utilized levels of products by species identified in FMP-18. The sectors used for revenue calculation in FMP-24 are pulp, veneer and sawmill. Rates per cubic metre are derived from the September, 2009 Ontario Stumpage Matrix. Product ratios used to determine revenues by sector are the same as those that were used in SFMM.

4.7 Monitoring and Assessment

To ensure sustainability it is not enough that just the planning meets the requirements of the Proposed Management Strategy, but also that operations are implemented and controlled in a reasonable manner. Monitoring is also conducted to document the observations of the effects of forest management operations on forest cover and forest values.

The documentation associated with monitoring is used in the preparation of annual reports on forest management operations and for audit purposes, and to contribute to an evaluation of management actions.

The ability of this Forest Management Plan to meet targets associated with these strategic directions will be assessed on an ongoing basis as identified in table FMP-13 (timing of assessments), via monitoring of all aspects of its operations by the Authority (including internal and external audits), audits by the Ministry of Natural Resources and independent forest audits. It is through these processes that sustainability of forest management processes in Algonquin Park will be assessed.

4.7.1 Forest Operations Inspections

Forest operations are monitored via ground inspections on a regular basis to ensure they are in compliance with the Forest Management Plan, existing legislation and the AFA's Sustainable Forest Management Policy for Algonquin Provincial Park.

AFA Monitoring Plan

A plan for monitoring forestry operations (Compliance Plan) is developed between the AFA and MNR at the start of each FMP (refer to Supplementary Documentation Section 6.1.25). This monitoring plan details how inspections will be conducted and where the emphasis for inspections will lie. The objectives of the AFA monitoring plan are:

- Sustaining healthy forest ecosystems shall be a priority in the planning and implementation of all activities.

- Forest operations shall be continuously evaluated for impacts on the natural environment and significant Park values, in addition to compliance with current laws and regulations.
- The Authority shall ensure AFA personnel and woods workers are trained in the most current environmentally sound forestry practices and are knowledgeable of Provincial regulations and guidelines relating to their respective jobs.
- The Authority shall strive for continual improvement of forest management practices.

The following areas are considered to be at the highest level of risk and will require the most monitoring:

- Operations adjacent to or within Areas of Concern as per values maps, notably wood turtle habitat/nesting sites & coldwater habitat (brook trout)
- Road crossings of waterways and portages
- Maximizing the survival and growth of residual trees and regeneration and maintaining the site in a productive state

The overall monitoring program for Algonquin Provincial Park is briefly described below. Refer to Supplementary Documentation Section 6.1.25 for complete details on the 2010-2020 Plan for Monitoring Forestry Operations in Algonquin Park.

i. The first step in the monitoring program is the inspection of the tree marking. AFA supervisors regularly inspect the tree marking program to the standards that are in place at a given point in time. A variance of +/- 5% is allowed from the standards and variations beyond this point usually require that the area be remarked. MNR technicians also audit the tree marking throughout the year. Results of all AFA marking inspections are forwarded to the MNR.

ii. Inspections of harvest operations will be conducted by the AFA Supervisor/ forest technician/ forester who is directly responsible for the supervision of a given operation. Inspectors will be knowledgeable in all aspects of the monitoring program. Moderate or more significant infractions will be reported to the MNR within 24 hours for any situation, with a written report on the occurrence. All AFA harvest inspections will be entered into the Provincial “Forest Operations Inspection Program” (FOIP) and shared with the MNR. The MNR will also conduct inspections to measure compliance.

iii. Independent Forest Audits will be carried out on the Algonquin Park Forest every 5 years. There have been four such audits thus far, and the next scheduled audit is in 2012. These audits report on compliance of forest management activities carried out in Algonquin Provincial Park against the forest management criteria described in the Independent Forest Audit Protocol (IFAP).

MNR Monitoring Plan

The following section describes how the Ontario Ministry of Natural Resources provincially, regionally and locally sets direction for auditing forest operations and forest operations inspections.

The MNR provincial compliance priorities are developed annually by the Provincial Compliance Steering Committee in discussion with all MNR programs. Based on this direction, each Regional Management Team generally provides additional compliance priorities in areas that are of concern within the region. Ontario Parks adopts these priorities as well as develops local compliance priorities to address specific concerns affecting operations at the local level. These local priorities are reviewed annually by the District Management team. Compliance objectives/priorities are based on past compliance issues, problem areas identified in previous year's compliance inspections, as well as new and existing sensitive areas, including areas identified in the Species at Risk Act.

The Ontario Parks program for auditing forest operations and forest operations inspections is based on a risk assessment that determines the likelihood of loss or damage occurring to the resource or a value and the consequence should loss or damage occur to that resource or value. Based on compliance history this likelihood is reflected in individual contractor and AFA inspector assessments as well as the complexity of a respective operation and the impact as it is related to the sensitivity of the areas of concern. This risk assessment is completed for all forest operation activities and is primarily based on the sensitivity of resource values (species at risk, natural reproducing brook trout lakes, cultural heritage sites), complexity of operations (complex boundaries, varied prescriptions, susceptible sites for site damage), site specific conditions (shallow soils, lowland areas) as well as water crossing installations / removals, wood measurement and aggregate standards.

Inspection targets are set by operating unit based on the risk assessment and then assigned to the respective Ontario Parks certified compliance inspector. This maximizes the efficient use of the inspector's time and focuses compliance efforts.

The Ontario Parks forest compliance plan will be revised annually to ensure priorities are updated, ensure they provide current implementation strategies, good documentation of results, and a sound evaluation of overall delivery effectiveness. This is done to help ensure resource sustainability and to optimize compliance effort. It also helps ensure all legal compliance requirements, including Environmental Assessment approval conditions are met.

Ontario Parks also monitors and audits forest operations:

- Conducting audits on Free To Grow /Silvicultural Effectiveness Monitoring data collection projects to ensure that data is being collected in a manner that ensures representative and accurate sampling and utilization of approved field collection procedures as well as ensuring that AFA results are correct. Direction for audits as per the Forest Health & Silviculture Section of the Ministry of Natural Resources,

- Conducting audits on renewal and maintenance (i.e. site preparation, tree plant) projects,
- Performing tree marking audits to ensure tree marking prescriptions are followed for harvest operations and that all personnel involved in tree marking are fully certified or in training as outlined by the Provincial Tree-Marking Committee "competency standards",
- Through field verifications of values discovered by AFA staff.

