BANCROFT MINDEN FOREST COMPANY

Forest Management Plan

for the

Bancroft Minden Forest

Management Unit #220

2021 to 2031

FOREST MANAGEMENT PLAN

for the

BANCROFT MINDEN FOREST

Bancroft District, Southern Region

Bancroft Minden Forest Company Inc.

for the 10-year period from 2021 to 2031

I hereby certify that I have prepared this forest management plan, including the silvicultural ground rules, to the best of my professional skill and judgment with the assistance of an interdisciplinary planning team in accordance with the requirements of the *Forest Management Planning Manual* and *Forest Information Manual*.

R.P.F. seal	Svetlana Zeran, R.P.F. Plan Author /General Manager of BMFC	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, the Forest Information Manual, and relevant policies and obligations (including any relevant MNRF agreements with Indigenous peoples). I also certify that the forest management plan has been prepared using the applicable forest management guides. In this forest management plan, prescriptions and conditions that differ from specific direction or recommendations in the applicable forest management guides are identified in the attached List of Exceptions.

Certified and Recommended for Approval by:

Brad Allen, A/District Manager	Date

Suzy Shalla, A/Regional Resources Manager	Date

Approved by:

Sharon Rew, Regional Director	Date

Natural Resources Information Portal Submission Identifier: FM-220-2021-FMP-740

Note: The original signed and sealed version of this page is available at the offices of the Ministry of Natural Resources and Forestry, and the Bancroft Minden Forest Company Inc.

FOREST MANAGEMENT PLAN

for the

BANCROFT MINDEN FOREST

Bancroft District, Southern Region

Bancroft Minden Forest Company Inc.

for the 10-year period from 2021 to 2031

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

Corinne Arthur, RPF	Regional Planning Forester, MNRF	SD-E, J, L, M, N; Text Sections 2.2 and 3.7.5
Name	Job Title	Sections Prepared
Signature	Date	

Alison Luke	Resources Liaison Specialist, MNRF	SD-C,D
Name	Job Title	Sections Prepared
Signature	Date	

Alison Smith	Management Biologist, MNRF	SD-O; Text Sections 2.1.4.1, 2.1.4.2, 2.1.4.3
Name	Job Title	Sections Prepared
Signature	Date	

Ernie Demuth, RPF	Management Forester	SD-E, G; Text Section 4.7.5
Name	Job Title	Sections Prepared
Signature	Date	

Norm Cottam	Regional Indigenous Relations Advisor, MNRF	Text Section 2.3
Name	Job Title	Sections Prepared
Signature	Date	

Julie Antler	Jr. Planning Forester, BMFC	SD-A; Text Sections 2.1, 3.0, 4.1, 4.2.2.1, 4.3, 4.4.1, 4.5.1, 4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.7, 4.5.8, 4.6, 4.9, 5.0
Name	Job Title	Sections Prepared
Signature	Date	

Tyler Hinze	Senior Technician, BMFC	Text Sections 4.5.6, 4.7.1, 4.7.4
Name	Job Title	Sections Prepared
Signature	Date	

Mindy Casselman	Silviculture Technician, BMFC	SD-G; Text Sections 4.4.2, 4.7.3
Name	Job Title	Sections Prepared
Signature	Date	

Natalie Heyblom	Office Administrator, BMFC	SD-G
Name	Job Title	Sections Prepared
Signature	Date	

Austin Cameron	Operations Technician	Text Section 4.8
Name	Job Title	Sections Prepared
Signature	Date	

Tim Wallen, RPF	Analyst, FRMG	SD-B; Text Section 4.9
Name	Job Title	Sections Prepared
Signature	Date	

Jane Dumas	LCC Representative	SD-K
Name	Job Title	Sections Prepared
Signature	Date	

Tania L. Baker	Regional Planning Biologist, MNRF	FMP-11; SD-H, I Text Sections 4.2.2.2, 4.5.5
Name	Job Title	Sections Prepared
Signature	Date	

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All silvicultural treatments in the silvicultural ground rules (FMP-4) that are exceptions to the recommendations in the silvicultural guides, and all operational prescriptions and conditions for areas of concern that 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 forest management activities included in this plan that are "exceptions".

FOREST MANAGEMENT PLAN

for the

BANCROFT MINDEN FOREST

Bancroft District, Southern Region

Bancroft Minden Forest Company Inc.

for the 10-year period from 2021 to 2031

PLANNING TEAM MEMBERS

Name	Affiliation	Role on Planning Team
Corinne Arthur, R.P.F.	MNRF Southern Region	Project Manager, Co-Chair
Svetlana Zeran, R.P.F.	SFL, BMFC	Plan Author, CO-chair
Ernie Demuth, R.P.F.	MNRF Bancroft District	Management Forester
Tania L. Baker	MNRF Southern Region	Regional Planning Biologist
Alison Smith	MNRF Bancroft District	Management Biologist
Jane Dumas	Local Citizens' Committee (LCC)	LCC Representative & Liaison
Alison Luke	MNRF Pembroke District	Resource Liaison Specialist
Eric Dillabough	Dillabough Forest Products	Forest Industry Representative
Richard Zohr	Bonnechere Algonquins	Indigenous Community Representative
Emmett Godin	Bonnechere Algonquins (Alternate)	Indigenous Community Representative
Bob Craftchick, R.P.F.	Whitney and Area Algonquins	Indigenous Community Representative
Ethan Huner	Algonquins of Ontario Consultation Office	Indigenous Community Representative
Wendy Jocko	Algonquins of Pikwakanagan First Nation	Indigenous Community Representative

Name	Affiliation	Role on Planning Team
Andre Carle	Algonquins of Pikwakanagan First Nation (Alternate)	Indigenous Community Representative
Dan Kohoko	Algonquins of Pikwakanagan First Nation (Alternate)	Indigenous Community Representative
Connie Mielke	Algonquins of Greater Golden Lake	Indigenous Community Representative
Paul Laderoute	Algonquins of Greater Golden Lake (Alternate)	Indigenous Community Representative
Stephen Hunter	Kijicho Manito Madaouskarini Algonquins	Indigenous Community Representative
Mike Green	Kijicho Manito Madaouskarini Algonquins (Alternate)	Indigenous Community Representative
Doreen Davis	Shabot Obaadjiwan Algonquins	Indigenous Community Representative
Tom Cowie	Hiawatha First Nation	Indigenous Community Representative
Sean Davison	Hiawatha First Nation (Alternate)	Indigenous Community Representative
Kaitlin Hill	Curve Lake First Nation	Indigenous Community Representative

PLANNING TEAM ADVISORS

Organization	Position
BMFC & First Resource Management Group (FRMG, hired consultant):	
Tim Wallen, R.P.F.	Analyst (FRMG)
Julie Antler, R.P.F. (provisional)	Junior Planning Forester
Tyler Hinze	Senior Operations Technician
Kelsey Hack	GIS Specialist
Natalie Heyblom, R.P.F. (provisional)	Forester in Training
MNRF Bancroft District:	
Glenn McLean	Forestry Technical Specialist
TBD	Fish and Wildlife Technical Specialist
Christine Apostolov	Lands and Waters Technical Specialist
TBD	District Planner
Luke Hillyer	Integrated Resource Management Technical Specialist
TBD	Resource Management Coordinator
Joseph Williams	Planning Team Secretary
MNRF Regional:	
Ildiko Apavaloae, R.P.F.	Forest Management Planning Specialist
Glen Watt, R.P.F.	Regional Planning Analyst
TBD	Regional Planning Biologist
Amy Clement	Regional Planner
Aklilu Yietagesu, R.P.F.	Forested Ecosystems Science Specialist
Jay Fitzsimmons	Terrestrial Ecosystem Science Specialist

Organization	Position
Sharon Zastre, Jennifer Hillyer	GIS Systems Officer
Megan Kilgour	Regional Lands Specialist
Jamie Prentice	Regional Outreach Specialist
Hassan Mohamed	Regional Operations Forester
Erica Barkley	Regional Parks Ecologist
Muhammad Waseem Ashiq	Forest Productivity Science Specialist
MNRF Provincial:	
Debra MacEwen, R.P.F.	Forest Industry Liaison Officer
Aaron Stacey	Fire Science and Planning Specialist
Renée Bellini	Provincial Cultural Heritage Specialist

LOCAL CITIZENS COMMITTEE MEMBERS

Name	Affiliation
Jane Dumas	Mayor, Township of South Algonquin, Whitney
Loy Freymond	Sawmill owner, Shareholder & President of BMFC, Bancroft
Peter Wood	Ontario Federation of Four Wheel Drive Clubs, Toronto
Irvin Yateman	Algonquin Nation Kijicho-Manito, Bancroft
Kimberley Roberts	Resident, Haliburton
Janice MacKillican	Councilor, Township of Limerick & Limerick Lake Cottage Association
Keith Hodson	Independent logger, Shareholder MDFS, Haliburton
Chris Ursulak	McKenzie Lake Cottage Owners Association, Whitney

A brief statement which reports on the local citizens' committee's agreement or disagreement with the forest management plan (final plan only):

The Bancroft Minden Local Citizen's Committee is in agreement with the 2021-31 Forest Management Plan as presented.

1 PLANNING TEAM REVIEWERS

Reviewer (name & title)	Review Roles and Responsibilities
Corinne Arthur, Regional Planning Forester	Operational & Preliminary Review
Ernie Demuth, Management Forester	Operational & Preliminary Review
Tania L. Baker, Regional Planning Biologist	Operational, Advisory & Preliminary Review
Alison Smith, Management Biologist	Operational & Preliminary Review
Amy Clement, Regional Planner	Advisory Review
Glenn McLean, Forestry Technical Specialist	Operational Review
TBD, Fish and Wildlife Technical Specialist	Operational Review
Christine Apostolov, Lands and Waters Technical Specialist	Operational Review
Jennifer Hillyer, Regional GIS Officer	Advisory & Preliminary Review
Ildiko Apavaloae, Regional Forest Management Planning Specialist	Advisory Review
Glenn Watt, Regional Analyst	Operational, Advisory & Preliminary Review
Hassan Mohamed, Regional Operations Forester	Advisory Review
TBD, District Planner	Advisory Review
Alison Luke, Resource Liaison Specialist	Advisory Review
Sharon Zastre, Regional GIS Officer	Advisory Review
Debra MacEwen, Forest Industry Liaison Officer	Advisory Review
Norm Cottam, Regional Aboriginal Advisor	Advisory Review
Aklilu Yietagesu, Regional Forested Ecosystem Science Specialist	Advisory Review
Jay Fitzsimmons, Regional Terrestrial Ecosystem Science Specialist	Advisory Review
Aaron Stacey, Fire Science and Planning Specialist	Advisory Review
Erica Barkley, Parks Ecologist, SE Zone, Ontario Parks (MECP)	Operational & Preliminary Review
Renee Bellini, Cultural Heritage Specialist	Advisory Review
Muhammad Waseem Ashiq, Forest Productivity Science Specialist	Advisory Review

TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

LIST OF FMP TABLES

LIST OF SUPPLEMENTARY DOCUMENTATION

A. Summary of the Historic Forest Condition
B. Analysis Package
C. First Nation and Métis Background Information Report
D. Summary of First Nation and Métis Involvement
E. Social and Economic Description and Demographic Profiles
F. Monitoring Program for Exceptions
G. Monitoring Program for Success of Silvicultural Activities
H. Roads & Water-crossing Documentation
I. AOC Documentation
J. Summary of Public Consultation & Desired Forest and Benefit Meeting Report
K. LCC Report
L. Final List of Required Alterations & List of Major Changes to the Draft FMP
M. Planning Team's Terms of Reference
N. Statement of Environmental Values
O. Wildlife Management
P. Climate Change Considerations

1.0 INTRODUCTION

The purpose of the forest management planning process is to establish a long-term strategic direction for forest management, with the overall objective of ensuring the sustainability and long-term health of forest ecosystems in Ontario. The intent is to benefit both local and global environments while providing social, economic, and environmental consideration to local forest-based communities.

The Crown Forest Sustainability Act (1994) requires that all forest management activities on Crown land within a management unit in Ontario be carried out in accordance with a provincially approved Forest Management Plan (FMP). Forest management plans are prepared by a plan author, who must be a registered professional forester licenced under the Professional Foresters Act (2000), assisted by an interdisciplinary planning team and local citizen's committee, and supported by plan advisors. A forest management plan must be prepared for each Forest Management Unit in Ontario and approved by the Ministry of Natural Resources and Forestry.

This plan was prepared through the Long-term Management Direction (LTMD) in accordance with the 2017 Forest Management Planning Manual (FMPM) by a Registered Professional Forester in an open and consultative fashion with input from both the Local Citizens Committee (LCC) as well as the interdisciplinary planning team. The 2020 Forest Management Planning Manual was approved effective July 1st, 2020. Due to delays in FMP preparation, the remainder of the FMP (i.e., Stages Three, Four, and Five) were prepared in accordance with Sections 1.3 to 1.6 of the FMPM 2020, to the extent reasonably possible, to enable the sustainable forest license holder to capitalize on new approved planning efficiencies within the forest management planning process. The planning team Terms of Reference can be found in Supplementary Documentation Section M. *"Planning Team Terms of Reference."*

Crown forests in Ontario are divided into management units for the purpose of forest management. The Ministry of Natural Resources and Forestry (MNRF) Bancroft District contains two management units: The Bancroft Minden Forest and the Mazinaw-Lanark Forest. The Bancroft District office is located in the town of Bancroft and is part of the Southern Region of MNRF whose head office is located in Peterborough, Ontario.

The Bancroft Minden Forest is administered and managed by the Bancroft Minden Forest Company Inc. (BMFC) – herein sometimes referred to as "the Company" - under the authority of Sustainable Forest License (SFL) No. 542585 in partnership with the MNRF. BMFC is a private company owned and funded by 25 local Shareholders. Its Shareholders include 15 independent logging companies, 10 sawmills, and 1 pulp mill (Cascades, Trenton).

Shareholder companies that harvest timber on Crown land hold overlapping licenses (Forest Resource Licenses or FRLs). Each Shareholder Company that holds an FRL receives a predetermined percentage of the total allowable harvest area. This percentage is based on the volume that each company has historically harvested on Crown land and was determined when the MNRF negotiated the terms of the SFL with BMFC. Each overlapping license holder pays BMFC a management fee, based on their percentage of harvest allocation.

As the SFL holder, BMFC is responsible for preparing the FMP and Annual Work Schedules (AWS); conducting forest operations in accordance with approved plans; monitoring operations for compliance; collecting and maintaining planning information for the forest according to the current Forest Information Manual and reporting on operations and objective achievements in Annual Reports.

The MNRF is responsible for collecting and maintaining values information for the Forest; input, review, and approval of planned operations in the FMP; maintaining communications with the public and Indigenous communities with a known interest in the forest; providing direction on provincial policy, guideline and manual implementation and auditing forest operations to ensure they comply with approved plans.

Prior to the formation of BMFC, the Crown land that is now the Bancroft Minden Forest management unit was managed by the Ministry of Natural Resources and Forestry as four separate crown management units (MUs): Bancroft; Whitney; Minden and Leslie M. Frost Centre, each with their own Timber Management Plan (TMP). After BMFC took over management of the Crown forest in 1996, it was amalgamated into two units: the Bancroft MU (#465) and Minden MU (#716), each with their own FMP. The Bancroft Minden Forest Management Unit (#220) was established on April 1, 2001. The boundary of the amalgamated Bancroft Minden Forest has not changed since its formation. A summary of the past management units that gradually amalgamated to form the administrative unit that is the Bancroft Minden Forest today is portrayed in Table 1 below.

Table 1. History of Management Units amalgamated in the present Bancroft Minden Forest.

<table>
<tr><th>Plan Period</th><th colspan="4">Management Unit(s)</th></tr>
<tr><td>2001 – Present</td><td colspan="4">Bancroft Minden Forest</td></tr>
<tr><td>1996-2001 FMP</td><td colspan="2">Bancroft MU</td><td colspan="2">Minden MU</td></tr>
<tr><td>1990-1996 TMP</td><td>Bancroft MU</td><td>Whitney MU</td><td>Minden MU</td><td>L.M. Frost Centre MU</td></tr>
</table>

The Bancroft Minden Forest Management Unit is located north of the cities of Peterborough and Lindsay and includes the principal towns of Minden, Haliburton, Bancroft, Apsley, and Whitney. Crown land within the FMU is generally located within the Counties of Haliburton, Hastings, Peterborough and Victoria, and the Districts of Nipissing and Muskoka (see **Figure** 1). Its proximity to large population centres like Toronto (250 km) and Ottawa (220 km) make this Management Unit unique. The Unit is often visited by tourists and cottagers seeking a country getaway. Additionally, private land comprises

54% of the total area within the Bancroft Minden Forest. The scattered nature and abundance of cottage lots on lakes and rivers have created a fragmented landbase leading to several implications (Section 2.1.2.3).

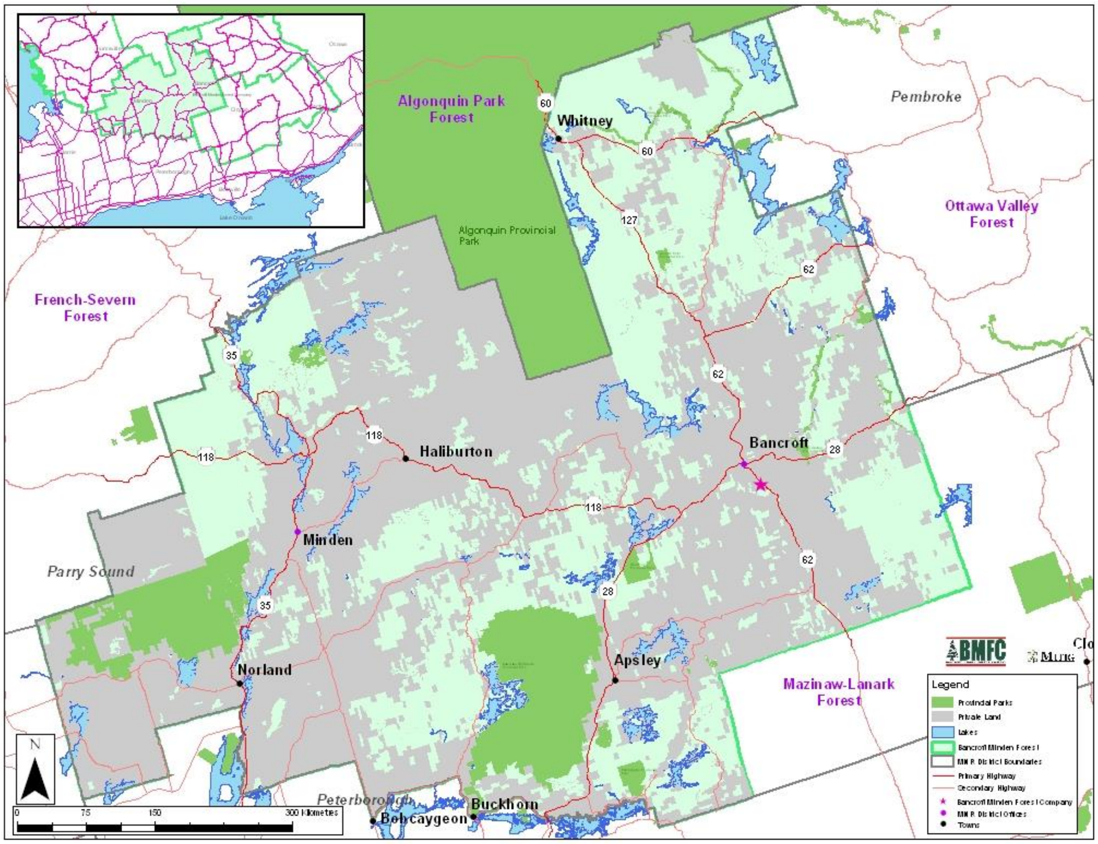


Figure 1. Map of the Bancroft Minden Forest Management Unit.

There are 11 provincial parks and 6 conservation reserves in, or partially within the Bancroft Minden Forest. The purpose of these areas is to permanently protect a system of provincial parks and conservation reserves that includes ecosystems that are representative of Ontario's natural regions, protect provincially significant elements of Ontario's natural and cultural heritage, maintain biodiversity and provide opportunities for compatible, ecologically sustainable recreation.[1] Provincial parks and conservation reserves and their classifications within the Bancroft Minden Forest are further described in Section 2.1.4.3.

The Bancroft Minden Forest overlaps with the traditional territories of Williams Treaties First Nations (WTFN), the Algonquins of Ontario (AOO) and the Kawartha Nishnawbe. The Indigenous communities

[1] Provincial Parks and Conservation Reserves Act, 2006 (PPCRA).

adjacent to the forest management unit whose interest or traditional uses may be affected by forest management activities are further described in Section 2.3.

Several major provincial highways (Hwy 62, Hwy 28, Hwy 118) pass through the management unit, providing excellent access to the north, south, east, and west parts of the district. Numerous secondary highways branch off to create an elaborate grid of primary access into all corners of the district. Besides provincial highways, most townships have a network of municipal and local roads. The logging roads, constructed primarily for wood harvesting, are multi-use, travelled by hunters, anglers, tourists, cottagers and off-road enthusiasts (to name a few) and primarily maintained by the forest industry. Recent government funding has allowed the forest industry to upgrade many of the primary forest access roads within the forest.

Several mills receive wood fibre from the Bancroft Minden Forest but are not solely dependent on the unit for their timber supplies. The major wood processing facilities that currently draw their wood supplies from the area and have Shareholder agreements with the Bancroft Minden Forest Company are listed in Table 2.

Table 2. Mills utilizing wood from the Bancroft Minden Forest.

Processing Facility	Type	Location	Total (m^3)
Huntsville Forest Products	Sawmill	Huntsville	1700
Chrisholms's Ltd.	Sawmill	Roslin	2150
Wilson's Forest Products Ltd.	Sawmill	Madoc	2750
Len Rumleskie & Son Lumber	Sawmill	Barry's Bay	3000
Neilson Lumber Ltd.	Sawmill	Hastings	3600
Thomas J. Neuman Ltd.	Sawmill	Palmer Rapids	3600
Ben Hokum and Son LTD.	Sawmill	Killaloe	4000
George Stein Ltd.	Sawmill	Palmer Rapids	4500
Freymond Wood Products	Pulp	Bancroft	11000
Freymond Lumber Ltd.	Sawmill	Bancroft	15800
Cascades Canada ULC	Pulp	Trenton	22100
McRae Mills Ltd.	Sawmill	Whitney	22600
Murray Brothers Lumber Co. Ltd.	Sawmill	Madawaska	32400

The MNRF Statement of Environmental Values (SEV) under the *Environmental Bill of Rights, 1993* (EBR) is a document that describes how the purposes of the EBR are to be considered whenever significant environmental decisions are made. MNRF's SEV has been considered during the development of this FMP. 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 N. *"Statement of Environmental Values."*

During the implementation of this FMP, situations will arise (e.g. new field data, changing market conditions, Land Use Strategy decisions, and recommendations) where amendments to the Plan should be proposed. In these instances, rationale and details regarding the proposed amendments must be documented and submitted to the Bancroft MNRF District Manager for amendment classification and approval.

A list of acronyms used throughout the plan text can be found in Appendix 1.

2.0 MANAGEMENT UNIT DESCRIPTION

2.1 FOREST DESCRIPTION

The following sections describe the forest in terms of forest history, current forest condition, forest classification, forest resources, a social and economic description and First Nations and Metis Background Information Report. Much of the information will be supported by referenced information in the Supplementary Documentation.

2.1.1 HISTORIC FOREST CONDITION

The Bancroft Minden Forest has been shaped by glaciers, fire and settlement. It also has endured a long history of past utilization. These influences are what have formed the current forest condition seen today. The logging history can be briefly summarized as follows:

- In 1850, area within the Bancroft Minden Forest was colonized by European settlers
- By 1863 colonization roads were established between Lake Simcoe and the Ottawa River
- Early settlers cleared much of the forested land as an effort to grow crops
- Poor soil conditions turned many settlers to logging in order to supplement their sustenance farming
- Between the 1800's and 1900's the area was managed heavily for pine and gave rise to the opening of many successful lumber companies
- The lumber industry assisted the growth of many towns and was able to support the community with necessities of life
- Pine logging left the land full of flammable debris and little to no remaining pine to act as a seed source
- Between 1908 and 1945 hardwood was harvested for charcoal, wood alcohol, and acetate production
- Hardwood logs were in high demand during the 1940's and 1950's, often resulting in high grading

- The 1950's marked the beginning of forest management planning at the unit level
- The Ontario Ministry of Natural Resources (OMNR) Timber Production Policy (1970's) became a source of staffing, funding, and production targets
- Forest management approaches in the 1970's started the "reverse high-grade" approach to improve forest quality and vigor. This required the use of tree markers and careful logging practices. Selection and shelterwood management systems were developed and implemented.
- The first Timber Management plans (1990's) were developed by government forestry staff and noticed that much of the tolerant hardwood forest contained poor stocking
- By 1997, OMNR began to withdraw from operations on Crown Management Units and initiated the process to convert to Sustainable Forest Licenses (SFL's)
- In 2001, the Bancroft Minden Forest Company Inc. obtained an SFL to combine the Bancroft and adjoining Minden Crown Management Unit
- Since 2001 BMFC has developed two forest management plans, one in 2006 and one in 2011 whereby single-tree selection was the management tool choice for tolerant hardwoods
- Sustainable adaptive resource management has been of utmost importance while developing forest management plans within the Bancroft Minden Forest

A detailed account has been provided in Supplementary Documentation A.

2.1.2 CURRENT FOREST CONDITION

The condition of the forest at the start of the planning period forms the basis of all management decisions, including the establishment of the desired forest and benefits (Section 3.4). This section will provide:

1. A breakdown of Crown forest and patent land Crown timber, as described in the planning inventory and a discussion of the implications of patent land Crown timber and land type on the development of the FMP.
2. A summary of land types for the management unit, at the beginning of the period of the FMP (portrayed in FMP-1).
3. A discussion of the implications of patent land within the management unit on the development of the FMP.

These parameters are also used to monitor and report on the forest condition throughout the plan term and in detail at years five and ten (enhanced) Annual Reports. The current forest condition (e.g. forest cover and age class) within parks and other protected areas will contribute to forest diversity and habitat objectives in addition to other related targets.

The Forest Resource Inventory (FRI) is the basis of all forest management planning. It provides resource managers with a snapshot of the state of the forest, including information about tree species composition, range, age and distribution, stocking, and forest ecological and land use conditions. The Bancroft Minden Forest Company uses this information to support forest management planning, wood supply, and habitat analysis. Information from the FRI is also used for provincial, federal, and international reporting.

The previous FRI was interpreted from 1987 aerial photography taken at a scale of 1:15, 840. MNRF updated it with operations up to 1998 before BMFC took this responsibility. BMFC has been responsible for the updates and maintenance of this product since 1998 when it functionally became the SFL holder. Inventory updates since 1998 include harvest depletions, silvicultural treatments, plantations, production forest reserve areas, and updates to the ownership coverage (provided by Ontario Surveyor General), including changes to Parks and Conservation Reserves resulting from Ontario's Living Legacy. The information used to update the inventory included forest operation prescription data, post-cut cruise data, free-to-grow assessments, depletion records, and Annual Report information.

In 2005 the Provincial FRI program was 'enhanced' to include improvements such as:

- 10-year development cycle (vs. 20 year)
- High-resolution digital imagery and new tools to increase accuracy and precision
- Increased number of plot networks and calibration plots (generally 1 plot for every 5-8 km^2)
- New attributes such as:
    - Two canopy layers described (overstory and understory with unique species composition strings as well as age and height of leading species described)
    - New Ecosite Land Classification information

The Bancroft Minden Forest was one of the first Forest Management Units to roll out under this new platform which involved new technology; new methods of data collection, processing, and storage; new attributes and specifications and a new workflow stream. The imagery for the unit was flown in 2006-7 and was then delivered to the contract company (based out of Montreal) hired to interpret the imagery and develop the eFRI. After receiving the imagery, the contractor began establishing and measuring FRI plots in the unit and interpreting the imagery in 2007. The FRI was delivered to the SFL a decade later in December of 2017.

The Forest Information Manual (FIM) standardizes the requirements for FRI update and submission as part of forest management planning. The eFRI was prepared using the 2007 FIM Technical Specifications, which has since been replaced with the 2017 FIM Technical Specifications, the new standard for 2021-31 FMPs; the Planning Inventory (based on the eFRI) has been updated to meet the 2017 FIM Technical specifications. Note that during the final stages of FMP development, the 2020 FIM Technical Specifications replaced the 2017 FIM Technical Specifications and was also used.

Many updates were made to create a planning inventory. Supplementary Document B contains the Analysis Package which documents the development of the planning inventory products and the way forest description information is updated (Checkpoint 1), projected or forecasted (Checkpoints 3 through 7). Actual updates include any activities that occurred up to the 2016 Annual Report and forecast activities are those scheduled to the end of the 2011 FMP planned operations term (April 1, 2016 to March 31, 2021). Forecast information is used to update the inventory to the beginning of the next plan start in

2021. For the purposes of plan creation, the planning inventory assumes that the remaining harvest areas in the 2011 FMP area will be depleted.

2.1.2.1 Crown Forest and Patent Land Crown Timber

Crown land occupies approximately 46% of the geographic area within the Bancroft Minden Forest Management Unit boundaries. FMP-1 shows the distribution of lands and water across various ownerships: Crown, provincial parks and protected areas, and patent land crown timber. It is important to note that there is no patent land crown timber within this planning period; the current 2021-2031 FMP ownership data is the more correct data as received from the MNRF corporate data repository via the Ontario Surveyor General office.

2.1.2.2 Summary of Land Types

Of the 461, 085 hectares of Crown land on the management unit, approximately 21% is water. An additional 1% is occupied by agricultural land, grassland, meadow, or unclassified area (referred to as "other land"). Non-productive forest, including treed muskeg, open muskeg, brush, alder, and rock covers approximately 10% of Crown land. Figure 2 shows a summary of the Crown land and patent Crown timber area by land type.

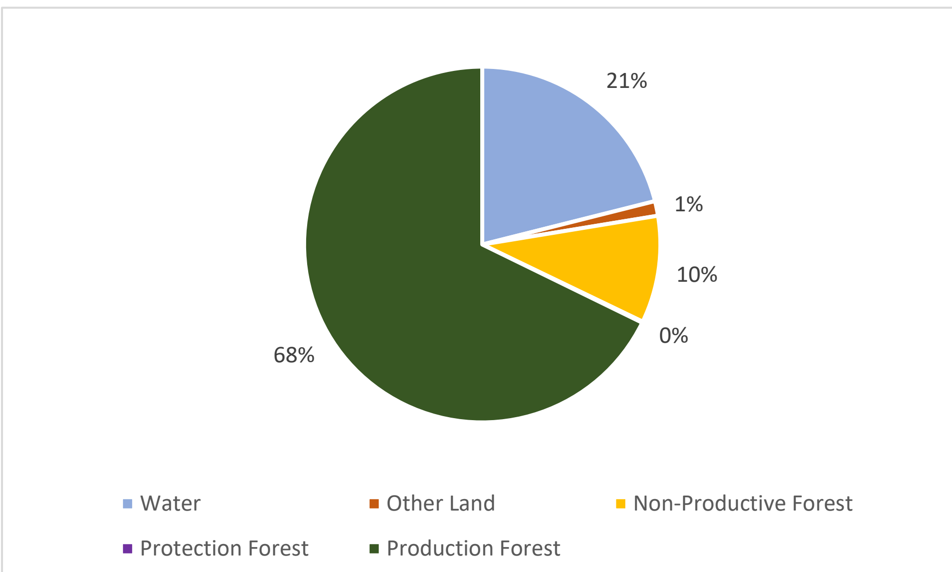


Figure 2. Summary of the Crown land and patent Crown timber by land type.

The production forest component is the largest of Crown Land area at just over 312, 000 hectares (representing 68% of Crown land). Approximately 50, 000 hectares of the productive forest (representing 17%) are in parks and conservation reserves and are not available for harvest. The remaining productive forest is considered managed Crown forest. Of this, about 399 hectares is protection forest that is not available for harvest, because of inaccessibility (islands, terrain too steep or too wet) or site conditions that do not encourage growth or regeneration (site class 4). An additional 3, 095 hectares is below regeneration standards, which means the area has received regeneration treatments (natural or artificial) but does not yet meet regeneration standards. This is an area that has been harvested but has not yet reached free-to-grow survey age. Follow-up treatments will occur when necessary and these areas will be surveyed and updated in the inventory at the appropriate time. That leaves approximately 240, 321 hectares of forest available for timber production, referred to as "productive forest". Figure 3 shows a summary of productive forest.

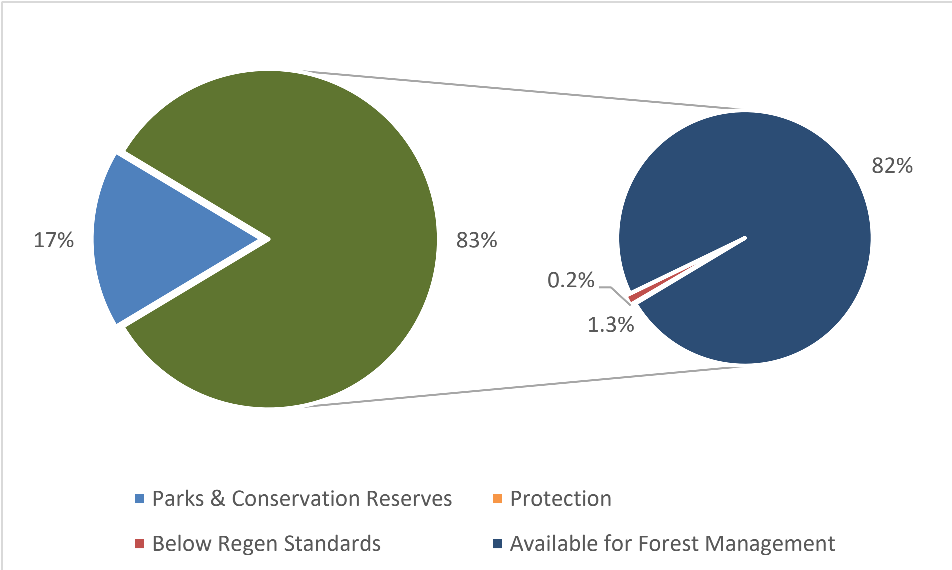


Figure 3. Summary of productive forest.

No land-related issues had implications on the development of the FMP. The large proportion of water in the management unit sometimes makes access challenging, but with the extensive existing road network and the increased use of portable bridges, this has become less of a problem. There is less area identified in the new inventory as "protection forest" than in the previous inventory. Areas encountered through forest operations that are deemed inoperable are tracked and recorded as operational bypass. The new inventory has coded most of these areas as 'site class 4' instead of 'protection forest'. An effort was made during the update of the planning inventory to map out known areas of protection forest sites that were previously in the available landbase, to paint a more realistic picture of the area available for harvest. Even with this effort, the variability of the forest, terrain and soil conditions on the management unit means that these areas are frequently encountered. Considerations were made for the expected bypass areas in strategic forest modelling (See Supplementary Documentation B, Checkpoint 3).

2.1.2.3 Implications of Patent Land

Patent (or private) lands account for 54% of the area within the Bancroft Minden Forest Management Unit boundaries. While this plan does not consider Patent land for management activities, these areas have several implications on plan development.

Accessing Crown land for harvest requires additional planning when patent land is involved. Effort is made to utilize existing road networks and work with the landowner in arranging permission for access across patent land. Accurate identification of licence boundaries is particularly important when working next to patent land. The Good Neighbour Policy (see Conditions on Regular Operations 4.2.2.2) speaks to this in more detail. Some blocks of Crown land are landlocked by private land and cannot be accessed without consent from adjacent landowners. Experience shows that normally landowners are cooperative and access to Crown land can be negotiated.

Incorporating residual forest and other forest values is difficult when patent land is so intertwined with Crown managed forest. Any forest beyond the border of Crown does not contribute to forest residual considerations since future forest management decisions of the landowner are unknown. Values known on patent land are protected by applying the appropriate Area of Concern prescription on adjacent Crown land.

2.1.3 FOREST CLASSIFICATION

2.1.3.1 Forest Units and Analysis Units

A forest unit is a classification system that aggregates forest stands for management purposes that have similar species composition, will develop in a similar manner (both naturally and in response to silvicultural treatments), and will be managed under the same silvicultural system. Forest units are the standard unit used in the creation and implementation of an FMP.

Forest units are defined for each management unit and re-assessed and updated for each FMP period; known as plan forest units (PLANFU) which may be based on regional Landscape Guide Forest units (LGFU). The Forest Management Guide for Great Lakes-St. Lawrence Landscapes (Landscape Guide) describes 25 LGFUs and they are a measure of forest composition at the landscape level. The LGFUs are used for simulations in Landscape Guide to evaluate landscape class indicators for used and preferred habitat types depicted in MNRF's habitat matrix. **Figure** 4 displays the relationship between the LGFU and the PLANFU.

Unlike the provincial forest types that have standard definitions, forest unit definitions are flexible at the management unit level to address local issues and forest conditions. Forest unit classification applies to the entire Crown Forest on the management unit, not just the portion of the production forest land area available for timber production. This enables the entire Crown Forest to contribute to specific, non-timber management objectives (e.g., biodiversity).

Forest units used in the plan (PLANFU), described in FMP-2, are the primary method for accounting and provide the basis for harvest allocations. Growth and yield curves, succession rules, silvicultural costs, and landbase summaries are all done on the basis of Forest Units. The plan forest units also link landscape classes and landscape guide forest units in order to develop and track indicators of biodiversity at the Landscape Scale in accordance with the Landscape Guide. The relationship between these different classification systems can be viewed in Table 3. Forest Classification Summary.

Forest unit definitions were, for the most part, unchanged from the 2011-2021 FMP. This provides an advantage for analysing long-term trends by having the same number and general definitions from one plan to the next. Analysis Units were not used in the development of this FMP as the PLANFUs were based on the 2011-2021 FMP. The Ecological Land Classification (ELC) was used as the foundation for the PLANFU (Section 2.1 of the Analysis Package in Supplementary Documentation B provides details on forest unit definitions).

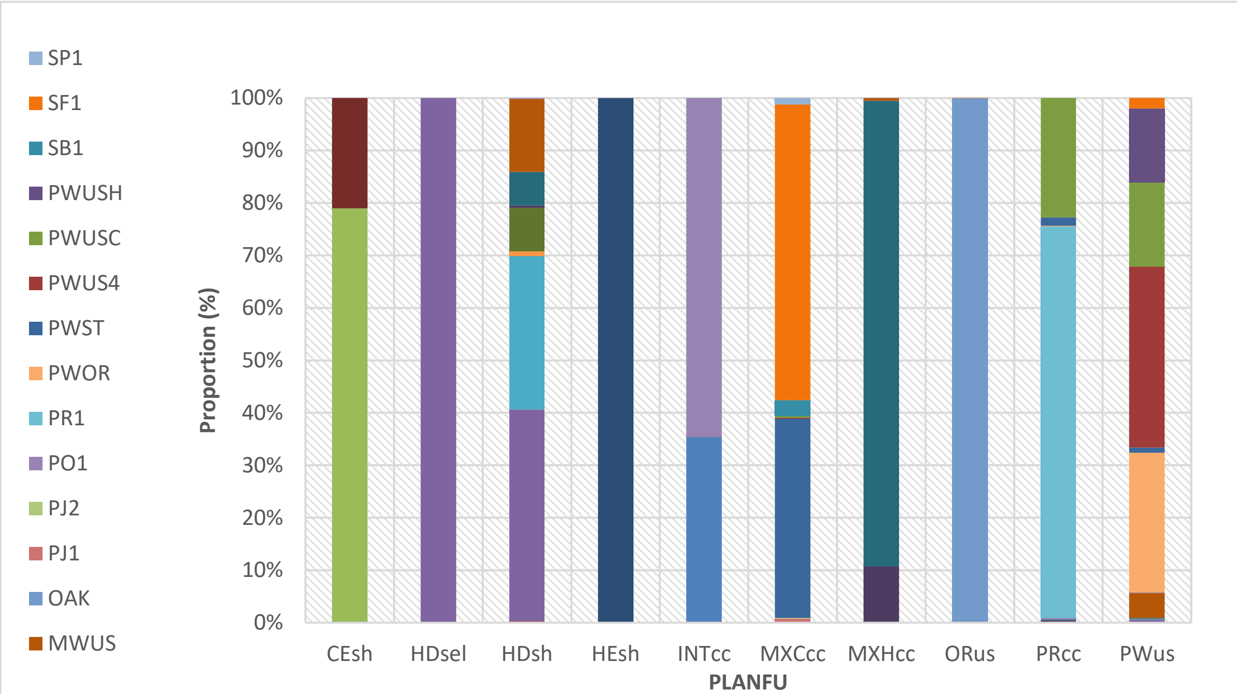


Figure 4. Proportions of LGFU within each PLANFU.

While most forest unit names stayed the same, there have been changes to the SQL sorting logic, groupings, and re-assignments. The most significant change is the adoption of irregular shelterwood as the predominant approach for modeling the hardwood shelterwood, hemlock and cedar dominated forest units. This was a recommendation in the year 7 Annual Report, as well as an audit observation from our 2017 Independent Forest Audit. More specifically, the threat of beech bark disease (*Neonectria faginata*) and hemlock woolly adelgid (*Adelges tsugae*) and updates to the Provincial Silviculture Guide have resulted in new management approaches to our hardwood, hemlock and cedar forest types. In addition, the 2011-21 FMP significantly over-estimated the actual area eligible for selection management. This resulted in a higher proportion of the forest being managed under the shelterwood system. Since hardwood selection and shelterwood utilize two different silvicultural systems, each with different average harvest volumes, silvicultural costs, and return intervals, there are strategic and operational planning implications associated with these discrepancies which have been addressed through various stages of development of the LTMD.

The 10 plan forest units in this plan include: 2 uniform shelterwood units, 1 selection/irregular shelterwood unit, 2 irregular shelterwood units, 1 selection unit and 4 clearcut units (Table 3):

1) ***Red Pine*** **(PRCC):** stands with red pine as the dominant species and insignificant white pine stocking. These stands are managed predominately through commercial thinning and through the use of clearcutting to facilitate red pine management.

2) ***White Pine*** **(PWUS)**: stands with significant white pine stocking; captures both stands that are predominantly white pine, but also stands with other conifers and hardwoods mixed in the stands. These stands will be managed as uniform shelterwoods to promote the regeneration of white pine.

3) ***Oak*** **(ORUS):** stands with significant oak stocking. These stands will be managed as uniform shelterwoods to promote the regeneration of oak.

4) ***Hemlock*** **(HESH):** stands with a significant proportion of hemlock. These stands will be managed appropriately as either single-tree selection or irregular shelterwood to manage the hemlock as well as the tolerant hardwoods that commonly associate with them.

5) ***Lowland Conifer*** **(CESH)***:* stands with significant cedar or larch components. These stands will be managed as irregular shelterwoods to facilitate the regeneration of cedar as well as the mid-tolerant hardwoods and other conifers that often associate in these stands.

6) ***Hardwood Selection*** **(HDSEL)***:* stands with significant tolerant hardwood proportions (such as sugar maple) growing on productive sites. These stands will be managed using the selection system to encourage the development of the tolerant species.

7) ***Hardwood Shelterwood*** **(HDSH**)*:* stands with significant mid-tolerant hardwood proportions. This includes stands with Ash, Basswood, Yellow Birch and Beech. These stands will be managed as irregular shelterwoods to facilitate the regeneration of the mid-tolerant components of the stands as well as to manage hardwood stands with high proportions of UGS stock (such as stands with beech).

8) ***Intolerant Hardwood*** **(INTCC**): composed of stands where poplar or white birch makes up the majority of the stand. These stands will be managed by using clearcutting to encourage intolerant hardwood regeneration.

9) ***Mixed Conifer*** **(MXCCC)**: composed of stands where the majority of the stand is composed of intolerant conifer species, such as jack pine or spruce which are managed through the use of clearcutting. It also captures stands with a component of white pine that is insufficient for shelterwood management, but would make good candidates for seed tree management (a modified clearcut system).

10) ***Mixed Hardwood*** **(MXHCC):** stands where the majority of the stand is composed of both intolerant or tolerant species, but they lack sufficient numbers of either to clearly assign the stand to other forest units. It is often the “catch-all” unit that includes mixed stands that could not be easily sorted into another PLANFU. These stands will be managed using clearcutting to manage the intolerant species and release the mid-tolerant species.

Table 3. Forest classification summary.