The LCC will be given the opportunity to review the forest operations inspections summaries which form part of each year's Annual Report. Significant compliance issues will be brought forward to the group for discussion at regularly scheduled meetings. In addition, should an LCC member express interest, the opportunity exists for LCC members to observe the conduct of forest operations inspections. LCC members are invited to attend and participate in the IFA audits.

4.7.2 Exceptions

There are no exceptions identified in this Forest Management Plan that require monitoring programs.

4.7.3 Assessment of Regeneration Success

Table FMP-25 identifies the forecast of regeneration success to be assessed by forest unit and silvicultural ground rule (SGR) for the first five-year term. The assessment of regeneration success is used to assess Free-to-Grow (FTG) status in areas previously depleted through harvest or natural disturbance, and is intended to confirm that areas have been regenerated in a manner consistent with the applicable SGR under which the stand was depleted.

The 'Regeneration Standards' section of each SGR details the standards by which FTG success is measured, including the minimum stocking of both crop and acceptable species, minimum heights and associated stocking definitions, as well as the age since harvest or silvicultural treatment at which standards should be met. The results of FTG surveys will be reported spatially and summarized in table AR-14 of the Annual Report for each assessment season, as per Forest Information Manual requirements.

The maximum FTG age at which regeneration standards should be met has been described in the 'Regeneration Standards' section of each SGR. If natural regeneration is being employed, the maximum FTG age is based on timing since harvest, since the harvest will most likely initiate regeneration. The maximum FTG age for areas receiving follow-up silvicultural treatments will be based on the timing of the regeneration-initiating treatment, since there is often a delay between harvest and initiation of artificial regeneration. Assessments may be carried out earlier than the maximum FTG age, and a silvicultural or regeneration success may be declared, but areas are only declared 'Not Successfully Regenerated' if standards have not been met by the final year.

FTG surveys and associated reporting will be completed after the regeneration harvest in clearcut forest units, and in group openings associated with group selection SGRs. For shelterwood SGRs, FTG will be assessed after the final removal harvest. Because regeneration must be well established in advance of the final removal harvest in shelterwood forest units, FTG assessments under these forest types will be conducted within three years of the harvest. Because of this short delay between harvest and FTG assessment, and the fact that the 2008-09 and 2009-10 Annual Reports were not completed at the time of FMP submission, FMP-25 relies on estimates of shelterwood harvest levels for all but the first year of assessments (2010 assessments are based on actual 2007-08 Annual Report areas).

A survey methodology for assessing FTG has been developed by AFA, which incorporates components of the provincial STARS program and draft guidance from OMNR Southern Science and Information Section. During plan implementation, it is anticipated that OMNR will be providing new direction with respect to survey methodologies. New science with respect to regeneration standards and survey methodologies for the Great Lakes – St. Lawrence Forest will be incorporated into the FTG program when practical.

In addition to FTG assessments used to declare that depleted areas have been successfully regenerated, the overall Silvicultural Effectiveness Monitoring (SEM) program also uses the Forest Operations Inspection Program (FOIP), the tree marking audit program and Stocking Assessments to ensure that depleted areas are progressing towards a desirable future condition.

Hardwood selection in the HDSEL-TOL and HDSEL-MID will be assessed to ensure Management Standards are being met. The pre-harvest tree marking assessment is used to ensure that stands are moving toward the ideal stand structure and the percentage of Acceptable Growing Stock (AGS) is increasing, as detailed in the SGR for HDSEL-TOL. During and immediately after harvest, FOIP will be used to ensure harvesting proceeds according to tree marking and that skid trail coverage, stand and site damage standards are being met.

Stand and site damage standards are identified in A Silvicultural Guide for the Tolerant Hardwood Forest in Ontario (Table 12. 0.3) and also in A Silvicultural Guide for the Great Lakes-St. Lawrence Conifer Forest in Ontario (Table 10.0.2). These standards identify the acceptable limits of major damage (as defined in the above silviculture guides Table 11.1.1 and Table 9.0.1 respectively) to residual trees, limits of damage to regeneration and acceptable levels of skid trail coverage. AFA will be following these stand and site damage standards on the Algonquin Park Forest (Appendix 6.2.6).

The above silvicultural guides do not describe standards related to rutting associated with skid trails. AFA has developed local skid trail rutting guidelines for minimizing site damage as a result of skidding activities. These guidelines are identified in Appendix 6.2.7. The MNR is working on the development of provincial/regional site impact standards. These will be reviewed by Ontario Parks and AFA and incorporated into the final plan or through an amendment if required.

All shelterwood forest units at the seeding cut stage of management, PWUS at the preparation cut and first removal stages of management, as well as commercial thinning operations will be assessed using the tree marking audit process and FOIP to ensure prescriptions are being followed and that skid trail coverage, stand and site damage standards are being met. If well-trained operators with a proven track record within Algonquin Park are utilized, commercial thinning operations may not necessarily be tree marked, as long as FOIP results continue to support this approach.

Stocking assessments will be used to ensure that silvicultural treatments are effective, and that shelterwood forest unit areas at the seeding cut and PWUS at the first removal stage of management are developing towards a desirable future condition.

FMP-13 includes the management objective to maintain or increase the mid-tolerant hardwood component in stands with suitable conditions. SEM results will be used as an indicator to confirm successful establishment of regeneration. Specifically, in hardwood selection stands being managed according to the HDSEL-MID SGR, a representative number of group openings in each stand that have received site preparation for natural (scarification) or artificial regeneration treatments will be assessed for FTG status, including the presence of mid-tolerant species. In hardwood shelterwood stands being managed using either the HDUS-HD or HDUS-BY SGRs, the establishment of mid-tolerant species will be monitored using stocking assessments after the seeding cut stage of management, and final FTG status including the presence of mid-tolerant species will be assessed after the removal stage of management.

FMP-13 also includes the management objective to maintain tree species diversity that would occur naturally, similar to the expected natural landscape dynamics, for tree species native to the Algonquin Park forest. Hemlock regeneration and recruitment status is one indicator that will be used to ensure this management objective is met. Stocking assessments and FTG surveys in stands managed using the HESEL-HE SGR will aid in monitoring the status of hemlock.

Field tours and meetings are periodically scheduled for local citizens committee (LCC) members, which include updates on silviculture and regeneration related topics. The LCC are also invited to participate in Independent Forest Audits of the Algonquin Park forest. Ontario Parks staff and AFA, whenever possible, facilitate field tours and provide additional information for any member of the LCC or the public at large that expresses concern or interest in any aspect of forest management.

4.7.4 Roads and Water Crossings

Monitoring of roads will be conducted by AFA to ensure the roads and associated infrastructure that have been identified as the responsibility of the AFA are maintained to an acceptable level identified in the FMP until such time as these are decommissioned or revert back to MNR responsibility. AOC water crossings will be monitored for environmental, structural and safety concerns. This monitoring will be conducted by AFA Operations

Supervisors annually, as scheduled by the AFA Area Manager/Manager of Operations. The planned monitoring for each road or road network is recorded in table FMP-22.

4.8 Comparison of Proposed Operations to the Long-Term Management Direction

An assessment of the expected effect of proposed types and levels of harvest, renewal and tending operations on the achievement of progress towards long-term management direction is presented below. This assessment consists of:

- Comparing the proposed harvest, renewal and tending operations to the projections in the long-term management direction;
- Comparing the stand conditions (e.g., species composition, site class) of the selected harvest areas to the eligible harvest areas;
- Examining the effect of the age class distribution and the projected harvest volume of the selected harvest area, on the achievement of the long-term management direction; and
- Examining the effect of the amount of surplus harvest area on the achievement of the long-term management direction.

This assessment was conducted by entering the selected areas for operations (mapped allocations) into the SFMM model as T1 harvest areas. The model was then solved to determine if planned objectives would continue to be met (wildlife habitat, landscape classes, old growth and wood supply).

Comparison of the proposed harvest, renewal and tending operations to the projections in the long-term management direction

Table FMP-13 compares the forecast harvest area by forest unit for the 10 year plan period to the available harvest area from SFMM. The forecast harvest area does not exceed the total available harvest area (1.9% less). At the forest unit level, there is variance to the available harvest area with no forest units exceeding the available harvest area and all forest units within the 10% target range.

Proposed renewal and tending operational levels are also consistent with the projected levels in the Proposed Management Strategy (refer to table FMP-11).

Comparison of stand conditions (e.g., species composition, site class) of the selected harvest areas to the eligible harvest areas

The forecast harvest areas were run through the SFMMTool model in order to generate average statistics for each forest unit. The average site class, stocking and species composition of the forecast harvest area (allocation) is compared to the average statistics for the entire forest unit (SFMM – total forest area) in the following summary.

Table 15 Comparison of Average Stand Conditions – SFMM vs. Allocation

SFMM	Site Class	Stocking	Pw	Pr	Pj	Sb	Sw	Bf	Ce	La	He	Po	Bw	Mh	Oh	Yb	Qr
INTCC	2.5	0.76	6	1	0	0	2	3	0	0	0	53	28	3	3	0	1
PjCC	1.5	0.65	8	4	75	2	1	2	0	0	0	8	2	0	1	0	0
PrCC	2	0.70	8	81	2	0	1	1	0	0	0	7	2	0	0	0	0
SbCC	1.5	0.63	1	0	0	81	1	6	4	4	0	1	1	0	0	0	0
HDUS	2.1	0.69	3	0	0	1	4	6	2	0	5	3	5	40	16	16	1
MWUS	2.4	0.68	12	3	1	1	5	7	1	0	2	31	20	8	6	2	4
LCUS	2	0.65	3	0	0	19	4	9	41	7	2	1	2	1	6	5	0
OrUS	2.9	0.75	13	1	0	0	1	2	0	0	0	13	7	8	7	0	48
PwUS	1.9	0.59	51	10	2	0	3	3	1	0	0	14	8	2	3	1	3
SFUS	0.6	0.68	3	0	0	10	16	40	6	0	3	2	4	3	5	8	0
HeSEL	2	0.71	1	0	0	0	1	4	2	0	54	0	1	15	4	18	0
HDSEL	1.5	0.70	1	0	0	0	2	2	0	0	8	1	2	63	9	11	1
Allocation	Site Class	Stocking	Pw	Pr	Pj	Sb	Sw	Bf	Ce	La	He	Po	Bw	Mh	Oh	Yb	Qr
INTCC	2.2	0.75	7	1	0	0	2	3	0	0	0	56	22	4	2	0	1
PjCC	1.3	0.63	8	12	64	4	1	2	0	0	0	9	0	0	0	0	0
PrCC	1.7	0.69	12	69	1	0	1	1	1	0	0	8	5	0	0	0	0
SbCC	1.6	0.60	0	0	0	82	2	7	2	5	0	1	1	0	0	0	0
HDUS	2.5	0.66	3	0	0	1	5	5	2	0	6	3	4	35	13	20	2
MWUS	2.2	0.64	15	2	1	0	5	5	1	0	1	35	16	8	6	2	4
LCUS	2.0	0.62	3	0	0	17	3	9	45	6	2	2	3	1	6	4	0
OrUS	2.7	0.79	16	1	0	0	1	1	0	0	0	14	5	9	6	0	46
PwUS	1.9	0.59	48	9	1	0	3	4	1	0	0	17	8	3	3	1	3
SFUS	0.9	0.61	3	0	0	11	16	38	6	1	2	2	4	3	4	8	0
HeSEL	1.9	0.72	1	0	0	0	1	5	2	0	52	0	1	17	4	18	0
HDSEL	1.6	0.71	1	0	0	0	1	2	0	0	7	2	2	64	10	10	1
Difference	Site Class	Stocking	Pw	Pr	Pj	Sb	Sw	Bf	Ce	La	He	Po	Bw	Mh	Oh	Yb	Qr
INTCC	-0.3	0.0	1	0	0	0	0	0	0	0	0	4	-6	1	-1	0	0
PjCC	-0.2	0.0	1	8	-11	3	0	1	0	0	0	2	-2	0	-1	0	0
PrCC	-0.3	0.0	4	-12	-1	0	1	1	1	0	0	1	4	0	0	0	0
SbCC	0.1	0.0	-1	0	0	1	1	1	-2	1	0	0	0	0	0	0	0
HDUS	0.4	0.0	0	0	0	0	1	-1	1	0	1	0	-1	-5	-3	5	1
MWUS	-0.2	0.0	4	-1	0	-1	1	-2	0	0	-1	4	-4	1	0	0	0
LCUS	0.0	0.0	0	0	0	-2	-1	0	4	-1	0	1	1	0	0	-1	0
OrUS	-0.2	0.0	4	0	0	0	0	-1	0	0	0	1	-2	2	-1	0	-2
PwUS	0.0	0.0	-3	-1	-1	0	0	1	1	0	0	3	0	1	0	1	0
SFUS	0.3	-0.1	0	0	0	1	1	-2	0	1	-1	0	0	0	-1	0	0
HeSEL	-0.1	0.0	0	0	0	0	0	1	0	0	-2	0	0	2	0	0	0
HDSEL	0.1	0.0	0	0	0	0	-1	0	0	0	-1	1	0	1	1	-1	0
Total	**-0.4**	**-0.2**	**9**	**-6**	**-13**	**0**	**2**	**0**	**4**	**1**	**-3**	**15**	**-10**	**2**	**-4**	**3**	**-1**

There are no significant differences between the average stand conditions for the entire forest unit vs. the forecast harvest allocation. The total average site class of the allocation is 0.4 less and the total average stocking is 0.2 less than the total forest unit area. The overall average species composition of the stands selected for harvest contain slightly less Pr, Pj, He, Bw, Oh and Qr and slightly more Sw, Ce, La, Po, Mh and By. This variance in species composition does contribute to differences in forecast (allocated) vs. available (modelled) volumes, especially for red pine (less than modelled) and poplar (more than modelled).