PLAN FU	Description	Landscape Class	LGFU	Area (ha)	Area (%)
CESH	Cedar/larch shelterwood	SPC SPC	CE1 LC1	4,378	1%
PRCC	Red pine clearcut	WPM	PR1	5,151	2%
HESH	Hemlock shelterwood/selection	MW	HE1	7,986	3%
MXCCC	Intolerant conifer clearcut	WPM MP MP SPC SPC SPC	PWST PJ1 PJ2 SP1 SF1 SB1	21,564	7%
HDSEL	Tolerant hardwood selection	TH	HDSEL1	32,623	10%
PWUS	White pine uniform shelterwood	WPM WPM WPM WPM	PWUS4 PWOR PWUSH PWUSC	35,112	11%
MXHCC	Mixed hardwood clearcut	SPC MW	MWD MWR	36,485	12%
ORUS	Oak uniform shelterwood	TH	OAK	37,286	12%
INTCC	Intolerant hardwood clearcut	IH IH	PO1 BW1	41,956	13%
HDSH	Mid-tolerant hardwood shelterwood	TH TH TH TH TH	LWMW BY1 MWUS HDSEL2 HDUS	90,338	29%

Given the rationale for changes to PLANFUs as detailed in the above section, changes were made to the SQL sorting logic for 2021 PLANFUs or to the management approach for some PLANFUs as described below:

1) Any non-conifer stand with a component (i.e. > 10%) of American beech was sorted into HDSH, with the expectation that stands with beech will be poor candidates for selection systems.

2) Stands with predominantly mid-tolerant hardwoods (ash, yellow birch, basswood) were sorted into HDSH, as these stands are often treated with shelterwood in the field.

3) HDSEL2 stands were sorted into the HDSH system as the mid-tolerant species and lower site quality makes them poor candidates for selection harvesting.

4) Yellow birch stands were also sorted into HDSH in order to reflect the shelterwood silviculture that is typically conducted to manage these stands.

The SQL changes outlined above resulted in a significant shift in both LGFU and PLANFU area between 2011 and 2021. The results of this shift can be seen in **Figure** 5 (LGFU) and Figure 6 (PLANFU).

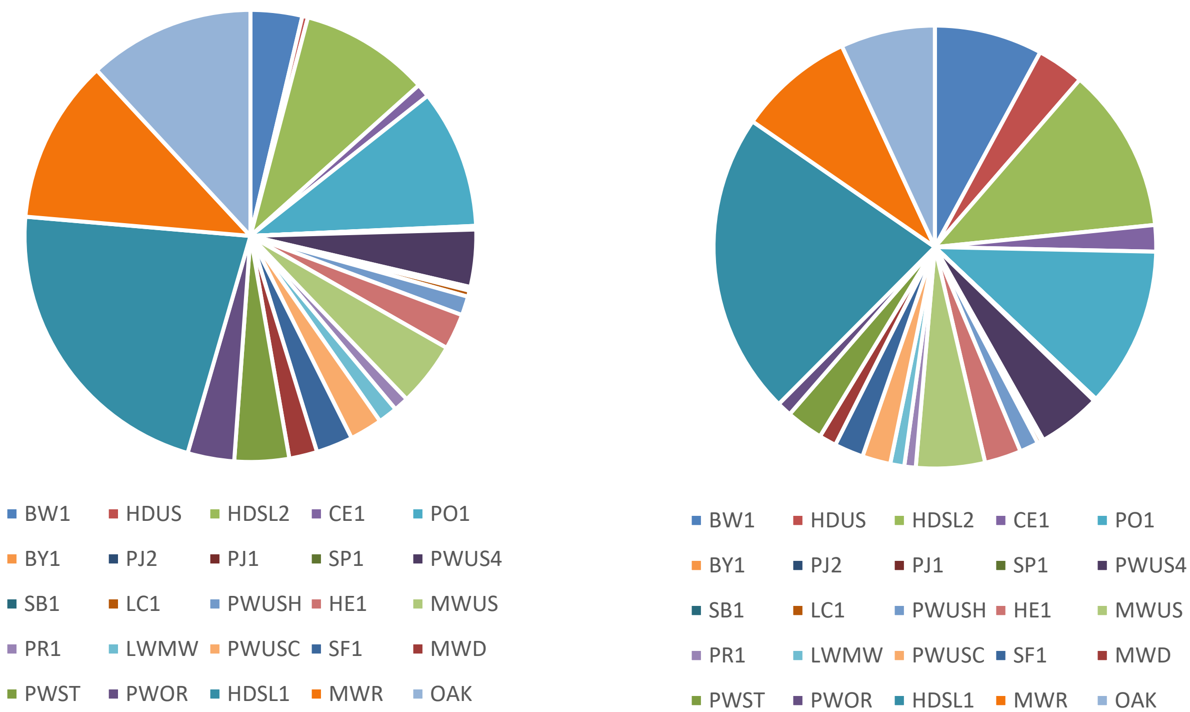


Figure 5. LGFU area in 2021 (left) and 2011 (right) FMP.

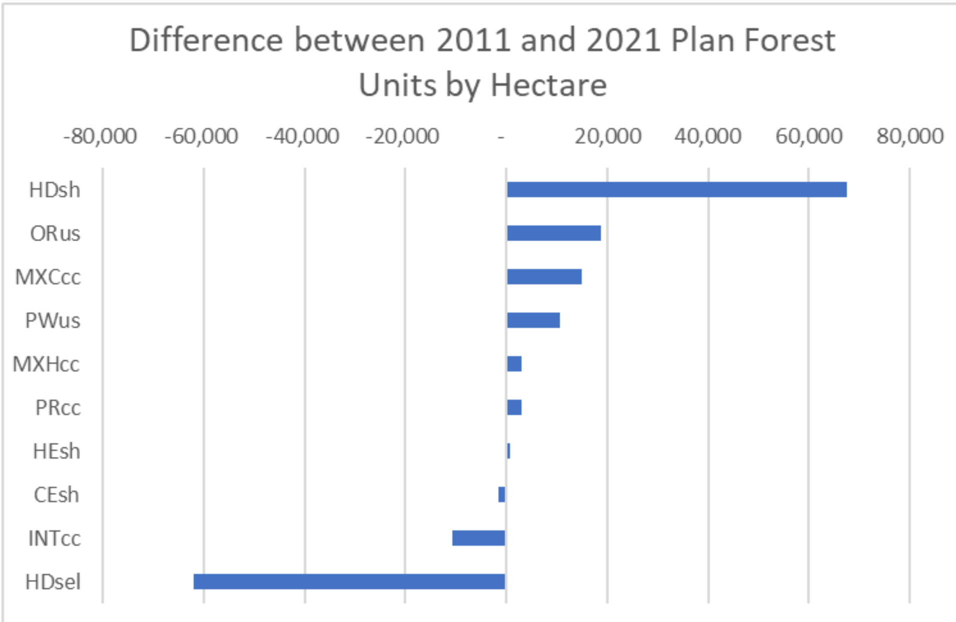


Figure 6. Shift in PLANFU area (ha) between the 2011 FMP and 2021 FMP.

The charts above show that a significant amount of area in the Hardwood Selection Forest Units will be reclassified as Hardwood Shelterwood. Additionally, a significant amount of area from the INTCC PLANFU is assigned to MXCCC.

The forest is further categorized by age-class for each forest unit in FMP-3 for the available and unavailable areas of Crown forest. **Figure** 7 summarizes the area of protection and production Crown forest by forest unit in the Bancroft Minden Forest. Areas that are unavailable for management due to parks, protected areas (such as old growth forest communities), protection forests, and withdrawals (e.g. Algonquin Land Claim) cannot be harvested but can still contribute to FMP objectives for biodiversity. The production forest includes forest area that is both available and unavailable for timber production. Area is classified as "unavailable" primarily for one of the following reasons:

- Not accessible
- Rocky, shallow soils where regeneration capacity would be limited
- Low, wet areas or steep terrain unlikely to be operable
- Areas that were classified as protection forest (PFR) in the inventory that have not been validated in the field

Circumstances may change that we would allow the unavailable area to be allocated, for example, if a field inventory found an area to be suitable for harvest that was misclassified as PFR in the inventory. The inventory would be updated accordingly.

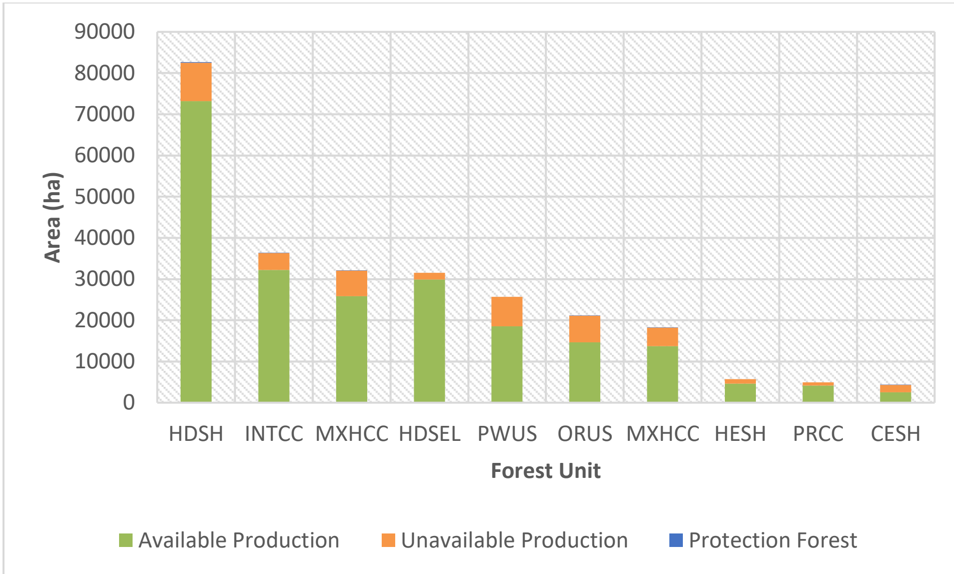


Figure 7. Protection and productive (available and unavailable) forest area by FU.

As demonstrated in **Figure** 8, a large proportion (33%) of the productive forest area on the Bancroft Minden Forest is Hardwood Shelterwood (HDSH). This results in over half (52%) of the forest unit area treated using the shelterwood; 34% falls into the clearcut management system, and 14% into selection. The diverse nature of the Bancroft Minden Forest adds to the complexity of managing the forest, but also provides a variety of species and products to the timber market.

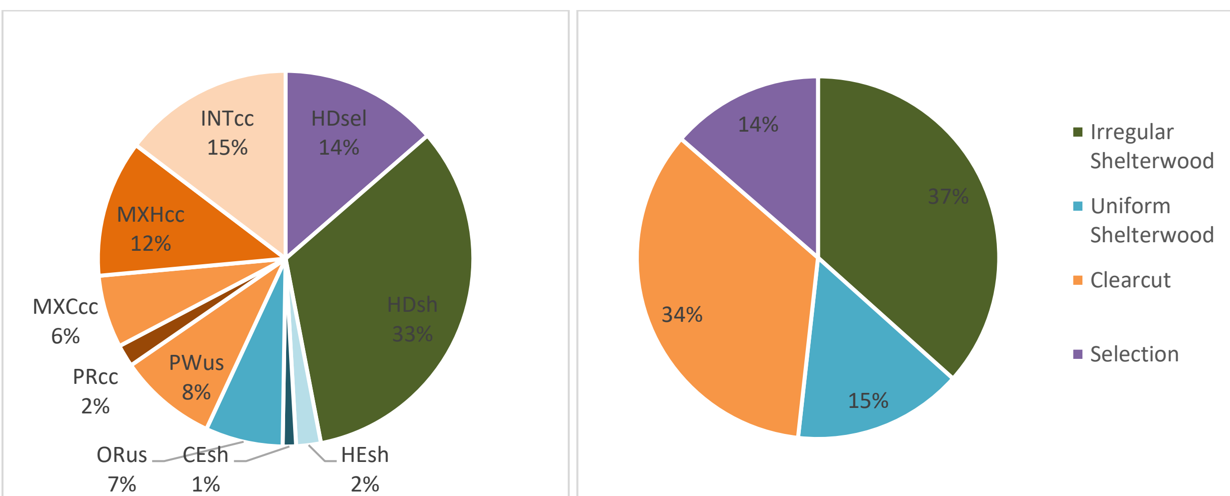


Figure 8. Area of production forest by forest unit (left), area of production forest by silviculture system (right).

The plan start area of each forest unit in the plan has management implications, particularly when the state of management and age classes are also considered. Generally, the forest is biased towards older age classes (Age 95+) with limited availability in the younger age classes. The detailed breakdown of these initial areas, broken by age class, stage of management and SMZ, is available in the Analysis Package Appendix 7. This age class distribution creates a challenge in meeting objectives in the landscape guide, as there is a need for a wider range of seral stages to have a stable, long term availability of habitats and wood supply as middle term demand (30-50 years) are dependent on the *existing* middle age forests. This pattern, as with previous plans, is a main constraint in model development.

A second trend observed with the initial areas is the abundance of hardwoods. The management unit is primarily a hardwood condition, with 64% of the landbase represented by a hardwood forest unit. This is contrary to natural condition modelled in the landscape guide, which predicts a condition where conifers represent the majority of the landbase. The pressing need to convert hardwoods to conifer plays a large role in the modelling constraints.

2.1.3.2 Forest Landscape Classes

Landscapes provide habitat for many wildlife species, each with its own preferences for combinations of vegetation types, development stages, patch sizes, and configurations. To reduce the complexity of managing habitat on a species-by-species level, the *Forest Management Guide for Great Lakes-St. Lawrence Landscapes* (*Landscape Guide*) defines landscape indicators based on how forests function as habitat. They are grouped into categories for evaluation of structure and composition: landscape classes, old-growth, red and white pine forest, and young forest. Pattern is evaluated in two different categories: Young Forest Patch Size and Texture of Mature and Old Forest. These indicators allow for a more accurate picture of how much area is present and maintained in different habitat types over time and aims to reduce the focus on specific species habitat.

Landscape class indicators are developed from the direction of the *Landscape Guide* and the Ontario Landscape Tool (OLT) to provide management direction in relation to the landscape condition at the start of the plan. Desirable levels are set using a “Simulated Range of Natural Variation” (SRNV) which projects how much area of each forest type would be present on the management unit in a more natural forest condition in the absence of human disturbance or intervention. This method of modelling habitat is more locally specific and aims to manage forest diversity that would be present in natural ecosystems. The work conducted to measure, model, scope out and achieve these indicators can be found throughout the Analysis Package, as these indicators are core component in each step of the process.

The landscape class by forest type is relevant when stands are >35 years old and are considered immature, mature or old. Shelterwood stands that have received a seeding cut within the past 20 years are not considered mature or old but rather classified as T-stage (two-tiered stand). All other stands are grouped into one of two separate landscape classes of a young forest – presapling, and presapling/sapling/T-stage. To reiterate, the landscape classes do not include young stands <35 years old. Young stands comprise their own landscape class. The landscape classes include:

- Tolerant Hardwood
- Intolerant Hardwood
- White Pine Mixedwood
- Mixedwood
- Mixed pines
- Spruce-fir-cedar
- Presapling
- Presapling/Sapling/T-stage

The Landscape Classes are the fundamental coarse filter assessment units and are groupings of Landscape Guide Forest Units by seral stages. The Landscape Classes express meaningful differences in wildlife use and are used to describe the current forest condition. They were developed based on cluster analyses of used preferred habitat types depicted in MNRF's habitat matrices. The habitat matrices summarize habitat affinities of selected vertebrate species based on forest type and development stage. As such, the landscape classes express meaningful differences in wildlife use.

The landscape pattern map reflects the amount of a landscape class, the distribution of the landscape class and the dominance of the landscape class. The spatial arrangement of the compositional landscape classes is portrayed in Figure 9 to show the general pattern across the Bancroft Minden Forest.

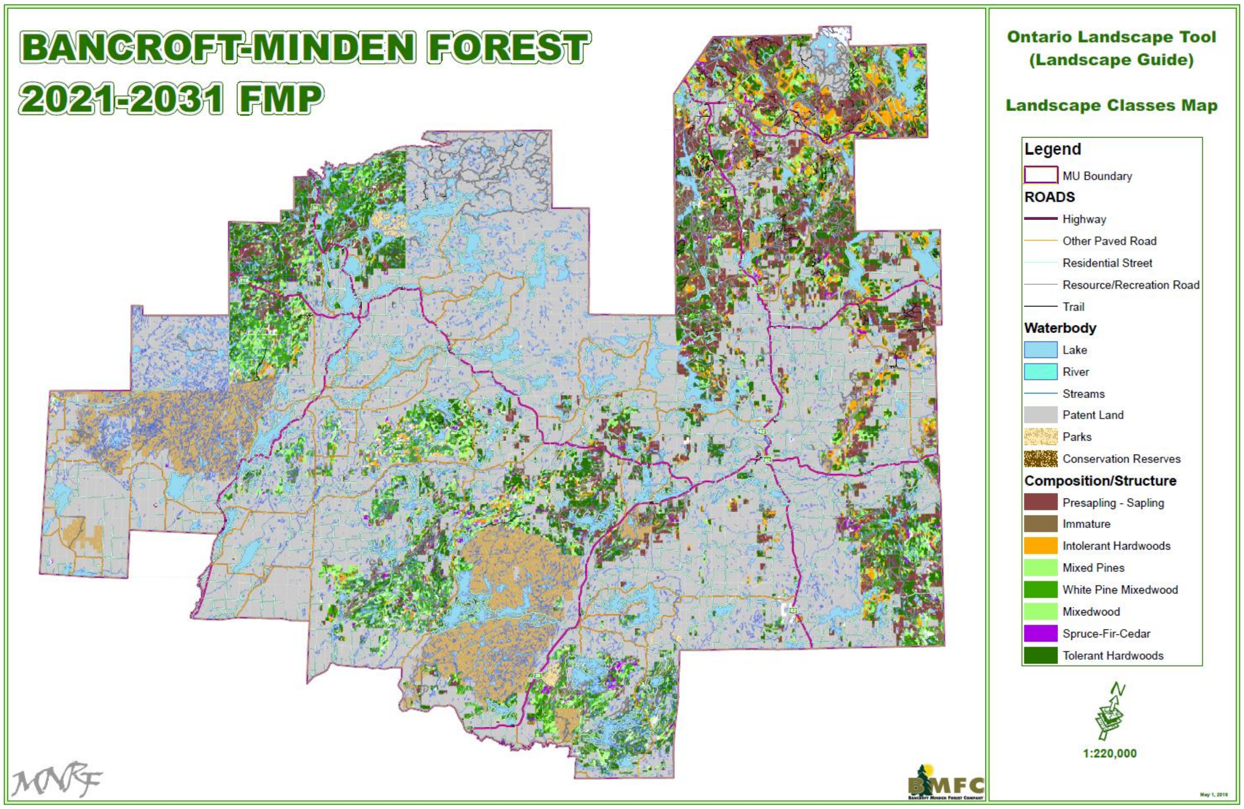


Figure 9. Forest Landscape pattern map for the Bancroft Minden Forest.

Landscape Classes for Mature and Old Age Forest

All landscape guide units are contained in one of six classes. Table 3 Forest Classification Summary demonstrates the connection of the Landscape Guide forest unit, planned forest unit, and landscape class for mature and old age classes. **Figure** 10 illustrates the initial levels of each of the prescribed indicators for the Bancroft Minden Forest at the start of the plan (i.e., the base model inventory in 2021). The area of each landscape class is shown in relation to the upper and lower simulated ranges of natural variation described within the OLT.

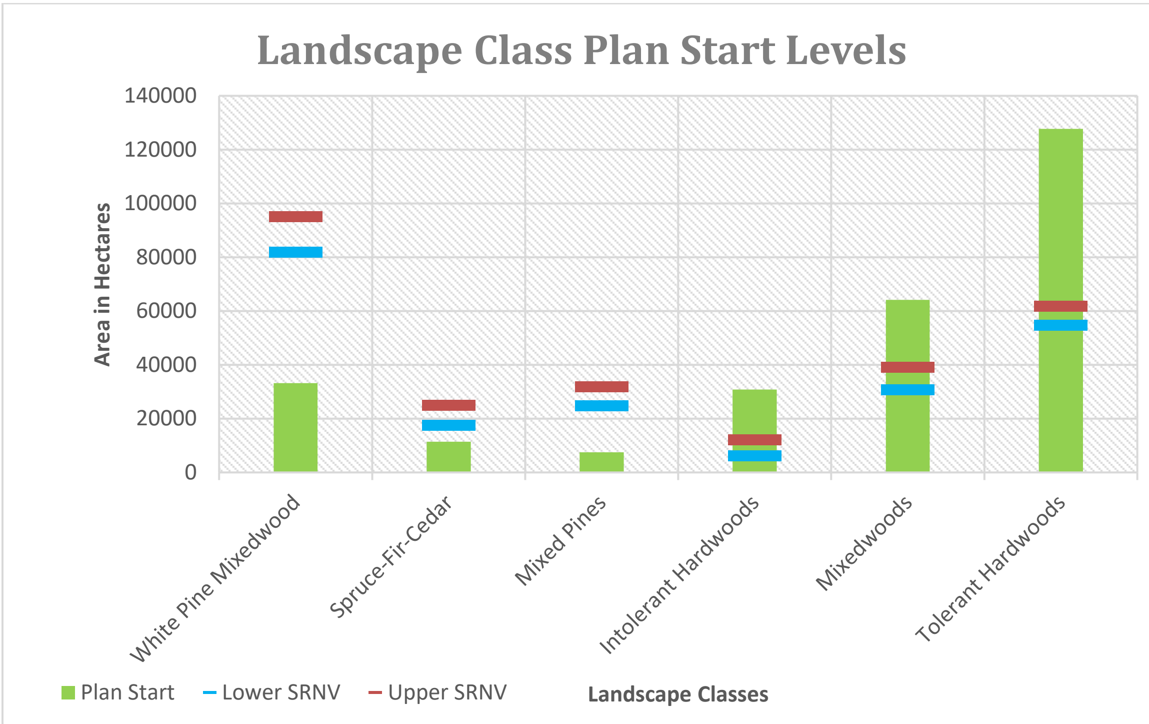


Figure 10. Plan start area (ha) and natural variation levels for landscape class indicators.

The Tolerant Hardwoods, dominated by sugar maple; Intolerant Hardwoods, and Mixedwoods classes have an over-abundance of mature and old conditions relative to natural landscape composition. White Pine Mixedwoods, Mixed Pine, and Spruce-Fir-Cedar are significantly below their natural ranges. Given that the current landscape pattern developed from over a century of un-natural disturbances (i.e. influenced by humans) and renewal, it will be a lengthy process to steer the composition of the forest towards a more natural condition at the current rates of harvest and natural disturbances (namely wildfire). The relationship between the SRNV and the plan start area will be further investigated in Section 3.

Consideration is also made for the spatial arrangement of mature and old forest on the landbase, referred to as texture by the Landscape Guide. Spatial arrangement describes how habitat types are related spatially. It is important because habitat suitability for a species depends on the physical location of different habitat types relative to each other. The assessments were carried out by the OLT and provide spatial results. The texture of the mature and old forest is measured at two levels for the GLSL South region: 50 hectares and 500 hectares. These scales were chosen based on the sizes of observed and simulated natural disturbances and landscape patterns. The Bancroft Minden Forest shows a very high proportion of mature and old forest conditions in the Forest Resource Inventory, as demonstrated in **Figure** 11 and **Figure** 12.

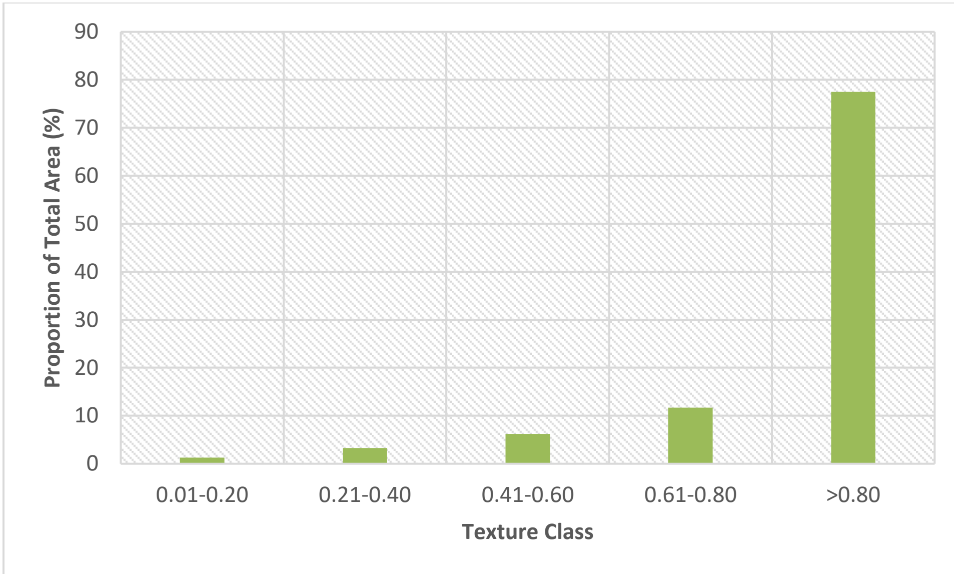


Figure 11. Proportion of mature and old growth by texture class, at a 50ha scale.

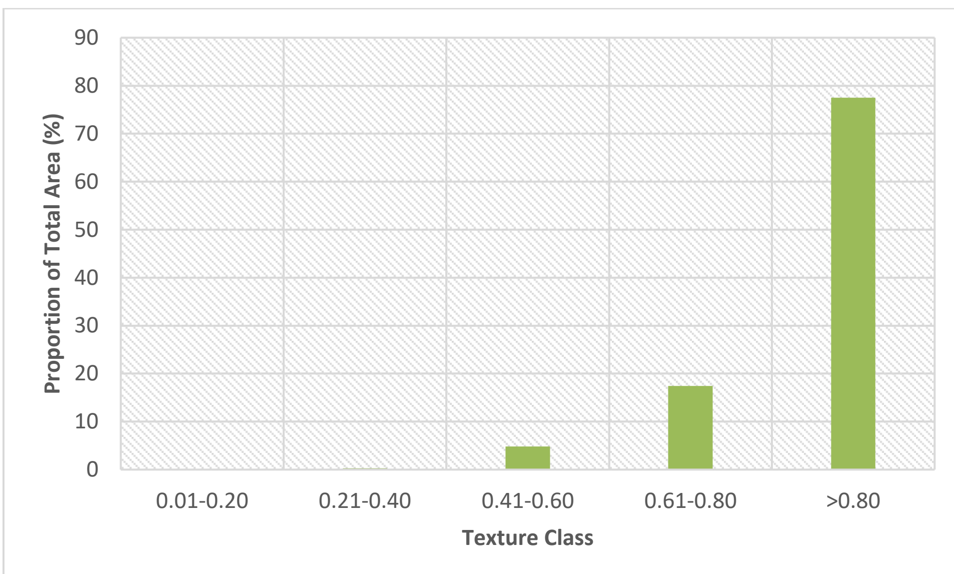


Figure 12. Proportion of mature and old growth by texture class, at a 500ha scale.

Old Growth

The *Old Growth Policy for Ontario's Crown Forests* (OMNRF 2003) requires forest management plans to ensure old growth conditions and values are present in Ontario's Crown forests to conserve biological diversity at levels that maintain or restore ecological processes, while allowing for sustainable development now and in the future. The old growth indicators, as described in the Landscape Guide, represent forest with complex stand structure, relatively large dead standing trees (snags), accumulations of down woody material, up-turned stumps, accelerating tree mortality, and ecosystem functions that may operate at different rates or intensities compared with earlier stages of development. Old growth forest, is represented in the model by the “late” seral stage in even-aged productive Crown forest. Area remains in a state of old growth until it is disturbed by either harvesting or natural processes (e.g. wind, fire, insect or disease) or until it naturally succeeds to a younger forest. Shelterwood forest unit areas contribute to old growth area until a seeding cut occurs, after which stand structure no longer meets old growth criteria. Selection forest units do not have strategic targets associated with old growth, due to their multi-aged structure. They are “all-aged” with old growth characteristics that are managed for such through on-the-ground considerations. These are discussed further in Section 3.7.

Each even-aged forest has an associated old growth indicator with a specific age-of-onset. The SRNVs are included in **Figure** 13 for comparison purposes to projected natural conditions. As expected, the majority of old growth area is below what is projected to occur naturally. The low levels of old growth is attributed to the long history of logging and settlement. Prior to the early 1900s, much of the area within the Bancroft Minden Forest was managed heavily for pine. Some residual old growth patches exist across the landscape where logging was not feasible, mostly due to terrain. Since the first wave of European settlement the forest has changed from one largely dominated by conifers, especially white pine, to one dominated by tolerant hardwood stands. One specific area of old growth (primarily eastern Hemlock) in the Bancroft Area is set aside for old growth protection and included within the Kawartha Highlands Signature Site. Stands of old growth hemlock have also been set aside in the Clear Lake Conservation reserve where logging is not permitted.

In contrast, there is an abundance of INTCC and MXHCC old growth on the landscape. Natural forest succession in unmanaged areas of the forest, where natural disturbances are not common contributes to this imbalance.

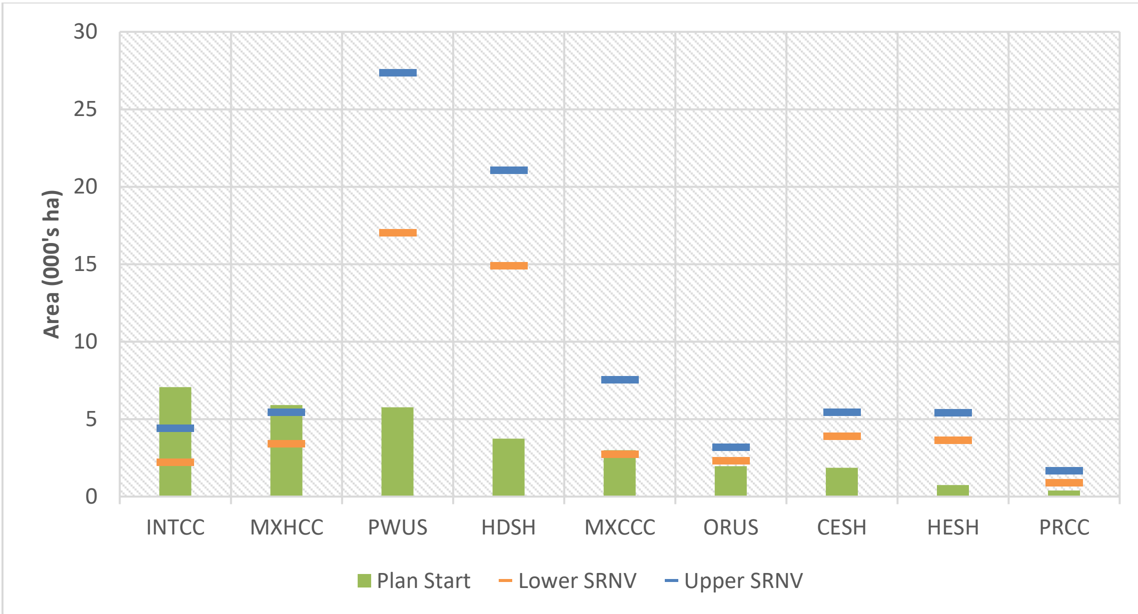


Figure 13. Plan start area (000's ha) and natural variation levels for even-aged old growth by forest unit.

Red and White Pine

There is a landscape indicator to measure differences between current landscape conditions, pre-industrial conditions, and simulated ranges of natural variation. This direction is consistent with *Old Growth Policy for Ontario's Crown Forests* (OMNR, 2003) which contributes to the maintenance of all ages of red and white pine now and in the future. The indicator is also compared to a Landscape Guide SRNV through non-spatial modelling in the LTMD. The plan start level of red and white pine (PWR) on the Bancroft Minden Forest is 50, 511ha, above the 1995 level (34, 784ha) but below the Landscape Guide SRNV of 128, 388 to 144, 848 hectares.

Young Forest

Young forest is important for a variety of wildlife, as it provides dense amounts of tender vegetation for food (referred to as browse). It is an additional landscape indicator that is measured spatially and non-spatially. On a non-spatial level, the young forest is made up of two objective indicators: Presapling (PRESAP) and Presapling-Sapling-T stage (PSST). Presapling is 15 years old or less, depending on ecosite. These conditions would result from a stand-replacing disturbance (e.g., fire) or clearcut harvest. PSST measures forest area that is less than 35 years old (depending on ecosite); two-storied stands that develop following a shelterwood seeding cut before final removal or are a result of natural disturbance that removes only part of the overstory, encouraging an understory to develop.

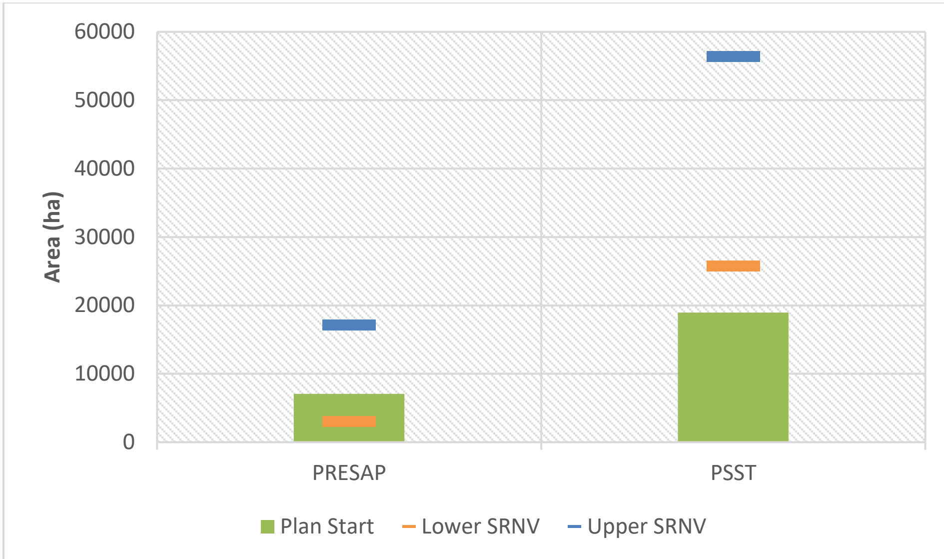


Figure 14. Plan start area(ha) and natural variation levels for presapling (PRESAP) and presapling-sapling-T stage (PSST).

Similar to the mature and old growth forest matrix, young forest is measured using a texture technique. A frequency distribution of young forest patches is created in nine size classes. The Young Forest Patch Size distribution as calculated by OLT is shown in **Figure** 15. The majority of young forest patches (74%) fall within the 1-100 ha area class. All forest patches remain under 500 ha in area.

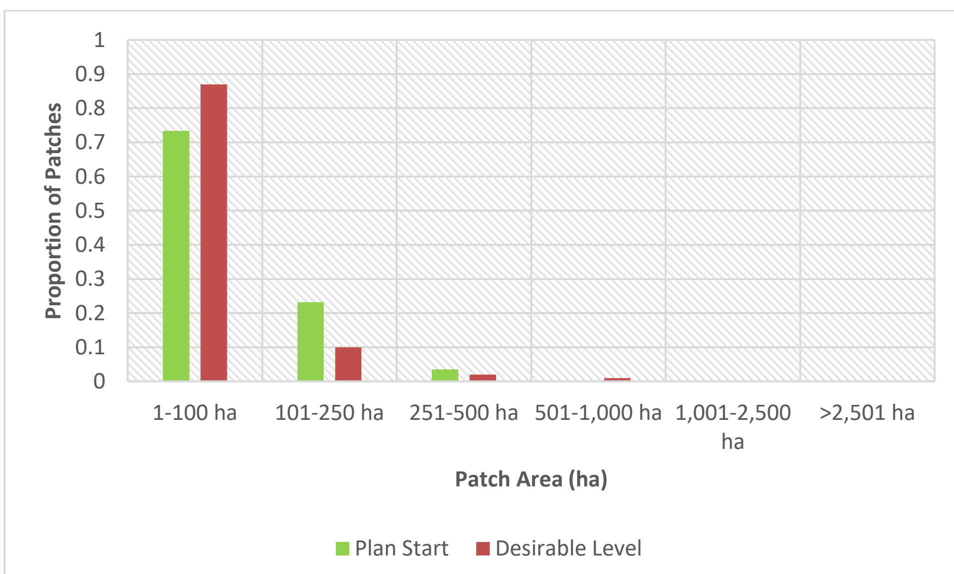


Figure 15. Size distribution of young forest patches.

Management Implications

As mentioned in the preceding sections, plan start levels for most forest landscape indicators are outside the SRNV. This created challenges in the development of the FMP in trying to balance all objectives and move closer to the SRNV over time. The SRNVs are calculated by estimating a natural condition that resulted from growing the current forest 900 years into the future, without human intervention. This FMP was written with a much shorter time frame in mind; 150 years for non-spatial modelling (referred to as the planning horizon), and 10 years for spatial modelling (referred to as the plan term). Given that the current landscape pattern developed from over a century of un-natural disturbances and renewal, it will be a lengthy process to steer the composition of the forest towards a more natural condition at the current rates of harvest and natural disturbances.

The amount of achievement may also be based on the amount of available forest area compared to the forest area not available for forest management. Currently, only 50% of Crown land within the Forest Unit is available for forest management intervention, which poses a great challenge of accomplishing targets where much of the landscape class occurs on forest not available for forest management. The impact of the remaining area, which is subject only to minimal natural disturbance levels and natural succession, is difficult to counteract. This explains why movement towards the SRNV are difficult to achieve even over long periods of time.

A limited area of young forest indicates an age class gap in the forest. Through time, there will be more area in old age classes and less in mature, since there is currently little in young and mature. This is a potential limiting impact on medium to long-term wood supply along with wildlife habitat. The age and species composition of the forest itself, coupled with good forestry practices and fire suppression, severely limit the amount of young forest which can be created, making these objective indicators difficult to achieve during the planning horizon.

2.1.3.3 Other Forest Classifications

In addition to the standard interpretations of previous inventories, the entire land base is now also classified by ecological land classification (ELC) eco-site typing at the interpretation stage. Previous inventories were assigned an eco-site based on the previous Forest Ecosystem Classification (FEC) systems. This assignment was based solely on tree species composition and site class. The new provincial ELC is determined during the inventory production and is more robust and based on interpreted tree species composition and site class as well as soil conditions and vegetation, calibrated from ground-based plots. The results provide a stand-level description of site types that can be used for broader purposes than just traditional forest units. **Figure** 16 describes the relationship between PLANFUs and the Ecological Land Classifications. Any ELC that represented 10% or more of a particular PLANFU is represented separately and all others are grouped together. There are over 250 ELCs, thus the level of variety and detail that can be derived from this analysis required modification to be interpreted properly in a graph or table.

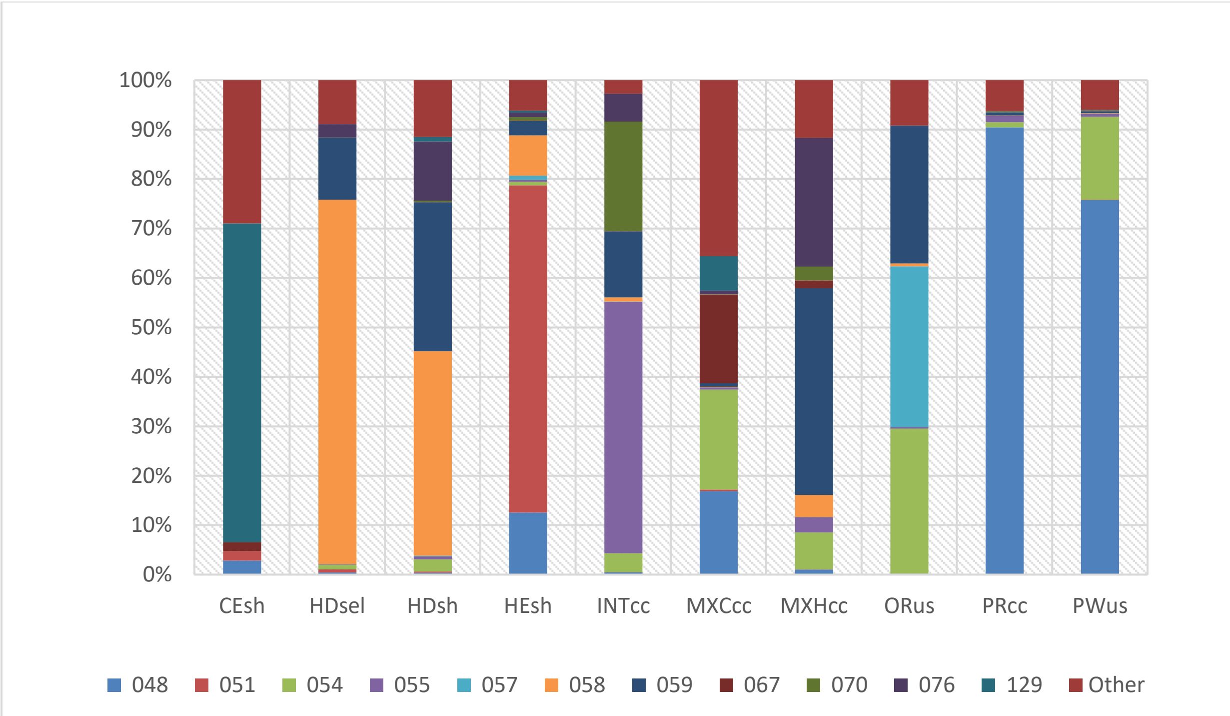


Figure 16. Ecological Land Classification and Plan FU relationship.

The graph above shows that most Plan FUs are derived from 1 to 3 distinct ELCs. For example, CESH is derived predominantly from ELC 129. This implies that the SQL used forests with similar soil regimes and canopy types. The most “mixed” Plan FUs are the MXCC and MXHCC Plan FUs, which are explicitly forest units with mixed canopy cover.

2.1.4 FOREST RESOURCES

2.1.4.1 Inventories and Information for Species at Risk

The CFSA enables comprehensive tools and mechanisms in place to ensure species at risk protection during forestry operations.

Species specific direction (including SAR direction) does not work in isolation e.g. a hollow tree, it works in a coarse fine filter system that is implemented by mandatory use of the landscape guide and Stand and Site Guide. For example the hollow tree may provide nesting and/or roosting habitat that requires protection, whereas other elements of habitat required by the species (e.g. foraging) is addressed by other direction in the coarse and fine filter system. Some of the SAR species location is kept confidential to provide for their protection as per FMPM, FIM, and FMP specs.

The overall objective of the Landscape Guide and Stand and Site Guide is to contribute to the sustainable management of Crown forests through the maintenance of their long term health (CFSA principle). A key aspect of this objective is the conservation of biodiversity (CFSA principle).

The objective of the Landscape Guide is to direct forest management activities to maintain or enhance natural landscape structure, composition and patterns (coarse filter), by emulating natural disturbance, that provide for the long term health of forest ecosystems in an efficient and effective manner. Emulation of natural disturbance and landscape patterns through forest management, directs how to conserve biodiversity.

The Stand and Site Guide uses a combination of coarse and fine filters to address the conservation of biodiversity. Coarse filters (e.g. pattern, structure, composition) create a diversity of ecosystem conditions through space and time, based on the concept of emulating natural patterns and processes, to provide habitat for the majority of native species of plants and animals. Fine filters (e.g. aquatics & wetlands, special features, moose, deer, bird nests, dens, species at risk, soil and water conservation) are applied when the ecological requirements of particular species may not be adequately addressed by coarse filters alone, or when societal and/or economic aspects of sustainable development require more or less habitat than coarse filters alone would provide. Both coarse and fine filter direction is based on a strong foundation of scientific knowledge and operational experience. The best available information was compiled from thorough review of relevant literature and discussions with experienced researchers and practitioners.

Guide direction is periodically updated following a review process where new science or information identifies a need. A revision of the current SSG is currently underway. SAR in the managed forest are included in this work.

ESA habitat regulations and government response statements will be considered in the development of forest management guide direction. Federal and provincial recovery strategies, general habitat descriptions and management plans for special concern species will be considered in the development of forest management guides. MNRF will consider these documents as a source of information during the guide revision process and in developing prescriptions for SAR that do not have direction in an approved forest management guide.

For a SAR (or any value) for which there is no direction in an approved forest management guide the planning team will develop an operational prescription and conditions with the assistance of MNRF staff with expertise in species at risk as per the FMPM (FMPM 2020 Part A s. 1.3.5.1 p. A-55 lines 40-44 and A-56 lines1-32).

Species at risk are recommended for listing under the Endangered Species Act (ESA) by the Committee on the Status of Species at Risk in Ontario (COSSARO). Forest operations on Crown land are exempt from ESA prohibitions against harming and harassing species, and damaging and destroying species habitat if the operation is under an approved license under the CFSA, and follows an approved forest management plan. The CFSA and associated guides and manuals provide direction for protecting species at risk. Approved forest management plans must align with this direction.

Thirty-six species determined to be at risk by COSSARO are recognized in this forest management plan; one lichen, two plants, one invertebrate, nine reptiles, five mammals, and eighteen birds. These species are ranked as endangered (END), threatened (THR), or of special concern (SC). Species at risk are rare over the landscape and across the province. For most, little is known about the extent and quality of their habitat or their population status over the forest management unit. For some species; including the West Virginia white butterfly, Kirtland's warbler, and yellow rail; the quality and extent of potential habitat has never been assessed. No management strategies are included in this plan to increase the preferred habitat for species at risk.