Examination of the effect of the age class distribution and the projected harvest volume of the selected harvest area, on the achievement of the long-term management direction

In general the age class distribution of the forecast harvest area is more widely distributed among age classes and younger on average than the SFMM Proposed Management Strategy. This is necessary in order to achieve an allocation that is operationally feasible and consistent with historical cut cycles, as per the selection criteria. The model continues to be feasible when solved with the forecast harvest areas entered into the model as term 1 values, and objectives continue to be met.

Ecological indicators such as preferred wildlife habitat, landscape classes and old growth are represented in the model as targets. When the model is unable to meet these targets an infeasible solution is generated. A feasible solution with the forecast harvest areas entered as term 1 values means that the same target values for these ecological indicators have been maintained as the Proposed Management Strategy (i.e. 75% of natural benchmark levels for all terms). An example of each is represented below:

Figure 24 Black-backed Woodpecker Preferred Habitat

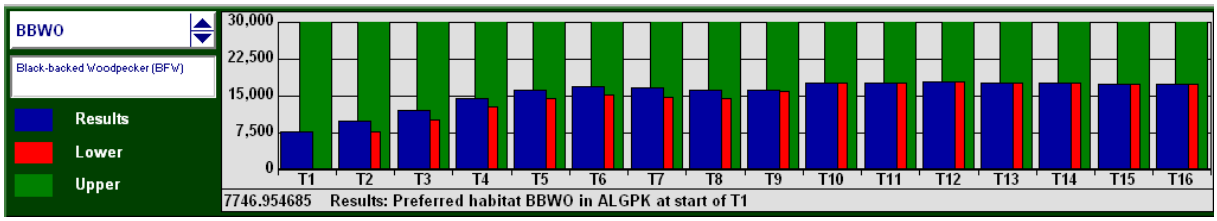


Figure 25 White Pine Uniform Shelterwood Forest Unit Old Growth

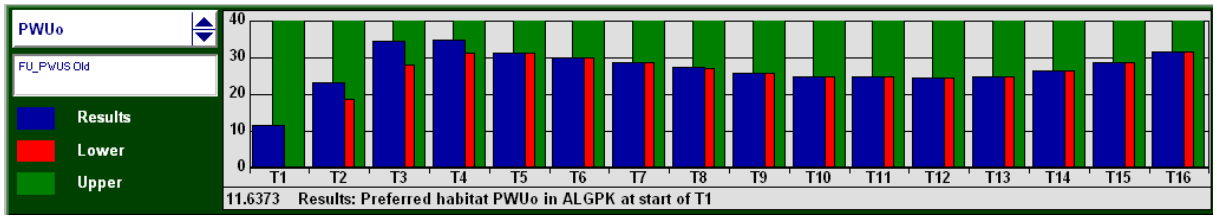
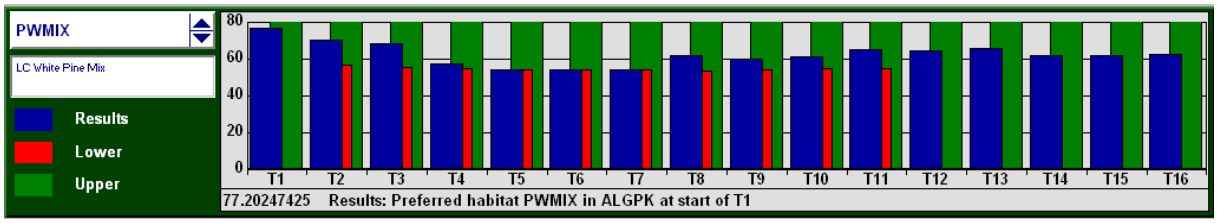


Figure 26 White Pine Mixed Landscape Class



Revisions to the first draft allocations were required in order to satisfy old growth targets for the PrCC, HDUS and MWUS forest units. The emphasis of these revisions was to reduce planned allocations in the PRSNT silvicultural intensity and in the younger age classes in order to keep this area available to satisfy old growth targets 40+ years into the future.

Wood Supply

The following graphs depict the wood supply projections for the forecast harvest areas along with the Proposed Management Strategy and current industrial demand. Similar levels and trends are projected for available harvest volumes with selected operations as with the Proposed Management Strategy. In general, projected volumes for selected operation are slightly less (2% -6%) due to the slight under-allocation of the available harvest area in T1.

The ability to meet wood supply targets is not significantly affected using selected operations as term 1 harvest areas in the model. The inability to meet current industrial demand for the poplar species group is exacerbated with selected operations over the medium term, however, the short term (T1) target of 111,800 m3/year is almost achievable with selected operations, and is 10.1% higher than the Proposed Management Strategy (only 1.5% short of the target). As per section 2.0, higher amounts of poplar in the stands selected for harvest in term 1 contributes to this higher T1 forecast harvest volume.

At the product level the T1 forecast harvest area is unable to meet the Pr poles target for all terms as opposed to the Proposed Management Strategy, which did meet this target in the first 3 terms. This shortfall of Pr poles is a result of less red pine in the T1 forecast harvest area than the average stand condition, and the 6% lower T1 projected PWR volume than the Proposed Management Strategy.

Species Groups:

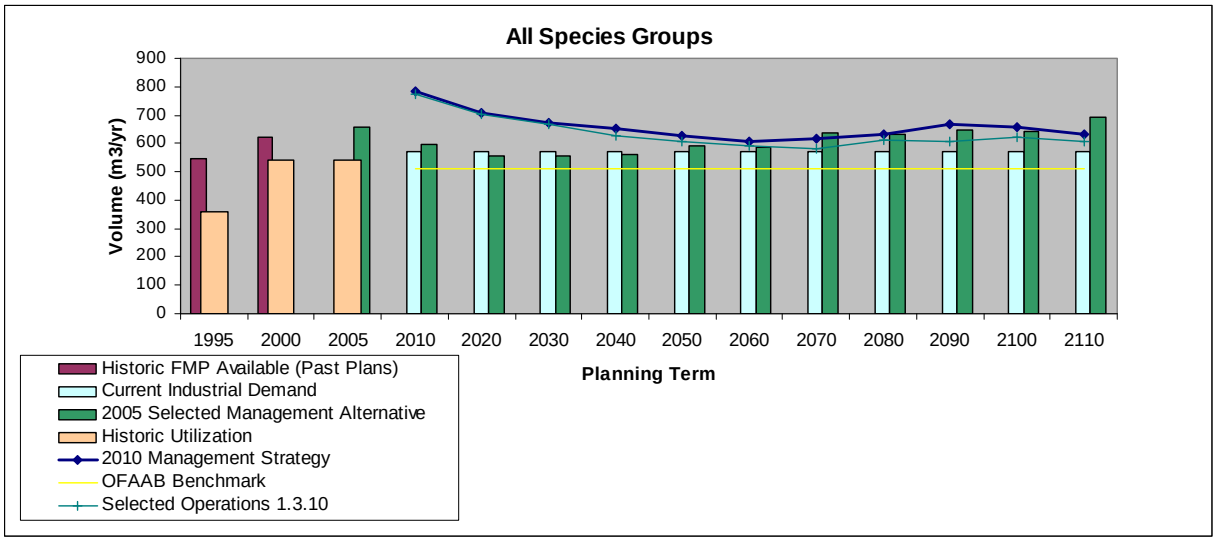


Figure 27 All Species Groups – Selected Operations Compared to PMS

Wood supply targets met in all terms for the all species group category.

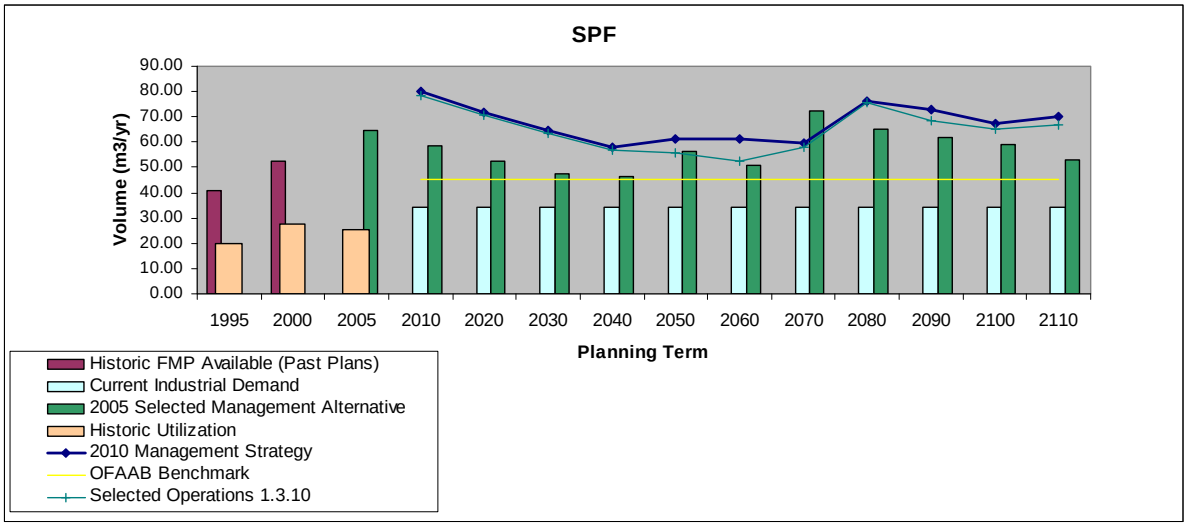


Figure 28 SPF Species Group - Selected Operations Compared to PMS
Wood supply targets met in all terms for the SPF species group category.

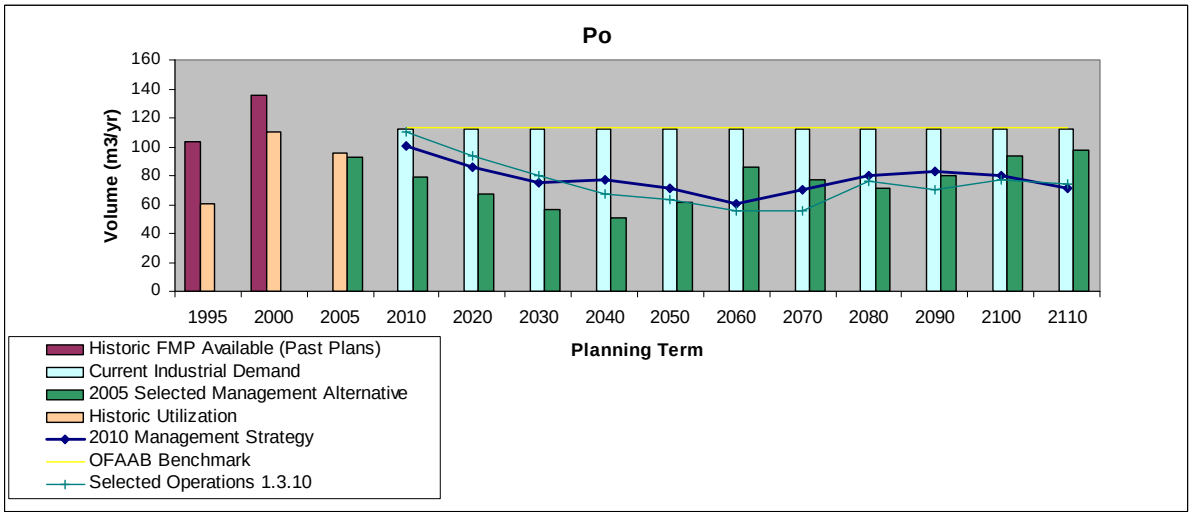


Figure 29 Po Species Group – Selected Operations Compared to PMS
Wood supply targets not met in any terms which is consistent with the Proposed Management Strategy. Almost meet target with forecast harvest areas in term 1 (1.5% short) as opposed to T1 Proposed Management Strategy (11% short)