Of the thirty-six species at risk, thirty-four have confirmed occurrences in the forest management unit. The remainder have no reported occurrences in the Bancroft Minden Forest; however, potential habitat exists and is within the species geographical range. By including these two species in the planning process, operations can proceed without the delay of classifying habitat and preparing Area of Concern (AOC) prescriptions during harvest. Provisions for the conservation of utilized habitat are applied through AOC prescriptions that are outlined in FMP-11.

Where species at risk are identified, operations are often modified to conserve specific habitat requirements and ensure protection. Modifications vary by species but can include restrictions on harvest, which reduce the amount of area or volume available for harvest, and timing restrictions, which most often limit harvest to winter months. The impact of these constraints is most notable in the southern portion of the forest management unit where there are increased occurrences of species at risk. Therefore, planning for year-round operations in this area is challenging.

LICHENS

<u>Pale-bellied frost lichen – *Physconia subpallida* (END):</u> grows in rich, humid habitats on the bark of ironwood, other hardwoods and, less commonly, on rocks. Habitat loss through forest clearing, whether for timber harvesting or other purposes, is one of the main causes of species decline. Pale-bellied frost lichen occurs in areas throughout the management unit.

PLANTS

<u>Butternut – *Juglans cinerea* (END):</u> grows on a variety of sites with high sun exposure. It grows best on well-drained fertile soils and may be mixed with other hardwoods. The main cause of decline for this species is butternut canker, an introduced pathogen that can kill the tree. Forest management can be applied to open up the canopy, letting in more light for the shade intolerant species, but care should be taken not to remove healthy butternut trees that may be resistant to butternut canker. For the survival of the species, it is important to retain trees that show signs of resistance to the pathogen. All butternut trees are protected from harvest unless determined to be unhealthy by a butternut health assessor or

otherwise authorized. There are populations of butternut along the southern portion of the forest management unit.

American ginseng – *Panax quinquefolius* (END): found in moist hardwood stands on calcareous soils. In the management unit it is primarily found in sugar maple dominant stands. Timber harvesting at or near patches of American ginseng can have detrimental effects on ginseng populations in a number of ways. New or reconditioned roads may provide increased access to ginseng patches and increase the opportunity for illegal harvesting of the plant. Timber harvesting operations that change canopy cover or disturb the forest floor may negatively alter habitat. Areas of ginseng habitat are found throughout the management unit. The size and location of many patches have been documented. Without constant monitoring by the MNRF, these populations (patches) run the risk of becoming locally extirpated due to illegal harvest of the ginseng plant.

INVERTEBRATES

West Virginia White – *Pieris virginiensis* (SC): a butterfly that inhabits moist, deciduous forests. The larvae of West Virginia white feed exclusively on the leaves of toothwort, a plant of the forest floor. Timber harvesting has the potential to negatively affect this species habitat through unintentional destruction of toothwort plants. The impacts to the plant are primarily from the use of heavy equipment and road building. There are no known occurrences of West Virginia white in the management unit.

REPTILES

Nine reptiles at risk are found within the management unit; six turtles, two snakes, and one lizard. Their dependency on forested habitat varies by species and seasonal behaviour. As well, their distribution varies widely by species.

Expanded road networks, the maintenance of roads, and increased traffic associated with timber harvesting negatively affect reptile populations. The increased road network facilitates access allowing collectors of the pet trade into new areas. Collection for the illicit pet trade is a serious threat to turtles and other reptiles. Roads and the traffic on them can act as migration barriers for movements to and from breeding sites, nesting sites, summer foraging areas, and/or hibernacula. Road maintenance, primarily grading, can negatively affect nests with incubating eggs dug into gravel roads or harm nesting females. Traffic from harvest operations or any other sources cause road mortalities to reptiles moving across the road or using the road as a medium to absorb solar radiation. Areas where turtles and other reptiles aggregate for breeding or nesting are particularly susceptible to these impacts. FMP-11 outlines mitigation procedures and precautions that will be applied for roads and landings to mitigate the potential negative effects on reptiles and other species.

Blanding's Turtle – *Emydoidea blandingii* (THR): use a network of wetlands, streams, ponds and lakes as habitat. They also travel large distances over land moving between these aquatic features or to terrestrial nesting areas. There are occurrences of this turtle throughout the management unit. The highest density of occurrences is in the southern portion. This area of Bancroft Minden Forest has a higher density of Blanding's turtles compared to many other areas of Ontario.

Eastern Hog-nosed Snake – *Heterodon platirhinos* (THR): inhabit forests, rock barrens and sandy flats that offer places to hunt for toads and take shelter. To be suitable, these dry areas need to be near wet areas as their primary food source is toads. The eastern Hog-nosed snake nests in open sandy areas such as road shoulders, sand pits, and under large flat rocks. Each year several occurrences of this snake are reported, though sightings are concentrated between Apsely and Minden.

Eastern Musk Turtle – *Sternotherus odoratus* (SC): highly aquatic and inhabit shallow areas of waterbodies with soft substrate and little to no current. Nesting habitat is variable but generally close to the water. There are few known occurrences of this turtle in the management unit.

Eastern Ribbon Snake – *Thamnophis sauritus* (SC): inhabit forest edges and meadows near marshes, ponds or other waterbodies. They will utilize both the aquatic and terrestrial habitats. Populations of the eastern ribbon snake have been found in a number of areas in the forest management unit, mainly in the southern portion.

Five-lined Skink, Southern Shield Populations – *Plestiodon fasciatus* (SC): inhabit rocky outcrops, sand dunes, and open deciduous forests; although, preferred habitat varies over the range of the species. The type of habitat most often utilized by skinks in the management unit is open bedrock areas with overlaid rocks that can be used for cover. Rock barren areas throughout the Bancroft Minden Forest are known to be inhabited by five-lined skink populations.

Northern Map Turtle – *Graptemys geographica* (SC): inhabit large rivers and lakes and can be found on lakeshores with basking features such as fallen trees and emergent rocks. A few populations of map turtles occur in the southern portion of the management unit, mainly in the Trent-Severn Waterway.

Snapping Turtle – *Chelydra serpentina* (SC): highly aquatic preferring shallow waters with soft mud and leaf litter to hide in. In the spring, females travel overland to nesting sites. Populations of snapping turtles occur throughout the management area.

Spotted Turtle – *Clemmys guttata* (END): prefer ponds, marshes and bogs with abundant aquatic vegetation such as sphagnum moss, sedge tussocks, water lilies, and shrubs. These turtles travel overland to move between wetlands, to nest, and to use moist terrestrial sites to aestivate. Habitat used for nesting and aestivation for this species varies by location. The preferred nesting and aestivation habitat for local populations of spotted turtles is unknown.

Wood Turtle – *Glyptemys insculpta* (END): prefer clear rivers or streams with a slight current. They spend more time on land and on the shores of watercourses compared to other Ontario turtles. Wooded areas are essential habitats for wood turtles, but they can also be found in wet meadows, swamps, fields and other habitats. There are a few known populations of this rare turtle within the management unit. These populations have been studied to learn the range of their habitat. Due to the illusive nature of this species, other populations that may exist on the landscape remain unidentified.

MAMMALS

Mammals include four species of bats and one species of wolf. Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas.

Little Brown Myotis – *Myotis lucifugus* (END): hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing. There are occurrences throughout the management unit.

Northern Myotis – *Myotis septentrionalis* (END): are associated with boreal forests, choosing to roost under loose bark and in the cavities of trees. These bats hibernate from October or November to March or April, most often in caves or abandoned mines. There are occurrences throughout the management unit.

Eastern Small-footed Myotis – *Myotis leibii* (END): roost in a variety of habitats in the Spring and Summer, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. There are occurrences throughout the management unit.

Tri-colored Bat – *Perimyotis subflavus* (END): found in a variety of forested habitats during the summer. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. This bat is found in southern Ontario and as far north as Espanola near Sudbury. Because it is very rare, it has a scattered distribution. There are a few occurrences throughout the management unit.

Algonquin wolf – *Canis sp.* (THR): not restricted to any specific habitat type but typically occurs in deciduous and mixed forest landscapes. It is found to be most prevalent in areas with abundant prey, such as Beaver, White-tailed Deer and Moose along with low levels of human-caused mortality. Den sites are typically found in conifer dominated forests close to a permanent water source. Suitable soil to construct a den, such as sand, is necessary for excavation. The Algonquin wolf is known to occur throughout the management unit, particularly in proximity to large relatively undisturbed areas including Algonquin Park and Kawartha Highlands Signature Site Park. Since local populations are dependent upon white-tailed deer, other forest management objectives related to the long-term provision of deer wintering habitat can indirectly benefit the Algonquin wolf population.

BIRDS

Eighteen species of birds listed as at risk have known or potential breeding habitat in the forest management unit. They may also use areas as migratory stopovers. Of these eighteen species one is endangered, three are threatened, and fourteen are species of special concern.

Forestry operations can impact bird habitat through the loss or fragmentation of habitat, indiscriminate harvesting of nesting trees or other disturbances to occupied nests.

Provisions in forest management planning call for the retention of nesting trees and include a buffered area around the tree to minimize the disturbance to active nests.

Bald Eagle – *Haliaeetus leucocephalus* (SC): prefer super canopy conifer trees near large bodies of water to nest in. There are known nesting areas in the management unit.

Black Tern – *Chlidonias niger* (SC): utilize floating vegetation in wetlands, ponds, and lake edges to nest. Due to their preferred habitat, forest management operations are likely to have little effect on black terns unless roads are created through their habitat. Black tern nesting areas occur through the southern portion of the management unit.

Canada Warbler – *Cardellina Canadensis* (SC): breeds in a range of deciduous and coniferous, usually wet forest types, all with a well-developed, dense shrub layer. Dense shrub and understory vegetation help conceal Canada Warbler nests that are usually located on or near the ground on mossy logs or roots, along stream banks or on hummocks. It winters in South America. The Canada Warbler occurs throughout the unit.

Cerulean Warbler – *Dendroica cerulean* (SC): inhabits mature tolerant deciduous forests with a clear understory and prefer riparian stands. Principle threats are considered to be the loss and fragmentation of large patches of mature tolerant hardwood forest. There are occurrences of this warbler throughout the southern portion of the management unit.

Chimney Swift – *Chaetura pelagica* (THR): known for their use of chimneys and abandoned buildings for nesting; however, in forested areas they revert to traditionally used tree cavities and woodpecker excavations. There are occurrences throughout the management unit.

Common Nighthawk – *Chordeiles minor* (SC): inhabit forest openings, burns, bogs, rocky outcrops, and other areas with sparse cover. Nighthawks are nocturnal and use tree limbs for resting during the day. Nesting sites are located on the forest floor. There are occurrences throughout the management unit.

Eastern Wood-Pewee – *Contopus virens* (SC): lives in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in intermediate-age mature forest stands with little understory vegetation. This bird is found throughout the management unit.

Golden-Winged Warbler – *Vermivora chrysoptera* (SC): inhabits shrubby fields, forest edges, and early succession forest clearings. Due to their preferred habitat, forest management operations are likely to have little effect on golden-winged warblers unless roads are created through their habitat. There are occurrences of this warbler through the southern portion of the forest management unit.

Kirtland's Warbler – *Dendroica kirtlandii* (END): requires dry young jack pine stands for nesting habitat. Principle threats are the limited supply of young, dense jack pine forest and nest parasitism by brown-headed cowbirds. There are no known occurrences of this rare bird in the management unit; however, there is potential for suitable nesting habitat.

Least Bittern – *Ixobrychus exilis* (THR): inhabits marshes with dense emergent vegetation. Due to their preferred habitat, forest management operations are likely to have little effect on least bitterns unless roads are created through their habitat. There are occurrences of least bittern through the southern portion of the management unit.

Louisiana Waterthrush – *Seiurus motacilla* (SC): inhabits mature hardwood or mixedwood forest adjacent to permanent headwater streams with well developed riffle and pool sections. Forest harvesting and forest fragmentation are considered primary threats, although there is little quantitative information on the effects of harvesting. There are occurrences of Louisiana waterthrush throughout the management unit.

Olive-sided Flycatcher – *Contopus cooperi* (SC): found along natural forest edges and openings. It will use tall trees and snags as foraging perches. Some forest management operations are beneficial in creating species habitat. There is some evidence to suggest that individuals breeding in managed forests have lower nest success. There are occurrences of olive-sided flycatcher throughout the management unit.

Peregrine Falcon – *Falco peregrinus* (SC): utilizes rocky cliffs or cutbanks of lakeshores and river valleys for nesting. They are sensitive to disturbance during the breeding season. There are a few known nesting sites in the forest management unit.

Red-headed Woodpecker – *Melanerpes erythrocephalus* (SC): inhabits open deciduous forests, river edges, and groves. Nests are excavated in dead trees. Habitat suitability may be negatively affected by some types of forest management operations (e.g. clearcutting), but positively affected by others (e.g. group selection harvest). There are occurrences of this woodpecker throughout the southern portion of the management unit.

Rusty Blackbird – *Euphagus carolinus* (SC): breeds in habitats that are dominated by coniferous forest with wetlands nearby including bogs, marshes and beaver ponds. During the winter, it is found in wet woodlands, swamps, and pond edges and often forages in agricultural lands. This bird has been found throughout the unit in limited numbers.

Whip-poor-will – *Caprimlugus vociferous* (THR): inhabits open, deciduous and pine forests. Nesting often occurs along the edge of a clearing under plants. Forest management activities may disturb nesting whip-poor-wills. There are occurrences of whip-poor-will throughout the forest management unit.

Wood Thrush - *Hylocichla mustelina* (SC): lives in mature deciduous and mixed (conifer-deciduous) forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing perches. These birds prefer large forests, but will also use smaller stands of trees. They build their nests in living saplings, trees or shrubs, usually in sugar maple or American beech. The wood thrush flies south to Mexico and Central America for the winter. The Wood Thrush is found throughout the forest management unit.

Yellow Rail – *Coturnicops noveboracensis* (SC): inhabit wet sedge meadows and marshes. Due to their preferred habitat, forest management operations are likely to have little effect on yellow rails unless roads are created through their habitat. There are a few known occurrences of the yellow rail in the southern part of the forest management unit.

2.1.4.2 Fish and Wildlife Inventories

There are numerous fish and wildlife species present throughout the management unit. These species are provided due consideration during the development of the forest management plan through landscape planning or through specific direction including emphasis areas, conditions on regular operations, and/or area of concern prescriptions. Values maps submitted with this forest management plan can be consulted for site-specific information on fish and wildlife. The MNRF continues to update fish and wildlife inventories and habitat information.

Expanded road networks allow access to new areas which alters the dynamics of current hunting and fishing pressures in the management unit. Fishing pressure and the risk of aquatic invasive species being introduced is increased. Aquatic invasive species are a great threat to the ecological integrity of lake and river ecosystems. Traffic from harvesting equipment or recreational vehicles may cause disturbance to nest sites at key times of the year. In addition, roads can act as barriers to movement for those species that will not travel into open areas. Other species may utilize the roads as travel corridors or as passage. These species are at risk of road mortality. Decommissioning targets and strategies exist in the FMP to limit potential negative impacts of road network expansion. Operational prescriptions for some wildlife values also provide direction for road decommissioning and access control.

FISH

Forestry activities can impact fish habitat through direct alteration by improper stream crossings, skid trail crossings and culvert installation. Indirectly, fish habitat can be impacted through activities in adjacent riparian areas such as the removal of forest cover, rutting, and soil erosion, which can result in the alteration of water temperature regimes and sedimentation of a waterbody.

There are coldwater, coolwater and warmwater fish species present in waterbodies throughout the management unit. Common coldwater species include brook trout, lake trout, rainbow trout, splake and lake whitefish. Coldwater species are more sensitive to temperature variations and sediment/nutrient loading. Coolwater species include walleye, yellow perch, muskellunge and northern pike. Warmwater species include species such as smallmouth and largemouth bass, and black crappie. Warmwater species include walleye, northern pike, smallmouth and largemouth bass, yellow perch, black crappie, and muskellunge. These species are less sensitive to temperature variations, sedimentation and nutrient loading. Baitfish is found throughout the lakes, rivers, and streams in the management unit. They provide forage for predators and are commercially important as well.

Sport fishing is very important to the tourism industry locally. The abundance of lakes and the proximity to southern population centres have made this area a popular destination for recreational anglers and contribute significantly to the local economy. Walleye, smallmouth bass, largemouth bass, brook trout, and lake trout are the species of most interest to anglers in the area.

Fisheries resources are protected through forest management planning by Area of Concern prescriptions which may include a protective reserve and/or modified area adjacent to the waterbody. In addition, stream crossings are planned to minimize the impact to fish habitat. Information on fish species occurrence and fish habitat is available from a number of sources, including aquatic habitat inventory surveys (lakes surveys), population monitoring projects, and data collected by external agencies for other purposes.

WILDLIFE

The Bancroft Minden Forest is home to a wide variety of birds, mammals, reptiles, amphibians, insects, plants, and a host of other organisms too numerous to list. Forest management is responsible for the manipulation of forest cover using forest management activities such as harvesting and silviculture. Existing habitat will change through the manipulation of forest cover resulting from forest management activities. The management of harvested forests is planned to mimic the natural variation that would otherwise occur. The planning process attempts to integrate fish and wildlife habitat conservation, natural processes and transformations of the forest with the goals of timber harvesting.

New values are continuously being found. Often these values are found during the prescription development or observed during tree marking and/or harvesting. Although finding these new values decreases data gaps and may aid in long term planning, the time required to alter prescriptions may cause delays in harvest operations.

The district conducts moose aerial inventories every 3-5 years, deer yard mapping when needed, late winter moose concentration habitat mapping when needed, values collection every year, and stream verifications when needed. Ontario’s Biodiversity Assessment Monitoring Section has Multi-Species Inventory and Monitoring Plots throughout Ontario including some in this forest.

2.1.4.3 Natural Resource Features, Land Uses and Values

Values Information

This section will identify and briefly describe the values information portrayed on the values maps and how it was used in the preparation of the FMP.

Types of values:

The values maps provide a summary of the geographic locations of known values that will be considered in forest management planning. The types of values information normally portrayed on the values maps are listed in the FIM. No listing of values can be definitive. The values maps will be produced and continually updated by MNRF as information is assembled during the production and implementation of the forest management plan. The most up-to-date versions will be maintained at the MNRF's Bancroft District Office and will be available for the public to review. There are eight composite scale maps listed as follows:

- Natural Resource Features – Wildlife & Forestry (Flora & Fauna)
- Natural Resource Features – Fisheries & Wetlands
- Resource Uses
- Land Values
- Bear Management Areas
- Trapline Areas
- Resource-Based Tourism Values
- Cultural Heritage Values

Sources of information:

i) Values information for this plan is documented in the Land Information Ontario (LIO) data warehouse and on the Values Map. This information comes from a variety of sources including:

- Values map from former Forest Management Plans
- Natural Resources Inventories
- Data received from the Natural Heritage Information Centre (NHIC)
- Public comments received during plan development
- District files, maps, and databases
- Ontario Base Map and National Topographical Series Maps information layers
- Registry Office files
- Forest Resource Inventory maps (FRI)
- Ecological/environmental consultant reports and maps
- Fisheries Management Plans
- Provincially Significant Wetland files
- Published brochures

- High-resolution aerial imagery (where available)

ii) Methodologies used for data collection:

Wildlife values information is collected using standardized habitat inventory procedures in the Selected Wildlife and Habitat Features: Inventory Manual. Recently developed survey protocols for fish and wildlife values can be found in “Fish and Wildlife Values Collection and Mapping in Forest Management Planning: A Southern Region Strategy”[2]. Protocols are based on inventory methodology developed using the best science, guided by legislative and policy direction. Fish and Wildlife Values priorities are revisited each year during work planning and updated following the criteria evaluation system in the Fish and Wildlife Values Collection and Mapping in Forest Management Planning: A Southern Region Strategy (OMNRF 2016). Provincially significant wetlands were mapped and evaluated using the Ontario Wetland Evaluation System: Northern Manual. Reports from the NHIC are from a variety of sources; MNRF staff, environmental/biological consultant’s reports, researchers and graduate students, and the general public. Different levels of accuracy exist for these datasets. Data is collected on an ongoing basis as funding permits. Information about species distribution and critical wildlife habitats is incomplete. Inventory funding is made available at the time of Forest Management Plan preparation but is insufficient to collect complete information on all species of concern in this FMP. When encountered, new values information is documented and incorporated into LIO, the values maps and AOC planning. Information about all other forest values will be updated as new data is collected. Some information on values is available on the Crown Land Use Policy Atlas. The Crown Land Use Policy Atlas is the source for area-specific land use policy for lands that are managed by MNRF. Land Information Ontario (LIO) is a web-accessible data warehouse that contains more than 250 different layers of geographic data. Metadata (data about data) is available on the LIO website as well.

Old Growth Forest

Defining old growth forests is often a contentious subject due to the inconsistent use of the terms “old growth” and “mature” in forestry. A forest is considered in a mature stage of development when the overstory trees attain full development and sexual maturity, the mortality of overstorey trees begins to create gaps and encourages understory development, and the average height of the overstory slows dramatically. According to the Forest Management Guide for Great Lakes St. Lawrence Landscapes (2010), the old growth period is a condition of dynamic forest ecosystems that tends to include complex forest stand structure, relatively large dead standing trees (snags), accumulations of downed woody material, up-turned stumps, root and soil mounds, accelerating tree mortality, and ecosystem functions that may operate at different rates or intensities compared with earlier stages of forest development. The current age class structure of the forest indicates that there are many stands within the management unit that are just beginning to pass the mature stage and enter the old growth stage.

[2] OMNRF. 2021. Fish and Wildlife Values Collection and Mapping in Forest Management Planning: A Southern Region Strategy. Peterborough, Canada.

Due to both the history of extensive logging in this area and the fire history associated with logging and settlement, there is little forest left in this management unit that is currently classified as old growth. Since the first wave of European loggers came, the forest has changed from one largely dominated by conifers, especially white pine, to one dominated by tolerant hardwood stands.

In reference to Section 4.2.5 of the Ontario Tree Marking Guide (2004), it is possible to retain key habitat and aesthetic features of an old growth stand through proper forest operations prescriptions in the selection system. This is accomplished at the prescription stage through instructing towards the retention of old growth characteristics such as veteran trees, downed woody debris, and cavity trees. Over time the amount of old growth will inevitably increase in both the protected areas and the managed areas across the management unit. Hemlock stands are commonly found to be mature and old growth in this Forest, and management strategies implemented reflect the most appropriate way to prepare for the on-going threat of hemlock woolly adelgid invasion into the Bancroft Minden Forest. All old growth red and white pine sites will be managed for old growth values.

MNRF has identified 19 hectares of a hemlock forest community that meet the definition of old growth on the Wildlife and Forestry Values Map. These two stands will essentially be left for old growth values. These stands are not eligible for forest management operations. As such, the duration of old growth stands will normally persist until such time as natural disturbance and succession change the features and characteristics of these stands. Old growth conditions in Ontario's Crown forests are identified using the age-of-onset and duration periods defined in the report Old Growth Forest Definitions for Ontario (MNRF 2003). Old growth hemlock forests, in addition to white and red pine, generally include the following features and characteristics:

- A complex forest stand structure (e.g. old trees for the ecosite, large tree size and wide spacing, multiple canopy layers and gaps, and rates of change in species composition);
- Large dead standing trees (snags), accumulations of downed woody material, up-turned stumps, root and soil mounds, and accelerating tree mortality; and
- Ecosystem functions (e.g. stand productivity, nutrient cycling, and wildlife habitat) that are different from earlier stages of forest development.
- No obvious signs of recent harvest disturbance.

Land Uses

There are a variety of land uses occurring on the Forest that affect forest management; some to a larger extent than others. The land uses include:

(a) Resource Based Tourism

A Resource Stewardship Agreement (RSA) is a contractual agreement between a licensed resource-based tourism operator and the SFL holder outlining the principles of the Agreement, the values important to each party, and recommended prescriptions to protect tourism values Resource

Stewardship Agreements and the Forest Management Planning Process – A Primer for Tourist Operators, January 2003).

(b) Mineral, Aggregate, and Quarries

Aggregate extraction operations are found on both private and Crown Land throughout the Bancroft Minden Forest. The area is designated under the *Aggregate Resources Act* (ARA) and as such all pits and quarries on private land require a licence under the Act. On Crown land, aggregate operations require a permit under the ARA and are managed according to the Crown land use policies described later in this section. Aggregate use by the forest industry is subject to conditions guided by the FMPM.

(c) Crown Land Recreation and Cottaging

While forestry is an important component of the local economy and sustains many year-round, or near year-round, well paying jobs, it is not the main economic strength of the area. Tourism is the main economic driver in this area and, in particular, cottaging; which is prominent throughout the management unit. The area holds a rich history of cottaging dating back to the 1800s when railways and steamboats delivered wealthy individuals from the south to the "wilds of northern Ontario". There is still an abundance of private land available within the area for new cottage development. While existing cottaging on Crown land is a permitted activity according to Crown land use direction within the General Use Areas described in Section 2.1.4.3, new authorizations for seasonal recreation, rural residential, or remote cottage development is not permitted. Further, no additional recreation camps for hunting or angling are permitted on Crown lands.

(d) Trapping (commercial fur) and Hunting

The Bancroft Minden Forest is host to a number of different hunting opportunities. There are eight different wildlife management units within the boundaries of the forest. Parts or all of Wildlife Management Units 53A, 54, 55A, 56, 57, 60, 61 and 75 are all found within the boundaries of the forest. The WMU boundaries throughout the Province are determined by the MNRF.

Bear hunting is a popular activity in the fall that draws hunters to the Bancroft Minden Forest. This activity helps manage bear populations. Bear Management Units (BMA’s) are administered by the MNRF. There are 75 BMA’s located in the Bancroft Minden Forest.

There are many other resource-based activities within the Bancroft Minden Forest. In addition to hunting, trapping of furbearing animals is one of the oldest activities in the province. Similar to BMA’s, trap lines are administered by the MNRF. There are 141 registered trap lines found within the Bancroft Minden Forest.

(e) Private/Patent Land

There are approximately 461,094 ha of Crown land (including its waters) in the Bancroft Minden Forest with 70,414 ha in Provincial Parks or Conservation Reserve in which forest activities cannot occur. There is a substantial amount of patent (privately owned) land comprising more than half of the area (54%) within the Bancroft Minden Forest Management Unit boundary. While some of the Crown land is in large contiguous blocks, a large area of Crown land is mixed in amongst large and small blocks of private land. Portions of the municipalities of the District of Muskoka and the District of Nipissing, as well as portions of the County of Haliburton, City of Kawartha Lakes, County of Peterborough and County of Hastings lie within the borders of the Bancroft Minden Forest. The largest communities in this forest include Bancroft, Haliburton, and Minden which also serve as service centres for the dozens of smaller communities nestled throughout the area.

Provincial Parks, Conservation Reserves, Forest Reserves and other Protected Areas

Protected areas within the FMU include 6 conservation reserves, 11 provincial parks, and 39 areas of natural and scientific interest (ANSI). Only two of the 39 ANSIs are on Crown land, including Crowe River Swamp and Egan Chute, both of which are Life Science ANSIs. There is also 1 parcel of federal land, 2 Crown game preserves and 2 significant ecological areas. Provincial Parks are managed to ensure that their natural and cultural values are retained and enhanced. Commercial timber harvest, aggregate extraction and commercial power generation development are excluded from all existing and new Provincial Parks with some exceptions (described below). Eleven provincial parks exist on or adjacent to the Bancroft Minden Forest:

Table 4. Provincial parks in (or adjacent to) the Bancroft Minden Forest.

Area ID*	Name	Class
P20e	Silent Lake Provincial Park	Natural Environment
P26	Kawartha Highlands Signature Site Park	Natural Environment
P34	Queen Elizabeth II Wildlands Provincial Park	Natural Environment
P56e	Egan Chutes Provincial Park	Nature Reserve
P56	Egan Chutes Provincial Park Addition	Waterway
P391	Lake St. Peter Provincial Park	Recreational
P392	Opeongo River Provincial Park	Waterway
P393	Petroglyphs Provincial Park	Cultural Heritage
P394	Upper Madawaska River Provincial Park	Waterway
P1915	Algonquin Provincial Park	Natural Environment
P4716	Carden Alvar Provincial Park	Natural Environment

* Identification number as per the Crown Land Use Policy Atlas

Conservation Reserves complement Provincial Parks in protecting representative natural areas and special landscapes. Commercial timber harvest, aggregate extraction and commercial power generation development are excluded from all existing and new Conservation Reserves.

There are 6 Conservation Reserves that exist on or adjacent to the Bancroft Minden Forest, all have been regulated.

Table 5. Conservation reserves in (or adjacent to) the Bancroft Minden Forest.

Area ID*	Name
C10	Crowe River Swamp Conservation Reserve
C24	Sharpe Bay Fen Conservation Reserve
C54	Conroy's Marsh Conservation Reserve
C55	Little Mississippi Conservation Reserve
C69	Plastic Lake and Dawson Ponds Conservation Reserve
C368	Clear Lake Conservation Reserve

* Identification number as per the Crown Land Use Policy Atlas

Commercial timber harvest is prohibited within Provincial Parks and Conservation Reserves, with the exception of Algonquin Provincial Park. Crown protection areas, including parks and conservation reserves, are part of the Crown landbase upon which forest modelling occurs. As such, most management unit objectives associated with forest structure, biodiversity and wildlife habitat (spatially and aspatially) incorporate these areas. For instance, old growth white pine forests in these protected areas contribute to old growth white pine objectives. Therefore, these parks and conservation reserves play a significant role in contributing towards meeting some management objectives.

Conversely, areas in parks and conservation reserves are not eligible for harvest and modelling software used in developing the LTMD which considers that all areas, inside and outside protected areas, have a very low fire frequency. If these areas (inside protected areas) cannot be harvested and effectively do not burn, management objectives for young forest or for wildlife species that prefer young forest may be difficult to achieve.

A concern may be raised that protected areas are being wholly relied upon to meet nontimber management objectives. This is not the case but due to the large percentage of the landbase in protected areas, much reliance is placed on these areas for some objectives. The potential downfall of such a strategy is that, in theory, there can be spatial clumping. (This is assessed in the analysis-pattern for Old Growth). For instance, if there was one large protected white pine area in the management unit and it was being relied heavily upon to meet old growth white pine objectives, there would not be a good spatial distribution of old growth across the landscape. However, as evidenced by the list of parks and conservation reserves above, any values that they contribute to meet plan objectives are well dispersed across the management unit.

Forest management efforts may be constrained in areas adjacent to these protected areas. Identifying the boundary of these areas on the ground is often left up to the forest industry. While some efforts were made to utilize geographic features to identify boundaries, often the boundaries are virtually non-distinguishable. In these cases, GPS technology is used to layout a management boundary. Also, it is sometimes difficult and costly for the forest industry to access managed Crown lands beside or beyond the protected area, especially if there are landscape features that severely restrict access options. Protected areas can also work in conjunction with private land to isolate patches of Crown land and prevent their harvest.

It should be noted that the single largest park boundary is not within the management unit but is adjacent to the management unit. Algonquin Park effectively forms most of the northern border of the Bancroft Minden Forest. The wording in the current Algonquin Provincial Park Management Plan states that transportation of unmanufactured forest products from areas outside the park via Algonquin Park roads is permitted only over public roads in the park. This effectively means that the Bancroft Minden Forest cannot be accessed through Algonquin Park interior logging roads.

Forest Reserves are areas where protection of natural heritage and special landscapes is a priority, but some resource use can take place with appropriate conditions. This designation has been applied to a relatively small number of areas. Policies for Forest Reserves are similar to the policies for Conservation Reserves, except that mining and related access will be allowed in a Forest Reserve. Commercial forest harvest, new hydroelectric power development, and peat extraction is not allowed, but most other non-industrial resource and recreational uses are permitted, provided they are consistent with the values being protected.

There is currently one Forest Reserve within the Bancroft Minden Forest. The Kawartha Highlands Signature Site Forest Reserve (F26) occupies approximately 125 hectares in Harvey Township, which is located within the County of Peterborough. During the preparation of Ontario's Living Legacy Land Use Strategy and through subsequent boundary refinement and inventory processes, it was determined that this area contained aggregate permits, and thus it has been designated as a Forest Reserve. The intention is that this Forest Reserve will become part of the Kawartha Highlands Signature Site Provincial Park if the aggregate permit is retired through normal processes. In the interim, the area is managed consistent with the protection of natural heritage values. Since there is only one such designation and the area is small, there is negligible impact on the forestry activities on Crown land.

Areas of Natural and Scientific Interest (ANSI)

Areas of Natural and Scientific Interest are areas of land and/or water containing natural landscapes or features which have been identified as having life science or earth science (or both) values related to natural heritage protection, scientific study or education. ANSIs vary in their type and level of significance. There is a total of 39 ANSIs on the Bancroft Minden Forest, listed in the table below along with their class subtype. Only two ANSIs are on crown land which may have policy direction applicable to forestry operations and potentially road management (marked with an asterisk*).

There are two kinds of ANSIs:

- Life Science ANSIs are significant representative segments of Ontario’s biodiversity and natural landscapes including specific types of forests valleys, prairies and wetlands, their native plants and animals and their supportive environments. They contain relatively undisturbed vegetation and landforms and their associated species and communities.

- Earth Science ANSIs are geological in nature and consist of some of the most significant representative examples of the bedrock, fossil and landforms in Ontario and include examples of ongoing geological processes.

Areas of Natural and Scientific Interest (ANSI) on the Bancroft-Minden Forest Management unit and their class subtype (**those on crown land that may affect forest operations*):

ANSI Name	**CLASS SUBTYPE**
Sadowa Wetland	Candidate ANSI, Life Science
Conroy Marsh	Candidate ANSI, Life Science
Kirkfield Beach	ANSI, Earth Science
Clear Lake	ANSI, Life Science
*Egan Chute**	ANSI, Life Science
*Crowe River Swamp**	ANSI, Life Science
Longford Barrens	Candidate ANSI, Life Science
Bottle Creek (Kawartha Highlands Pk)	ANSI, Life Science
Aylen Lake Cliff	Candidate ANSI, Life Science
Silent Lake - Lowrie Lakes	Candidate ANSI, Life Science
Kirkfield Liftlock Area	Candidate ANSI, Earth Science
Silent Lake Provincial Park Nature Reserve Zone 2	ANSI, Life Science
Conroy Marsh	Candidate ANSI, Life Science
Silent Lake Park Nature Reserve Zone1	ANSI, Life Science
ANSI Name	**CLASS SUBTYPE**
Kirkfield Liftlock	ANSI, Earth Science
Kennisis River	Candidate ANSI, Life Science
Dawson Ponds/ Plastic Lake	Candidate ANSI, Life Science
Shadow Lake Road Cut	Candidate ANSI, Earth Science
Tory Hill Formation	Candidate ANSI, Earth Science
Coboconk South Road Cut	Candidate ANSI, Earth Science
Upper Madawaska River Provincial Park	ANSI, Life Science
Coboconk East Quarry	ANSI, Earth Science
Peteroglyphs Park Barrens	ANSI, Life Science
Victoria Road Bog	ANSI, Life Science
Sharpe Bay Fen	Candidate ANSI, Life Science
Silent LakeProvincial Park Nature Reserve Zone4	ANSI, Life Science
Silver Lake Road Cut	Candidate ANSI, Earth Science

Opeongo R.P.P. Provincial Nature Reserve	ANSI, Life Science
Carden Alvar	ANSI, Life Science
Burnt River Mouth Wetlands	ANSI, Life Science
Buttermilk Falls	Candidate ANSI, Life Science
Lochlin Esker	Candidate ANSI, Earth Science
Johnston Lake Bog	ANSI, Life Science
Lochlin Bog	Candidate ANSI, Life Science
Dalton Black Ash	Candidate ANSI, Life Science
Sherborne Lake	Candidate ANSI, Life Science
Bentshoe Lake	Candidate ANSI, Life Science
Anson Hemlock	Candidate ANSI, Life Science
West Guilford	Candidate ANSI, Life Science

Crown Land Use

Information on Crown land use on the Bancroft Minden Forest is documented in the Crown Land Use Policy Atlas (2003). The Atlas outlines land use direction for Crown lands managed by the Ontario Ministry of Natural Resources and Forestry. Land Use Policy information can be found in the Crown Land Use Policy Atlas. The basis of land use direction for the Bancroft Minden Forest comes from Ontario's Living Legacy (OLL) Land Use Strategy (1999), The Leslie M. Frost Natural Resources Centre Integrated Plan for Land Use and Resource Development (1980), the District Land Use Guidelines for Bancroft District (1983) and the District Land Use Guidelines for Minden District (1983).

The Crown Land Use Policy Atlas (the Atlas) is the source of area-specific land use policy for Crown lands in the Area of the Undertaking. The Atlas contains land use policies consolidated from a variety of planning documents (e.g., district land use guidelines, Ontario's Living Legacy Land Use Strategy). The Atlas is also the central site for documenting amendments to area-specific land use policies. The Atlas provides context for more detailed resource management direction in a wide range of planning documents including provincial park management plans, interim management statements for parks, statements of conservation interest or management statements for conservation reserves, forest management plans, fisheries management plans and water management plans.

Land use policies include general land use intent as well as permitted and restricted uses in an area (e.g., public road use, new commercial tourism) and selective guidelines associated with some land uses. There are two broad types of land use policy information: primary and overlay.

Primary Land Use Area Policies

These policies relate to the principal land use area (e.g., i.e., enhanced management area, forest reserve, general use area). Policies for primary land use areas include a wide range of activities and uses which are described in policy reports in the Atlas.

Overlay Area Policies

Overlay areas occur in certain locations. Some examples within the Bancroft Minden Forest include deer yards and the Peterborough Crown Game Preserve. The Peterborough Crown Game Preserve was established by an Order-in-Council in 1933 on approximately 223 square kilometres of forested land near Apsley, Ontario. The Preserve was established to: provide wildlife viewing opportunities in a natural environment setting; increase wildlife populations; and protect local wildlife populations in order to ensure an abundance of game for hunters in adjacent areas. The boundaries of these overlay areas generally do not match those for the primary land use area and may overlap more than one primary land use area.

Policies for overlay areas are typically focused on a specific use or for a small grouping of related activities and may differ from those for the overlapping primary land use area(s). A use may be permitted in the primary land use area, but restricted in the overlay area. Where primary land use area policy addresses an activity that differs from the overlay area policy, it is the overlay area policy that applies.

Crown Land

Crown land in the Bancroft Minden Forest has been divided into the following land uses:

Protected Areas:
- Provincial Park
- Conservation Reserve

Primary land use designations:
- Forest Reserve
- Enhanced Management Area (EMA)
- General Use Area

Provincial parks and enhanced management areas are categorized in the Atlas. The category is the classification of the park or the type of EMA. Land use activities for each primary land use area within a policy report are presented in a table in the Atlas. Guidelines for some activities are also included. Whether uses and activities are or are not permitted is indicated by Yes, Maybe or No.

Enhanced Management Areas

Enhanced Management Area is a land use category that has been established in order to provide more detailed land use direction in areas of special features or values. A wide variety of resource and recreational uses can occur in EMAs. Enhanced Management Areas may lead to modifications (e.g., timing, location, method, access) in resource-management practices in order to recognize other land use values. These adjustments will be implemented with no impact on wood supply, and only in exceptional cases will wood costs be affected. EMAs provide a specific focus for the application of guidelines and other planning and management strategies. Depending on the type of EMA, the effect on forestry activities can be minimal or substantive. EMAs that also exclude forestry of course can have a profound impact on the available landbase with reductions to wood supply and management objectives that rely on harvesting. Access has proved to be the most difficult aspect in working in some EMAs. Identifying an access plan has at times been a difficult process, especially when other access issues (e.g. private land) are often unknown and ever changing.

Because EMAs are intended to maintain a range of values, there are five categories of EMAs. These categories are:

n - Natural heritage
r - Recreation
a - remote access
w - Fish and wildlife
g - Great Lakes coastal areas

Only two categories have been identified within the Bancroft Minden Forest; recreation and remote access:

1. Recreation EMAs have been applied to areas with high recreational use or significant recreation values for activities such as angling, hunting, motorized and pedestrian trail use, and canoeing. This EMA can be used for a wide range of recreation values and management intents, ranging from areas where relatively substantial recreation development is permitted, to areas providing low-density, high-quality recreation in a natural setting. Some Recreation EMAs have been identified to protect remote recreation values. The intent is that these areas will be managed to provide high-quality recreation, resource-based tourism and natural values within a remote or semi-remote forested setting, while also permitting sustainable business and industrial activities. In these recreation areas, industrial activities such as forestry, mining, aggregate extraction, and hydro development, and the related use of roads, need to be carried out in such a way as to maintain or enhance the remote recreation qualities. One method to achieve this, as in the Kawartha Barrens EMA (E22r), is by restricting road use during high recreational use times such as the gun hunting seasons for moose and deer when large numbers of hunters are in the area. Recreation EMAs will also be used in future planning to identify areas in which enhanced management and use of accessible fish and wildlife resources is a major objective of planning and resource management. Other resource interests will be accommodated.

2. Remote Access EMAs are intended to maintain the remote character of selected areas. Typically, these are relatively large areas that provide the public and tourism operators with high-quality remote recreational experiences including hunting, fishing, canoeing, and camping. Given the large size, remoteness, and relative absence of roads, these areas will play a significant role in protecting wilderness values outside the parks and protected areas system. Forestry, mining, aggregate extraction and hydroelectric development may occur in this EMA. The remote character will be retained through planning and establishing standards for the location and the use or abandonment of new roads and trails. Roads for industrial and commercial use are permitted; however, their standards should be lower than those governing primary access roads. New roads must be planned through comprehensive long-term access planning that considers the values of the area. Some guidelines are:

- Roads should be constructed to the lowest standard possible;
- New roads/trails should be directed to existing corridors where possible;
- Layout should consider aesthetics; and,
- Design and construction should facilitate access controls and closure/rehabilitation.

New roads are restricted from public use and existing authorized access continues.

There are 10 Enhanced Management Areas in the Bancroft Minden Forest as described in the following table.

Table 6. Enhanced management areas in the Bancroft Minden Forest.

Area ID*	Name	Category
E5a	Weslemkoon Lake	Remote Access
E19a	Anson	Remote Access
E22r	Kawartha Barrens	Recreation
E51a	Aylen Lake East	Remote Access
E52a	Aylen Lake West & Upper Madawaska River	Remote Access
E53a	Bark Lake	Remote Access
E65r-2	Black River - Frost Centre	Recreation
E64a-1	Clear Lake	Remote Access
E64a-2	Clear Lake - Frost Centre	Remote Access
E65r-1	Black River	Recreation

* Identification number as per the Crown Land Use Policy Atlas

General Use Areas

About 70 percent of the planning area in the province has been placed in a general use designation. This designation includes all Crown lands not placed into a specific designation or Enhanced Management Area. A full range of commercial, resource and recreational uses can occur in General Use Areas. Management of General Use Areas occurs in the context of maintaining ecological sustainability. There is an extensive set of legislation, policy and guidelines that support and direct management actions in General Use Areas.

In addition to CLUPA, the Bancroft District Land Use Guidelines (1983) and Minden District Land Use Guidelines (1983) provide detailed land use and resource management direction for General Use Areas.

There are four General Use Areas within the Bancroft Minden Forest. These areas are: G342, G343, G340, and G421.

The land use intent for these areas is to provide and encourage the provision of a wide variety of resource production and recreation opportunities. Land use direction permits a full range of commercial activities, including commercial timber harvest.

The Provincial Crown Land Use Atlas website should be referred to for more information on area-specific Crown Land Use Policy and amendments for Provincial Parks, Conservation Reserves, Forest Reserves, Enhanced Management Areas and General Use Areas.

Access Condition

The Bancroft Minden Forest is a well-roaded forest given the historical use of the forest and the nature of partial cutting where roads are reused every 15-25 years. This is reflected in the level of existing roads portrayed on maps. In addition, there is an extensive existing network of provincial highways and municipal roads. Large contiguous blocks of productive Crown forest are relatively small by northern Ontario standards. Because the majority of harvest is based on a 20 to 25-year return cycle (selection and shelterwood) much of this forest already has a road system developed in it. As a result, the level of new access is relatively low compared to other management units, especially for primary road construction. The use and upgrade of existing roadbeds into the forest are very common.

There are very few areas on the Bancroft Minden Forest that are in a “roadless” condition. Those areas where there is limited access have been identified through various land use planning exercises such as Lands for Life and the District Land Use Guidelines. The limited access areas such as the area around Clear Lake in Sherborne and Stanhope Township have been included in Conservation Reserves or Provincial Parks, as with areas within Kawartha Highlands Signature Site. Other areas with limited access have been designated as remote access enhanced management areas such as Anson, Aylen Lake, Bark Lake, and Clear Lake. The implications to forest management activities in these areas could limit the type of access, time of year, and decommissioning of roadways.