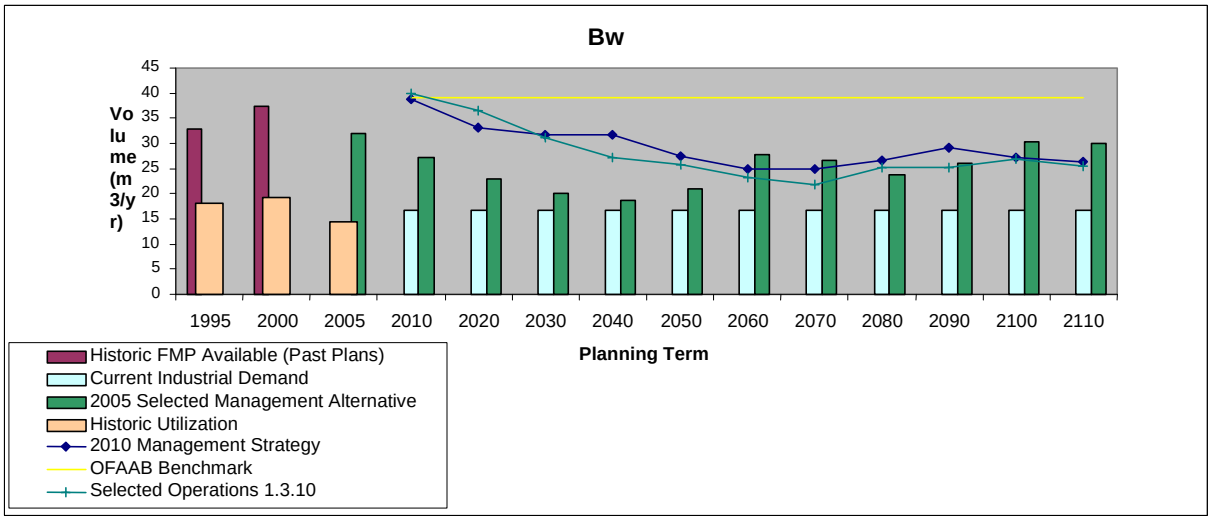


Figure 30 Bw Species Group – Selected Operations Compared to PMS
Wood supply targets met in all terms for the Bw species group category.

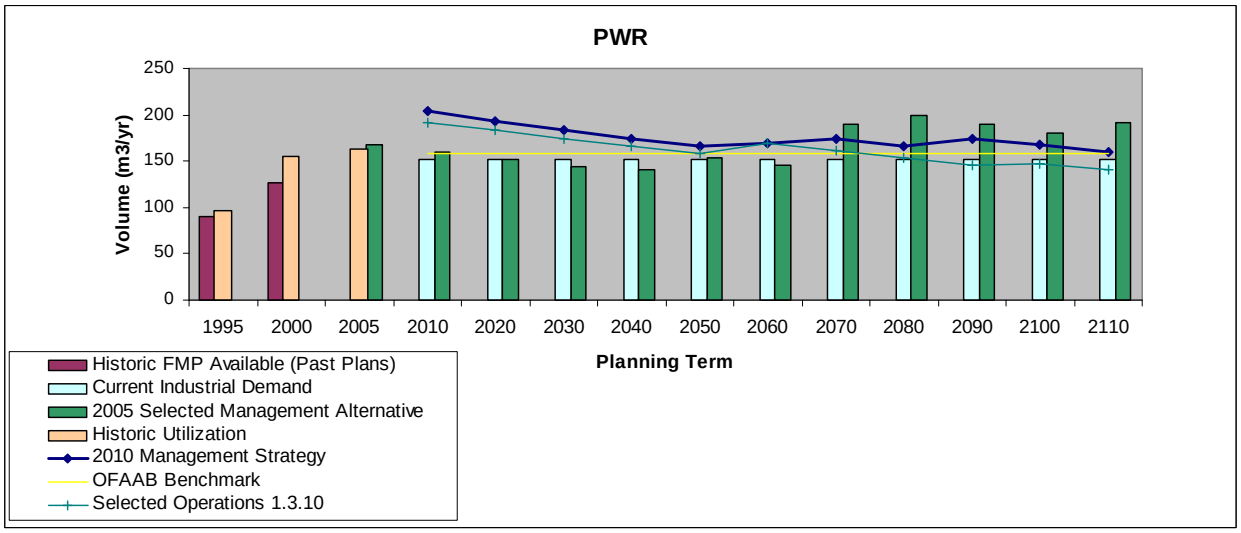


Figure 31 PWR Species Group – Selected Operations Compared to PMS
Wood supply targets met until last 3 terms as opposed to Proposed Management Strategy which meets targets in all terms. Slightly lower term 1 volume than the Proposed Management Strategy (5.9%).

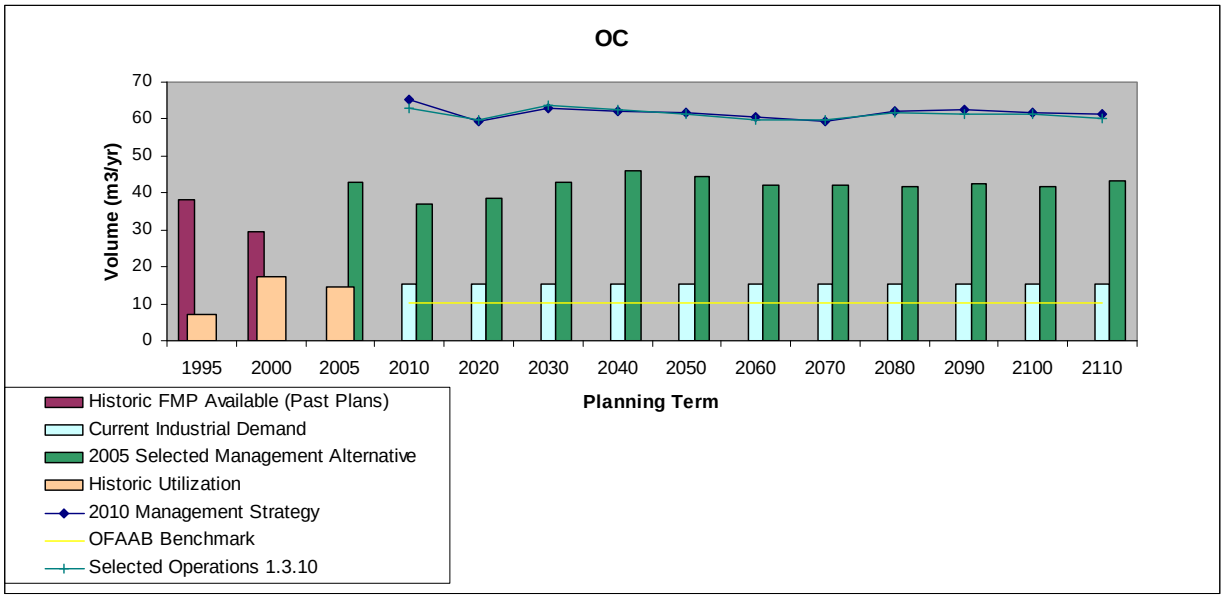


Figure 32 OC Species Group – Selected Operations Compared to PMS
Wood supply targets met in all terms as per Proposed Management Strategy.