FMP Commitment

This FMP is committed to maintaining the viability of the tourism industry by protecting tourism values in the forest management planning process through the application of MNRF’s approved forest management guide that addresses forestry and resource-based tourism and the use of RSA’s as one method of protecting and sustaining these values.

2.2 SOCIAL AND ECONOMIC DESCRIPTION

Refer to Supplementary Documentation E for the complete social and economic description for the Bancroft Minden Forest Management Unit.

2.2.1 OVERVIEW OF SOCIAL AND ECONOMIC CONTEXT

Forests provide substantial commercial benefits, including both timber and non-timber forest products. They also provide significant non-commercial benefits, such as wildlife, recreation, aesthetics, and wilderness values. Although not always measurable in monetary terms, these activities are highly valued by Ontarians and provide significant benefits to society. Sustainable forest management requires that forests be managed to provide a broad range of goods and services for all generations of Canadians. This includes balancing the social, economic and ecological benefits derived from forests. A summary of the socio-economic aspects for the Bancroft Minden Forest is presented in the following three sections.

As per Statistics Canada (2017), eleven communities obtain substantial social and economic benefits related to forest management activities in the Bancroft Minden Forest. These communities include: Bancroft, Brudenell-Lyndoch-Raglan, Faraday, Hastings Highlands, Havelock-Belmont-Methuen, Madawaska Valley, Minden Hills, North Algoma Wilberforce, Papineau-Cameron, Quinte West and South Algonquin.

The Bancroft Minden Forest overlaps with the traditional territory of the Williams Treaties First Nations (WTFN); the Algonquins of Ontario (AOO) and the Kawartha-Nishnawbe. The WTFN includes the following seven Indigenous communities: Alderville; Beausoleil; Chippewas of Rama; Chippewas of Georgina Island; Curve Lake; Hiawatha and Mississaugas of Scugog Island.

There are also ten Algonquin First Nation communities within or adjacent to the Bancroft Minden Forest Management Unit whose interests or traditional uses may be affected by forest management activities. These communities are: Antoine, Bonnechere Algonquins, Whitney and Area Algonquins, Algonquins of Pikwakanagan First Nation, Algonquins of Greater Golder Lake, Ottawa Algonquins, Kijicho Manito Madaouskarini (Bancroft), Shabot Obaadjiwan, Snimikobi and Mattawa/North Bay Algonquins. As per Statistics Canada (2017), the Algonquins of Pikwakanagan First Nation was the only community included from the ten Algonquins of Ontario communities, given they are recognized under the Indian Act, 1876, which Statistics Canada uses to help define their census. Representatives from eight of these Indigenous communities held a seat on the forest management planning team and were actively involved in the planning process.

2.2.2 SUMMARY OF DEMOGRAPHIC PROFILES

The key findings from the demographic profiles for the eleven listed communities are summarized below. The full demographic profiles and local economic profiles can be found in Supplementary Documentation E.

The demographic profiles included in the social and economic descriptions for the Bancroft Minden Forest were prepared by the MNRF using statistical data sourced from the 2016 Statistics Canada Census of Population. Statistics Canada uses standard geographic units for statistical purposes.

Statistics Canada census data was not available for all First Nations (FN) communities within the Bancroft Minden Forest. As such, full demographic profiles were retrieved for four of the listed First

Nations. Alternatively, local economic profiles were captured for three of the listed First Nations. As a result, the demographic and local economy profiles included in Appendix I of Supplementary Documentation E only include 7 of the 9 FN communities

Key Findings

Population Trends: Between 2011 and 2016 the size of most communities decreased with the average rate of growth being (-1.36), which is a stark contrast to the provincial rate of population growth (4.6). With respect to individual communities, the population of Minden Hills saw the most growth (7.66), while South Algonquin experienced the largest reduction (-10.0).

Community Diversity: The birthplace (country of birth) of residents was used as a measure of community diversity, with a greater proportion of foreign-born residents corresponding to a greater level of community diversity. Based on the 2016 census data, the proportion of foreign-born residents was on average 5.7%., This is relatively low in comparison to the provincial level of diversity where over a quarter of the population is foreign-born (approx. 30%). Hasting Highlands was the only community in which more than a tenth (10.1%) of the population was foreign born, whereas Brudenell, Lyndoch and Raglan had the lowest level of diversity with less than 3% of the population being foreign-born.

Household Income: With respect to income in 2016, the average household income within the Bancroft Minden Forest was less than that of the provincial average ($80,322). The average household income for the eleven communities ranged from a low $59,446 for Brudenell, Lyndoch and Raglan, to a high $78,733 for Papineau-Cameron, and an overall average of $68,088.

Employment: Statistics on employment are measured by both labour force participation (defined as the percentage of the working age population – 15 years of age and older – that is part of the labour force i.e. employed or actively seeking employment) and employment rate (defined as the number of people of working age in the population who are employed and is expressed as a percentage of the labour force). In 2016, seven of the eleven communities had a labour force participation rate exceeding 50%, with North Algona Wilberforce and Quinte West being the only communities to exceed 60%. Four communities had a labour force participation rate lower than 50%, with the lowest participation rate in Bancroft at 46.1%. The majority of the communities (6 of 11) had an employment rate below 90%; Papineau-Cameron had the lowest employment rate at 87.1% whereas Quinte West had the greatest employment rate at 93.7%.

Many communities within the Bancroft Minden Forest are dependent on the forest industry for employment. Consequently, most communities hold a greater proportion of forest industry workers compared to the provincial average. The relative importance of the forest industry to the local economy is defined as the “forest dependency ratio” and is calculated as the percentage of forest industry jobs in the local labour force divided by the percentage of forest industry jobs in the provincial labour force (Statistics Canada). South Algonquin holds the highest proportion of their work force in the forest industry at 32.6%, followed by Madawaska Valley at 15.6%. Refer to the table below for a full list of forest dependency ratios for communities within the BMF.

Table 7. Demographic statistics for communities in the Bancroft Minden Forest.

Communities	Population Change (%) 2011-2016	Foreign Born (%)	Avg. Household Income ($)	Labour Force Participation Rate (%)	Labour Force Unemployment Rate (%)	Forestry Industry as % of Labour Force
Bancroft	0.03	8.4	60,093	46.1	11.3	5.0
Brudenell, Lyndoch and Ragland	-9.30	1.3	59,446	51.8	10.9	8.8
Faraday	-4.56	7.5	70,590	47.4	8.5	6.1
Hastings Highlands	-2.16	10.1	76,581	48.7	8.1	6.4
Havelock-Belmont-Metheun	0.15	6.5	68,734	45.9	8	1.0
Madawaska Valley	3.71	6.1	63,520	52.6	11.4	15.6
Minden Hills	7.66	8.0	72,548	51.0	9.1	1.3
North Algona Wilberforce	1.46	5.0	75,431	61.8	10.7	9.6
Papineau-Cameron	3.89	4.1	78,733	55.8	12.9	3.8
Quinte West	1	2.9	77,733	60.3	6.3	2.3
South Algonquin	-10	2.7	62,761	50.5	11.2	32.6
Average of communities in the Bancroft Minden Forest	-1.36	5.7	68,088	52.0	9.85	8.4

2.2.3 INDUSTRIAL AND NON-INDUSTRIAL USES OF THE FOREST

2.2.3.1 Industrial Uses of the Forest

The main industrial users of the Bancroft Minden Forest are forestry, mining and mineral exploration, aggregate extraction and power generation. Please see Supplemental Document E for more details.

Forestry and Wood products

The major consumptive use of forest resources on the Bancroft Minden Forest is commercial timber harvesting. An average of 137,886 m^3 was harvested annually from the forest (from 2010/11-2019/20 MNRF iTREES).

The Bancroft Minden Forest provides wood to sawmills, hardwood veneer mills, pulp mills, a paperboard mill, a medium density fibreboard mill, and a coated bleached board and chemicals facility. These companies wholly or partly depend on the raw material from the Bancroft Minden Forest. The Bancroft Minden Forest provides roundwood to a total of 51 mills, several of which reside in Quebec. Eight of these mills receive almost 70% of all wood harvested on the FMU, shown in Table 8.

Table 8. 10-year average wood volume flow from the Bancroft Minden Forest (2010/11-2019/20 TREES).

Mill	Community	% Share of BMF Volume	Volume from BMF (m^3)
Murray Brothers Lumber Co. Ltd.	Madawaska	19.8%	27,358
Freymond Lumber Ltd. (sawmill)	Bancroft	12.8%	17,616
McRae Mills Ltd.	Whitney	10.3%	14,232
Cascades Canada ULC	Quinte West	9.9%	13,714
Fortress Specialty Cellulose Inc.	Thurso	5.5%	7,588
Rayonier A.M. Canada Industries Inc.	Timiskaming	4.2%	5,783
Leonard Rumleskie & Sons Lumber Co.	Madawaska	3.0%	4,092
Neilson Lumber Ltd.	Hastings	2.2%	3,043

The Bancroft Minden Forest Company has shareholder agreements with 13 processing facilities, one supply agreement and two open markets. Table 9 below shows the processing facility, the agreement type and the projected amount of merchantable wood volume by species group utilization projected for each for the entire 10-year term of the 2021-2031 FMP.

Table 9. Processing facility, agreement type and projected amount of wood volume for the 10-year Term of the 2021-31 FMP for each processing facility in the Bancroft Minden Forest.

Processing Facility	Agreement Type	Location	Total Merchantable Volume (m^3)
Ben Hokum and Son Ltd. (Sawmill)	Shareholder	Killaloe	40,000
Cascades Canada ULC (Pulp)	Shareholder	Trenton	140,000
Chisholms's Ltd. (Sawmill)	Shareholder	Roslin	21,500

Commercial Fuelwood	Open Market	N/A	230,000
Freymond Lumber Ltd. (Sawmill)	Shareholder	Bancroft	158,000
Freymond Wood Products (Pulp)	Shareholder	Bancroft	110,000
George Stein Ltd. (Sawmill)	Shareholder	Palmer Rapids	45,000
Huntsville Forest Products Inc. (Sawmill)	Shareholder	Huntsville	25,000
Len Rumleskie & Son Lumber (Sawmill)	Shareholder	Barry's Bay	30,000
McRae Mills Ltd. (Sawmill)	Shareholder	Whitney	226,000
Murray Brothers Lumber Co. Ltd. (Sawmill)	Shareholder	Madawaska	324,000
Neilson Lumber Ltd. (Sawmill)	Shareholder	Hastings	36,000
Rayonier AM Canada G.P (Sawmill)	Supply Agreement	Montreal	32,000
Thomas J. Neuman Ltd. (Sawmill)	Shareholder	Palmer Rapids	36,000
Wilson's Forest Products Ltd. (Sawmill)	Shareholder	Madoc	27,500
Other Utilization	Open Market	SR	1,032,314
Total			2,458,263

Mining and Mineral Exploration

The Bancroft Minden Forest has an estimated 2,649 active mining cell claims recorded throughout the FMU based on the mineral resource information taken from the Ministry of Energy, Northern Development and Mines' (MENDM) Mineral Deposit Inventory (MDI). The claims represent an investment in the management unit of approximately $507,950 CDN for claim staking, which directly relates to its mineral potential. In addition, there is an estimated expenditure of $980,000 CDN per year related to mineral exploration work required to keep the claims in good standing. Current claim staking targets areas with potential for zinc, graphite, cobalt, vermiculite, rare earth elements, uranium, gold, talc, copper, nickel, building stone and mineral specimens, which makes mining an important industrial use of the Bancroft Minden Forest.

Aggregate Extraction

Aggregate resources include any combination of sand, gravel, or crushed stone in a natural or processed state. Aggregates are used in the construction of highways, dams and airports, as well as residential, industrial and institutional buildings and are critical ingredients in numerous manufactured products such as glass, coated paper, and in the manufacturing processes of steel, aluminum and plastic. Although the actual tonnage of operations within the forest is not available, the socio-economic benefits that aggregate extraction gives to the surrounding communities are expansive and include wages, purchases of large equipment (haul trucks, front end loaders, bulldozers, etc.) as well as fuel and parts/repairs of the equipment. The forest industry uses extracted aggregates to build roads for forest operations and therefore provides benefits to the public in the form of increased access to areas not previously accessible in the Forest Management Unit.

Power Generation

Within the boundaries of the Bancroft Minden Forest, Bracebridge Generation has several dams used to generate hydroelectricity. Numerous generating stations are located within the FMU as well. None of the generating stations adversely affect forest operations in the Bancroft Minden Forest. Additionally, small scale community-based wind power and solar power applications for projects have increased in the past ten years.

2.2.3.2 Non-Industrial Uses of the Forest

The main non-industrial commercial uses of the Bancroft Minden Forest include trapping, hunting and fishing guide services and tourism. Please see Supplemental Document E for more details.

Trapping Activities

The Bancroft Minden Forest has 128 trapping zones, with the majority located in the townships of Cardiff, Glamorgan, Anstruther, Cavendish, and Burleigh. The trapping zones are comprised of both Crown and private lands. The main species trapped are beaver, otter, muskrat, and fisher and the fur harvested from the species can be sold to the fur auction house, providing supplemental income to trappers and their families.

Hunting Activities

Hunting is an important recreational activity in the FMU. It provides substantial economic benefits to communities in the area through both direct expenditures (licenses and hunting-related equipment) and indirect expenditures (gas, food and lodging).

The FMU contains all or portions of 7 Wildlife Management Units (WMUs) in which hunting for many species occurs (WMU 55A, 57, 61, 60, 75, 56 and 54). Open seasons for big game include moose, white-tailed deer, black bear, and elk. There are resident and non-resident hunters/seasons with different licenses and conditions for hunting on Crown/private land. Commercial operators, such as moose tourist outfitters and Bear Management Area operators also exist within the FMU. Some hunt camps are located on Crown land, for which Land Use Permits or leases are issued. There are an estimated 249 Crown land camps within the Bancroft Minden forest. White-tailed deer are one of the most sought-after big game species in Ontario. They hold strong ecological, social and economic importance in Ontario and generate millions of dollars in economic activity each year, through hunting, viewing and tourism. In the Bancroft Minden Forest, as there are an estimated 16,259 white tailed deer hunters (includes residents and non-residents), which represents 8.6% of deer hunters within the province.

Moose are an important species ecologically as well as socially. Similar to white-tailed deer, moose generate millions of dollars annually through hunting, viewing and tourism. There are an estimated 5, 994 moose hunters within the FMU (includes residents and non residents), which represents 9.3% of moose hunters within the province. There are 77 Bear Management Areas (BMA) within the FMU. An estimated 2, 927 bear hunters are hunting within Bancroft Minden FMU (includes residents who make up 94% of bear hunters and non-residents at 6%). This represents 5.2% of bear hunters within the province. A modern-day elk hunt came into effect in 2011 in the Bancroft following the successful reintroduction of elk and it is estimated that up to 132 hunters participated in the elk hunt within the Bancroft Minden FMU. Small game seasons are open for species such as wild turkey, wolf and coyote, ruffed grouse, spruce grouse, sharp-tailed grouse, ring necked pheasant, gray partridge, cottontail rabbit, European and snowshoe hare, gray and fox squirrels, raccoon, red fox, skunk, and weasels. Migratory bird species with open seasons include ducks, geese, woodcock, snipe and mourning doves. Small game species licenses are not specific to WMUs, thus no estimates of hunter numbers are available for small game species (including wild turkey).

Recreation and Tourism Activities

Tourism is essential to the economy within the Bancroft Minden Forest. The Bancroft Minden Forest expands across two tourism regions; region 8 (Kawarthas Northumberland) and region 11 (Haliburton Highlands to the Ottawa Valley). The natural resources found on both Crown and private lands are extremely important in promoting the area as a tourism destination. Aside from timber harvesting, outdoor activities such as camping fishing, hunting, hiking, canoeing, boating, cross-country skiing, wildlife viewing, foraging, spiritual/mental/physical wellbeing, kayaking including whitewater kayaking and recreational vehicles such as snowmobiles and ATVs/4x4 vehicles/off road motorcycles are important recreational activities and commercial uses of the Bancroft Minden Forest. Crown land supports a variety of local and commercial tourism establishments, such as resorts, lodges and tour companies and the tourism industry within the Bancroft Minden Forest has approximately 7,500 establishments.

Forest operations occurring on Crown Forest as regulated by the *Crown Forest Sustainability Act (1994)*, must not impede social and economic values including that of recreational values. The forest management plan for the Bancroft Minden Forest will have regard for all recreational and tourism values within the forest and ensure the values identified will contribute to the long-term sustainability of the forest.

Protected Areas

Within the Bancroft Minden Forest, there are several areas that have been set aside and are considered protected. Depending on the classification of the protected areas, there may be restrictions on permitted activities and uses. Protected areas with the FMU include 6 conservation reserves, 11 provincial parks, and 39 areas of natural and scientific interest (ANSI). Only two of the 39 ANSIs are on Crown land, including Crowe River Swamp and Egan Chute, both of which are Life Science ANSIs. There is also 1 parcel of federal lands, 2 Crown game preserves and 2 significant ecological areas.

2.3 FIRST NATION AND MÉTIS BACKGROUND INFORMATION REPORT

As part of the approach to working with First Nations and Métis and support their involvement in the forest management planning process, MNRF invited communities that are within or adjacent to the forest management unit to participate in the preparation or update of a Background Information Report (BIR).

BIRs are intended to document information such as a community's use of natural resources on the management unit, community concerns related to forest management, and the location of specific values in the forest. BIRs are used in part to inform the planning team about forestry-related concerns and identify First Nation and Métis values that could be adversely affected by forest management operations. The First Nation and Métis BIR includes:

- A summary of the use of natural resources on the management unit, particularly with respect to hunting, fishing, trapping, harvesting of wood for domestic purposes, and gathering;
- A summary of forest management-related concerns
- A summary of First Nation and Métis communities in the preparation of the report; and,
- First Nation and Métis values information.

The planning team, including First Nation and Métis community representatives, considers this information to guide approaches to prevent, minimize or mitigate adverse effects of forest management operations on values.

The following is a general overview of the use of the lands, and natural resources on the management unit by First Nation and Métis communities and forest management-related concerns, issues and opportunities identified in the BIRs received by the planning team. For the 2021 FMP, the Algonquins of Ontario was the only community that submitted a draft Background Information Report. Specific values information was not provided with the AOO BIR. The descriptions below are reflective of the AOO BIR only.

Use of Lands & Natural resources

The BIRs describe an historic and inextricable connection of Indigenous communities and people to the lands, water and natural resources in the Bancroft Minden Forest linking its importance to their cultural, social, spiritual, physical and economic well-being. All species of flora and fauna and their ecological linkages are significant. BIRs identify the importance of hunting, fishing, trapping as well as the gathering of building materials, food and medicine as recurring themes of great importance. The presence of and spiritual significance of archaeological and culturally important sites and landscapes is also clearly identified.

Forest Management-Related Concerns, Issues and Opportunities

In general, the potential adverse impact of forest management activities on the use of and integrity of natural ecosystems and culturally significant sites and landscapes is a recurring theme in the BIRs.

Concerns include potential impacts to:

- terrestrial and aquatic flora and fauna habitats;

- hunting, fishing, trapping and gathering of building materials, food and medicine;
- species at risk; and
- archaeological sites and culturally significant sites and landscapes.

Various issues were identified including:

- community capacity to meaningfully participate in forest management planning;
- road access planning (construction, maintenance, decommissioning); and
- regard to climate change and invasive species.

Opportunities for improvement have been identified and include:

- improved curation and use of traditional knowledge;
- improved inventories of Indigenous values across the landscape;
- focussed consultation on specific aspects of forest management e.g. roads planning; and
- greater economic participation in forestry.

Having regard to the sensitivity of information detailed in the BIRs, MNRF is seeking advice from communities about the degree to which the information provided should be made public. BIRs are only included in this FMP if agreed to by the communities.

3.0 DEVELOPMENT OF THE LONG-TERM MANAGEMENT DIRECTION

3.1 INTRODUCTION

The Long-Term Management Direction (LTMD) provides direction for the levels of access, harvest, renewal and tending activities required to achieve the desired forest and benefits. In the development of the proposed LTMD, management objectives were identified; social and economic assessments were completed; and analytical models and tools regarding forest regulation, wildlife habitat supply and landscape management were used.

The components involved in the development of the LTMD consist of the following;

- planning composite inventory
- forest classification and current forest condition
- base model inventory & base model
- management objectives and scoping
- proposed LTMD, determination of sustainability & primary road corridors

Through strategic analysis, or modelling, the LTMD will identify the levels of harvest (both area and volume) along with the access, renewal, and tending activities that will balance the achievement of management objectives. The LTMD also provides a means of assessing forest sustainability through the measurement and monitoring of indicators that have been developed for each management objective. It is expected that a balanced achievement of the quantitative and qualitative environmental, social and economic objectives, will result in the desired long-term future forest condition and benefits.

3.2 MANAGEMENT CONSIDERATIONS

Management considerations are changes to the forest condition (e.g. large natural disturbance) or social, economic, or environmental concerns that were considered in the development of the LTMD. Management considerations were identified by a review of past FMPs, Independent Forest Audits and issues affecting the implementation of the current (2011-21) FMP. Other sources of direction include new science and policy direction, the Aboriginal Background Information Reports and consultation with First Nation communities, particularly the negotiations for the Algonquin Land Claim, and input from the LCC and general public. Identified management considerations will also be considered in the planning and implementation of operations.

Unopened Municipal Road Allowances (UMRAs)

The unopened municipal road allowance is a strip of land owned by a municipality where a road may be built in the future but does not currently exist. In the past, where these intersected Crown land, they were treated the same as any Crown land with no special provisions. It was recently communicated to the SFLs that according to the Surveyor General's Office and the rules outlined in the Municipal Act (2001), these rights of way are to be considered Patent Land and therefore will need to be tagged in the planning composite and base model as private land (permanently subtracted from the Managed Crown Landbase). This is not technically an FRI problem since ownership is not part of the interpretation process. However, it is a policy issue related to the FRI which will have downstream impacts.

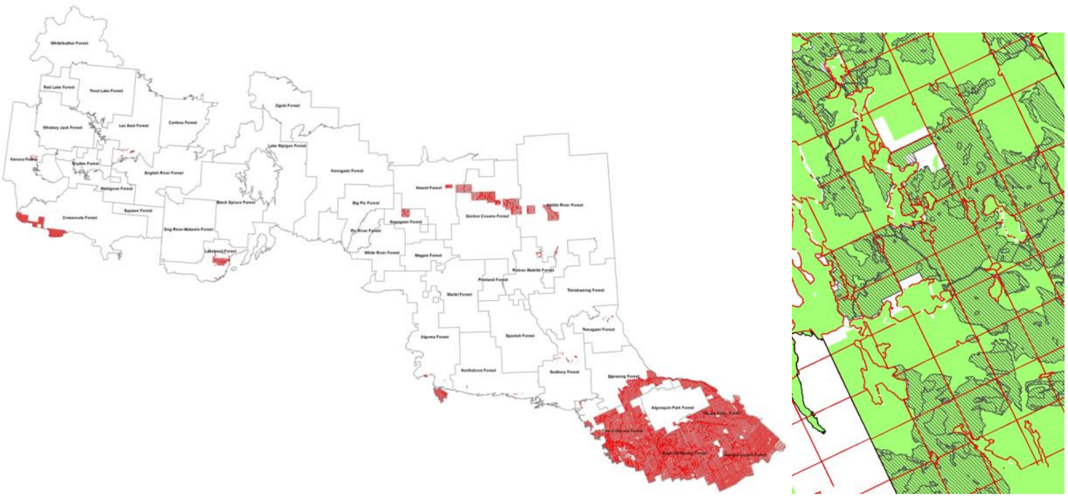


Figure 17. A visual representation of Unopened Municipal Road Allowances on a provincial scale (left) and how they will appear on maps close-up (right)

In terms of area, the Bancroft Minden Forest has the highest amount of productive crown forest within road allowances at 6,298 ha, representing 2.5% of the productive landbase. While this may not seem like a significant area, the operational implications of having to consider these road allowances during all harvest and renewal operations as well as road construction could be severe, especially when dealing with 17 different municipalities within the forest management unit.

<u>Algonquin Land Claim</u>

For some time, the Algonquins of Ontario have been in negotiation with the Federal and Provincial governments regarding a land claim. The Algonquins of Ontario Agreement-in-Principle was ratified in 2016 (for more information please refer to https://www.ontario.ca/page/algonquin-land-claim) outlining many details that might be contained in an eventual treaty. One part of the settlement involves the proposed transfer of approximately 10,000 hectares of Crown land within the forest to the Algonquins as private land. In the BMF, a reduction of approximately 4% of total Crown land available for Forest Management is expected.

Through discussions between the SFL and Algonquin community representatives it has been determined that some land should be sustainably managed for timber production before an ownership transfer, and the area contributes toward the achievement of non-timber forest objectives in the development of the 2021-31 FMP. A transition plan was developed for Algonquin Treaty Negotiations that documents discussions and details the type of forest management activities that can occur on Land Claim parcels. The transition plan was used to inform the planning of operations (Stage 3 & 4) and is considered an active report that will be respected and updated as required through plan implementation. An understanding exists that operations in proposed settlement lands that are approved in the current FMP will proceed. While this may mitigate the impact on wood supply to mills in the short term, in the longer term there will be an additional reduction in the Crown land base.

Forest Resource Inventory

The forest resource inventory (FRI) forms the backbone of a forest management plan as it is used to assign forest units and model allowable harvest area. This is the first time the Company has created a plan with an entirely new FRI. The last version was from 1987 and was comprised of panchromatic aerial photography. When working with the 30-year-old inventory, the Company found that stand conditions were not always as predicted and often required reclassification of what was planned in the inventory. The new enhanced forest resource inventory (eFRI) consists of high-resolution, digital airborne imagery interpreted from 2006/2007. In addition to increased resolution, the eFRI provides ecosite information, such as soil texture and depth, plant communities below the trees, as well as additional forest information to create a much more valuable picture of the forest.

Unfortunately, BMFC did not receive the eFRI until December 2017, weeks before the beginning of planning. Once received, the inventory was updated to account for stand conditions that would be expected in 2021 (i.e., stand age, forecast depletions, etc.). Natural depletions that had occurred since the 2007 aerial photography were added, as were other updates, such as field data from the SFL, values information from both the MNRF and SFL as well as historical and traditional management information. A detailed account of the inventory updates, which happen regularly during the planning process, is available in the Analysis Package.

The eFRI was missing information, such as stocking attributes, which forced some attributes to be calculated using associated attributes. . These generated statistics provided the data necessary for modelling, but the statistics tended to be conservatively set, which affected Yield Curve work andmade some processing, such as blending canopies, difficult to do. The additional processing added significant time to the project. However, considerable effort was made during the development of forest classification that relied on local professionals with the expertise to refine the eFRI products for use in planning. Significant differences were found in the composition of the land base from previous plans. For example, the new eFRI has a greater proportion of area in the tolerant hardwoods and white pine whose changes greatly influence management considerations.

Beech Bark Disease

The most significant disturbance affecting the Bancroft Minden Forest is beech bark disease (BBD). Damage from this disease has more recently rendered the entire beech component in the Bancroft Minden Forest as unhealthy/UGS (unacceptable growing stock). To begin with, beech is considered inferior due to its fine-grained characteristics compared to species of birch and maple that is often used for furniture and flooring. The Company has been conducting more salvage operations to stands affected by BBD. Freymond Lumber Mill in Bancroft has reported that over 95% of beech entering the yard is sorted as pulp with less than 5% of sawlog quality that can be put through the mill. The pulp is often so badly decayed that pulp mills will not accept it. In the North end of the forest, McRae Lumber Mill – who obtains a majority of their wood from the Algonquin Park forest – is observing beech with high levels of scale and fungus that increase annually, decreasing the amount of sawlog quality beech.

Not only does BBD continue to have a significant negative economic impact on wood supply, but also poses ecological issues. Extirpation of large American beech can lead to changes in the structure, composition, and function of forests within the management unit. Beech is an important mast producing species that is not easily replaced. Replacement species could include red oak, basswood, or black cherry; however, they are not as shade tolerant as beech and may not flourish in some of the areas where beech trees grow. A recommendation from the Year 7 Annual Report, prompted the creation of new Silvicultural Ground Rules (SGRs) to provide flexibility when managing BBD. It was the preferred option of the Company to consider all beech to be diseased and assume that every stand with a component of beech (>10% in inventory terms), should be placed in the irregular shelterwood system, where management approaches can best address it. In addition, BMFC has been treating understory beech regeneration where it is concentrated to prevent thickets from forming using chemical and mechanical techniques.

Irregular Shelterwood

As mentioned previously, irregular shelterwood has been formally recognized as the primary silviculture system used to manage hardwood (HDSH), hemlock (HESH) and lowland conifer (CESH) forest units. This is based on the Year 7 Annual Report and 2017 Independent Forest Audit. Irregular shelterwood is a form of uneven-aged shelterwood management that promotes diversity and creates conditions that are resilient and adaptable. It is also effective at managing stands affected by invasive pests and diseases like beech bark disease and hemlock woolly adelgid since it maintains irregular stand conditions, and focuses on promoting healthy vigorous species suited to the site, while increasing diversity and building resilience.

The need for irregular shelterwood arose when foresters noticed that many sites were understocked and of low quality or had a high proportion of within-stand diversity. For example, it is not uncommon to encounter a forested stand with more than 10 unique species in the overstory, each with their own unique silvics. These impoverished and diverse stands are often the consequences of selective logging in the late 1800s and early 1900s prior to the understanding of tree marking and sustainable silviculture. Because of highly variable harvest intensities and small-scale disturbances common to the region, stands in the Great Lakes St Lawrence region are commonly found to have an irregular stand structure. This has resulted in gaps in diameter distributions, making stands difficult to manage under the balanced uneven aged structure applied in selection system cuttings. Low harvest rates made it difficult to carry out logistically and economically. Therefore, a hybrid of group selection and uniform shelterwood (irregular shelterwood) was implemented to offer greater operational and ecological flexibility.

While irregular shelterwood has been practiced for many years on hardwood stands in the Bancroft Minden Forest, it has never been formally reported or described using the proper terminology and is novel to the modelling process. During the early stages of plan development, a lot of time was devoted to reworking the forest units and associated management assumptions to input into the model and develop new Silvicultural Ground Rules. By modelling much of the tolerant hardwood forest as irregular shelterwood, the FMP can more accurately describe current practice and track management decisions more accurately. Modelling changes have also allowed for greater clarity of forest structure and age in Cedar and Hemlock stands.

3.3 BASE MODEL

The base model is the starting point for the development of the LTMD. This model was developed with the aspatial Strategic Forest Management Model (SFMM) using a new planning inventory for the forest. The inventory was updated to account for stand conditions that would be expected in 2021 (i.e., stand age and forecast depletions). The base model includes a number of assumptions related to the landbase (ecological zones, land use decisions), forest dynamics (forest succession, growth and yield), available silviculture options, biological assumptions, and other model assumptions identified by the planning team and documented in the analysis package.

This model sets the foundation to perform strategic analysis for the management plan. The results must be consistent with science-based information to ensure that the model portrays an accurate representation of the current and future forest condition. Section 3 of the Analysis Package (Supplementary Documentation B) provides the details of the development of the base model inventory and base model.

3.3.1 ANALYSIS OF SILVICULTURAL ACTIVITIES

Past silvicultural activities were analyzed during the development of the enhanced Year 7 Annual Report and the trend analysis for the Independent Forest Audit in 2017. This involved a review of planned compared to actual renewal activities and expenditures, and their past performance (refer to next Section 3.3.2).

The analysis of past silvicultural activities also informed the development of yield curves. The MIST program was used to develop a yield curve for each silvicultural stratum, relying on empirical data. Yield curves with a beech component were created to help reflect the status of BBD in the forest as well. A complete summary of each growth and yield curve applied and the rationale for selecting the yield curve specifications can be found in Appendix 3 of the Analysis Package (Supplementary Documentation B).

The level of silviculture activities is greatly influenced by the level of harvest. Annual Reports from previous FMPs identify actual levels of harvest as being lower than planned. Nevertheless, silviculture activities are keeping pace with harvest levels.

Regeneration targets largely depend on the harvest of suitable forest units. Natural regeneration is the most significant component of the planned renewal program for the BMF, representing an average of 96% of total regeneration efforts. Artificial regeneration has accounted for a small proportion of overall renewal efforts, representing 4-9% depending on the term. Planting is the only form of artificial regeneration typically practiced in the forest, mainly used to regenerate white and red pine.

Site preparation activities have fluctuated over the past four terms, ranging from 15% of planned to 52% of planned. Lower than planned levels of site preparation are a direct result of lower than planned harvest and tree planting efforts. However, sufficient area has been treated to accommodate the planting of trees that required site preparation (primarily PWUS seed cuts). Mechanical site preparation is the primary method employed on the BMF. Chemical site preparation, conducted with a skidder-mounted ABS makes up the majority of the remaining area. Prescribed burning is generally not practiced as the cost of planning and implementation has made this treatment prohibitive.

Tending levels have also fluctuated over the past 4 terms, ranging from 37% of planned to 104% of planned. With the majority of tending operations applied as tolerant hardwood stand improvement. Cleaning is carried out mostly on white pine stands to reduce competition and ensure regeneration success is achieved. As white pine seedlings are sensitive to glyphosate, the site is sometimes chemically prepared prior to the seedlings being planted.

Surveys of regeneration success were and continue to be an important monitoring focus for BMFC. In general, clearcuts and seedcuts are the only areas where regeneration assessments are scheduled, and account for approximately 40% of the average annual area declared regenerated. Based on the Year 7 Annual Report, the Company has a silviculture success (i.e. stand regenerated to target forest unit) rate of 92% with the remaining 8% a regeneration success (i.e. stand sufficiently regenerated).

The 2017 Independent Forest Audit concluded that Forest Operations Prescriptions (FOPs) and their accompanied silviculture activities, in particular stand improvement, tending and thinning projects, were properly executed and effective. With a healthy balance in the Forest Renewal Trust and an effective renewal monitoring program in place, the only limiting factor for renewal treatment area is the actual harvest of suitable area or the need for follow-up treatment of existing plantations.

3.3.2 ANALYSIS OF PAST SILVICULTURAL PERFORMANCE

An analysis of past silvicultural performance was performed on historic Silviculture Effectiveness Monitoring (SEM) data from 2001-2017, which considers the results of past silvicultural treatments informed by silvicultural ground rules; assessment of regeneration results and the relationship between new forest classifications and historic records. This information provided default post-harvest succession rules which were then adjusted based on expert opinion with the rationale provided below to create FMP-5 (Post harvest renewal transition rules). Information from FMP-5 is used to inform the SFMM model on how the forest develops through applied silviculture.

The Plan forest unit definitions have evolved over the past forest management plan periods and are not always consistent with the 2021-2031 FMP forest units and their definition or in their aggregation via the Structured Query Language (SQL) sort order. This makes summarizing sixteen years of SEM data challenging because there have been three different FMP periods, each with their own set of forest unit classification systems. For ease of comparison and analysis, forest units from previous FMPs with similar species compositions were combined and re-labeled using the 2011-21 FMP forest unit names. The 2011-21 FMP forest units created the default post-harvest succession rules as they are informed by empirical data. Due to the changes in forest unit definitions and SQL sort order for the 2021-31 FMP, the default post-harvest succession rules were adjusted according to regeneration type.

Adjustment for forest units using primarily natural regeneration

HDSEL: SFMM is unable to transition selection PLANFUs to shelterwood or clearcut forest units. Therefore, the default transition rule (Table 10) has 100% of area harvested transitioning back to HDSEL.

Table 10. Default and adjusted post renewal transition rules for HDSEL.

	FMP Plan Period	**Proportion (%) of area transitioning to future forest unit**									
	2011-2021	HDSEL	INTCC	HDUS	PWUS	HESEL	ORUS	MXHCC	MXCCC	PRCC	CESEL
Default		**96%**	1%	2%	0.10%		0.10%	1%	0.10%		
	2021-2031	HDSEL	INTCC	HDSH	PWUS	HESH	ORUS	MXHCC	MXCCC	PRCC	CESH
Adjusted		**100%**									

HESH (formerly HESEL): Table 11 default succession rules show a small percentage of HESEL area that transitioned into INTCC and HDUS. This stems from a small area (63 ha) that was surveyed and declared Free to Grow where a salvage SGR was applied in an area of natural disturbance. Therefore, this is an anomaly and the area has been adjusted to reflect standard silviculture practice where hemlock dominated stands are managed to maintain themselves as hemlock dominated stands with 100% of area harvested transitioning back to HESH. This is consistent with the 2011-21 FMP.

Table 11. Default and adjusted post renewal transition rules for HESH.

	FMP Plan Period	Proportion (%) of area transitioning to future forest unit									
	2011-2021	HDSEL	INTCC	HDUS	PWUS	HESEL	ORUS	MXHCC	MXCCC	PRCC	CESEL
Default			7%	3%		**90%**					
	2021-2031	HDSEL	INTCC	HDSH	PWUS	HESH	ORUS	MXHCC	MXCCC	PRCC	CESH
Adjusted						**100%**					

HDSH: (Table 12) The area transitioning into MXHCC was only 1% in the past (default) and has been adjusted to 5% to account for stands with heavy beech composition where the newly created SGR (HDSH-MXHCC) is anticipated to be applied.

Table 12. Default and adjusted post renewal transition rules for HDSH.

	FMP Plan Period	Proportion (%) of area transitioning to future forest unit									
	2011-2021	HDSEL	INTCC	HDUS	PWUS	HESEL	ORUS	MXHCC	MXCCC	PRCC	CESEL
Default		5%		**93%**			1%	1%			
	2021-2031	HDSEL	INTCC	HDSH	PWUS	HESH	ORUS	MXHCC	MXCCC	PRCC	CESH
Adjusted				**95%**				5%			

ORUS: Red oak renewal efforts have been more successful in the recent past as knowledge has improved. Area transitioning back to ORUS was adjusted slightly to reflect this (Table 13). Other areas were adjusted for rounding and to remove outliers.

Table 13. Default and adjusted post renewal transition rules for ORUS.

	FMP Plan Period	Proportion (%) of area transitioning to future forest unit									
	2011-2021	HDSEL	INTCC	HDUS	PWUS	HESEL	ORUS	MXHCC	MXCCC	PRCC	CESEL
Default			5%	**15%**	4%	2%	**61%**	11%	1%		0.2%
	2021-2031	HDSEL	INTCC	HDSH	PWUS	HESH	ORUS	MXHCC	MXCCC	PRCC	CESH
Adjusted			5%	**15%**	5%		**65%**	10%			

Adjustments for forest units primarily using artificial regeneration

PRCC: This is the only PLANFU that relies primarily on artificial regeneration. Common practice has been to plant these stands with red pine or white pine. A slight adjustment was made for rounding (Table 14).

Table 14. Default and adjusted post renewal transition rules for PRCC.

	FMP Plan Period	Proportion (%) of area transitioning to future forest unit									
	2011-2021	HDSEL	INTCC	HDUS	PWUS	HESEL	ORUS	MXHCC	MXCCC	PRCC	CESEL
Default					13%					**87%**	
	2021-2031	HDSEL	INTCC	HDSH	PWUS	HESH	ORUS	MXHCC	MXCCC	PRCC	CESH
Adjusted					15%					**85%**	

Adjustments for forest unit regenerated with both natural and artificial regeneration

Table 16 shows the adjustments made to PLANFUs that use both artificial and natural regeneration and describes forest units using current (2021-31) FMP forest units. Analysis of SGRs was done for these forest units to separate those that apply artificial regeneration vs. natural regeneration and a weighted average was calculated where multiple SGRs with multiple targets were used. This information is represented in FMP-5. Areas highlighted illustrate where major adjustments have been made and are rationalized below.

Table 15. Default (total of all regeneration types) is from default table and natural and artificial proportions from analysis of SGRs (empirical data).

2021-31 Forest Unit	Type of Regeneration	Proportion (%) of area transitioning to future forest unit									
		HDSEL	**INTCC**	**HDSH**	**PWUS**	**HESH**	**ORUS**	**MXHCC**	**MXCCC**	**PRCC**	**CESH**
PWUS	Total	0.3%	14%	2.2%	70%	2.3%	2%	7%	0.2%	3%	
	Natural (20%)		28%	6.2%	55%		1.1%	8.2%	1.1%		
	Plant (80%)	0.4%	10%	1.5%	80%	2%	1.4%	4.3%			
INTCC	Total	1.1%	45%	20%	16%	0.1%	0.3%	7%	5%	5%	0.6%
	Natural (75%)	0.3%	74%	16%	0.5%	0.02%	0.3%	5%	3%	0.9%	0.1%
	Plant (25%)		14%		72%	0.1%	0.1%	9%	0.2%	5%	
MXHCC	Total	18%	3%	38%	6%	2%	1%	29%	1%	2%	
	Natural (98%)	12%	4%	39%	4%	1.2%	0.7%	36%	1.2%	2%	
	Plant (2%)				100%						
MXCCC	Total	1%	14%	6%	41%	1%		4%	14%	15%	3%
	Natural (35%)	4%	36%		22%	4%		6%	24%		4%
	Plant (65%)		1%	5%	58%				5%	27%	4%

Table 16. Adjustment to the default table (differences ≥ 5% are shown in red).

2021-31 Forest Unit	Type of Regeneration	Proportion (%) of area transitioning to future forest unit									
		HDSEL	INTCC	HDSH	PWUS	HESH	ORUS	MXHCC	MXCCC	PRCC	CESH
PWUS	Total		14%	2.5%	70%	2.5%	2%	2%	7%		
	Natural (20%)		28%	5%	55%		2%	2%	8%		
	Plant (80%)		10%	2%	80%	2%	2%		4%		
INTCC	Total		45%	20%	16%			7%	6%	6%	
	Natural (75%)		75%	15%				5%	5%		
	Plant (25%)		15%		70%			10%		5%	
MXHCC	Total	0%	5%	56%	6%			30%		3%	
	Natural (98%)	0%	5%	52%	5%			36%		2%	
	Plant (2%)				100%						
MXCCC	Total		15%	6%	41%	1.5%		4%	14%	15%	3.5%
	Natural (35%)		35%	5%	20%	5%		5%	25%		5%
	Plant (65%)			5%	60%				5%	25%	5%

PWUS: Salvage SGRs were not considered in the analysis because areas had a mixture of both natural and artificial regeneration. Table 15 shows a small amount of area transitioning to PRCC. This is attributed to the past application of salvage but is an uncommon treatment and therefore not considered. The MXCCC forest unit has been changed in this plan to include the Landscape Guide forest unit PWST (white pine seed tree) which was formally encompassed in MXHCC. As a result, area transitioning to MXCCC was increased and area transitioning to MXHCC decreases.

INTCC: No major adjustments were made. Only slight adjustments for rounding and to remove outliers.

MXHCC and MXCCC: Area transitioning to HDSEL was transferred to HDSH to adjust for SFMM limitations. Other slight adjustments were made for rounding and to remove outliers. A very small area (14 ha) was planted in MXHCC and successfully regenerated to the target white pine forest unit. In the absence of a more robust data set, the default has been set to 100% renewal for white pine.

In general post harvest transition rules are similar to the 2011 FMP. Only minor adjustments were made for rounding, outliers and SFMM limitations. Perhaps the most significant adjustment to the development of the 2021-2031 FMP was the inclusion of the PWST Landscape Guide forest unit in the MXCCC PLANFU. Continued improvement has been the mechanism by which the SFL has operated, therefore improvements to timing, methodology, and technology will continue to be made and re-evaluated when delivering silvicultural activities. During plan implementation, each applied SGR treatment package and resulting regenerated forest unit will continue to require verification from future survey data.

3.4 DESIRED FOREST AND BENEFITS

The Desired Forest and Benefits (DFB) meeting provides an opportunity for the District Manager, Plan Author, forest management planning team and local citizens committee to discuss the composition of the forest and the types of benefits to be derived from it and brainstorm goals and objectives to incorporate into the FMP. The DFB meeting for the 2021 Bancroft Minden FMP was held on May 13th, 2019. The meeting was well attended by members of the planning team, including Indigenous representatives and members of the Bancroft Minden Forest Local Citizens Committee.

Input from this meeting aided influenced the development of new objectives and their associated indicators and desired levels used in the 2021-2031 FMP-10: Assessment of Objective Achievement. Meeting participants were given an overview of the Bancroft Minden Forest, along with the previous plan objectives, indicators, and desired levels to help stimulate discussion about what the participants felt was important to carry over into the new plan, as objectives or other plan components. The participants were divided into three groups for discussions focused on **i) Operations and Silviculture**, **ii) Socio-Economics** and **iii) Forest Diversity and Ecological Sustainability.**

A total of 72 comments and recommendations were recorded. A follow up meeting was held between the MNRF District Forester, Plan Author and Regional FMP Specialist to review all the DFB input and determine what was in scope and out of scope of the FMP process. The input was then grouped into similar topics and relevance to various sections of the plan. Most comments (41) were considered in developing the FMP, either through constructing FMP objectives or elsewhere in the plan text. Major topics discussed include climate change, beech bark disease, First Nations, roads and road use management strategy, wood supply, monitoring, vegetation management, and strategic planning (Figure 18).

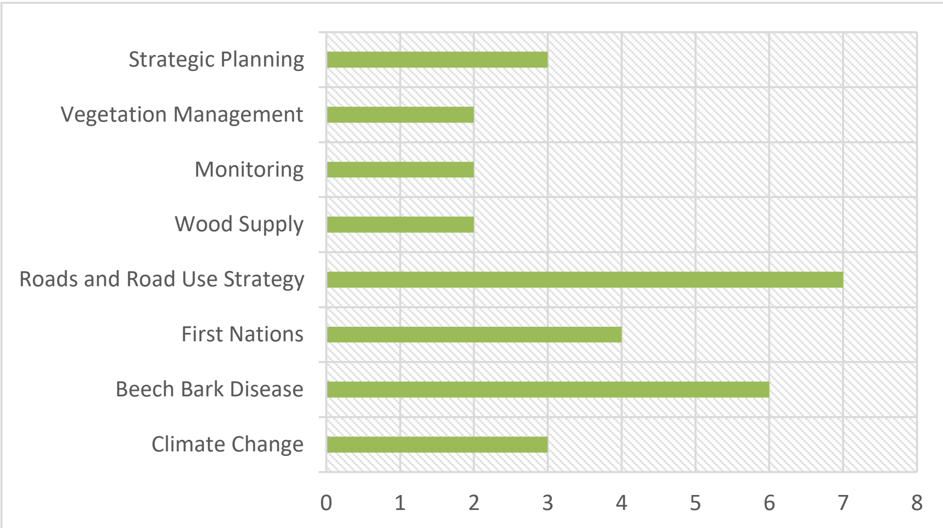


Figure 18. Summary of DFB comments.

As seen in Figure 18, there was a lot of discussion surrounding roads and road use strategy, beech bark disease and First Nations. There were comments from First Nation representatives that they wish to be involved and consulted in developing a road use strategy with priority given to road alternatives that pass-through Crown Land as opposed to private land. Others commented on the need for the strategy to provide clarity of language over terminology on roads decommissioning and associated roles and responsibilities. These comments were addressed during the development of road use strategies through Operational Planning.

As mentioned earlier in the plan text, beech bark disease has become a major threat to the Bancroft Minden Forest. Members from the DFB meeting stressed the importance of creating a long-term plan for managing and monitoring beech bark disease. In 2016 BMFC developed a beech bark disease strategy which has been updated yearly to stay abreast of the newest available science and information. In addition, BMFC has proposed to use irregular shelterwood as a silviculture tool to manage all stands in the forest that have a beech component (see Analysis Package Checkpoint 2, Section 2.3 for more information). The Company will also continue to apply for funding for beech tending treatments through the forestry futures trust.

The CFSA describes a mandatory objective to provide for First Nation involvement in FMP development. However, members of the DFB meeting felt that BMFC could improve their communication with local First Nations communities and include more Indigenous knowledge of the land during plan development and operations. Consequently, a new objective with two indicators has been created that considers First Nations communities.

The comments and outcomes from the Desired Forest and Benefits meeting influenced the development of new objectives and their associated indicators and desired levels for the management unit. Perspectives from the meeting also contributed to the decision to carry some objectives from the current plan forward. Five new objectives under two objective categories were considered by the planning team and included in the 2021-2031 FMP-10 table as follows:

CFSA Objective Category: Healthy forest ecosystems

a) In a changing climate, maintain or improve the ability to resist pests and pathogens.
b) Maintain or restore hydrology through the proper installation of water crossings.

CFSA Objective Categories: Social and economic – harvest levels and community well-being

c) To ensure that enough roads are in place to allow for effective and efficient forest operations while also limiting company and ministry liability for roads that are no longer required.

d) To minimize loss of Crown productive forest thereby maintaining harvest levels & related community well-being.

e) Identify, protect and share information about values of interest with local First Nation communities.

Some comments were not in scope (31) or were ultimately not appropriate for the development of objectives; however, many of these perspectives will be considered as principles and ideas for informing the development and/or implementation of the FMP. These include comments related to public education and communication, the economic feasibility of forestry, improved process for issuing approvals, MNRF values collection, tourism, land-use planning, AOC planning, government regulations for other industries, the Algonquin Land Claim, adaptive management, UMRAs, and roads. This input was summarized and sent as a letter to the Regional Director so that it could be responded to at the appropriate jurisdiction.

Supplementary Documentation J documents the participation in the desired forest and benefits process and documents the desired forest and benefits summary.

3.5 STRATEGIC MANAGEMENT ZONES

Strategic Management Zones (SMZs) are geographical areas within a management unit that provide spatial context when preparing the LTMD or planning proposed operations. SMZs reflect objectives unique to the forest management unit. The area that is now the Bancroft Minden Forest was once two distinct Crown Management Units, each with its own unique management plan: The Minden and the Bancroft Crown Management Unit. The Unanimous Shareholder Agreement which governs SFL business still recognizes the Minden and Bancroft Management Units respectively for the purpose of allocating shares and harvest area. For this reason, they have been selected as SMZs to inform the future spatial distribution of harvest area across the unit. While the SMZs were not explicitly described as an objective or indicator in FMP-10, the assessment of spatial distribution is useful to determine whether shareholder allotments of harvest area can be met in the short and long term.

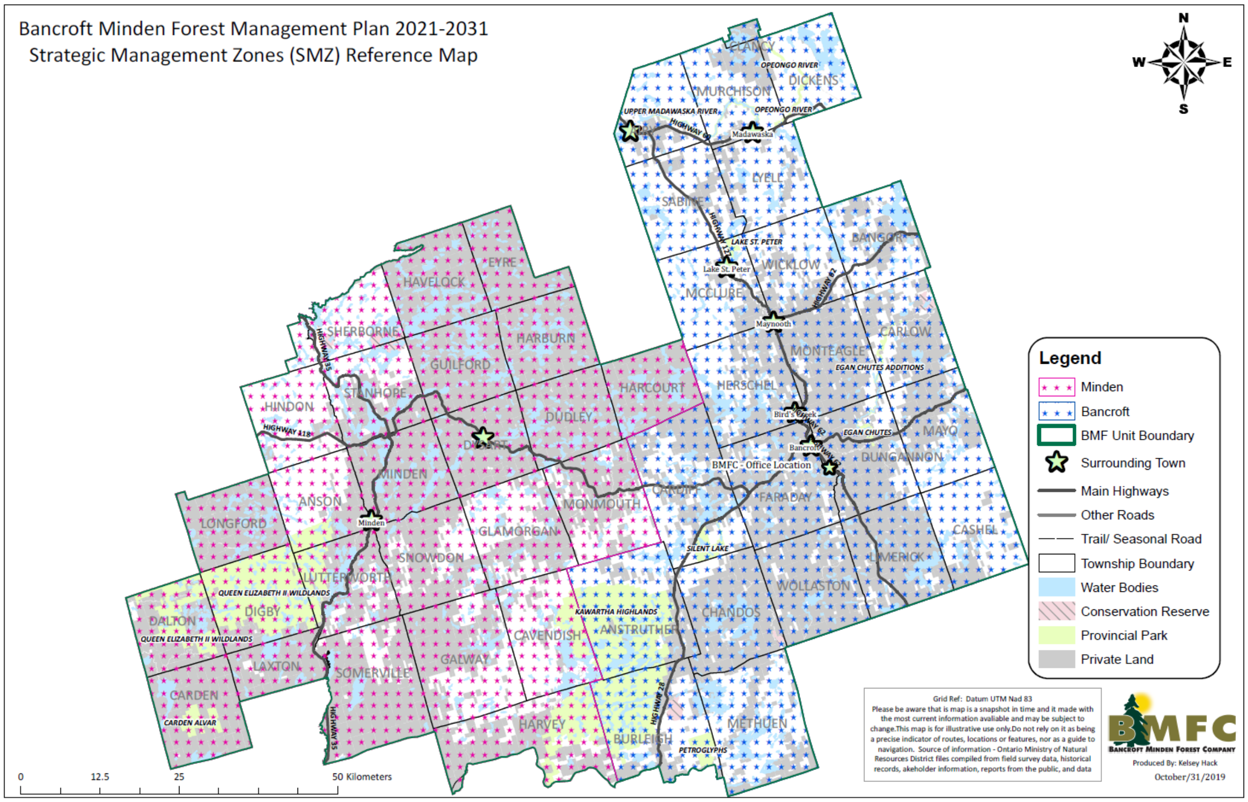


Figure 19. Map outlining the Strategic Management Zones.

3.6 OBJECTIVES AND INDICATORS

The Crown Forest Sustainability Act (CFSA 1994) requires that sustainability be determined at the management unit level in compliance with the FMPM. This means that forest management plans must include objectives and indicators that correspond with the sustainability of Crown forests. In Ontario, there are two guiding principles for the determination of sustainability: 1) large, healthy, diverse and productive Crown forests and their ecological processes and biological diversity should be conserved and 2) long term health and vigor of Crown forests should be provided for by using forest practices that emulate natural disturbances and landscape pattern while minimizing adverse effects. The purpose of creating management objectives is to establish a direction for the plan while considering a multitude of forest values. For each objective, there is at least one indicator that enables the assessment of objective achievement. In order for indicators to be measurable, each respectively includes a desirable level, target and timing of assessment.

Management objectives and indicators were developed based on input from the desired forest and benefits meeting; planning team discussions; findings from previous Independent Forest Audits; past forest management plans for the Bancroft Minden Forest; and the year seven enhanced Annual Report information. Objectives were also guided primarily by MNRF sources of direction (including Figure A-3) from the Forest Management Planning Manual for Ontario's Crown Forests (MNRF 2020), MNRF's available wood supply report and forest management guides, particularly the Forest Management Guide for the Great Lakes and St. Lawrence Landscapes (MNRF 2010), and the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (MNRF 2010).

There are 18 objectives, 98 indicators and desirable levels and over 200 targets outlined in this plan, all of which have been or will be assessed individually. The majority of these objectives are mandatory direction from the FMPM or the Landscape Guide (see Figure A-3 in the 2020 FMPM). Landscape Guide indicators achieve the CFSA objective categories of structure and composition, as well as pattern through 6 different indicator groups: landscape classes, old growth forest, red and white pine forest, young forest, young forest patch size, and texture of the mature and old forest. Specific targets for Landscape Guide indicators are developed using milestones identified in Table A9 of the Forest Management Guide for Great Lakes St-Lawrence Landscapes (2010). Often the plan start forest condition is drastically different than what is expected to occur naturally. It may not be possible to achieve the modelled conditions within the planning horizon. Therefore, milestone statements are used to estimate the achievable management trajectory for each Landscape Guide (LG) indicator. The milestones include directional statements (e.g. maintain, increase or decrease) from the present condition over the short (0-10 years), medium (0-20 years) and long term (0-100 years) to assess the performance of the LG indicators.

Other objectives and indicators are developed by the planning team. The planning team's review of management objectives from the 2011 FMP resulted in a reduction in the total number of objectives from 24 to 18. Six objectives were not carried forward because they were either deemed redundant or difficult to measure. As mentioned earlier, five new objectives under two objective categories were considered by the planning team and included in the 2021-2031 FMP-10 as an outcome of the Desired Forest and Benefits Meeting. Furthermore, a finding from the 2017 Independent Forest Audit has been incorporated into a new objective for delivering annual operator training.

The objectives and indicators are assessed at various times during the preparation and implementation of the FMP. Some objectives were assessed at the LTMD stage, some at the operational planning stage and draft plan and others will be assessed during plan implementation (Year 5 annual report) and after the FMP is concluded (Final-Year 10 annual report). Analysis and modelling tools are used to assess a variety of objectives and indicators during the development of the LTMD. More specifically, objectives and indicators that require measurement over medium- and long-term scales were assessed using the

Strategic Forest Management Model (SFMM). The Ontario Landscape Tool (OLT) was used to evaluate specific spatial and non-spatial indicators of landscape diversity at the start (2021) and end (2031) of the plan.

The spatial assessments during the LTMD overestimate harvest levels by using 120% of the available harvest area (AHA). This provides flexibility and diversity when planning the initial allocations and gives insight into how the refinement of allocations will impact objective achievement. Therefore, reassessment at Proposed Operations and Draft Plan submission may provide a different trend for the indicators, as it will assess the smaller and more representative set of harvest areas.

Other objectives are assessed during the development of the plan. These are objectives related to the effective participation of First Nation planning team members, along with the Local Citizens' Committee in forest management planning activities. Short term objectives (objectives to be accomplished within the 10-year plan), will be assessed during plan implementation through the use of compliance inspections. The desirable level for instances of non-compliance is set at 0%. While all forest companies strive for zero instances of non-compliance, it is acknowledged that individual circumstances arise where a standard may occasionally not be met. The target (<5%) has therefore been set low enough to ensure that the plan is being implemented to still achieve the overall objectives. These indicators will be tracked and monitored through the Annual Report and will be assessed during the implementation of the FMP, in Years 5 and 10 Annual Reports.

3.6.1 QUANTITATIVE OBJECTIVES

CFSA Objective Category: Forest Diversity – natural landscape pattern and distribution

Objective 1: To move towards a more natural forest landscape pattern and distribution.

This objective contains three indicators, all of which measure the spatial pattern of the forest and were assessed as part of the LTMD. The Landscape Guide is the source of direction for these indicators and the desirable levels associated with each. During the Long-term Management Direction, an assessment is carried out on preferred harvest areas to determine the movement relative to the Simulated Range of Natural Variation by concentrations. The target is to move towards the mean with areas allocated for harvest being operated by the end of Term 1. With only a 10-year window, changes are expected to be small. Indicators for this objective share the same timing of assessment and assessment methodology as follows:

Timing of Assessment: Preliminary assessment at LTMD, assessment at completion of operational planning and the Year 5 and Final Year Annual Reports.

How to Measure: Spatial assessment in OLT

Indicator 1.1 & 1.2: Texture of Mature and Old Forest (50 ha and 500 ha)

The Texture of Mature and Old Forest is measured at two scales for the GLSL South region: 50 hectares and 500 hectares. These scales were chosen based on the sizes of observed and simulated natural disturbances and landscape patterns. Because the current age structure consists mostly of mature forest, Texture of Mature and Old Forest is overrepresented at plan start for both scales. The greatest concentrations of mature forest are focused in the southern and western parts of the forest due to low utilization (west) and wildlife reserve areas (south).

Desirable Level: To have the landscape pattern move toward the mean (SRNV) of each mature and old forest texture pattern through each concentration class projections as recorded in OLT.

Table 17: Desirable Level and Target for Texture of Mature and Old Forest at 50 & 500 Ha Scales

Analysis Scale	50 Ha Assessment Level		500 Ha Assessment Level	
	Plan Start Level	Desirable Level	Plan Start Level	Desirable Level
.01 - .2.0	1.5%	1.0%	0.0%	0.0%
.21 - .40	3.5%	6.0%	0.5%	2.0%
.41 - .60	6.4%	17.0%	5.3%	16.0%
.61 - .80	12.3%	29.0%	18.5%	43.0%
>.08	76.3%	46.0%	75.8%	39.0%

Indicator 1.3: Young Forest Patch Distribution

Young forest is defined as being less than 35 years of age, as described in the Landscape Guide. Disturbance patches that create young forest are assessed according to broad patch size groupings described in the Landscape Guide. These size groupings include: 1-100 hectares, 101-250 hectares, 251-500 hectares, 501-1000 hectares, 1001-2500 and 2501-5000 hectares. Landscape Guide direction is to increase the representation of medium and large patch sizes and reduce the representation of small patches.

Table 18: Desirable Level and Target for Young Forest Patch Distribution

Analysis Scale	Plan Start Level (% of Young Forest Patches)	Desirable Level
1 – 100 ha	73.4%	87.0%
101 – 250 ha	23.2%	10.0%
241 – 500 ha	3.5%	2.0%
501 – 1,000 ha	0.0%	1.0%
1,001 – 2,500 ha	0.0%	0.0%
2,501 – 5,000 ha	0.0%	0.0%

The ability to meet these targets is highly dependent on the area available for harvest and the silviculture systems used. As mentioned earlier, over half of the area within the BMF is private land. In addition, parks, conservation areas and other reserves are excluded from harvest making it impossible to create young forest in these areas through forest management activities. The impact of selection harvesting is not reflected in the young forest patches metric, further fragmenting harvest blocks into smaller patches. While only 24% of the available landbase is managed under the clearcut system, the planning team is further constrained by social pressure not to create the large cut areas required to meet these targets.

CFSA Objective Category: Forest Diversity – forest structure, composition and abundance

Objective 2: To move towards a more natural forest landscape structure, composition and abundance.

The indicators related to this objective are all non-spatial and based on science documented in the Landscape Guide. Landscape classes, old growth forest area, red and white pine forest area, and young forest conditions fall under this objective. Milestones, by management unit, for each Landscape Guide indicator are used to provide a directional statement (e.g. maintain, increase or decrease) from the present condition over the short (0-10 years), medium (0-20 years) and long term (0-100 years). Measurable targets are developed from the milestones based on the simulated range of natural variation for each indicator.

Indicators for this objective share the same timing of assessment as follows:

Timing of Assessment: Preliminary assessment at LTMD, assessment at completion of operational planning and the Year 5 and Final Year Annual Reports. The assessment methodology differs. Landscape Class, Old Growth and White and Red Pine objectives are aspatial and measured in SFMM based on the OPI.

Indicator 2.1: Landscape Class

These are non-spatial indicators that represent area of mature, late, two-story and uneven-aged development stages in all productive Crown forest. The Landscape Guide provides the source of direction for establishing desirable levels and targets for these indicators. There are six Landscape Classes of grouped Landscape Guide Forest Units (LGFUs). Plan start levels for all landscape classes remain outside of the SRNV. Because of this scale of imbalance, desirable levels are challenging to meet. Intolerant Hardwood (INTOL) is the only landscape class capable of achieving the desirable level. However, all landscape classes are able to meet their targets during either the short, medium and/or long terms.

Table 19: Desirable Level and Target for Landscape Class indicators

Landscape Class	Plan Start Level Area (ha)	SRNV	Target
Tolerant Hardwood (TOL)	127,695	54,576 – 61,804	Decrease towards SRNV
Intolerant Hardwood (INTOL)	30,760	6,068 – 12,176	Decrease & Maintain in SRNV
White Pine Mixedwood (PWMIX)	33,176	81,788 – 95,000	Increase towards SRNV
Mixedwood (MIXED)	64,105	30,660 – 39,072	Decrease towards SRNV

Mixed Pines (MXPRJ)	7,518	24,720 – 31,816	Increase towards SRNV
Spruce-fir-cedar (SFC)	11,440	17,524 – 24,952	Increase & Maintain in SRNV

Indicator 2.2: Old Growth

Old growth forest is represented in the model by the "late" seral stage in even-aged productive Crown Forest and are derived from Plan Forest Units (PLANFUs). The Landscape Guide provides the source of direction for establishing desirable levels and targets for these indicators. Area remains in a state of old growth until harvesting or natural succession occurs, after which time the area can re-enter a state of old growth once it reaches the age of onset as described in the landscape guide. Selection forest units do not have associated old growth, due to their uneven age class they are considered in the inventory as "all-aged" and have old growth characteristics that are managed appropriately through on-the-ground considerations by applying principles from Section 4.2.5 of the Ontario Tree Marking Guide (2004).

Table 20: Desirable Level and Target for Old Growth Indicators

Old Growth Indicator	Plan Start Level Area (ha)	SRNV	Target
PWUS	5,772	17,032 – 27,340	Increase towards SRNV
PRCC	397	892 – 1,660	Increase towards SRNV
MXCCC	2,893	2,716 – 7,524	Maintain within SRNV
CESH	1,849	3,380 – 5,436	Increase towards SRNV
MXHCC	5,906	1,632 – 4,080	Decrease towards SRNV
HESH	752	3,620 – 5,420	Increase towards SRNV
HDSH	3,737	14,896 – 21,048	Increase towards SRNV
ORUS	1,100	2,184 – 3,148	Increase towards SRNV
INTCC	7,066	2180 – 4,388	Decrease towards SRNV

Indicator 2.3: White and Red Pine (PWR)

The white and red pine measure address two indicators: 1) the Landscape Guide requirement to achieve and maintain a natural level of red and white pine across the forested landscape and 2) the 1995 PWR Conservation Strategy mandate to maintain the 1995 level of red and white pine forest area. Both of these measures are required by the Old Growth Policy (2003). The upper and lower limits are based on the Landscape Guide SRNV, while the second criterion aims to keep the area above the 1995 threshold of 39,786 hectares.

Table 21:Desirable Level and Target for Red and White Pine Indicators

PWR Indicator	Plan Start Level	Desirable Level	Target
White & Red Pine SRNV	50,511	128,388 – 144,848	Increase towards SRNV
1995 Levels		>= 39,786	Remain above 1995 level

Indicator 2.4: Young Forest

Young forest area achievement is near the end of the recommended order of priority application and is considered secondary to other objectives. Two types of young forest are included in this indicator: 1) the pre-sapling development stage of all forest units (PRESAP) and 2) the pre-sapling, sapling and T-stage of all forest units combined (PSST).

Table 22: Desirable Level and Target for Young Forest Indicators

Assessment Scale	Plan start Level	Desirable Level	Target
Pre-sapling development stage	7,050	2,972 – 17, 116	Maintain within SRNV
Pre-sapling, Sapling & T-stage development stages combined	18, 954	25,712 – 56,392	Increase & Maintain within SRNV

CFSA Objective Category: Forest Diversity – habitat for animal life/ values dependent on forest cover

Objective 3: Within the identified Moose Emphasis Areas, manage the productive forest, according to provincial direction (Stand and Site Guide).

Four MEAs are identified on the BMF and are assessed using three habitat indicators; browse (young forest), mature conifer, and hardwood/mixedwood forest. These indicators are referred to as the "Big 3" and result from Stand and Site Guide direction. The "Big 3" indicators measuring moose habitat within the Moose Emphasis Area (MEA) were assessed in Ontario Landscape Tool (OLT) based on the planning inventory and will be evaluated for plan start and plan end assessing the impact of the proposed allocations. The target is to move towards an ideal composition and the Stand and Site Guide provides the desirable levels and targets for these habitat indicators.

Indicators for this objective share the same timing of assessment as follows:

Timing of Assessment: Preliminary assessment at LTMD, assessment at completion of operational planning and the Year 5 and Final Year Annual Reports.

How to Measure: Using OLT and OPI

Indicator 3.1: Percent of MEA in browse-producing habitat

This indicator measures the amount of area that is young browse-producing habitat, defined as stands <35 years old and <10 m tall; or stands that have received a selection cut within 10 years or a shelterwood regeneration cut within 20 years. Cashel, Hindon, and Kawartha MEAs are below the target range for browse-producing forest at plan start. South Algonquin is the only MEA that remains within the target at plan start.

Table 23: Desirable Level and Target for browse-producing habitat in MEAs

MEA	Plan Start Level	Desirable Level	Target
South Algonquin	10.8%	5 – 30%	Maintain within the desirable level
Hindon	1.8%		Increase towards the desirable level
Kawartha	3.1%		Increase towards the desirable level
Cashel	0.5%		Increase towards the desirable level

Indicator 3.2: Percent of MEA in mature conifer-dominated forest

This indicator measures forest that is conifer-dominated (HESH, CESH, PWUS, MXCCC) in the mature or old/late development stage. Cashel, Hindon and Kawartha MEAs are within the target range for mature conifer-dominated forest at plan start, whereas the South Algonquin MEA starts below target range.

Table 24: Desirable Level and Target for mature conifer-dominated forest in MEAs

MEA	Plan Start Level	Desirable Level	Target
South Algonquin	7.8%	15 – 35%	Increase towards the desirable level
Hindon	27.6%		Maintain within the desirable level
Kawartha	21.6%		Maintain within the desirable level
Cashel	23.5%		Maintain within the desirable level

Indicator 3.3: Percent of MEA in hardwood-dominated or mixedwood forest

This indicator measures forest that is hardwood-dominated or mixedwood forest (HDSH, HDSEL, INTCC, MXHCC) ≥35 years old or ≥10 m tall, or has recently received a partial harvest that meets the definition of residual forest. All MEAs begin above the target range for hardwood forest at plan start and plan end.

Table 25: Desirable Level and Target for mature conifer-dominated forest in MEAs

MEA	Plan Start Level	Desirable Level	Target
South Algonquin	62.4%	20 – 55%	Decrease towards the desirable level
Hindon	67.3%		Decrease towards the desirable level
Kawartha	67.3%		Decrease towards the desirable level
Cashel	72.0%		Decrease towards the desirable level

Objective 4: Within the identified Deer Wintering Areas (deer yards stratum 1), maintain or create critical thermal cover (CTC), where possible, according to provincial direction (Stand and Site Guide).

There are two deer yards mapped on the Bancroft Minden Forest with sufficient crown forest management activities to affect habitat; Baptiste and Mephisto. Critical thermal cover (CTC) was assessed using OLT and OWHAM analysis of carrying capacity and determines the desirable levels and targets. The desirable level for both Baptists and Mephisto is 15% and the target is move towards this level.

Indicators for this objective share the same timing of assessment as follows:

Timing of Assessment: Preliminary assessment at LTMD, assessment at completion of operational planning and the Year 5 and Final Year Annual Reports.

How to Measure: Using OPI

Indicator 4.1: Percent of Critical Thermal Cover

Critical thermal cover (CTC) within for both DEAs starts below desired level at plan start. More specifically, the Baptiste deer yard only achieves 2.2% of CTC at plan start. Fortunately the Mephisto deer yard sits just below the target at 12.7%.

Table 26: Desirable Level and Critical Thermal Cover (CTC) in Stratum 1 Deer Yards

Deer Yard	Plan Start Level	% CTC Threshold	Target
Mephisto	12.7%	15%	Increase towards CTC Threshold
Baptiste	2.2%		

Objective 5: Protect the habitat of forest dependent species at risk with known occurrences on the Bancroft Minden Forest.

This objective stems from an FMPM (2020) requirement and is assessed for the Year-5 Management Unit Annual Report and the Annual Report for the final year of plan implementation. However, no reliable models currently exist to measure any species at risk habitat. The District MNRF surveys for species at risk and protection are implemented via Area of Concern prescriptions.

Indicator 5.1: Compliance reports through Forest Operations Inspection Program (FOIP)

Since the protection of species at risk (SAR) habitat is implemented operationally, it was decided that compliance with SAR Area of Concern prescriptions would serve as a measure of protection. The desired level is to have zero non-compliance incidents in SAR areas of concern. We acknowledge that operational mistakes may arise, therefore the target is to have less than 5% non-compliance reports for SAR. These desired levels and targets were set by the planning team.

CFSA Objective Category: Silviculture

Objective 6: To ensure the successful renewal of harvested stands (naturally or artificially) to the most silviculturally appropriate species and tended until establishment or management standards are met, using the most appropriate and cost-effective methods to achieve.

This objective is associated with mandatory indicators from the *Forest Management Planning Manual (2020)*. The achievement of these forest renewal indicators will demonstrate that the silvicultural strategies implemented in the FMP (Section 4.2.2 & FMP-4) are on track to achieve the desired future forest condition as projected in the LTMD. These silvicultural strategies include treatments that move towards achievement of objective indicators for forest composition, age and landscape pattern, as well as sustainable achievement of socio-economic indicators in the future.

All three indicators under this objective share the same timing of assessment (Year 5 and Year 10 annual reports). None have plan start levels because they are new standards for the 2021 FMP. The desirable levels and target levels were set by the planning team.

Indicator 6.1: Percent of harvest area assessed as successfully established by forest unit

This indicator measures the success of harvest and renewal treatments in achieving the planned future forest. The desirable level and target is to achieve 100% of the area harvested successfully established by forest unit. This target was set to reflect that all stands are expected to be successfully regenerated to an acceptable forest unit (as defined by FMP-4: Silvicultural Ground Rules). This indicator will be assessed based on establishment surveys that occur post-harvest.

Indicator 6.2: Planned and actual percent of harvest area treated by silvicultural strata (clearcut)

Treatment types are identified as Natural, Plant and Seed with a desired level of 100% of planned. The target level is 80% of the actual area treated. It is important that renewal treatment efforts match the level of intensity projected by the LTMD. However, variation in chosen broad renewal treatments may be acceptable if similar results can be achieved through less intensive or less costly methods. Similarly, renewal treatments may be altered in areas that require more intensive treatments to achieve desirable results.

Indicator 6.3: Planned and actual area successfully regenerated to the target forest unit by forest unit

While the regeneration success of established stands is expected, there may be some areas that regenerate to forest units other than those originally planned. This indicator is a measure of silvicultural success and planning assumptions. The desirable level is to have 100% of the actual harvested area successfully established to the target forest unit. It is recognized that not all harvest areas will be regenerated “as planned” therefore the target level has been set to ≥80%. Instances where area is not successfully regenerated to the target forest unit may still result in acceptable future forest conditions that are consistent with the strategic post-harvest renewal transitions (FMP-5) in the LTMD. Lower achievement does not mean that the forest is not being regenerated effectively, but it does reflect the change in forest units on certain sites through time. This indicator will be assessed at Years 5 and 10 Annual Reports.

CFSA Objective Category: Social and economic – harvest levels and community well-being

Objective 7: Provide a sustainable, continuous and predictable wood supply from the forest that will meet, as closely as possible and for as long as possible, the current recognized industrial demand of the forest.

The purpose of this objective is to protect the future local forest economy by ensuring a constant amount of wood fibre is harvested from the forest. This ultimately continues the economic benefits that local communities experience through the extraction and utilization of wood fibre. Overall, continuous and predictable flow of wood fibre allows a stable supply of wood products. Available harvest volume was projected by SFMM as the annual harvest that could be sustained while meeting all other plan objectives. All three associated indicators were informed through scoping analysis and assessed as part of the LTMD.

Indicator 7.1: Long-Term Projected Available Harvest Volume (m^3/year), by species group

This indicator specifically looks at the major species groups that are harvested and which contribute to the total timber yield. They include White and Red Pine (PWR), Spruce-pine-fir (SPF), Other Conifer (OC), Poplar (PO), White Birch (BW) and Tolerant Hardwood (TOL). The BMF has a long history of forest management and timber yield that is valuable to mills that rely on nearby wood supply. The forest has been harvested consistently, therefore; it is fundamental to maintain timber yields that maximize harvest volumes at a limit that is sustainable while taking into consideration other forest values.

The desired level is to provide a harvest level greater than or equal to the Industrial Wood Requirements for all species groups for each term during the 100-year planning horizon. The Industrial Wood Requirements (IWR) developed for the 2021-2031 FMP are based on existing wood supply commitments and current mill business plans and were used to set the desirable levels for the objective. The target of this indicator is to meet 100% or greater of the IWR for all species groups for each term (100 years) while balancing social, environmental and economic objectives.

Table 27: Desirable Level and Targets for Long Term Projected Harvest Volume by Species Group

Species Group	Plan Start Level (m^3)	Desirable Level/IWR	Target
PWR	61,158	>= 25,600	Meet 100% of IWR
SPF	28,675	>= 5,250	Meet 100% of IWR
OC	6,219	>= 1,000	Meet 100% of IWR
Po	85,937	>= 60,000	Meet 100% of IWR
Bw	15,273	>= 1,500	Meet 100% of IWR
Tolerant Hwd	67,739	>= 64,000	Meet 100% of IWR
Total	265,000	>= 157,000	Meet 100% of IWR

The Industrial Wood Requirements by species group are met in the short, medium and long term for all species groups.

Indicator 7.2: Long-Term Projected Available Harvest Volume (m^3/year), by product group

Product groups are used as a more generalized category (e.g. sawlog, pulp and composite), to better represent volume utilization by destination. Species accepted by mill are dependent on the end product(s) produced. In order to fulfill existing wood supply commitments to mills, the desired level and target is to meet 100% of the Industrial Wood Requirement by product for each term.

Table 28: Desirable Level and Targets for Long Term Projected Harvest Volume by Product Group

Product Group	Plan Start Level (m^3)	Desirable Level/IWR	Target
PWR Sawlogs	52,475	>= 20,000	Meet 100% of IWR
Hwd, Bw & Po Sawlogs	82,513	>= 50,000	Meet 100% of IWR
Total Sawlogs & Better	155,783	>= 70,000	Meet 100% of IWR
Total Pulp & Composite	109,217	>= 50,000	Meet 100% of IWR

Indicator 7.3: Long-Term Projected Available Harvest Area (ha), by forest unit

While it may be impossible to predict market demand, we can help protect the long-term sustainability of the local forest economy by providing adequate harvest area. The desired level is to provide a harvest area mix greater than or equal to the expected industrial demand for all species groups in the short, medium and long term that does not vary significantly between terms. The target is to provide a harvest area mix that meets the expected industrial demand for all species groups in the short, medium and long term and does not vary by more than +/- 25% between terms.

Table 29: Long-Term Projected Available Harvest Area (ha) by forest unit

Forest Unit	Hectares (ha)
HDSH	1,151
HDSEL	648
INTCC	400
PWUS	232
ORUS	221
MXHCC	200
MXCCC	150
HESH	90
PRCC	56
CESH	6
Total All	3,153

Objective 8: Harvest a sustainable and continuous wood supply from the forest that will meet the current recognized industrial demand of the forest.

These indicators are not part of the LTMD; they will be assessed at Years 5 and 10 Annual Reports. Planned harvest area and volumes are the results of analyses of planned allocations, those that are mapped as harvest blocks in this plan.

Indicator 8.1: Actual harvest area, by forest unit (% of planned harvest area)

This indicator will compare the area that is actually harvested through plan implementation with the planned harvest area. The desired level and target is for the actual harvest area to be more than 85% of the planned harvest area (as defined in FMP-12) by forest unit for the 2021-2031 term. The desired level was carried over from the 2011 FMP and accepted by the planning team.

Indicator 8.2: Actual harvest volume, by species group (% of planned harvest volume)

This indicator will compare the volume that is actually harvested through plan implementation with the planned harvest volume. The desired level and target is for the actual harvest volume to be more than 85% of the planned harvest volume (As defined in FMP-13) by forest unit for the 2021-2031 term. The desired level was carried over from the 2011 FMP and accepted by the planning team.

Objective 9: To minimize loss of Crown productive forest to infrastructure development thereby maintaining harvest levels and related community well-being.

Indicator 9.1: Managed Crown forest area available for timber production

This indicator stems from an FMPM (2020) requirement to limit losses of productive forest to permanent access structures (roads, landings and aggregate pits). The desired level and target is to have less than 2% of production forest area harvested used for roads, landings and aggregate pits by the end of Term 1 as set by the planning team. The plan start level for this indicator is 219,538 hectares. This will be assessed at Years 5 and 10 Annual Reports.

CFSA Objective Category: Healthy Forest Ecosystems

Objective 10: Continually improve forest management operations in the Bancroft Minden Forest and increase knowledge of ecosystem processes and human interactions with forest ecosystems.

Indicator 10.1: Percent of forest operation inspections in non-compliance by activity and remedy type

The Bancroft Minden Forest provides important ecosystem service values. These values can be negatively affected by forest operations; therefore this objective includes another compliance-based-indicator. The desired level is to have zero non-compliance reports in total. The target is to have less than 5% non-compliance reports. Again, this was set by the planning team in recognition that although major issues should be avoidable, accidents do happen. It would be unrealistic to expect no issues whatsoever over a 10-year period. This indicator will be assessed at Years 5 and 10 Annual Reports based on a summary of FOIP reports in the plan period.

Objective 11: In a changing climate, maintain or improve the ability of forests to resist pests and pathogens.

Indicator 11.1: Communication with forest operators to ensure new information on science and process is disseminated to be applied in the field.

Climate change was an important topic of discussion during the DFB meeting. It has the potential to impact many facets of forest management and is therefore challenging to pinpoint into one specific indicator. Therefore, this indicator has been created to ensure the latest emerging science and research is effectively communicated to our operators and contractors. This is accomplished through formal bi-annual training sessions to relay new information and adaptive management strategies to operators and contractors who work on the management unit. This indicator will be assessed at Years 5 and 10 Annual Reports.

Objective 12: To protect the productive capacity of the soil and water in the management unit.

Indicator 12.1: Rate of non-compliance for site disturbance/rutting

Section 4.2.2.2 describes the conditions on regular operations, with specific direction on thresholds of site damage and rutting. Any incidents of non-compliance associated with damage exceeding these standards would be reported in FOIP. The desired level is to have no incidences of non-compliance as a result of forest management activities causing site damage and loss of forest productivity. Similar to other compliance-based indicators, the target is to have less than 5% incidences of non-compliance and will be assessed during the Year 5 and Year 10 annual reports. These rates were set by the planning team.

Objective 13: Conserve the quality and quantity of interior waterways, wetlands and catchment areas within the Bancroft Minden forest management areas.

Indicator 13.1: Compliance with prescriptions developed for the protection of water quality and fish habitat

FMP-11 describes the Area of Concern prescriptions for working around water features including lakes, streams and provincially significant wetlands. Any incidents of non-compliance associated with forestry activities that are not authorized in the AOC prescription would be reported in FOIP. The desired level is to have no incidences of non-compliance as a result of forest management activities causing site damage and degraded water quality. The target is to have less than 5% incidences of non-compliance with AOC prescriptions for the protection of water quality and fish habitat and will be assessed during the Year 5 and Year 10 annual reports. These rates were set by the planning team.

Objective 14: Maintain or restore hydrology through the proper installation of water crossings.

Indicator 14.1: Compliance with water crossing protocol and installation and removal of water crossings

A basic compliance monitoring objective is set to encourage continuous improvement in the quality of operations on the forest. Recommendations from the Desired Forest and Benefits meeting were used to develop this objective and its desirable levels/targets. Proper installation and decommissioning of water crossings is paramount to protect water quality and fish habitat. The % of inspections in non-compliance related to water crossings is used as the indicator. The target is to have less than 5% incidences of non-compliance related to installation and removal of water crossings and will be assessed during the Year 5 and Year 10 annual reports.

Objective 15: To ensure that enough roads are in place to allow for effective and efficient forest operations while also limiting company and ministry liability for roads that are no longer required.

Indicator 15.1: Kilometres of Primary/Branch road (all ownership/responsibility) per square kilometre of Forested Managed Crown Land

Primary and Branch Road infrastructure provides access to allocated harvest areas, silvicultural treatment areas, and recreational areas and is critical to the successful implementation of the FMP. However, increased road construction can have negative environmental impacts. This indicator evaluates the kilometres of passable (i.e. with a 4x4 vehicle) primary and branch road (all ownership responsibility) per square kilometre of forested managed Crown Land. The following calculation was used to determine the plan start road density:

1. Km of Road
   Description: All Primary and Branch Roads on the Bancroft Minden Forest Unit.
   Source: List of Roads Eligible for Provincial Roads Funding (found in Beneficiary agreement with Forest Industry Division, updated 2020)
   TOTAL LENGTH (km): 672.7 km
2. Km^2 of Crown Land
   Description: Subtotal of Forested Managed Crown Land.
   Source: FMP-1 Management Unit Land Summary (Subtotal of Forested)
   TOTAL AREA (ha converted to km^2): 289007 ha = 2890.07 km^2
3. Final Calculation: Total Length of Road (km) / Total Area of Crown Land (km^2)
   672.7 km/ 2890km^2 = **0.23**

As per planning team direction it is desirable to have road density consistent with plan start levels, but the target is to have less than a 5% increase in plan term. This indicator will be assessed during the Year 5 and Year 10 annual reports.

Indicator 15.2: Percent of upgraded or new operational roads decommissioned after operations are complete

The second roads indicator deals with the abandonment of operational roads and has been carried over from the 2011-2021 FMP. The target and standard practice are to decommission all roads with the exception of those left intentionally to accommodate other forest users. This indicator will be assessed during the Year 5 and Year 10 annual reports.

Objective 16: To encourage and support the participation of the Local Citizens Committee in the development of the Forest Management Plan for the Bancroft Minden Forest

Indicator 16.1: Local Citizens Committee's self-evaluation of its effectiveness in plan development

At the time of draft plan completion, the LCC had 10 members representing a range of affiliations including forest industry, First Nations, naturalists, recreationalists, trappers and municipal government. The LCC met almost monthly from early 2019 until final plan submission and were kept informed and consulted regularly during the planning process. This objective is measured at the time of draft plan submission with a desirable level of maintaining a score at or above the level achieved for the 2011-2021 FMP, as per planning team direction. The LCCs self-evaluation of its effectiveness in plan development for the 2011-2021 FMP was rated 8.6 out of 10, providing the target to strive for. The LCC Report in Supplementary Document K provides detail on participation, issues addressed and assessment of effectiveness.

3.6.2 QUALITATIVE OBJECTIVES

CFSA Objective Category: Social and economic – harvest and community well-being

Objective 17: To provide opportunities for Indigenous involvement in forest management planning activities.

Indicator 17.1: Opportunities for involvement of First Nation and Métis communities in plan development

The involvement of Indigenous communities is critical to developing successful outcomes in the planning process. This objective was developed to ensure there is effective involvement of First Nation and Métis communities in the plan development including, but not limited to, participation on the planning team, Aboriginal working group, community meetings, development of the Aboriginal Values Information Report, and development of AOCs for the protection of Indigenous values. The FMPM is the source of direction on timelines.

Objective 18: Identify, protect and share information about values of interest with local First Nation communities.

This is a new objective with two new indicators that have evolved from the Desired Forest and Benefits meeting to consider First Nation community values. It will be assessed by discussing the work that is done during plan implementation in developing and using a process for sharing information with First

Nation communities, associated with values identified in the Aboriginal Background Information Reports.

Indicator 18.1: Offer and deliver upon request a presentation on annual operations to interested First Nation communities to keep them informed on annual activities and seek input on values

The desired level and target for this indicator is to deliver presentations annually to all interested communities who have made the request.

Indicator 18.2: Train Operators and Contractors on identification of First Nation values of interest so they can recognize them during operations and relay information back to communities and ensure protective measures are taken

The desired level and target for this indicator is to deliver training or updates at bi-annual operator training depending on desired participation from First nation communities and availability of instructors.

3.7 LONG-TERM MANAGEMENT DIRECTION

Strategic modelling projects how the forest develops over time, in terms of its structure and composition in response to different types and levels of forest management activities. Strategic modelling was conducted as part of the Proposed Long-term Management Direction (LTMD) that received preliminary endorsement by the Regional Director on November 30th, 2020. Projections over a time period of 150 years were used to demonstrate that the effects of the projected forest management activities in the proposed LTMD for the period of the FMP provide sustainable levels of forest management activities in the future.

The Strategic Forest Management Model (SFMM) was used as the primary analysis tool for the strategic planning of this FMP. SFMM is a non-spatial model based on linear programming techniques designed to represent large, forested areas and project forest conditions and management actions through time. It is a tool that enables us to test our forest management activities for sustainability and determines the types and levels of harvest that can be carried out while meeting other non-timber plan objectives. The development of the model is a complex process that takes years of effort from a multi-disciplinary team. The Analysis Package outlines the process of developing the model in detail and documents the decisions made at each stage by the planning team regarding the models inputs, parameters, constraints that define the model's development. The key outputs are summarized in tables:

a) FMP-2: Describes the forest units for the 2021-2031 FMP
b) FMP-6: Describes the forest condition for the Crown productive forest
c) FMP-7: Describes habitat for selected wildlife species
d) FMP-8: Summarizes the available harvest area by forest unit and 20-year projections

e) FMP-9: Summarizes the estimated available harvest volume (for 10-year periods) by 20-year projections
f) FMP-10: Summarizes management objectives, indicators and targets and includes an assessment of achievement for each objective that can be assessed during the development of the LTMD

These outputs project the likely outcomes of the FMP. The resulting harvest schedule defines the locations, types and levels of harvesting, renewal and tending activities required to create those outcomes. The harvest schedule is then used to inform the allocations of planned operations, so that the activities conducted in the plan will correlate to the projected outcomes predicted in the model.

The process of creating this model being a core FMPM requirement is to conduct scoping investigations to evaluate the impact on specific indicators used to assess desirable levels and targets for each management objective. Scoping is used to comprehensively assess impacts on the current and projected future forest when implementing various modelling assumptions or constraints. This approach provides context into the behavior of a proposed management strategy and allows the planning team to make informed forest management decisions by considering projected outcomes.

The following mandatory investigations were completed in consideration of the development of desirable levels:

a) An investigation into the ability of the forest to meet forest diversity and forest cover desirable levels (based on current forest condition and forest dynamics) including landscape classes, old growth, white and red pine, and young forest.
b) An investigation and assessment of the ability of the forest to continue to supply forest benefit levels associated with the current FMP, including an investigation and assessment of the ability of the forest to supply the Industrial Wood Requirements and Ontario Forest Accord Advisory Board (OFAAB) levels.