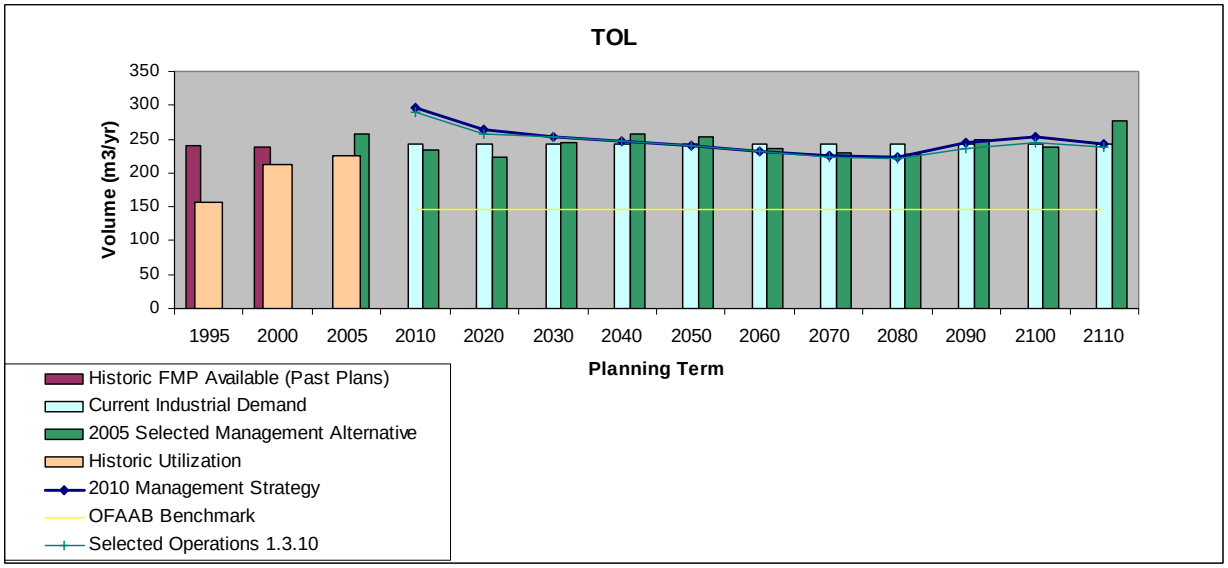


Figure 33 TOL Species Group – Selected Operations Compared to PMS
Similar projection as the Proposed Management Strategy however targets not met in 5 terms instead of 4 terms (2090 also not met with forecast operations).

Products:

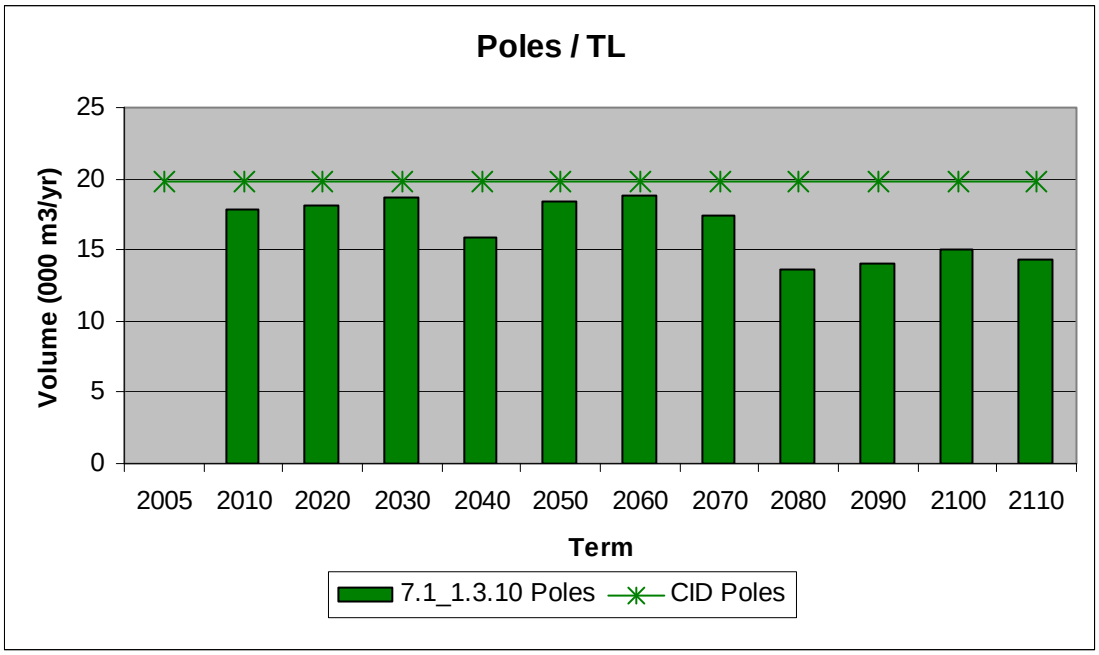


Figure 34 Poles/Treelength Product Group – Selected Operations Compared to PMS
Unable to meet product targets in this category for all terms (10.2% short in term 1), as opposed to the Proposed Management Strategy which meets targets in the first 3 terms only.

Examining the effect of the amount of surplus harvest area on the achievement of the long-term management direction.

No surplus harvest area has been identified

Conclusion

To ensure operationally feasible allocations on the landscape, a certain level of ageclass/stage of management substitution was required. The proposed allocation has been simulated in the SFMM to project any effect of this variation on the achievement of the long term management direction. The verification run solved and met all of the ecological targets.

In general, projected volumes for selected operations are slightly less (2%-6%) due to the under-allocation of the available harvest area, the difference between the Proposed Management Strategy harvest recipe, and some stand ages and stages of management selected in the forecast allocation. This decrease amounts to 1.4% of the overall available fibre in the short term, with minor variation in individual species groupings into the medium and long terms. The greatest impact on the ability to meet wood supply targets is in the Pr poles product category which is projected to fall short of the T1 by 2,019 m3/yr.