While this seems relatively straightforward, these investigations involved creating hundreds of iterative models that scoped each indicator individually and collectively against various benchmarks, such as those provided in the sources of direction, or levels set in the previous plan. The results of these highly tailored models provided insight into the maximum potential objective achievement for each indicator and objective, while providing the opportunity costs associated with that achievement on other indicators and objectives. This information provided insight that allowed for balanced models, which attempt to achieve all the objectives simultaneously. Creating a balanced model is also iterative work; each modelled solution is complex and the interaction between hundreds of competing indicators must be assessed and refined. The results of this scoping analysis was provided to the planning team. Feedback from the team was used to set reasonable targets for objectives, as well providing direction on how to prioritize competing objectives.

Detailed information on the development of inputs and the use of SFMM for the preparation of the FMP can be found in Section 4.0 of the Analysis Package in Supplementary Documentation B. The results from the analysis suggest that a balanced, sustainable management strategy can be achieved that meets the direction required by the Landscape Guide while providing a continuous and predictable wood supply. The proposed LTMD follows trends that are consistent with previous management plans, without any major changes or fluctuations in habitat or wood supply. The planning team had to take the information from the scoping exercise to create a balanced model that could achieve the balance of objectives. The MATT met several times over the course of several weeks to review models, tweak parameters and assess the results. Each iteration provided additional insight into the interaction of model elements and led to further optimization of constraints and parameters. The LTMD used in the FMP represents a model that meets the majority of the indicators over the short, medium and long term and was chosen because of its ability to balance competing objectives in a way consistent with sources of direction used in the plan. The outputs from the LTMD are used to create selected management approach, which marries the outputs from the model with the decision making that creates the planned allocations. These allocations were assessed at the LTMD stage, which intentionally overestimate the available harvest area to provide insight into how the refinement of allocations will impact objective achievement. As such, there is an opportunity for improvement of objective achievement during operational planning (Section 4.0). Additionally, areas of operation may be adjusted as a result of the planning of operation prescriptions and conditions for areas of concern, the availability of new or better information and in response to public comments. Consequently, the assessment of spatial indicators such as landscape pattern objectives and indicators are examined twice, both at the LTMD and at Final Plan. Section 4.9 compares the aspatial indicators of the Proposed Operations to the Long-Term Management Direction.

Forest Condition for the Crown Productive Forest

Figure 20 shows the area of each plan forest unit that is projected to be on the landscape over the next 100 years. The most significant forest unit currently on the landscape is the hardwood shelterwood (HDSH) forest unit. As mentioned earlier, the Bancroft Minden Forest is composed primarily of tolerant hardwoods. There is a small increase in this forest unit over the next 100 years (20%). However, the most noticeable increases can be seen in the PRCC (48%), CESH (44%) and PWUS (26%) forest units (Table 17). The weighted average was also shown since to illustrate the changes proportional to the relative size of the forest units represented on the landbase. For instance, PRCC experiences the largest increase in area relative to itself, but is a relatively small forest unit on the landscape and as such, experiences a marginal increase when measured against the sum.

These forest units start below natural levels at the beginning of the plan, consequently, increases in area are good indicators of objective achievement. In contrast, the INTCC, MXCCC and ORUS forest units experience a dramatic decrease in area at -44%, -25% and -22% respectively. This again is consistent with plan objectives as there is an overabundance of area within these forest units. Only marginal changes can be seen for the remaining MXHCC, HDSEL and HESH forest units. Seeing as these projections correspond with the plan objective achievement, implications of these projected changes are not anticipated. Table FMP-6 documents 100-year projection of forest conditions in the Crown productive forest, by forest unit and age class.

Table 30. Percent change in PLANFU area (ha) from 2021 to 2121.

	HDSEL	HESH	CESH	PRCC	MXHCC	MXCCC	PWUS	ORUS	HDSH	INTCC
2021	32623	7987	4378	5308	36485	21407	35113	37292	90340	41956
2121	32280	8109	6305	7851	33717	15963	44148	29231	108770	23329
% Δ	-1%	2%	44%	48%	-8%	-25%	26%	-22%	20%	-44%
Weighted Δ	0%	0%	1%	1%	-1%	-2%	3%	-3%	6%	-6%

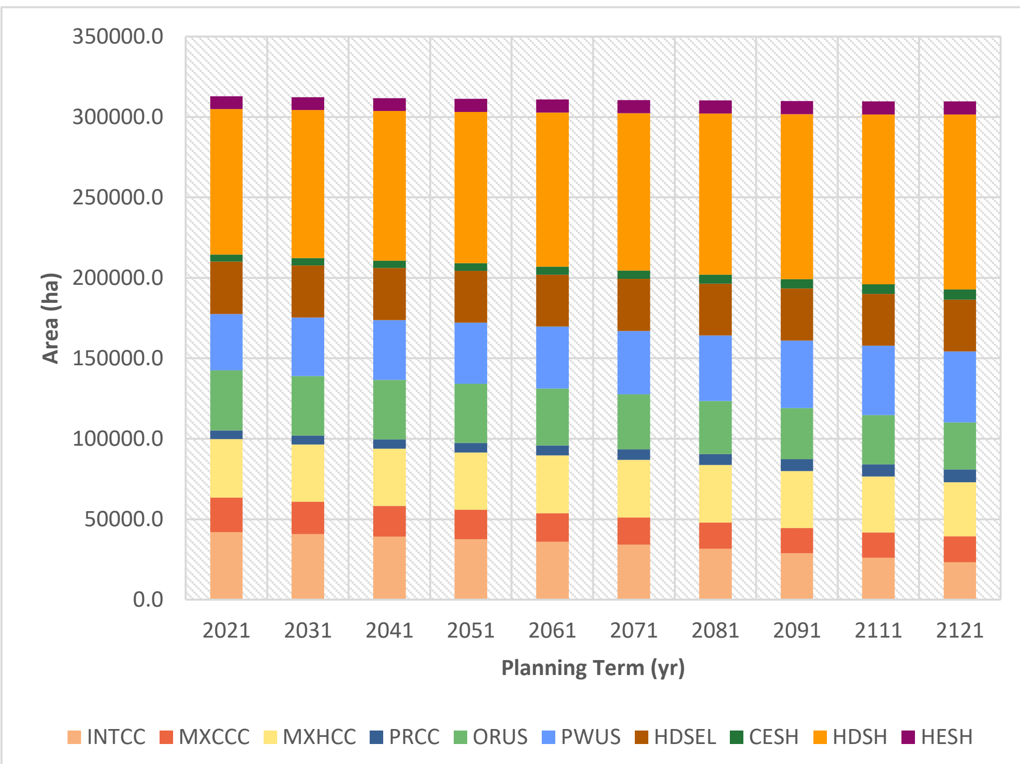


Figure 20. Projected condition of the Crown productive forest by PLANFU.

Habitat for Wildlife Species

A variety of forest dynamic variables are used in the development of the LTMD as a means to protect biodiversity and wildlife habitat. See FMP-7 for tabular projections of SFMM-based forest composition (wildlife) indicators. Three key prescriptive indicators (pattern, composition and structure) are used to address the coarse filter approach outlined in the Landscape Guide. The coarse filter approach seeks to preserve biodiversity by maintaining a variety of ecosystems across the landscape. This, in turn, should provide an adequate amount of habitat for the majority of native species. Landscape Guide indicators have been developed to describe the current landscape mosaic and make predictions on the future landscape mosaic. Upon completion of the scoping analysis, the suggested management approach was selected based on tradeoffs and balancing the achievement of all objectives and indicators. A graphical representation of this data and the implications of those changes is provided below in a series of graphs, which portray the achievement of objectives in the LTMD model. Note that T1 in the represents the plan start condition.

Forest Structure and Composition

Landscape Class Indicators

Species composition is one of the strongest drivers of the future forest condition and is likely to influence future forest conditions as strongly as management activities. As a result, landscape class indicators are the first set of indicators in the recommended order of application in the Landscape Guide. The aspatial Landscape Class achievement plotted against the Simulated Range of Natural Variation (SRNV) in the model for each indicator is shown below in Figure 21.

In general, we see that the model aims to achieve decreases in area of broadleaf landscape classes and an increase for pines and conifers. The current area for Intolerant Hardwoods (INTOL) far exceeds the SRNV. This large age class gap in initial area originates from cleared and burned area that accompanied the settlement of the Bancroft Minden area 80-100 years ago. Additionally, this landscape class is composed primarily of poplar and white birch. Poor poplar markets within the last 20 years have left much of the poplar unharvested. Notwithstanding, the model shows a steady decrease in area until it is maintained within the SRNV at Term 10.

The objective for the Tolerant Hardwoods (TOL) landscape class is similar, in that the model aims to reduce the amount of area and trend towards the upper SRNV. The area decreases slightly until Term 6, where it remains relatively steady for the remainder of the terms. It is hard for the model to meet the target as it requires more forest conversion than can be achieved in a balanced scenario. In addition, natural succession rules indicate that most forest types naturally succeed to Tolerant Hardwoods, meaning that any forest in a reserve will eventually contribute to this class. Reducing the pace of succession is limited because forest conversion from Tolerant Hardwood to other classes is not common.

The Mixedwood (MIXED) landscape class is also a difficult category to outpace due to the modelled succession rules. The creation of this forest type by natural succession is occurring at levels that outpace the ability to reduce this forest type via forest management activities. All things considered; the trend does show a slow decrease towards SRNV over the modelling horizon.

The remaining pine and conifer dominated landscape classes (MXPRJ, PWMIX, and SPC) start below the SRNV at Term 1, but slowly increase towards the SRNV target levels by the end of the modelling horizon. The desirable levels for these landscape classes are significantly harder to reach since they require more forest conversion than can be achieved in a balanced scenario. Also, Mixed-pine is often bypassed due to site conditions and does not regenerate as rapidly from forest management activities compared to natural fire regeneration. Additionally, fire suppression has influenced the White pine mixed landscape class which in turn, has created requirements for intensive silviculture and planting.

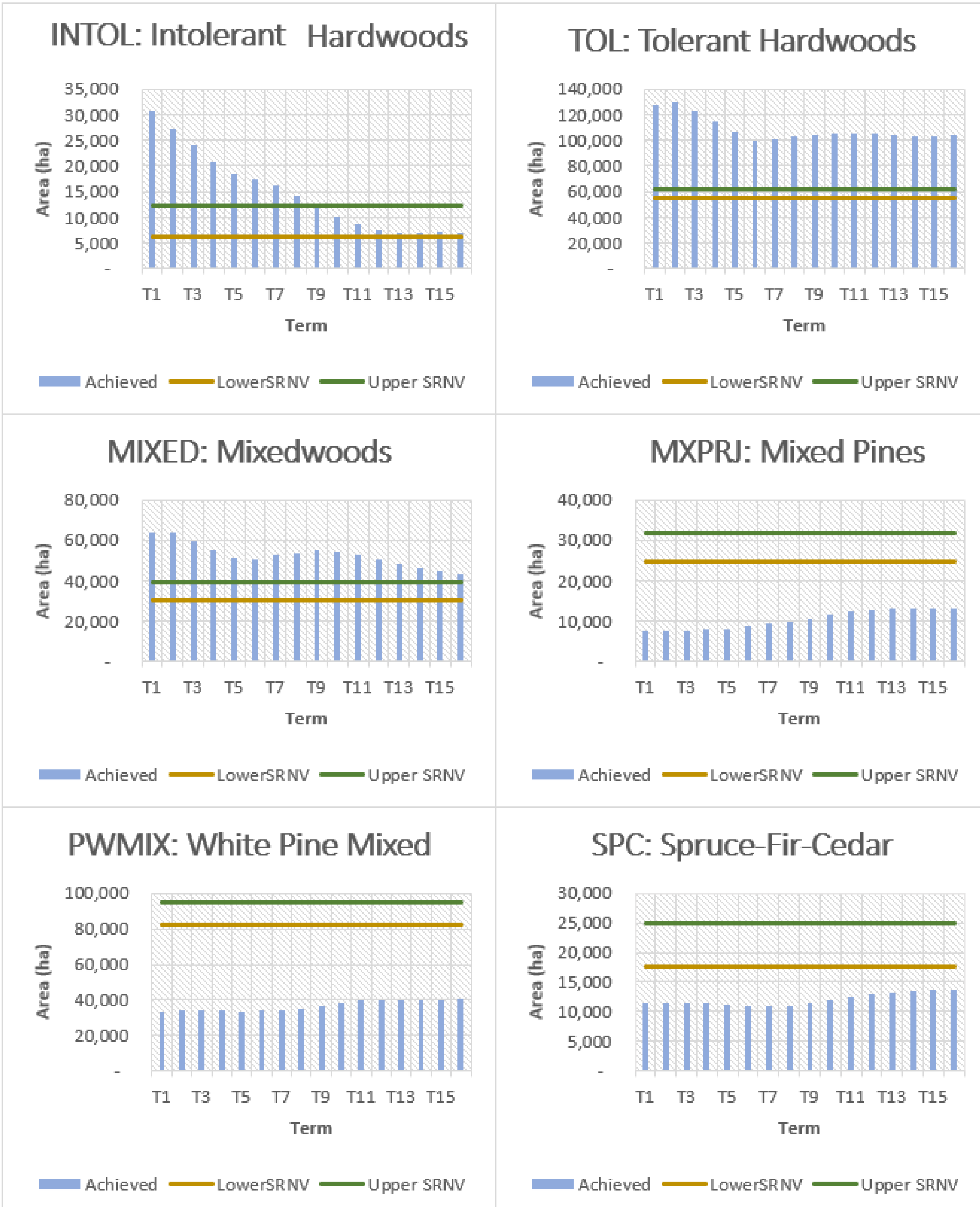


Figure 21. Landscape class achievements from the LTMD model.

Old Growth

The achievement and maintenance of old growth PLANFU area is the second most important Landscape Guide indicator. As shown in Figure 22 & 23, there are no issues creating old growth on the forest. The levels found within unmanaged reserves combined with the limited application of the clearcut silvicultural system allow the modelled forest types to move towards the old growth targets and in many cases, significantly overachieve the Landscape Guide targeted levels. The exception to this is PWUS, which is proportionally lacking in the forest. The PWUS PLANFU has a positive trend for the first 5 terms of the model before a decline until T14, where the indicator begins to increase. The low initial area of PWUS on the landbase coupled with natural succession rules has made it difficult for the model to meet the desirable levels.

New PWUS areas must be created in managed areas to maintain an Old Growth PWUS forest. PRCC increases steadily over time but does not achieve the SRNV until T4. As this is a plantation-based PLANFU with few naturally occurring stands, the initial areas of old growth red pine are limited as the overall amount of area is limited. However, the model is capable of setting aside area for the indicator to steadily increase the representation of this forest type over time.

HDSH old growth begins well below the SRNV, but surges in the early terms since much of the area at plan start is just below old growth age definitions. The old growth target is overachieved in most terms, as the amount of forest succeeding into HDSH is not offset by the rate of harvest. HESH and CESH show similar modelling trends. They both start well below the SRNV but steadily increase until reaching SRNV around Terms 8 and 9 respectively. It is important to note that HESH encounters a small decline in the first term before increasing towards SRNV. This is an example of the model balancing dozes of objectives with several indicators. Nevertheless, a 2% drop from plan start in the short term for a single element of old growth represents a small decline in an overwhelmingly positive trend for old growth. This was an important trend to observe for follow up/mitigate during operational planning.

The MXCCC old growth indicator maintains its status within the SRNV for the majority of terms (Terms 2 & 6 being the exception). The model tends to keep the indicator in the upper portion of the SRNV, speaking to the general model behaviour to retain old growth components.

INTCC and MXHCC have a significant surplus of old growth through most of the plan. INTCC is reduced from Term 3 to 11, where it remains within the SRNV. This is proportionate to the amount of Intolerant Hardwood being maintained on the landbase, representing a consistent and reliable source for this forest condition. Similarly, MXHCC increases until Term 4, then declines slowly but remains above SRNV throughout the planning horizon. The decline represents the succession of MXHCC to HDSH or ORUS. The ORUS PLANFU starts at levels slightly below the Landscape Guide SRNV then surges to dramatically overachieve the target before beginning a slow reduction in area from T6 onwards. Much of the ORUS old growth area exists in reserves and is on the cusp of the old growth definition, which creates the initial surge. The decline is a product of natural succession; old oak stands tend to succeed into Tolerant

Hardwoods over time, slowly replacing the oak with other hardwoods. In any case, there is a significant overachievement of the indicator.

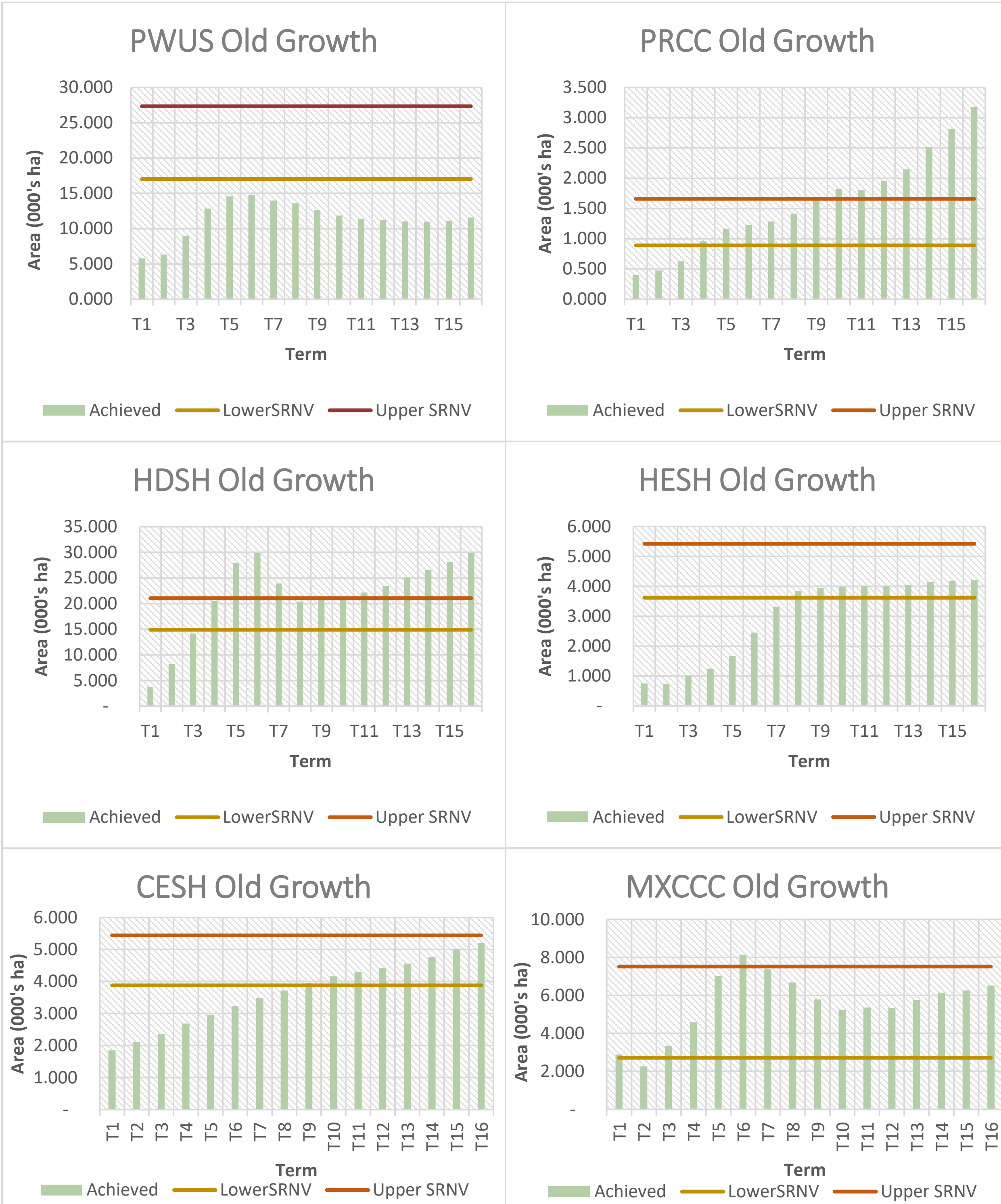


Figure 22. Old growth achievement from the LTMD model.

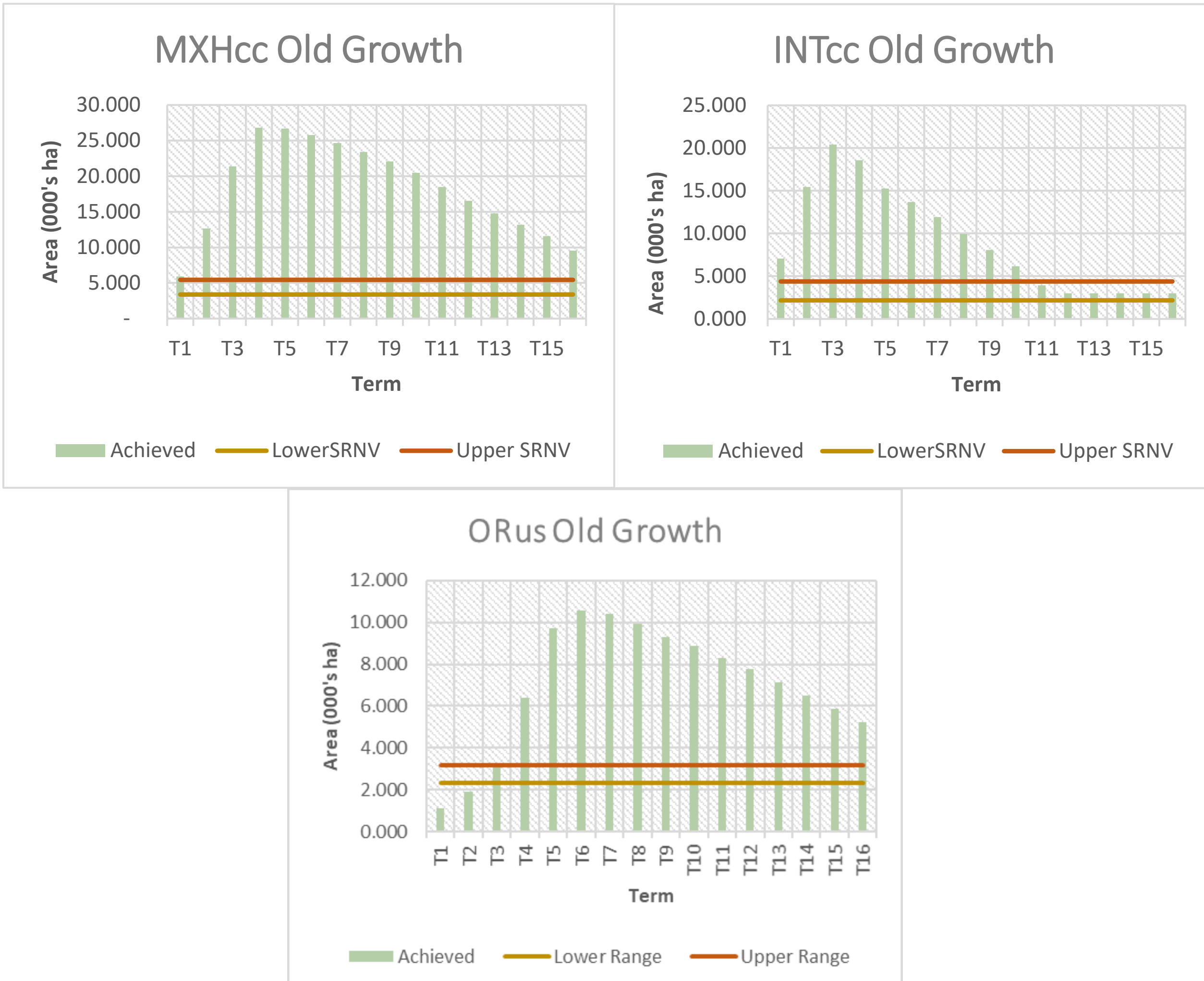


Figure 23. Old growth achievement for the proposed model continued.

<u>White Pine and Red Pine</u>

The 1995 PWR target is surpassed at plan start and remains above the threshold throughout the planning horizon (Figure 24). The achievement for the PWR landscape class shows a slow upward trend by the end of the modelling horizon, which meets the target but not the desirable level. The gap between plan start and the SRNV is a product of the large surplus of Tolerant Hardwood on the landscape; the Landscape Guide predicts that the forest condition should be predominantly PWR, whereas the current forest is predominantly Tolerant Hardwood. This conversion to a PWR forest is slow, as the PLANFU's associated with PWR are the most expensive to create. These factors limit the ability of the LTMD to meet the desirable levels of the SRNV.

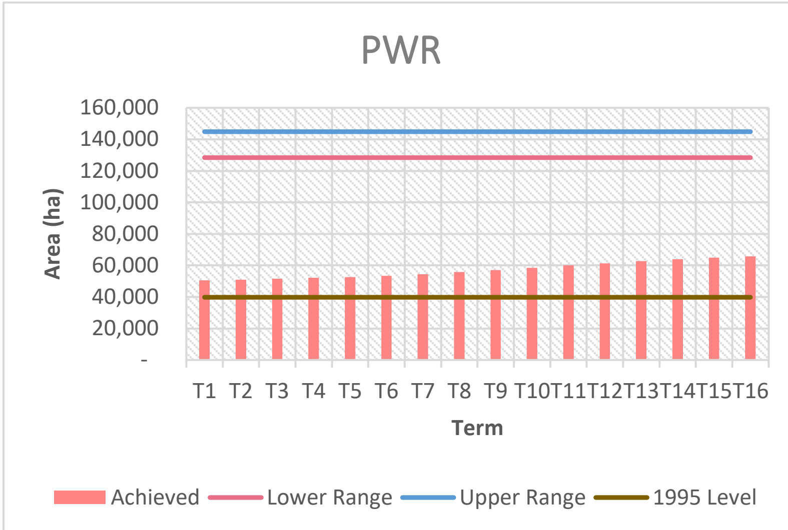


Figure 24. PWR achievement from the LTMD model.

<u>Young Forest</u>

The final assessed indicator for this category is to achieve and maintain a natural level of young forest across the management unit. It is measured in two ways; Pre-sapling (PRESAP), which represents the conditions of true clearcuts where the majority of the area is very young, as well as the Pre-sapling, Sapling and T-Stage indicator (PSST), which includes the conditions of shelterwood regeneration cuts, consisting of both young and mature components. The definitions for these are included in Section 2.1.3.

For the two assessed young forest indicator (PRESAP and PSST) targets there is a general trend of staying within the SRNV throughout the modelling horizon (T1 numbers reflect the plan start condition). A sufficient amount of harvesting activity is created to ensure a steady supply of young forest habitat in each term.

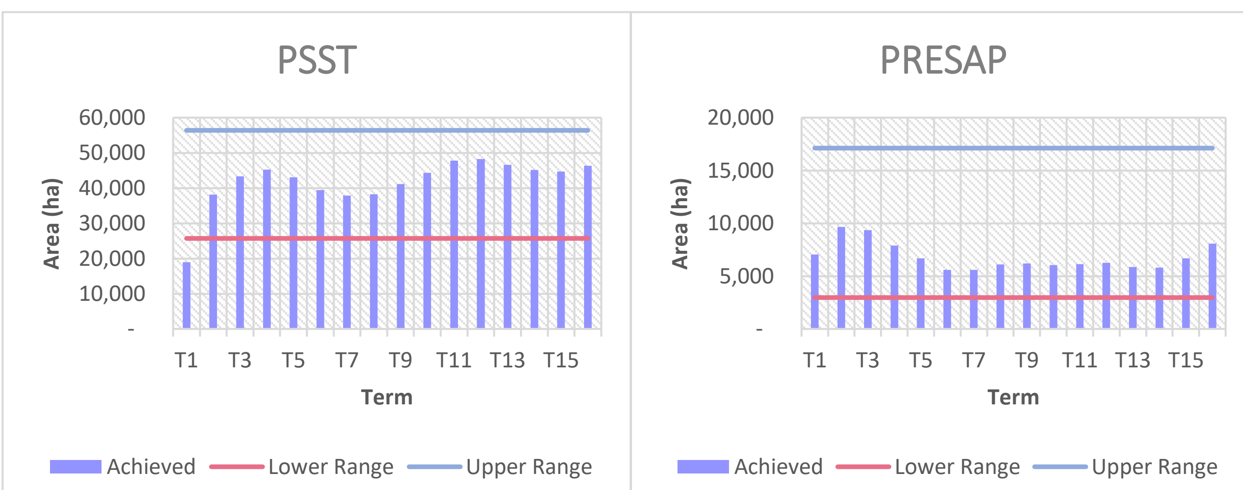


Figure 25. PRESAP and PSST achievement for the proposed model.

Natural Landscape Patterns

The CFSA Forest Diversity-Natural Landscape patterns objective Category to be assessed at LTMD is as follows: "*To move towards a more natural forest landscape pattern and distribution*". Two of the identified indicators involved the spatial assessment of the preliminary proposed 10-year allocation for the impact on the Texture of Mature and Old Forest in various patch size classes. The other identified indicator involves the spatial assessment of the Young Forest Patch Sizes. The Ontario Landscape Tool (OLT) was utilized to assess the achievement of these targets

Texture of the Mature and Old Forest

The Texture of Mature and Old Forest is measured in OLT by parsing the inventory into distinct hexagons, then measuring how much forest within each polygon is considered to be Mature/Old. Each polygon is then tallied into various thresholds or concentrations of Mature/Old forest; 1%-20%, 21%-40%, 41%-60%, 61%-80% and 81%+ Mature/Old. After being tallied this way, a simple histogram can be created that can show the overall maturity of the forest. Figure 26 and Figure 27 display the indicators of the Texture of Mature and Old Forest. The proportion of forest area (vertical axis) was calculated using 50 ha hexagons (top) and 500 ha hexagons (bottom) with differing percentages of mature and old forest (horizontal axis) at Plan Start, LTMD Plan End and with Plan End with final allocations. Using this assessment method, Texture of Mature and Old Forest is overrepresented at plan start, well above the ideal mean in the 81-100% mature category and well below the mean in the 61-80 % and 41-60% category. The 21-40% is slightly underrepresented and the 1-20% category is relatively small and stable. The landscape ideally should have less 81-100% mature hexagons and more 21-40%, 41-60% and 61-80% hexagons to provide for a greater diversity. However, the projected condition in the LTMD increases the proportion of 81-100% hexagons at the expense of others, moving away from the ideal composition in all cases. Final Plan allocations have similar outcomes.

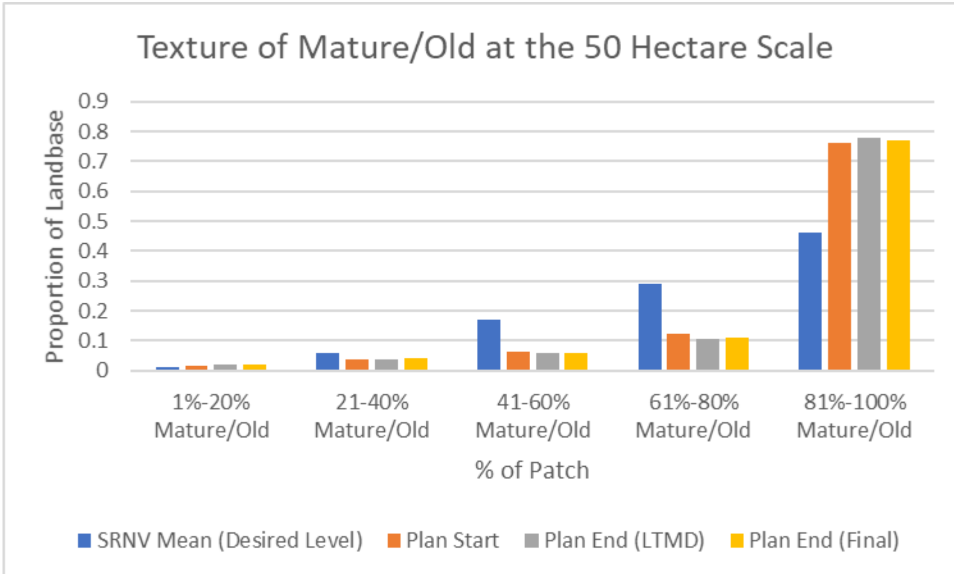


Figure 26. 50-hectare texture of old and mature indicator.

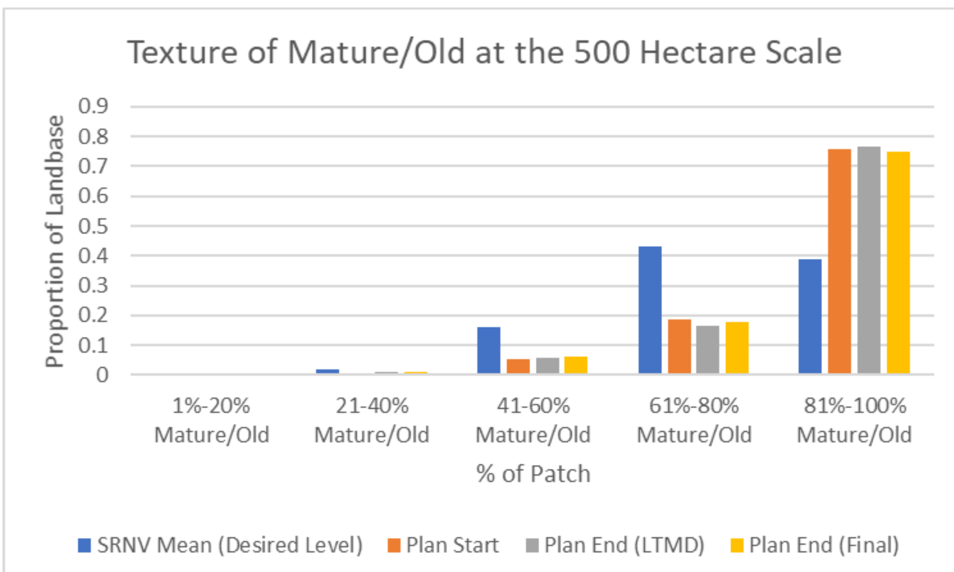


Figure 27. 500-hectare texture of old and mature indicator.

Figure 28 and Figure 29 show the spatial arrangement of the hexagons of the Mature and Old Forest at plan end, measured at the 50 ha and 500 ha scales respectively. Overall, it is apparent that the greatest concentrations of mature forest are focused on the southern and western parts of the forest. The areas to the west end represent areas of low utilization, whereas the southern section of the forest contains a wildlife reserve, which does not allow for harvesting. It is important to note that at the LTMD stage, the plan end condition is an over-representation of disturbance as it includes all the preferred harvest area, which are generally overallocated to including some areas that will become contingency or removed.

This analysis is used to plan potential allocations and assess impacts on the distribution of mature and old forest and is used at the subsequent stages of management to refine the final allocations for the FMP.

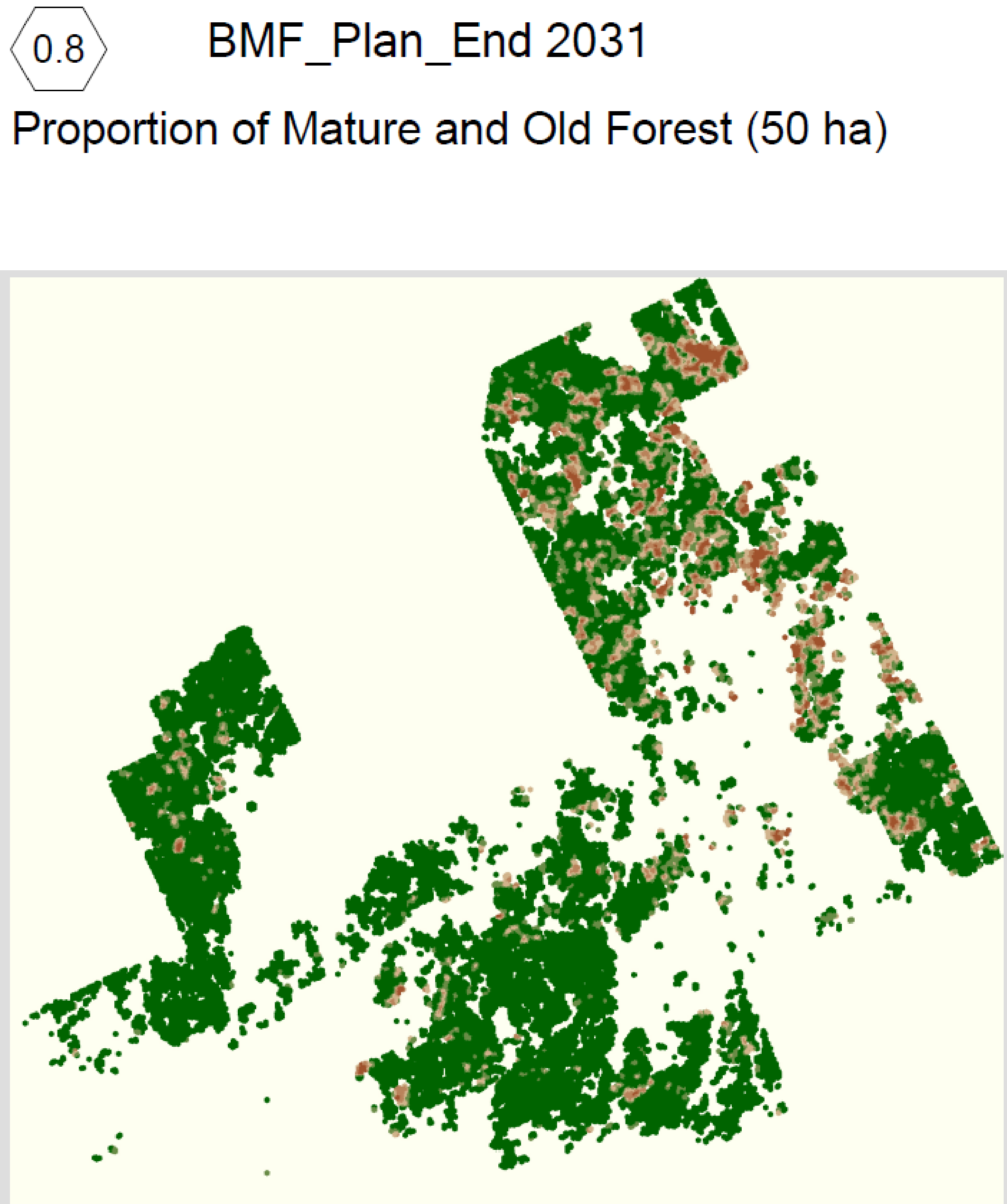


Figure 28. Spatial distribution of indicators of spatial texture at the 50 ha scale at plan end.

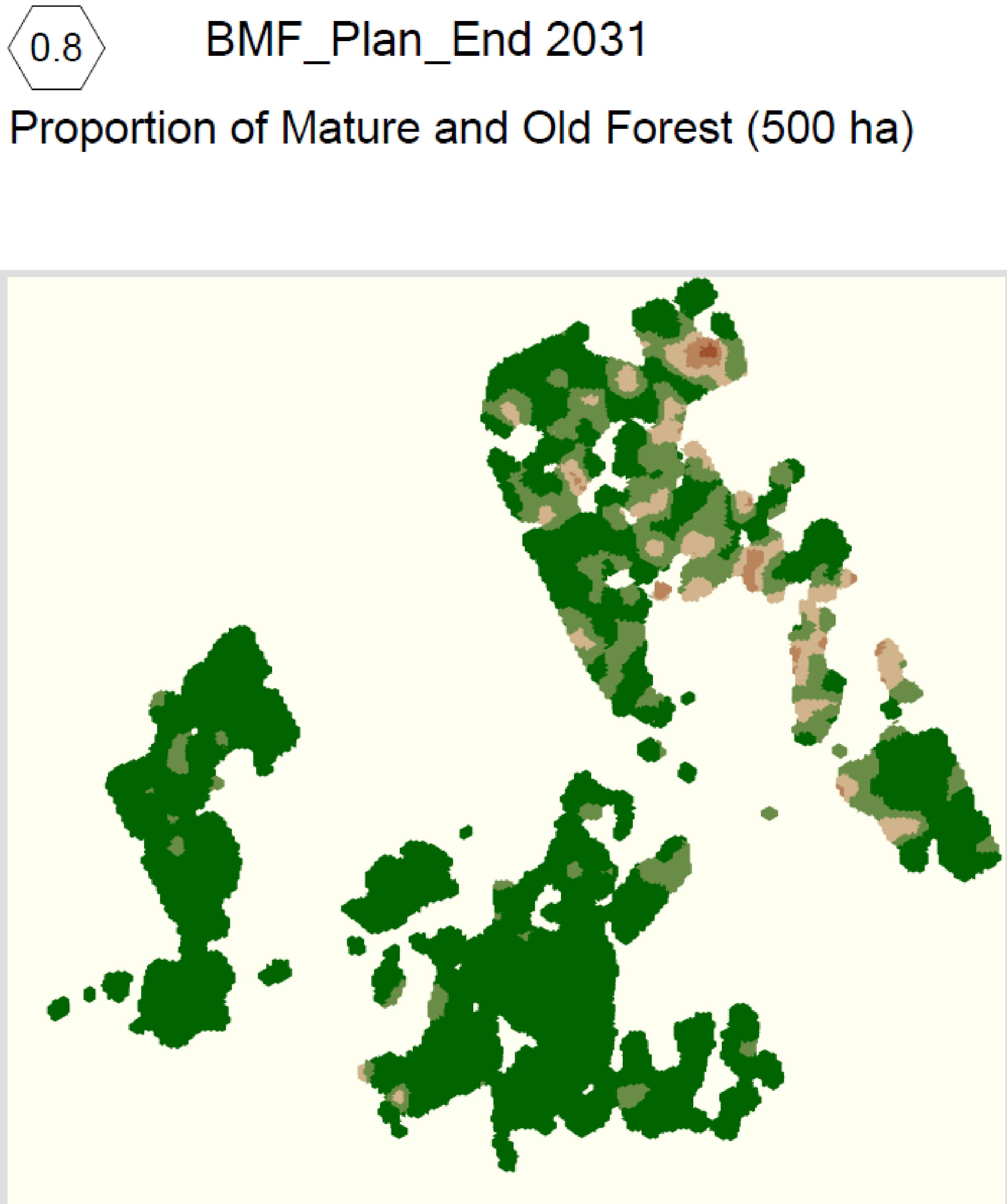


Figure 29. Spatial distribution of indicators of spatial texture at the 500-ha scale at plan end.

Young Forest Patch Size

Disturbance patches that create young forest are assessed according to the broad patch size groupings described in the Landscape Guide. OLT systematically identifies areas that are considered to be depleted or disturbed, contributing to the creation of young forest. The size of these patches is broken into size categories; 1-100 hectares, 101-250 hectares, 251-500 hectares, 501-1000 hectares and 1001-2500 hectares. Disturbances over 2500 hectares in size are extremely rare in the Southern Region and are not expected to be identified in OLT.

Landscape Guide direction is to increase the representation of medium and large patch sizes and reduce the representation of small patches. Figure 30 and Figure 31 show an underrepresentation of the smallest patch size and an underrepresentation of larger patch sizes. The Young Forest Patch Size distribution is projected to shift towards the ideal mean in the 101-250 and 501-1000 hectare patch sizes and are expected to remain steady in the 1-100 hectare patch sizes. The magnitude of these changes are small and difficult to perceive on a chart, but the trends are positive. The LTMD provided better outcomes than the Final Plan allocations, as they also improved the 251-500 hectare patch size. However, the LTMD projections tend to have higher levels of disturbance, which tend to favour young forest indicators such as this one.

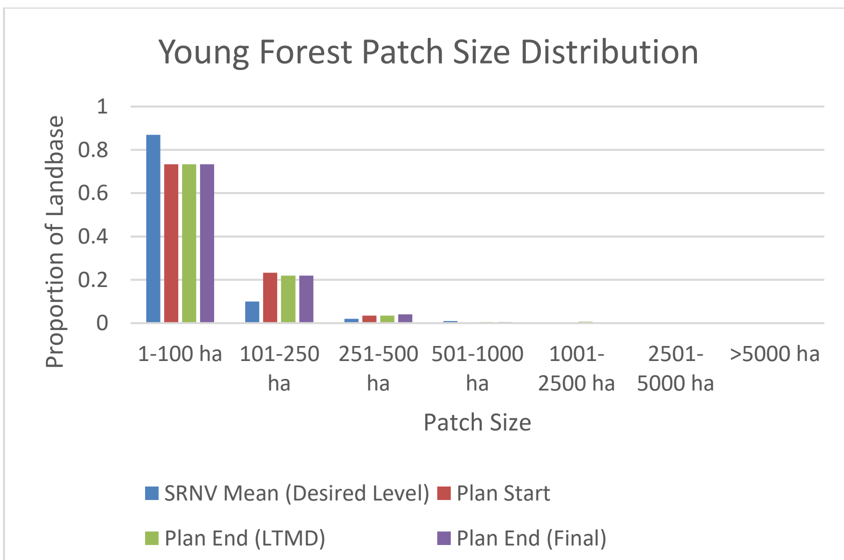
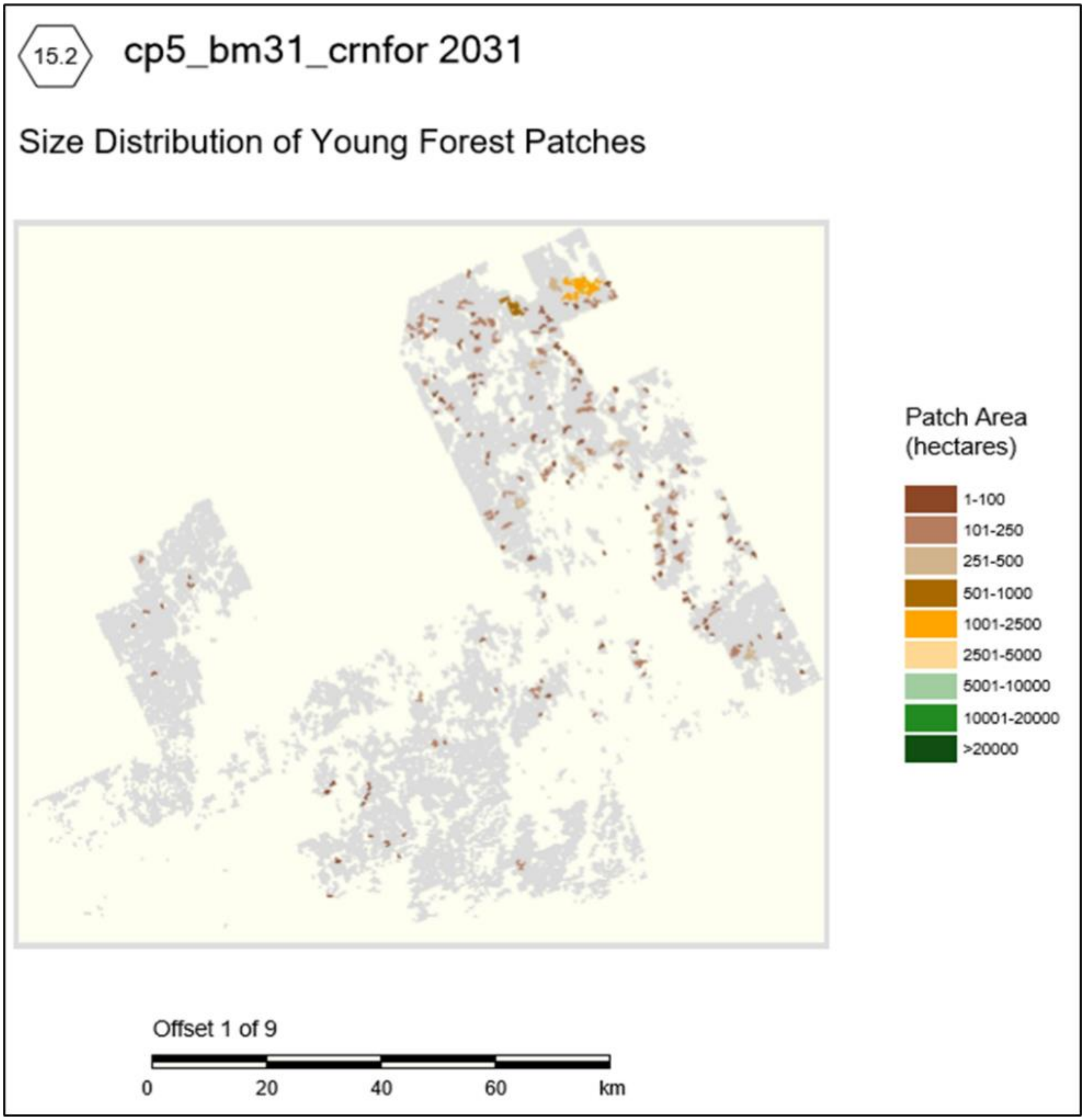


Figure 30. The frequency of young forest patches of varying size classes.



1 **Figure 31. Spatial distribution of indicators of spatial texture: the proportion of forest area (vertical**
2 **axis) comprised of young forest patches at plan end.**

Provision of Forest Cover (Deer Yards and MEAs)

It is not uncommon for overlapping non-timber objectives to exist on the landbase. This often requires different and sometimes conflicting management strategies. Identification, arrangement, and planning of conifer cover in deer yards and moose emphasis areas must aim to enhance these habitats in a way that contributes to the broader landscape pattern objectives.

Deer Emphasis Areas (DEAs)

There are two Deer Emphasis Areas (DEAs) on the Bancroft Minden Forest; Baptiste and Mephisto (Figure 32). Deer yards are identified and updated through successive aerial surveys documenting winter use of habitat by deer. Baptiste and Mephisto deer yards have been selected as DEAs as these two areas contain enough managed Crown Land for forest operations to potentially affect habitat.

Crown forest within the deer yards was analyzed in OLT to determine plan start and plan end critical thermal cover (CTC) levels. CTC for both DEAs is below the desired level at plan start. CTC increases slightly in Baptiste, remaining below the desired level, with a result similar to a scenario with no harvest. Mephisto CTC decreases slightly from plan start to plan end and remains slightly below the target level.

The achievement of this objective may be improved through operational planning and harvest block layout during 2021-2031 FMP development. Additionally, Conditions on Regular Operations (CROs, FMP Text Section 4.2.2.2.21) will be implemented in DEAs to maintain or increase critical thermal cover objectives with a target retention of 15% of each allocation as CTC where suitable conditions are identified.

The natural growth of the forest combined with prescribed forest management activities that encourage either natural regeneration or artificial regeneration in the deer yard will contribute to critical thermal cover. In addition, harvesting can also benefit deer habitat through the provision of browse. Yards that have heavy annual usage, combined with little forest management activity, may result in low levels of browse needed for sustenance during the critical winter period.

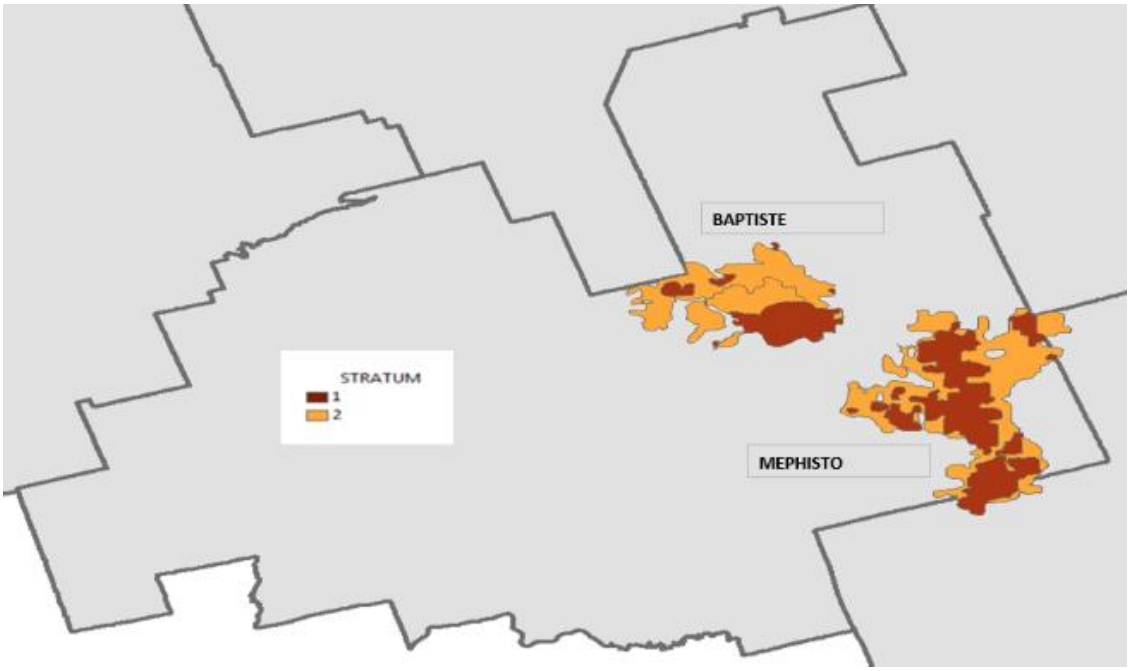


Figure 32. Spatial distribution of deer yards.

Moose Emphasis Areas (MEAs)

Four MEAs are identified on the Bancroft Minden Forest (Figure 33). MEAs are assessed using three habitat indicators; browse (young forest), mature conifer, and hardwood/mixedwood forest. The target is to move towards an ideal composition and the Stand and Site Guide provides the range for these habitat indicators.

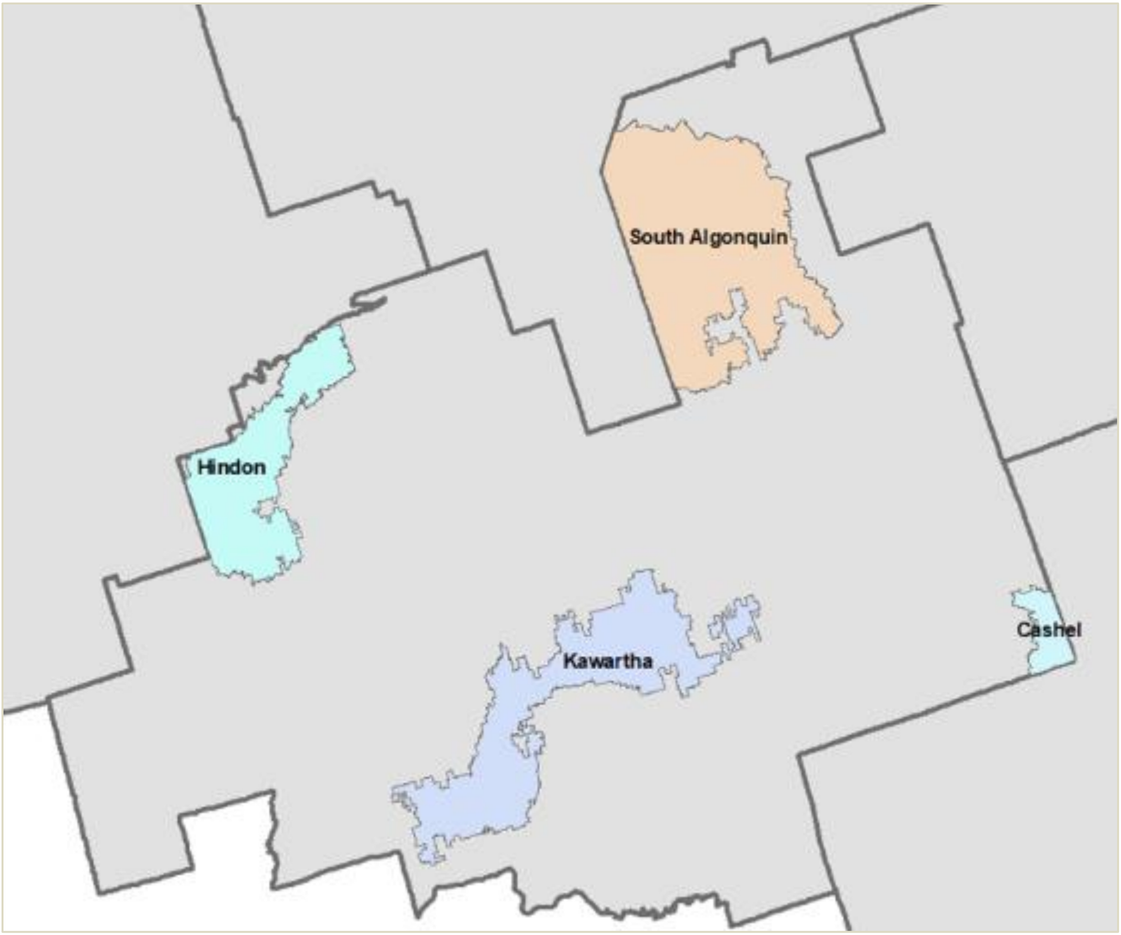


Figure 33. Spatial distribution of MEAs.

Kawartha, Cashel and South Algonquin reach the target range at plan end for the browse indicator. Hindon decreases from the target but remains higher than if no forestry operations occurred. Browse-producing forest is a reflection of young forest conditions and could be increased through applications of clearcuts in the MEAs.

Cashel, Hindon, and Kawartha MEAs are within the target range for mature conifer-dominated forest at plan start and plan end. South Algonquin MEA is below the target range at plan start, and increases towards the target range at plan end, remaining below the target level. The achievement of this objective may be improved through operational planning and harvest block layout during 2021-2031 FMP development. Additionally, Conditions on Regular Operations (CROs, FMP Text Section 4.2.2.2.22) will be implemented in MEAs to maintain or increase winter cover (mature conifer objectives) with a target retention of 15% of each allocation as winter cover where suitable conditions are identified.

Conifer cover could be increased through the strategic retention of conifer within harvest blocks.

All four MEAs are above the target range for hardwood or mixedwood forest and plan start and plan end. Cashel, South Algonquin, and Kawartha decrease slightly towards the target range at plan end. Hindon increases slightly away from the target range at plan end. Overachievement of this indicator is not a large concern in itself but suggests an opportunity to move some of these stands to browse-producing forest to increase the achievement of that indicator over time.

Volume

The CFSA Forest Social and Economic- Long-term Harvest levels objective category to be assessed at LTMD is as follows: "*Provide a sustainable, continuous and predictable wood supply from the forest that will meet the current recognized industrial demand of the forest*".

There are 3 indicators assessed for this group; Industrial Wood Requirements by Species Group, Industrial Wood Requirements by Product Group and Long Term Projected Available Harvest Area. The targets and desirable levels are defined by the Planning Team and informed through scoping analysis. The targets and desirable levels for each are represented in FMP-10. These targets help ensure that the harvest schedule created in the LTMD is being applied during plan implementation. This is critical for the achievement of other objectives. The projected level of available harvest volume (Table FMP-9) is portrayed graphically in Figure 34 along with; projections from the previous FMPs, the historic wood utilization, the Industrial Wood Requirement (IWR) and the Ontario Forest Accord Advisory Board (OFAAB) benchmark harvest levels.

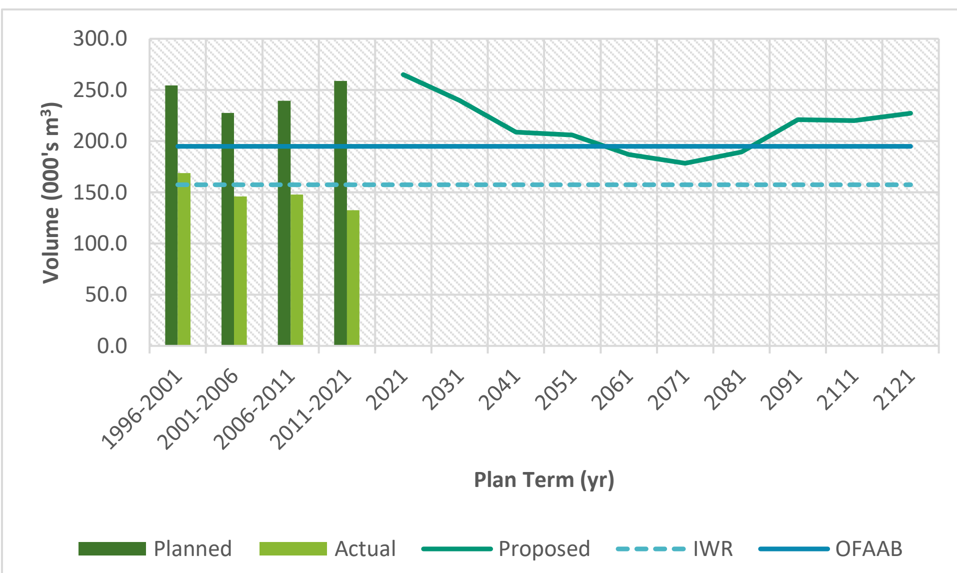


Figure 34. Harvest volumes for all species groups combined by 10-year terms.

The IWR reflects input from historic planned volumes and actual harvest volume, Available Wood Resources report data, the Analysis of Regional Wood Supply data (originates from the Provincial Wood Supply Strategy), discussion with the MNRF Region and consultations with the local processing facilities, as well as planning team input. The OFAAB targets defined in the Provincial Wood Supply Strategy represent the long-term supply of wood necessary for industrial processing. The historic utilization shows the difference between the planned and actual harvested volumes from the previous FMPs.

A general observation for all species groups is that the IWR volumes are collectively met in the long term. In addition, the 2021-2031 FMP provides for more volume compared to the previous FMPs. There is also a trend of underutilization for previous plans. Notwithstanding, there are several factors that make greater utilization difficult. Access, distance to markets, quality of timber, timing restrictions for species at risk operating restrictions, and of course markets and availability of forest workers including log trucks all contribute to this level of utilization. Utilization levels are lowest for SPF, OC, and BW. In more recent years, PO and TOL demands have been high and align more closely with the volume targets outlined in the 2011 FMP .

The total available volume is similar to projections of the 2011 FMP. The short and mid-term dip in available volume can be attributed to the current age class structure of the forest, where a large portion of the area is mature and old and eligible for harvest, followed by a period where the forest requires time to age and become eligible in later terms. The introduction of the irregular shelterwood system creates immediate pressures to balance the age class distributions, as the system utilizes relatively short harvest intervals similar to those of a selection system. The trend is not concerning for total volume since demand can still be met in all terms, however particular species .

Future projections show large increases in PWR (Figure 35) and SPF (Figure 36) volumes compared to historic levels. Increased volumes of PWR are obtained through the commercial thinning of red pine stands. Red pine stands that were planted several decades ago yield much larger volumes than other species, and well-stocked stands are eligible to be thinned at regular intervals. Current and future plantings of red pine contribute to further increases in volume, and therefore are an important part of the proposed silviculture program.

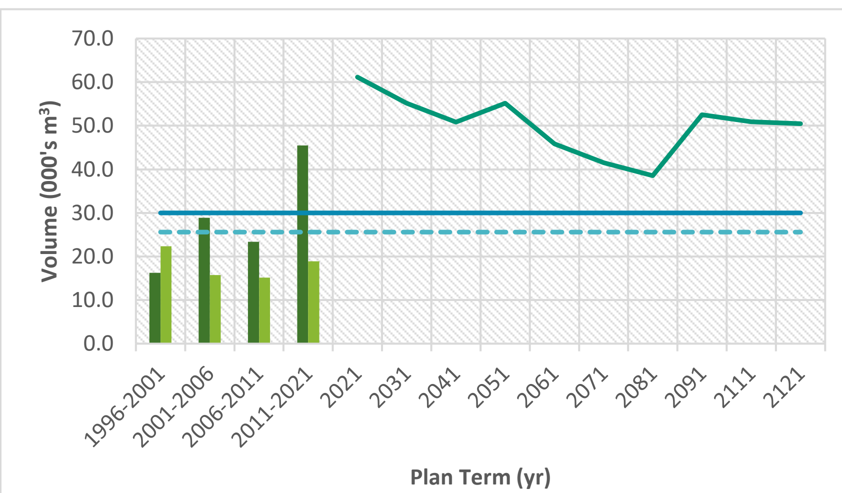


Figure 35. Harvest volumes for PWR by 10-year terms.

Available volume for SPF is far above industrial demand because of low utilization in the past coupled with a skewed age class and structure. In the early terms, a high proportion of the area is eligible for

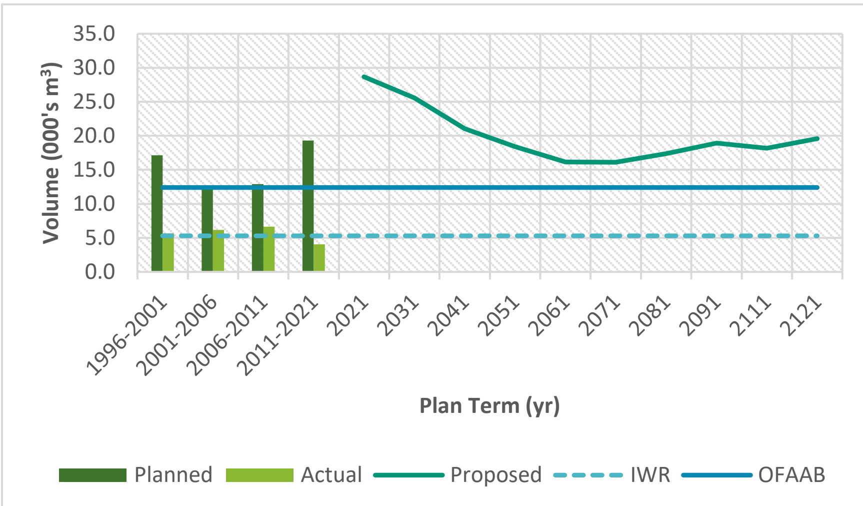


Figure 36. Harvest volumes for SPF by 10-year terms.

harvest. Once, this area is harvested, there will be a gap of time where less area is eligible for harvest, decreasing available volume. Over time, the age class structure becomes more even and available volume more predictable.

In the case of PO (Figure 37) and BW (Figure 38), desirable levels and targets can be met in the prescribed intervals measured in FMP-10. A closer inspection of the projections shows a shortfall from 2051 to 2091. The reduction is mostly a product of the reduction in INTCC area over time, which is needed to meet other objectives. In addition, there is an age class gap that exists in the INTCC initial forest area, created by the spike in cleared and burned area that accompanied the settlement of the

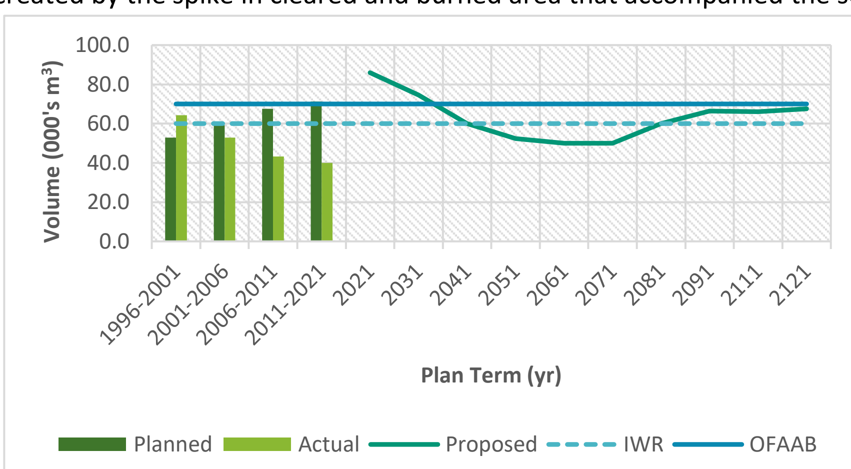


Figure 37: Harvest Volumes for PO by 10-year terms.

Bancroft Minden area 80-100 years ago. There is currently very little area in young INTCC forest,

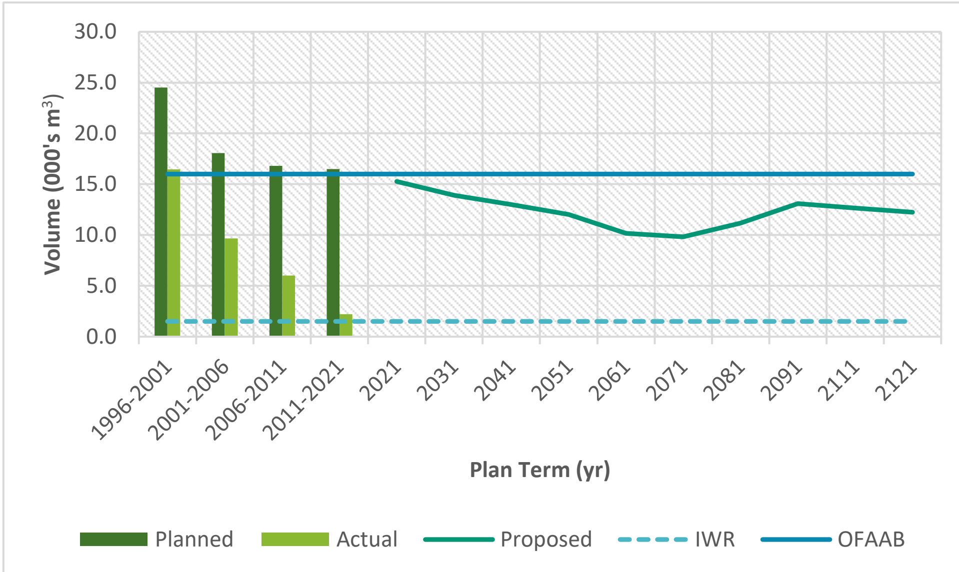


Figure 38. Harvest volume for BW by 10-year terms.

meaning once the abundance of mature and old forest is harvested, there will be a period of time when less area meets the harvest age eligibility criteria.

The drop in volume between the 2011 and 2021 plans in Tolerant Hardwoods is substantial, but the reduction is mostly a product of significant changes to yield curves and the shift to an irregular shelterwood management approach in Tolerant Hardwoods, which are described in detail in the Analysis Package. The TOL volume desirable levels and targets are met, as they exceed the IWR/OFAAB levels in the short and long terms (Figure 39). Unfortunately, available volumes slip below the target levels by a small degree in the middle terms. The reduction in overall projected volumes explains why the LTMD is unable to meet the target levels in these terms, and while the inability of the LMTD to meet the

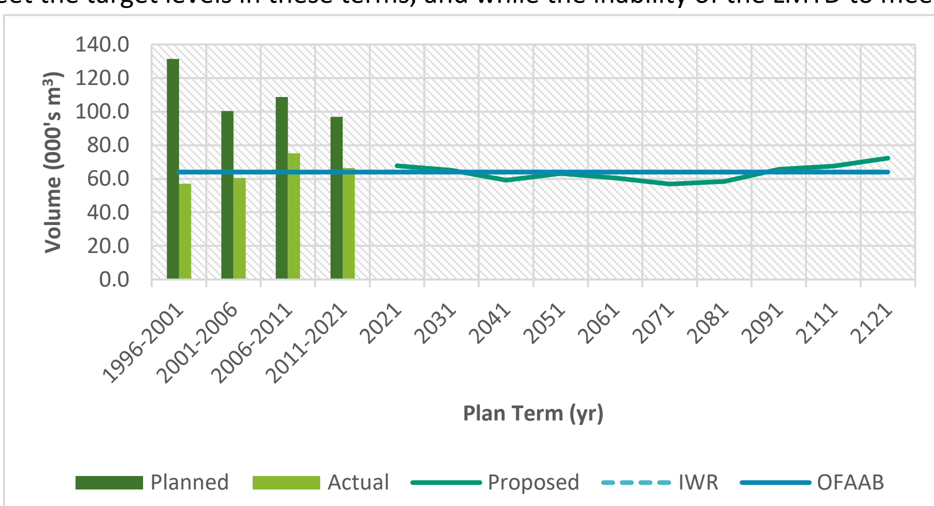


Figure 39. Harvest volume for TOL by 10-year terms.

desirable levels in the middle terms would imply a risk of industrial shortfall, the Product Group volumes are consistent throughout the plan. This indicates that alternative volumes to this species group are available in the shortfall terms and the industrial demand can be met through other means.

OC available volume decreases over time, likely due to old growth hemlock objectives (Figure 40). Hemlock volume is the largest contributor to the “other conifer” species group, therefore any changes to hemlock-focused objectives will pose noticeable effects to the OC species class. Aside from old growth hemlock objectives, the inventory used to prepare this plan identified fewer hemlock forest stands than the previous inventory. In addition, hemlock markets are unpredictable and only a couple of mills desire this species for sawlogs, while pulpwood demand is virtually zero.

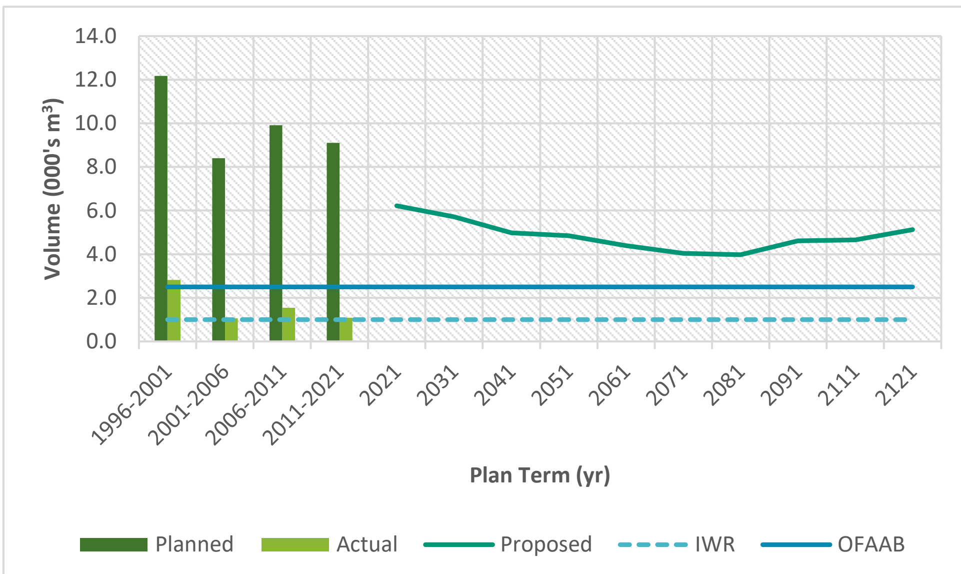


Figure 40. Harvest volumes for OC by 10-year terms.

Product group volumes are met in each term, as per Table FMP-9, and are summarized below. The 2011 volume targets became the targets for 2021, as they also closely coincided with the volume reported in the Available Wood Report. This means that the “target” referred to in the graph reflects the historic utilization in the 2006 and 2011 plans, as well as the objective set out for the 2021 LTMD.

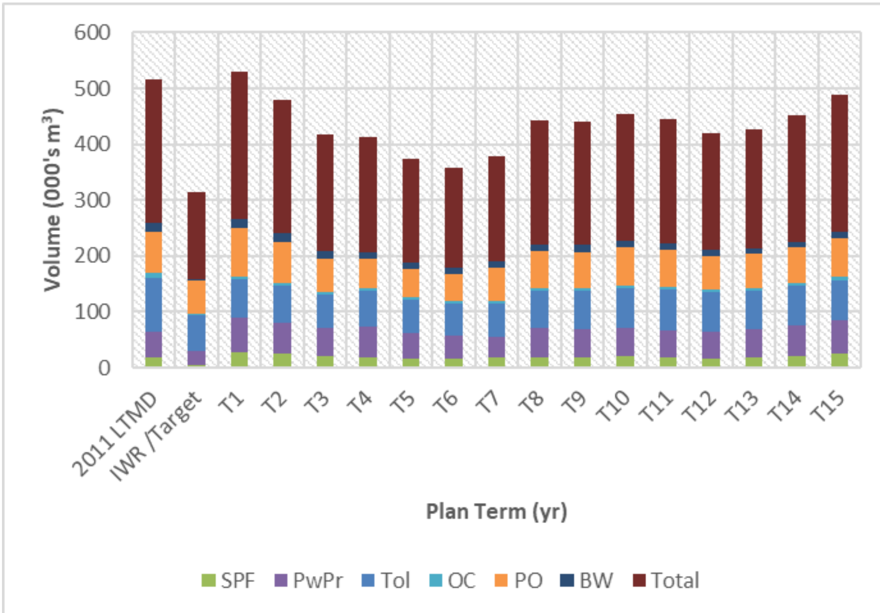


Figure 41. Projected harvest volume by product group for the next 100 years.

The LMTD's T1 volumes can supply volumes similar to the 2011 LTMD's T1 volumes. It is also able to supply the IWR/target levels in all terms, which means the LTMD able to meet product group demands. The downward trend into T6 is a reflection of the forests age class imbalance and the fluctuations in Available Harvest Area that must be made to address it. This effect is explored in greater detail with the Available Harvest Area below.

3.7.1 AVAILABLE HARVEST AREA

Available harvest area (AHA) is determined by the modelled output of SFMM once all checks of sustainability have been met. A long term projection is made and the first term (T1) is synonymous with the allowable cut for the 10-year 2021-2031 FMP period. The total available harvest area for the 2021-2031 term is 33, 078 hectares, averaging out to approximately 3, 307 hectares per year. Table FMP-8 summarizes the estimated available harvest area by twenty-year projections for the LTMD. Figure 42.

(Projected annual available harvest area (AHA) by forest unit) illustrates the projected areas for the full 15 terms of the modelling horizon, by forest unit.

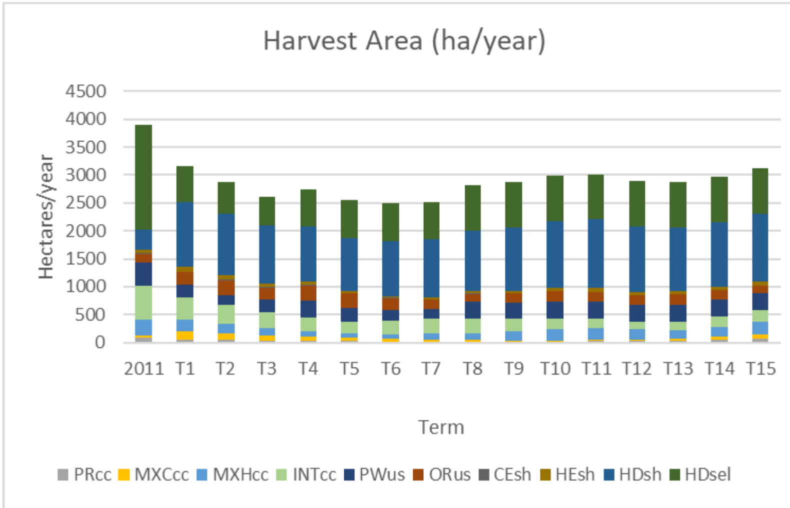


Figure 42: Projected annual available harvest area (AHA) by forest unit. Commercial Thinning is not included.

The short term decline and middle term valley in AHA were a necessary component of the LTMD. The age class imbalance on the landscape is a common theme throughout the LMTD and it had a noticeable impact on AHA. The forest has mature forests ready to be harvested and an established young forest that will be available in the long term, but lacks of middle aged forest that is needed in 30-60 years. This creates a natural bottleneck that cannot be overcome, as middle age forest cannot be readily created. The model must also strategically set aside area for habitat targets, which become stricter as time passes. This forces the model to simply ignore area that could increase AHA in favour of meeting these objectives. Additionally, management objectives that favour the conversion of stands tend to favour the first term (such as conversions to conifers), as the model must take advantage of stands eligible for conversion in the earliest terms to meet long term targets. This creates a preference in T1 harvesting in the modelling solution. This AHA schedule is able to meet most objectives, meeting the needs of balancing economic activity, habitat creation and habitat preservation throughout the modelling horizon.

Commercial thinning area is also projected in the LTMD. This harvest type is used to increase the health of stands by reducing competition for key species (such as removing balsam fir on white pine sites). This activity does not create transitions between forest conditions and thus does not affect the achievement of habitat objectives. It does provide additional volumes that are tracked and the area disturbed by this kind of activity must be limited in order to be realistically projected and accounted for during planning.

PWUS, ORUS, HDUS and PRCC forest units had these kinds of silvicultural activities modelled, with the area of portrayed below.

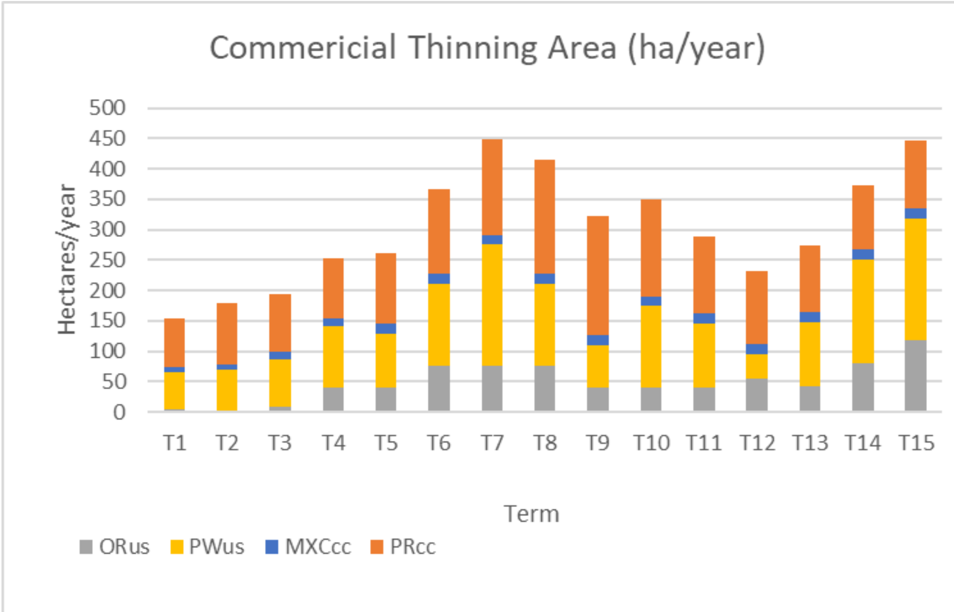


Figure 43: Projected Commercial Thinning Area in the LTMD

PRCC commercial thinning is extensively used in the field, as red pine plantations are very well suited for thinning operations. PRCC stands often have upwards of 4 thinning operations prior to the final clearcut of the stand. PRCC thinning area thus often is higher than regular operations, as there is 4 times greater need for available thinning area than clearcut area. PWUS thinning activity is cyclical, being directly limited by the availability of young PWUS stands, which take 3-4 terms to establish. MXCCC thinning is capped to maximum level that is met in most terms. This cap is based on what can realistically be done, as the availability of MXCCC area for thinning greatly outpaces the capacity to conduct such activity. ORUS thinning is not projected to have much utilization, but the option is used silvicultural in a limited way and thus was modelled for consistency. ORUS eventually follows the cycles that PWUS does, increasing in availability as new ORUS stands become eligible.

When comparing the projected AHA to the 2011 FMP, we notice a decrease in area along with significant changes in forest unit proportions. As the forest inventory and forest unit definitions have changed since the 2011 FMP, it is difficult to make a direct comparison of AHA to the 2021 plan. Table 31 shows a relative relationship between the 2011 forest unit AHA and the 2021 forest unit AHA. Weighted percent change ranges anywhere from -44% (HDSEL being the most significant change) to 1% (INTCC and MXCCC being the least significant change). Many reasons contribute to the differences amongst forest unit AHAs between the two plans. Noteworthy changes include the adoption of a new eFRI, changes to modeling e.g. introduction of irregular shelterwood and adjustments to forest unit definitions and sorting logic. Figure 6 (Section 2.1.3.1 Forest Units and Analysis Units) illustrate the shift in forest units between the 2011-2021 FMP and the 2021-2031 FMP.

The 2021-2031 FMP also experiences a 16% decrease in AHA compared to the current plan. This is required to address other management objectives as the model addresses age class distributions for young and old growth indicators as well as the long-term habitat targets.

Table 31. Comparison of 2021 AHA to 2011 AHA by forest unit.

2021/2011 Forest Unit	Available Harvest Area (ha/yr.)		Difference	% Change	Weighted %
	2021 AHA	2011 AHA			
INTCC	648	598	50	8%	1%
MXCCC	6	50	-44	-88%	-1%
PRCC	136	14	122	871%	3%
CESH/CESEL	224	35	189	540%	5%
ORUS	400	150	250	167%	6%
HESH/HESEL	292	63	229	363%	6%
PWUS	200	450	-250	-56%	-6%
HDSH/HDUS	90	360	-270	-75%	-7%
MXHCC	1151	300	851	284%	22%
HDSEL	158	1897	-1739	-92%	-44%
TOTAL	*3307*	*3917*	*-610*	*-16%*	*-16%*

The target to limit the harvest area variation requirement of <25% was not able to be met for each Plan Forest Unit, as the MXCCC Plan Forest Unit required 40% variation, particularly in the later terms of the model. This variation was needed to account for the fact that MXCCC is a small unit and its importance to some Landscape Guide indicators is quite high (SPF and Mixed Pines in particular). However, the difference between 25% and 40% is low impact, as this PLANFU did not contribute significantly to the overall AHA. When considering the weighted average of each forest unit, overall there is only a 2% decrease in AHA. Since the majority of PLANFUs do not fluctuate significantly and the socio-economic targets are met long term, the declines in the short and middle terms are not concerning, especially since they rebound in the latter terms (Table 32). By the end of the modelling horizon (2171), the AHA experiences a negligible 1% decrease compared to the start of the plan (2021).

Table 32. Comparison of 2021 AHA to 2171 AHA by forest unit.

	PRCC	CESH	MXHCC	HESH	PWUS	HDSH	MXCCC	ORUS	HDSEL	INTCC	Total
2021	56	6	200	90	232	1151	150	221	648	400	3153
2171	61	6	224	71	300	1211	90	139	813	205	3119
% Δ	10%	0%	12%	-21%	29%	5%	-40%	-37%	25%	-49%	-1%
Weighted	0%	0%	1%	-1%	2%	2%	-2%	-3%	5%	-6%	-1%

Figure 44 illustrates the spatial distribution of the planned harvest area for the next four terms. The general intent is to show that strategic consideration has been given for future operational planning so that there is the provision of a range of locations that consider landscape targets, economic factors such as distance to mill and current access. The criteria for eligibility and allocation will be further discussed in Section 3.7.2.

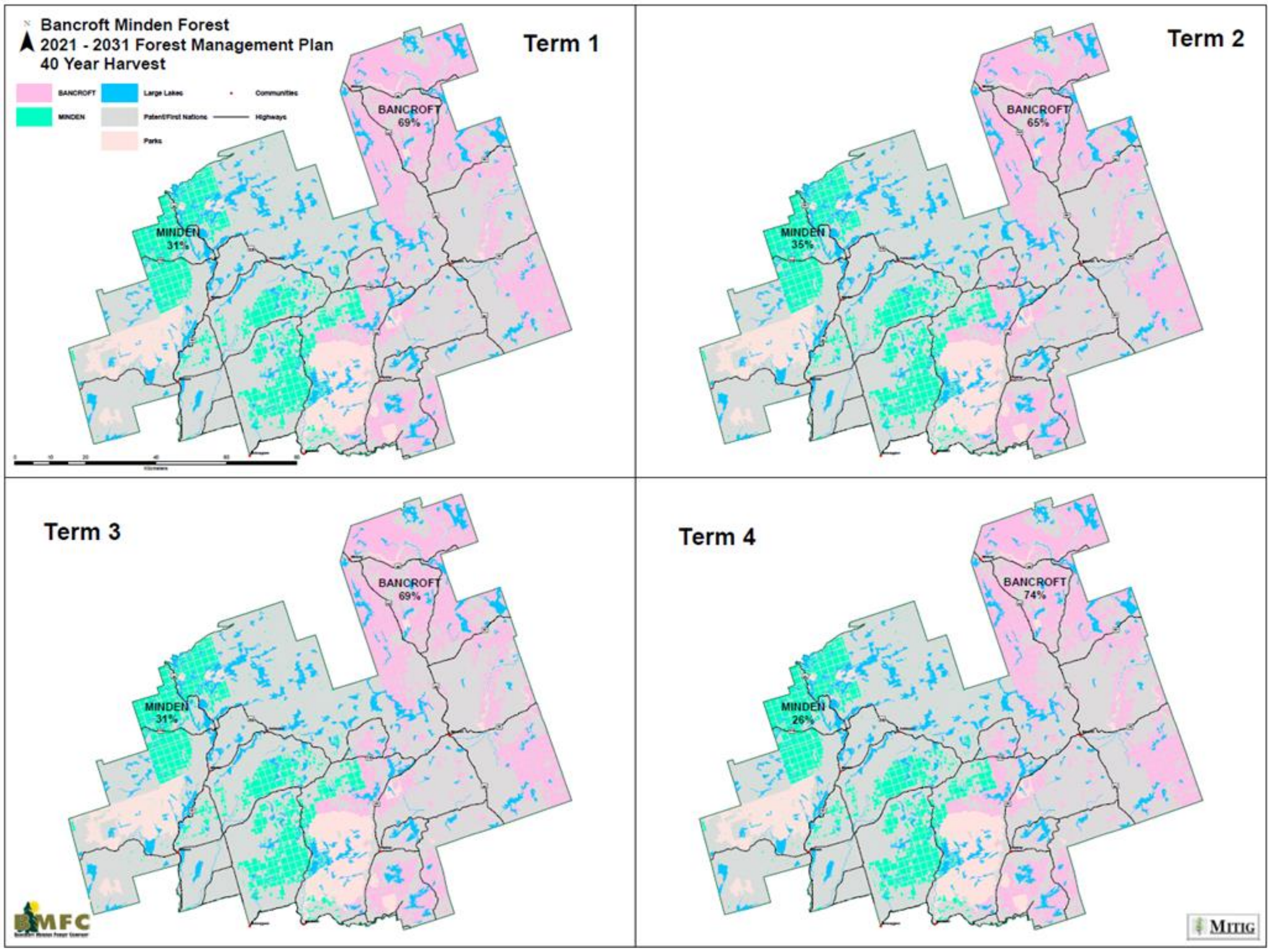


Figure 44. Spatial distribution of harvest levels over the next four terms (40 years).