The types and levels of proposed operations for term 1 of the FMP do not deviate significantly from the projections in the Long Term Management Direction and there are no significant effects on objective achievement or sustainability.

5.0 DETERMINATION OF SUSTAINABILITY

Based on FMP-13, the vast majority of the indicators of sustainability that have been assessed at this stage of the plan development were within, or moving toward, the desired levels. Of the 251 desired levels established, 236 have been achieved, resulting in an overall 94% level of achievement. In all cases, the indicators that are not within or moving toward the desired level are a result of the current forest condition (ageclass distribution) or balancing multiple objectives.

Desired projections of forest cover types, wildlife habitat and old growth were based on the natural benchmark forest condition. Desired levels were met for all forest cover types, with the exception of the pre-sapling forest, which is a function of the limited amount of clearcutting on the forest and the maintenance of continuous forest cover across the majority of the landscape. Desired levels were met for all wildlife habitat species, with the exception of black bear summer habitat, which is directly linked to the pre-sapling forest condition. Desired levels were met for all even-aged old growth forest units.

Spatial assessments of preferred wildlife habitat and old growth have achieved desired levels and targets for the selected areas selected for operations. In addition, the non-spatial assessment of the areas selected for operations (the 1.3.10 run) confirmed the achievement of management objectives consistent with the Proposed Management Strategy.

Spatial assessment of the Proposed Management Strategy has identified movement toward the natural disturbance template; moving closer to the desired level in 5 of 6 possible indicators. An analysis of planned clearcuts identified that 100% of the clearcuts planned are less than 260 ha, meeting the standard identified in the NDPE Guide.

Wood supply projections have illustrated achievement of the desired levels for many species groupings in many of the future planning terms (86% achievement level). While current industrial demand levels are being sustained over the long term at the total species group level, shortfalls have been identified in the poplar species group, and to a lesser extent the tolerant hardwood species group. Wood supply projections have also illustrated achievement of the desired levels for many product categories in many of the future planning terms (93% achievement level), with some shortfalls identified for Pr poles and hardwood sawlogs over the medium to long term. Targets were set lower than the desired levels to account for a balance of social, environmental and economic considerations and were met in all terms.

The projected total available short term harvest area (2010-2020) has increased by 2.8% from current plan levels (2005 FMP). Overall short term projected volumes have increased more significantly (19.8 % increase) due to revisions of forecasted yields to more closely align with actual historical yields.

Social and economic analysis performed on the Proposed Management Strategy concluded that outputs for employment, salary, and value added, all have improved significantly from the 2005 FMP with the 19% increase in planned harvest volume. The sustainable management of the Algonquin Park Forest provides a stable economic base and overall positive impact on

the social and economic well-being of the surrounding dependent communities in terms of employment and the value added opportunities in production. It is important to note that anticipated reductions in timber supply over the medium to long term in some species and product groups could place strain on employment if resources are being fully utilized.

Area of Concern planning has been completed and allows for a fine filter approach to values protection including ecological and social values. Effectively implementing area of concern prescriptions to protect, maintain and enhance forest values is critical in forest sustainability. Monitoring of forest operations and effective communications between AFA, forest workers and Ontario Parks are the mechanisms by which this will be accomplished.

The preliminary determination of sustainability was presented to the LCC on January 12, 2009.

The Algonquin Park planning team concludes, on balance, that plan objectives are being met and progress is being made towards the desired forest and benefits. Based on the results from the collective achievement of objectives, the spatial assessments and the social and economic assessment, the Proposed Management Strategy provides for the sustainability of the Algonquin Park Forest.

6.0 DOCUMENTATION

The Algonquin Park Forest Management Plan includes supplementary documentation, which is a summary of the information used, and the documentation of decisions and analyses made, during the planning process. In addition, there is other documentation of information, which because of its sensitive nature, has not been included in the plan.

6.1 Supplementary Documentation

The supplementary documents listed in the Table of Contents outlines the relevant information as per requirements of the Forest Management Planning Manual. The supplementary documentation has been submitted as a separate document. The public correspondence related to the development of the plan and The Report on the Protection of Identified Aboriginal Values will be retained on file with the Algonquin Park Forester at the MNR Pembroke district office.

6.2 Appendices

The FMP appendix documents are listed in the Table of Contents. The appendices have been submitted as a separate document.

7.0 FOREST MANAGEMENT PLAN SUMMARY

The Forest Management Plan summary is contained in Supplementary Document 6.1.20. The FMP summary is prepared to facilitate public review. It can also be downloaded as a PDF from the AFA website at www.algonquinforestry.on.ca.

8.0 PLANNED OPERATIONS FOR THE SECOND 5-YEAR TERM

This section is included to serve as a place holder for the planned operations that will be conducted for the second five year phase of the FMP (i.e. 2015-2020).

9.0 FOREST MANAGEMENT PLAN TABLES

This section has been submitted as a separate document.

FMP-1: Management Unit Land Summary
FMP-2: Summary of Crown Productive Forest by Provincial Forest Type
FMP-3: Description of Forest Units
FMP-4: Summary of Managed Crown Productive Forest by Forest Unit
FMP-5: Silvicultural Ground Rules
FMP-6: Summary of Management Objectives
FMP-7: Projected Forest Condition for the Crown Productive Forest
FMP-8: Projected Habitat for Selected Wildlife Species
FMP-9: Projected Available Harvest Area by Forest Unit
FMP-10: Projected Available Harvest Volume by Species Group
FMP-11: Projected Operations, Revenues and Expenditures
FMP-12: Frequency Distribution of Forest Disturbances
FMP-13: Assessment of Objective Achievement
FMP-14: Operational Prescriptions for Areas of Concern
FMP-15: Forecast (10-year) and Planned (5-year) Harvest Area
FMP-16: Planned Clearcuts (5-year
FMP-17: Forecast of Harvest Volume by Species (10-year)
FMP-18: Planned Harvest Volume and Wood Utilization (5-year
FMP-19: Forecast (10-year) and Planned (5-year) Wood Utilization by Mill
FMP-20: Contingency Area: Harvest Area and Volume
FMP-21: Forecast (10-year) and Planned (5-year) Renewal and Tending Operations
FMP-22: Forecast (10-year) and Planned (5-year) Road Construction and Use Management
FMP-23: Road Crossings of Areas of Concern
FMP-24: Forecast of Revenues and Expenditures (10-year)
FMP-25: Forecast of Assessment of Regeneration Success (10-year)