3.7.2 SELECTION OF AREAS FOR HARVEST

The criteria to identify areas that could reasonably be harvested (i.e. eligible harvest areas) were developed and are consistent with the direction and standards in MNRF's applicable forest management guide(s) (e.g. the GLSL silviculture guide). Areas selected for harvest do not exceed the AHA by Forest Unit. The criteria for harvest eligibility are listed below in order of relative importance. No one criterion was addressed without consideration of all criteria listed.

a) The maturity of forest stands (age class)

- Areas meet the following age criteria by forest unit, related to yield curves. The minimum age suitable relates to financial feasibility and is the age where the net merchantable volume (NMV) yield curves provide for an average harvest volume (>50m^3/ha) that is beneficial to the operator and supplies an appropriate mix of timber products (sawlog and pulp) consumable by the local mills to satisfy economic constraints and Industrial Wood Requirements.

- Minimum age by PLANFU for harvest eligibility criteria. PLANFU age ranges reflect those used in strategic modelling for silvicultural inputs.

b) Operability of an area (e.g. physical, topographical, and economic constraints)

- A significant amount of area was verified through ground survey by BMFC staff to determine if the area is eligible for harvest. These areas were coded as available and selected for harvest allocation regardless of if they meet the inventory-based eligibility criteria, as these stands have been confirmed as operable through field assessments that use non-inventory statistics, such as Basal Area by Size Class, to judge operability. Updates to select forest stand attributes for ground surveyed/field assessed allocated areas will be found in the OPI.

- Areas are coded as Available meaning they are on Crown land and exclude islands, non-productive areas and protection forest.

c) Strategic and operational management zones

- Strategic management zones will be considered during the allocation process to ensure there is a balance of harvest available to satisfy the BMFC Shareholder Agreement.

d) Wildlife habitat requirements

- Stands that have known wildlife and species at risk habitat values may be ineligible depending on the nature of protection afforded to that species or its habitat (e.g. reserve or modified reserve as per the Stand and Site Guide or direction created by the planning team).

e) Industrial Wood Requirements

- Industrial Wood Requirements will be considered during the allocation process to ensure the area allocated can satisfy industrial supply demands.

f) Previous commitments to harvest areas

- Areas that were previously harvested (e.g. received a commercial thin, seeding cut shelterwood) and are ready for a final removal will be preferentially allocated. For shelterwood seeding cuts, any stands harvested before 2001 are considered eligible for final removal for PWUS, ORUS and HDSH plan forest units; this will provide flexibility by allowing a thirty-year delay between harvest entries.

g) Provision for continuity of operations

- Some harvest areas that were not harvested in the 2011-21 FMP were re-allocated as new harvest allocations in the 2021-31 FMP. During the LTMD analysis, these areas are assumed to be harvested and are coded as forecast depletions. However, for the Final Plan, they were identified as bridging area if they remained unharvested. Including these stands in eligibility criteria allowed for them to be included in the analysis. This difference in process was only used for the development of the LTMD as this method was a requirement of the 2017 FMPM used at the time. The Final Plan bridging allocations follow the updated process that conforms to the latest FMPM requirements and is available in section 4.3.1.

h) The need for insect pest management and salvage operations

- Stands that have a high composition of beech will be preferentially allocated where operationally feasible to conduct salvage operations to manage beech bark disease.

During the LTMD the selection of areas for planned harvest operations were identified as either preferred or optional (Figure 45). The preferred harvest areas were used for the preliminary spatial assessment of texture indicators. The optional harvest areas are eligible for harvest and may be substituted for preferred areas during later stages of planning for proposed operations and the draft and final plan if preferred areas are found to be suitable.

Areas selected were also guided by input from Algonquin Land Claim negotiations on a parcel by parcel basis in accordance with the Algonquin Land Claim Forestry Transition Plan for the Bancroft Minden Forest.

Curve Lake First Nation (CLFN) expressed an interest in areas near the Petroglyphs Provincial Park and Jack Lake area. There is a harvest allocation planned for in the 2011-2021 FMP which was not harvested and was selected again for harvest in the 2021-2031 FMP. The SFL has committed to working with representatives of CLFN to address their concerns prior to any operations occurring in this area of interest.

The distribution of private land influenced and limited the selection of areas for harvest by creating access issues. This did not, however impact the achievement of forest management objectives.

The planned allocations have a lower age class than the LTMD projected. The lower overall age class of the allocations creates a projected volume that is significantly less than the LTMD. This is problematic for the tolerant hardwood objective, which are not expected to meet the target because of the lower age of the HDSH and HESH PLANFUs. However, the lower age class distribution does increase the achievement of the Old Growth objectives, particularly in the HESH objective. Thus, the age class distribution tends to help the habitat objectives, but not volume objectives. In particular, the drop in the average age of the HEsh PLANFU greatly aided in the achievement of the Hemlock Old Growth targets. Stage of management is closely followed between the LTMD and planned allocations for all PLANFUs. Commercial thinning allocations deviate from the LTMD in the ORUS and PRCC PLANFUs. ORUS planned area was not allocated at all, as no suitable areas were discovered in the inventory. However, this specific treatment is typically identified during operations and the area will be retained until then. PRCC was allocated in such a way that area assigned for clearcut was used for commercial thinning instead. This resulted in commercial thinning area being overallocated compared to the LTMD, but clearcut being significantly less than the LTMD. This was to the accommodate the condition of the selected stands, which were generally better suited for another round of commercial thinning, rather than a clearcut. In the case of both ORUS and PRCC, these changes do not significantly affect the outcomes of objectives, as both of these PLANFU commercial thinning programs represent a very small proportion of the overall harvest area for the management unit.

Objective achievement between the LTMD allocations and plan allocations are very similar, largely due to the initial landscape pattern decisions and fundamental operational considerations consistent in both scenarios. The LTMD areas and the refined harvest areas from planned operations were both tested using OLT to confirm continued spatially acceptable results related to operations and management objective achievement.

Public input did not influence the selection of areas for harvest during the LMTD. However, as a result of the two Issue Resolution (IR) Requests (see Summary of the Issue Resolution (IR) Process for the Bancroft-Minden Forest 2021-2031 Forest Management Plan (FMP) in Supplementary Document J and Part 2 of Supplementary Document L) additional changes to allocations and restrictions were required as follows:

<u>Changes from IR Request #1 (Catchacoma Forest Stewardship Committee)</u>

- Identifying two hemlock dominated stands near Catchacoma Lake as unavailable for forest management (see Operational Map MU220_2021_FMP_MAP_Ops1714_00).
- Changing Harvest allocation #2749 from Regular to Contingency. This change created a smaller planned HESH harvest area compared to the LTMD, however this change did not negatively affect objective achievement, but rather positively affected old growth hemlock objectives.
- Delaying the eligibility to amend in allocations 2749 & 3710 from Contingency to Regular and harvest them for one year to allow MNRF staff to complete additional Species at Risk values surveys and until the conditions imposed by the Regional Director decision are met i.e.
    - MNRF to develop technical guidance for old growth verification and delineation.
    - Addition of two Old Growth SGRs (see Table FMP-4 and section 4.2.2.1).
    - Additional FMP Map that portrays hemlock stands older than 130 years from the Inventory to be considered for application of the Old Growth hemlock SGR.

- Managing Hemlock areas in allocation #2749 under the selection system where appropriate (using the newly created old growth hemlock SGR: HESH-OG-HESH) and not the irregular shelterwood system which is the default or 'most commonly applied' SGR for HESH stands.

Changes from IR Request #2 (Jack Lake Cottage Association)

- Delaying the eligibility to harvest allocations 1100 & 3222 for one year from the implementation date of the FMP to allow MNRF staff to complete additional Species at Risk values surveys.
- Limiting harvest operations in allocations 1100 & 3222 to the months of November to April.
- Requiring the SFL submit a start-up notification to the Jack Lake Cottage Association when harvest operations are scheduled to occur.

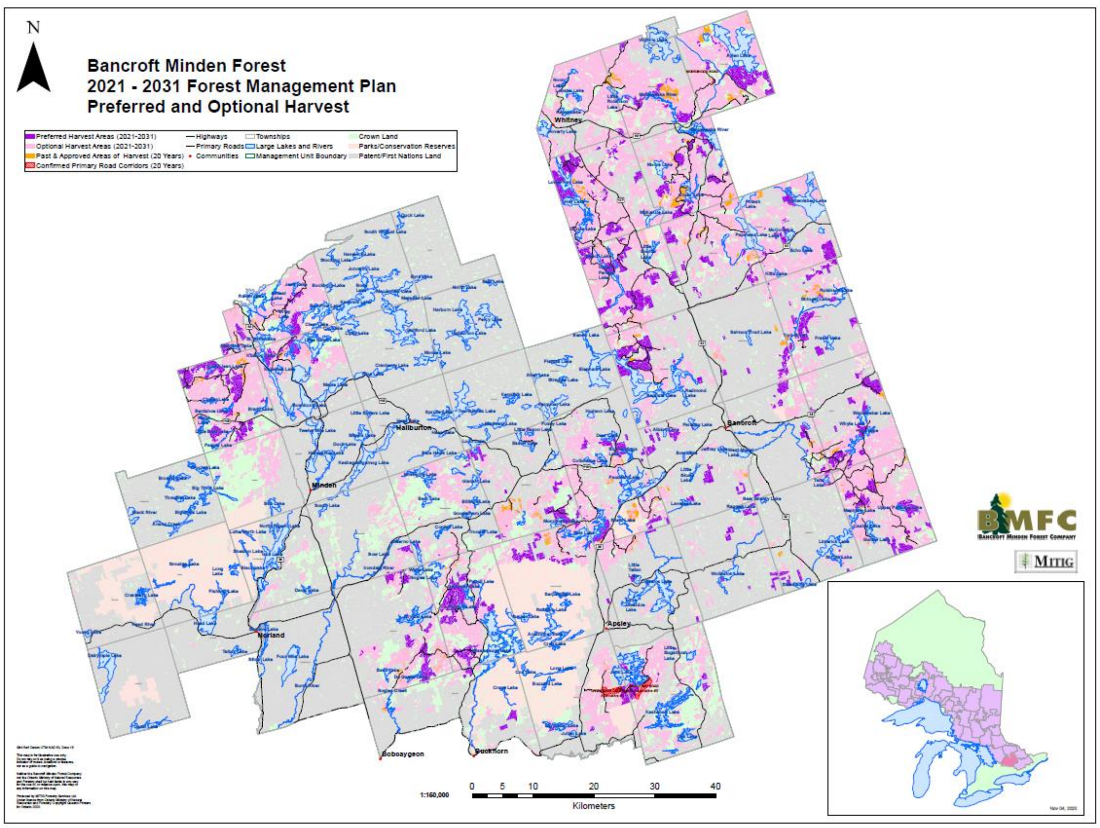


Figure 45. Preferred and optional harvest areas assessed during LTMD.

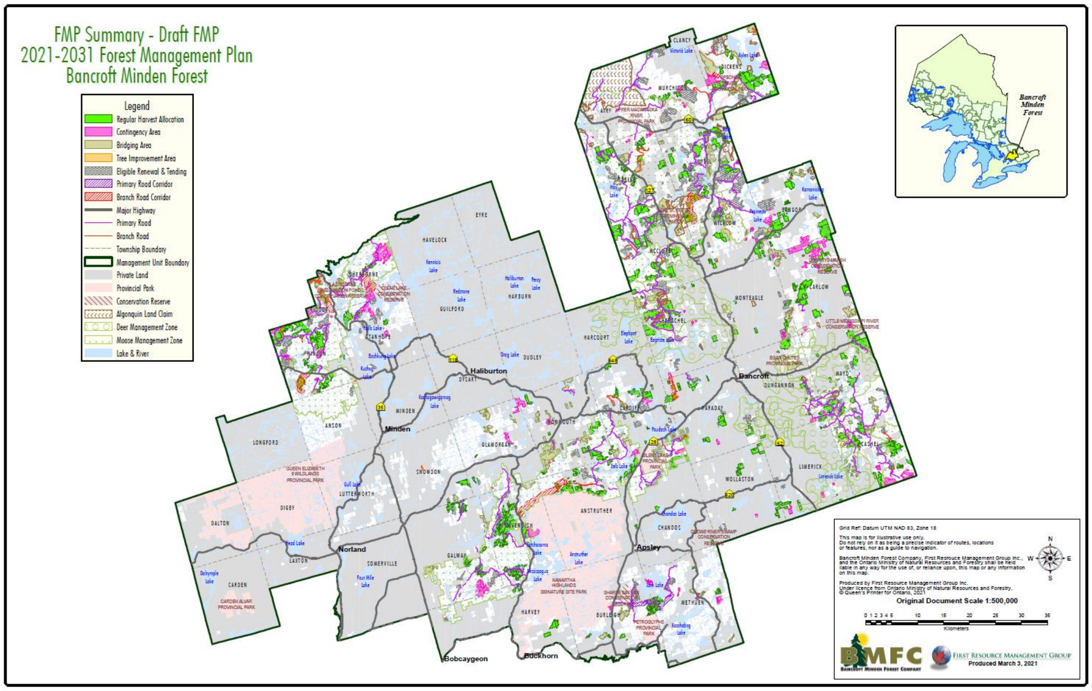


Figure 46: Planned and Contingency Area in the Draft Plan.

3.7.3 ASSESSMENT OF OBJECTIVE ACHIEVEMENT

All objectives, indicators, desired levels and targets were described in detail in Section 3.6. This section will provide the results of the objective achievement, discuss if assessment was scheduled to take place following the completion of the LTMD and provide rationale if desired levels were not achieved. This section will also describe how objectives and indicators will be assessed during plan implementation. Many of the indicators are time-sensitive or time-dependent and therefore cannot be assessed until the identified point in the future, whether that be at final plan approval or in years to come. It is important to note that objective achievement is likely to change following proposed operations because the analysis will be re-run on the final planned allocations and not an over-estimate of area used for the purpose of LTMD development. As a result Section 4.9 Comparison of Proposed Operations to the Long-term Management Direction, will provide an overview of changes in objective achievement after operational planning. A summary of the projected objective achievement, desirable levels and targets in the LTMD is recorded in Table FMP-10.

Objectives scheduled for assessment during the development of the LTMD

<u>Non-spatial objectives and indicators related to forest cover and harvest</u>

The non-spatial portion of the preferred management strategy was developed based on a balance of wood supply, harvest area, landscape class indicators, and old growth objectives. The results can be seen as a summary in table FMP-10, *Assessment of Objective Achievement*. Table 33 provides an overview of the achievement for each non-spatial indicator. The selected modelling scenario was able to achieve 81 of the 123 desirable levels (approx. 66%) and 115 of the 123 associated targets (representing 93%) during the development of the LTMD. Further sections and tables will explain in more detail the reasons why some of these desired levels and targets have not been met. Red cells indicate movement away from the target/desirable levels, yellow cells indicate movement towards the desirable levels, green cells indicate that the target/desirable level is being met and blue cells indicate an overachievement of desirable levels.

Table 33. Non-spatial objectives assessed for LTMD.

Non-Spatial Indicator	Desirable Levels Set	Desirable Levels Met	Achievement	Targets Set	Targets Met	Achievement
Landscape Classes	18	1	6%	18	17	94%
Old Growth	27	6	22%	27	21	78%
Red and White Pine	6	3	50%	6	6	100%
Young Forest	6	6	100%	6	6	100%
Species Group Volume	21	21	100%	21	21	100%
Product Volumes	12	12	100%	12	12	100%
Harvest Area	33	32	97%	33	32	97%
Total Non-Spatial	*123*	*81*	*66%*	*123*	*115*	*93%*

Objective: Move towards a more natural forest landscape structure, composition and abundance.

Indicator: Landscape Class

Assessment: Desirable levels are not met for this objective; all indicators except for Intolerant Hardwoods are below or above the SRNV in the 100-year planning horizon. The FMP does meet the target to show movement towards the SRNV for all indicators, with the exception of Tolerant Hardwoods in the short term (Table 34).

Table 34. Assessment of objective achievement for landscape class indicators.

Landscape Class	Plan Start	SRNV	Defined by being within the SRNV			Defined by moving towards the SRNV		
			Desirable Levels			Targets		
			Short (10 Years)	Medium (20 Years)	Long (100 Years)	Short (10 Years)	Medium (20 Years)	Long (100 Years)
TOL	127695	54, 576 - 61, 804	130143	122706	105658	Decrease	Decrease	Decrease
INTOL	30760	6, 068 - 12, 176	27291	23907	8509	Decrease	Decrease	Maintain
PWMIX	33176	81, 788 - 95, 000	34022	34330	39700	Increase	Increase	Increase
MIXED	64105	30, 660 - 39, 072	63823	59206	53184	Decrease	Decrease	Decrease
MXPRJ	7518	24, 720 - 31, 816	7637	7838	12500	Increase	Increase	Increase
SFC	11440	17, 524 - 24, 952	11490	11483	12436	Increase	Increase	Increase

The LTMD achieved 1 of 18 (or 6%) of the desirable levels for all Landscape Classes and 17 of 18 (or 94%) of the associated target levels. In the case of Landscape Classes, all classes are trending towards Simulated Range of Natural Variation (SRNV) levels in the long term. As a result, the LTMD is able to move towards an ideal forest composition over time.

The low achievement of desirable levels can be attributed to the initial age-class structure, the PLANFU harvest levels and the post-harvest and natural succession rules. These elements of the model collectively correspond to the rate at which the ideal composition can be achieved. Generally, it will take the forest greater than the 150 year modelling horizon to achieve the SRNV for Landscape classes. This is especially true for the White Pine Mixed class, which has a particularly high SRNV compared to the plan start and is the most difficult class to create on the landscape.

Tolerant Hardwood is the only indicator that is not able to achieve its target, as it is already overabundant on the landscape and experiences a small increase in area over the short term. This desirable level is substantially harder to meet, as it requires more forest conversion than can be achieved in a balanced scenario. Also most forest types naturally succeed to Tolerant Hardwood, meaning that any forest in a reserve will eventually contribute to this class.

Indicator: Old Growth

Assessment: All old growth desirable levels a) are met or exceeded in the long term except for PWUS and b) all targets to move towards the desirable levels are met in the medium term except for INTCC & MXHCC. Most targets are met or exceeded in the short term, with the exception of MXCCC and HESH (Table 20).

Table 35. Assessment of objective achievement for old growth indicators.

Old Growth	Plan Start	SRNV	Defined by being within the SRNV			Defined by moving towards the SRNV		
			Desirable Levels			Targets		
			Short (10 Years)	Medium (20 Years)	Long (100 Years)	Short (10 Years)	Medium (20 Years)	Long (100 Years)
PWUS	5,772	17,032 - 27,340	6,345	9,014	11,425	Increase	Increase	Increase
PRCC	397	892 - 1,660	473	626	1,803	Increase	Increase	Increase
MXCCC	2,893	2,716 - 7,524	2,270	3,345	5,357	Maintain	Maintain	Maintain
CESH	1,849	3,380 - 5,436	2,118	2,365	4,301	Increase	Increase	Increase
MXHCC	5,906	1,632 - 4,080	12,658	21,393	18,490	Decrease	Decrease	Decrease
HESH	752	3,620 - 5,420	733	1,013	4,000	Increase	Increase	Increase
HDSH	3,737	14,896 - 21,048	8,261	14,141	22,170	Increase	Increase	Increase
ORUS	1,100	2,184 - 3,148	1,907	3,169	8,320	Increase	Increase	Increase
INTCC	7,066	2180 - 4,388	15,449	20,398	3,949	Decrease	Decrease	Decrease

The LTMD achieved 4 of the 27 desirable levels (approximately 15%) and 20 of 27 of the associated targets (representing 78%) for old growth. The majority of the old growth indicators show movement towards the SRNV.

Although PWUS achieves its targets for the short, medium, and long terms, it is the only indicator that falls short of the SRNV during the planning horizon. The inability to meet the desirable levels is caused by a number of factors. First, the natural level (SRNV) of PWUS is much higher than what is currently available on the landbase. This makes it unreasonable to maintain the natural level of old growth since there simply is not enough available PWUS to set aside for old growth. Second, the PWUS that is currently sitting in reserve will eventually meet the old growth definitions but may also succeed into other forest types (or succeed into itself at a non-old growth age). This means that the initial gains in the short and medium terms, which are primarily driven by reserves, cannot be sustained indefinitely. Therefore, new PWUS areas must be created in managed areas to further increase and maintain an old growth PWUS forest. As a result, the plan aims to keep roughly 25% of PWUS area in old growth through the planning horizon. This will ensure that the area that naturally succeeds it is consistently replaced and that as more PWUS area is created, PWUS old growth area is set aside at a proportionate rate.

Subsequently the LTMD achieves the target level to move towards the SRNV, as the long term availability of PWUS old growth is stable and able to be managed at a level proportionate to the amount of PWUS area available on the landscape.

MXCCC and HESH are the only old growth indicators that show a decrease in area during the short term. However, the reduction in areas is slight and temporary as both indicators show rapid increases during both the medium and long terms. The decline in area for MXCCC is followed by a large increase in old growth area. The long term availability remains stable and trends towards the upper levels of the SRNV. As mentioned earlier, the model tends to keep the indicator in the upper portion of the SRNV, speaking to the general model behaviour to retain old growth components.

INTCC and MXHCC are overrepresented on the landbase across the entire planning horizon. In the long term INTCC meets the target to decrease but MXHCC does not meet the target in the long term. In contrast, ORUS begins slightly below the SRNV then quickly exceeds the natural maximum. This can be attributed to the sizeable amount of mature ORUS area at plan start and large proportion in reserve. Trending downwards to the SRNV proves difficult as much of the ORUS old growth area is in reserve which cannot be managed.

In this model, the old growth hemlock forest condition (represented by HESH) is in relatively low supply initially. However, the amount of the HESH forest unit is close to the natural range expected. Old growth area is lacking because the age of hemlock in the landscape tends to be below the Landscape Guide Old Growth definition of 155 years. A review of Table FMP-6 shows that roughly 4,000 hectares of HESH area are mature, but below the old growth definition. This means that meeting the target level is a matter of simply waiting for these forests to age. As seen in Table 36, the percentage of HESH Old Growth is expected to increase significantly over the medium and long term, eventually representing nearly 50% of the HESH forest on the landbase.

Table 36. Percent of HESH area that meets the old growth definition.

FMP-10 Timing	SRNV Proportion	Plan Start	Short Term	Medium Term	Long Term
Term		T1	T2	T3	T11
% Old Growth	48%	9%	9%	13%	49%

In absolute term, the indicator encounters a small decline in the first term (-2%) and later increases towards the SRNV until it is achieved in 2101 at a pace of roughly 250 hectares each term. Afterward, the indicator continues to increase, albeit at a much slower pace, but is within the SRNV and creates a scenario where roughly half of the HESH is old growth.

The LTMD projects a forest condition where hemlock (HESH) forests decline in the short term with a consistent increase afterward for the next 100 years. While not ideal, the LTMD creates a solution that must balance dozens of objectives with several individual indicators. For example, old growth is measured in 9 different ways, with HESH being only one element of the whole. The LTMD increases the overall old growth representation on BMF by over 20,000 hectares in the next 10 years, 40,000 hectares in the next 20 years and nearly 60,000 hectares in the next 100 years. Additionally, the HESH old growth trends show that an additional 250 hectares of old growth HESH will be represented on the landscape over the next 20 years and 3000 hectares over the next 100 years, meaning that the decline is not only slight but also temporary. In that context, a 19 hectare drop from plan start in the next 10 years for a single element of old growth represents a small decline in an overwhelmingly positive trend for old growth.

Finally, because the declining trend for the indicator is in the short term, the careful allocation of HESH harvest area can provide an improvement to the short term outcomes of this indicator while still preserving the long term projection.

Indicator: Red and White Pine

Assessment: 1) The SRNV desired level cannot be achieved in the 100-year planning horizon. 2) The 1995 level of PWR is maintained and increased in all terms, meeting the desirable levels defined by the Old Growth Policy.

Table 37. Assessment of achievement for red and white pine indicators.

Red and White Pine	Plan Start	SRNV	Defined by being within the SRNV			Defined by moving towards the SRNV		
			Desirable Levels			Targets		
			Short (10 Years)	Medium (20 Years)	Long (100 Years)	Short (10 Years)	Medium (20 Years)	Long (100 Years)
Red and White Pine SRNV	50,011	128,388 - 144,848	51006	51563	60044	Increase	Increase	Increase
Red and White Pine 1995 Levels	50,011	>= 39,786	51006	51563	60044	Maintain	Maintain	Maintain

Short, medium and long term targets are met to increase toward the Landscape Guide SRNV over time. The gap between plan start and the SRNV is due to the current forest condition. The shortage of PWR at plan start is a result of the logging pressures on white pine in the 1800's and into the 1900's followed by consistent fire suppression which favoured hardwood and suppressed the natural replenishment of white pine. Since there is far less white pine in the area than would be naturally, the SRNV desired levels for red and white pine is exceedingly difficult to achieve. Alternatively, there were no issues meeting the targets associated with increasing or maintaining PWR levels from the 1995 benchmark level.

Indicator: Young Forest

Assessment: Both the desirable levels and targets are met for the young forest indicators.

Table 38. Assessment of achievement for young forest indicators.

Young Forest	Plan Start	SRNV	Defined by being within the SRNV			Defined by moving towards the SRNV		
			Desirable Levels			Targets		
			Short (10 Years)	Medium (20 Years)	Long (100 Years)	Short (10 Years)	Medium (20 Years)	Long (100 Years)
PSST	7,050	2,972 - 17,116	9,663	9,360	6,145	Increase	Increase	Maintain
PRESAP	18,954	25,712 - 56,392	38,193	43,332	47,796	Maintain	Maintain	Maintain

While only a small proportion of the management unit can contribute to young forest conditions (35% of the available forest area falls into clearcut forest unit), the model is still able to achieve the young forest desirable levels and targets. As mentioned earlier, a sufficient amount of harvesting activity is created to ensure a steady supply of young forest habitat in each term than would be the outcome of a scenario with no harvesting activity.

Objective: Provide a sustainable, continuous and predictable wood supply from the forest that will meet, as closely as possible, the current recognized industrial demand of the forest.

Indicator: Long-Term Projected Available Harvest Volume by Species Group (m^3/yr)

Assessment: The desirable levels and targets are achieved in the short, medium and long term for all species groups.

The desirable levels for Industrial Wood Requirement by Species group are listed below, as well as the projected achievement. The Industrial Wood Requirements for species group volumes collectively are met in the long term. The desirable levels and target levels are the same value, but the desirable levels aim to exceed the value, whereas the target levels must be met to satisfy current demand.

Table 39. Industrial Wood Requirement desirable levels by species group.

Long-term Projected Available Harvest Volume, by Species Group (m^3/yr)	Provide a harvest level >=100% of the Industrial Wood Requirement for all species groups for each term (100 yrs.)	Short Term (m^3/year)	Medium Term (m^3/year)	Long Term (m^3/year)
PWR	>=25,600	61,158	55,196	50,470
SPF	>= 5,250	28,675	25,583	19,598
OC	>=1,000	6,219	5,709	5,121
PO	>= 60,000	85,936	74,485	67,522
BW	>=1,500	15,273	13,903	12,241
Tol HWD	>= 64,000	67,739	65,000	72,274
Total	>= 157,350	265,000	239,876	227,225

Indicator: Long-Term Projected Available Harvest Volume by Product Group (m^3/yr)

Assessment: The desirable levels and targets are achieved in the short, medium and long term for all product groups.

Product group volumes are met in each term, as per Table FMP-9, and are summarized below. The desirable levels and targets are based on the available wood report levels for each product, meaning that the “target” referred to in the graph reflects the Industrial Wood Requirements. The desirable levels and target levels are the same value, but the desirable levels aim to exceed the value, whereas the target levels must be met to satisfy current demand.

Table 40. Product group volume (000's m^3/yr) achievement for the 100-year plan horizon.

Product Group	Target	2021 (T1)	2031 (T2)	2051 (T4)	2071 (T6)	2091 (T8)	2111 (T10)
PWR Sawlogs	20.0	52.4	47.6	47.3	35.7	45.0	43.4
Hardwood Sawlog	50.0	82.5	74.1	57.6	53.5	70.8	76.5
Total Sawlogs	70.0	155.8	140.6	118.7	100.7	129.1	134.0
Total Pulp	50.0	109.2	99.3	87.2	77.6	92.0	93.2

Indicator: Long-Term Projected Available Harvest Area (ha) by Forest Unit

Assessment: Desirable levels and targets are met for all forest units with the exception of MXCCC. The MXCCC forest unit exceeds the variation target of +/- 25% in the long term.

While the overall change in AHA between terms is relatively low (<12%), the desirable level to limit the harvest area variation by <25% for each PLANFU was not met. As seen below in Table 41, the MXCCC Plan Forest Unit required 40% variation. This variation was needed, particularly in the later terms of the model, to account for the fact that MXCCC is a small forest unit (representing 7% of the total managed landbase). However, the difference between 25% and 40% is low impact, as this PLANFU does not contribute significantly to the overall AHA. All other PLANFUs stayed within the 25% target. Overall, the variation between terms is low, creating a stable wood supply that can meet industrial volume targets.

The 2021-2031 FMP also experiences a 20% decrease in AHA compared to the current plan. While individual PLANFU AHA deviates more than this, the changes to PLANFU sorting logic and the substantial changes to modelling approaches, particularly in the silvicultural options, make direct comparisons less meaningful. The reduction in harvest area is partially offset by volumes obtained from different harvesting approaches and commercial thinning, resulting in a <2% difference in volume between plans. As the primary focus of the AHA objective is to create consistent volume supply, the drop in AHA between terms is not a significant risk because volume remains consistent.

Table 41. Maximum variation between terms by PLANFU.

PLANFU	CESH	INTCC	PRCC	MXHCC	PWUS	ORUS	HESH	HDSH	HDSEL	MXCCC	ALL
Max % Change	0%	15%	25%	25%	25%	25%	25%	25%	25%	40%	12%
Proportion of Landbase	1%	13%	2%	12%	11%	12%	3%	29%	10%	7%	100%

<u>Spatial objectives and indicators related to forest cover</u>

Objective: To move towards a more natural forest landscape pattern and distribution.

The desirable levels and targets are the same for all spatial indicators under this objective. The desirable level is to move towards the SRNV (mean) in each concentration class/size class. The target is to show movement towards or maintain the SRNV (mean) in the majority of concentration classes/size classes by the end of the 10-year plan term. Table 42 provides an overview of achievement for each spatial indicator. The selected modelling scenario was able to achieve 5 of the 30 desirable levels (approximately 17%) and 16 of the 30 targets (representing 53%) during the development of the LTMD. Although the achievement for these spatial indicators is low, there is an opportunity to improve objective achievement through operational planning. Objective achievement will be further assessed in Section 4.9.

Table 42. Spatial objectives assessed for LTMD.

Spatial Indicator	Desirable Levels Set	Desirable Levels Met	Achievement	Targets Set	Targets Met	Achievement
Young Forest Distribution	6	1	17%	6	3	50%
Mature/Old Distribution	10	0	0%	10	3	30%
MEA Habitat	12	4	33%	12	10	83%
DEA Habitat	2	0	0%	2	1	50%
Total Non-Spatial	*30*	*5*	*17%*	*30*	*17*	*56%*

Indicator: Texture of Mature and Old Forest (50 ha)

Assessment: The LTMD does not achieve any of the desirable levels and moves away from the target in all texture patterns except for 1. The forest trends towards a texture that overrepresents mature/old forest.

Table 43. Assessment of achievement for Texture of Mature and Old Forest (50 ha) indicators.

Texture of Mature & Old Forest (50 ha)	Desirable Level	Plan Start (2021)	Short (2031)	Target
.01 - 2.0	1.0%	1.5%	2.0%	Move Towards Mean
.21 - 4.0	6.0%	3.5%	4.0%	Move Towards Mean
.41 - 6.0	17.0%	6.4%	6.0%	Move Towards Mean
.61 - 8.0	29.0%	12.3%	11.0%	Move Towards Mean
> .80	46.0%	76.3%	77.0%	Move Towards Mean

Based on the 50 ha assessment, the portion of mature and old forest relative to the SRNV indicates that there is less old forest in medium proportions and more old forest in the small and large proportions. Table 43 shows an overabundance of mature and old forest in the .01 – 2.0, .21 – 4.0, and >0.80 proportions. In contrast, the .41 – 6.0 and .61 – 8.0 proportions are underrepresented.

Indicator: Texture of Mature and Old Forest (500 ha)

Assessment: The LTMD does not achieve any of the desirable levels and moves away from the target in most texture patterns, including the largest, which need the most adjustment. The forest trends towards a texture that mature/old forest.

Table 44. Assessment of achievement for Texture of Mature and Old Forest (500 ha) indicators.

Texture of Mature & Old Forest (500 ha)	Desirable Level	Plan Start (2021)	Short (2031)	Target
.01 - 20	0.0%	0.0%	0%	Move Towards Mean
.21 - 40	2.0%	0.5%	1.0%	Move Towards Mean
.41 - 60	16.0%	5.3%	5.0%	Move Towards Mean
.61 - 80	43.0%	18.5%	18.0%	Move Towards Mean
> .80	39.0%	75.8%	76.0%	Move Towards Mean

Similar to the 50-hectare scale, the forest continues to age and management activities or natural disturbances cannot create young forest in reserve forest at levels that will affect the proportion distribution. However, some portions (.21- .40 and .61-.80) show movement towards the SRNV mean.

For both the 50 ha and 500 ha scales, there is an overall movement away from the ideal composition. This is because the majority of the landbase will be dominated by mature and old forest at plan end. In the LTMD, the solution does not create enough disturbance to significantly shift compositions towards younger age classes. This is a direct result of the heavy utilization of shelterwood and selection systems on the forest and the proportionate low-level application of the clearcut silvicultural system, as well as the existing age class structures that are biased to mature/old, especially in reserves. This bias is a difficult trend to reverse within the plan timeframe as management intervention is limited. However, the achievement of these indicators is better than would be expected in a natural scenario.

Indicator: Young Forest Patch Distribution

Assessment: The LTMD moves towards the target in the 101 – 250 ha and 501- 1, 000 ha patch size categories but moves away from the targets or holds even in the other categories. In terms of area, the forest does not trend towards a texture that better represents a natural young forest patch distribution.

Table 45. Assessment of achievement for young forest patch distribution indicators.

Young Forest Patch Distribution	Desirable Level	Plan Start (2021)	Short (2031)	Target
1 - 100 ha	87.0%	73.4%	73.4%	Move Towards Mean
101 - 250 ha	10.0%	23.2%	22.0%	Move Towards Mean
251 - 500 ha	2.0%	3.5%	3.6%	Move Towards Mean
501 - 1, 00 ha	1.0%	0.0%	0.4%	Move Towards Mean
1, 001 - 2, 500 ha	0.0%	0.0%	0.6%	Move Towards Mean
2, 501 - 5, 000 ha	0.0%	0.0%	0.0%	Move Towards Mean

In contrast to old growth distribution, initial even-aged forest age class distributions are lacking (Table 45). Clearcutting and stand-replacing disturbance events are necessary to produce young forest, although some shelterwood cuts will also contribute toward young forest objectives for a short period of time. Therefore, the same factors that affect the higher than average levels for old forest directly impact the lower amounts of young forest.

This indicator tends to be overrepresented in the middle patch sizes and underrepresented in the smallest and largest patch sizes and does not move significantly towards a better distribution from plan start to plan end. The 1-100 hectare category desirable level is significantly higher than plan start, but remains steady. The 101-250 hectare category shows a slight decrease to move towards the SRNV mean. The 251-500 category increases slightly plan start in an undesirable trend. The 501-1000 category increased slightly to meet the desirable level.

The plan also has an increase in the 1001-2500 hectare category, resulting in an overrepresentation of area within this patch distribution. The 1001-2500 hectare category is rare to be represented in Southern Ontario, as the private land generally fragments the land base too much to have a contiguous block of this size. The area in question is primarily INTCC stands of similar age concentrated on the south shore of Aylen Lake. This area is likely the creation of large-scale disturbance events in the area a century ago, thus creating a relatively homogenous forest of pioneer species. These poplar forests are best managed via clearcutting activity and the harvesting of this area aligns with the LTMD's goal to reduce the representation of INTCC on the landscape, increase the representation of young forest and offer the opportunity to convert hardwoods into other forest types. Additional residual planning will be conducted in this area to ensure adequate retention of cover.

Objective: Within the identified Moose Emphasis Areas (MEA), manage the productive forest, according to provincial direction (Stand and Site Guide).

Indicators:

Browse – Percent of browse-producing habitat or stands that have received a selection cut within 10 years or a shelterwood regen cut within 20 years

Mature Conifer – Percent of MEA in mature conifer-dominated forest

Hardwood or Mixedwood – Percent of MEA in hardwood-dominated or mixedwood forest >= 35 years old or >= 10 m tall, or recent partial harvest areas that meet the definition of residual forest

Assessment: The majority of indicators show movement towards the Stand and Site Guide threshold and achieve target levels. The percent browse for the Hindon MEA is the only indicator that decreases by plan end (2031). The percent of hardwood or mixedwood forest for the Hindon MEA is overabundant on the landscape and continues to increase away from the target level.

Table 46. Assessment of achievement for Moose Emphasis Area indicators.

MEA Indicator	Desirable Level	Plan Start (2021)	Short (2031)	Target
Browse				
South Algonquin	5 -30%	10.8%	11.3%	Increase
Hindon	5 -30%	1.8%	1.5%	Increase
Kawartha	5 -30%	3.1%	4.8%	Increase
Cashel	5 -30%	0.5%	3.6%	Increase
Mature Conifer				
South Algonquin	15 - 35%	7.8%	8.4%	Increase
Hindon	15 - 35%	27.6%	27.6%	Maintain
Kawartha	15 - 35%	21.6%	21.8%	Maintain
Cashel	15 - 35%	23.5%	21.4%	Maintain
Hardwood or Mixedwood				
South Algonquin	20 - 55%	62.4%	61.7%	Decrease
Hindon	20 - 55%	67.3%	68.3%	Decrease
Kawartha	20 - 55%	67.3%	66.4%	Decrease
Cashel	20 - 55%	72.0%	70.9%	Decrease

The Hindon MEA is not able to meet the target levels for the browse and hardwood/mixedwood indicators. Overabundance in the hardwood/mixedwood indicator is not of great concern as this provides an opportunity to convert some hardwood/mixedwood stands to browse-producing forest through harvesting. This could, in turn, increase the achievement of browse-producing forest through time. Although these targets could not have been met through the LTMD, the objective achievement remains higher than if no forestry operations occurred. The remainder of the MEAs meet the targets and show movement towards the desirable levels.

Objective: Within the identified Deer Wintering Areas (deer yards stratum 1), maintain or create critical thermal cover (CTC), where possible, according to provincial direction (Stand and Site Guide).

Indicator: Percent of Critical Thermal Cover (CTC)

Assessment: The LTMD does not meet the desirable levels for Critical Thermal Cover in both deer yards. It meets the target of increased CTC in the Baptiste Yard but does not in the Mephisto Yard.

Table 47. Assessment of achievement for Deer Emphasis Area indicators.

DEA Area	Desirable Level	Plan Start (2021)	Short (2031)	Target
Mephisto	15%	12.7%	11.8%	Increase
Baptiste	15%	2.2%	2.3%	Increase

Both deer yards start below the desired level of 15%. While the Baptiste Yard shows a slight increase in area (+0.1%), there still remains a significantly low amount of critical thermal cover. As mentioned earlier, the achievement of this objective may be increased through operational planning. Conditions on Regular Operations (CROs, Section 4.2.2.2) will be implemented in DEAs to maintain or increase CTC objectives. Additionally, the OLT modelling results do not take into consideration bypass area or areas excluded due to Area of Concern (AOC) prescriptions. For example, cedar and lowland conifer areas are often bypassed in harvest operations due to operability concerns. This often results in an underestimation of CTC.

Objectives scheduled for assessment during draft plan submission

Objective: To provide opportunities for Indigenous involvement in forest management planning activities.

Indicator: Opportunities for involvement of First Nation and Métis communities in plan development

Assessment: In addition to letters and correspondence, all communities with representatives at the planning team table regularly received communications regarding upcoming team or Indigenous task team meetings, team items for review and input and meeting minutes.

Indigenous communities that may have an interest in the Bancroft Minden Forest Management Unit were identified based on past involvement in the planning process or identified by asserted territory/rights within the Management Unit. A list of communities that were contacted can be viewed in the Summary of First Nations and Métis Involvement in Supplementary Document D.

All First Nations and Métis communities within or adjacent to the Bancroft Minden Forest were to be contacted at least nine months prior to the commencement of public consultation and provide opportunities for involvement in the planning process.

Invitations to participate in the preparation of the plan were sent out to all 18 of the identified communities in December of 2017. This letter of invitation outlined the FMP process and identified a number of options and/or opportunities for communities to be involved in the planning process. Follow up communication was made in the form of phone and email contact.

Six Algonquin communities chose to participate on the planning team. The following are the community representatives on the team; Richard Zohr and Emmett Godin (alternate) – Bonnechere Algonquin First Nation, Robert Craftchick – Whitney and Area Algonquins, Wendy Jocko and Dan Kohoko (alternate) – Algonquins of Pikwakanagan, Connie Mielke and Paul Laderoute (alternate) – Algonquins of Greater Golden Lake, Stephen Hunter and Mike Green (alternate) – Kijicho Manito Madaouskarini Algonquins, Doreen Davis – Shabot Obaadjiwan (Sharbot Lake), and Ethan Huner representing the Algonquins of Ontario Consultation office. In addition, Robert Craftchick – Whitney and Area Algonquins is a member of the Steering Committee.

Two Williams Treaties First Nations communities chose to participate on the planning team. The following are the community representatives on the team; Tom Cowie and Sean Davison (alternate)– Hiawatha First Nation, Kaitlin Hill – Curve Lake First Nation.

No communities identified the custom consultation approach so Indigenous consultation has proceeded alongside the public consultation process. However, the AOO has asked for an enhanced regular consultation through FMP updates to their Forestry and Parks Working Group Meetings.

All identified communities in the management unit were invited to participate in plan development and to provide an Aboriginal Background Information Report. The desired level was achieved for this objective.

Objective: To encourage and support the participation of the Local Citizens Committee in the development of the Forest Management Plan for the Bancroft Minden Forest.

Indicator: Local Citizens Committee's self-evaluation of its effectiveness in plan development

Assessment: The 2021-2031 FMP does not meet the desirable level and target of achieving a score ≥8.6 on the LCC self evaluation.

At the time of draft FMP completion, the LCC had 5 members representing a range of affiliations including forestry, First Nations, naturalists, recreationalists, trappers and municipal government. The LCC met almost monthly from early 2018 until final plan submission and were kept informed and consulted regularly during the planning process. The Local Citizen's Report in Supplementary Document K provides detail in participation, issues addressed and assessment of effectiveness.

Prior to draft plan submission, members were invited to fill out a questionnaire regarding their self-evaluation of LCC effectiveness during plan development. Based on the results from the attending members, a score of 8.0 was achieved. In comparison to the score of 8.6 in the development of the 2011 FMP, the desired level and target were not achieved to maintain or improve the score.

Objectives scheduled for assessment during plan implementation

A number of objectives are scheduled to be assessed at Years 5 and 10 Annual Reports. Additional requirements exist in these Annual Reports for analysis to examine if the scheduled forest management activities are contributing to the overall objective achievement.

Compliance-based indicators

Many of the objectives and indicators scheduled for assessment at Years 5 and 10 are compliance-based. These indicators can be found under the healthy forest ecosystems and habitat for animal life objective categories to include:

- Protection for species at risk (SAR)
- Improvement of forest management operations

- Protection of soil and water
- Conservation of quality and quantity of interior waterways, wetlands and catchment areas
- Maintenance or restoration of hydrology

Forest Operation Information Program (FOIP) reports completed by the SFL and MNRF throughout the plan term assess all activities to determine compliance with the numerous standards and guidelines laid out in the Area of Concern (AOC) prescriptions (FMP-11) and Conditions on Regular Operations (CROs, Section 4.2.2.2). These are filed through an electronic system and at the time of objective assessment, an analysis of all FOIP reports filed during the plan period will be completed. A comparison of compliant and non-compliant reports by indicator-specific category can then be made, to determine the percent compliance by indicator-specific category.

Roads indicators

There are two indicators in FMP-10 associated with the objective to *ensure that enough roads are in place to allow for effective and efficient forest operations while also limiting company and ministry liability for roads that are no longer required.* The first evaluates kilometres of passable road (with a 4x4 vehicle) per km^2 of forest. It is desirable to have less than 2% of the forest landbase converted to roads or landings per plan term. The same evaluation will also be used to assess the achievement of the managed forest area available for timber production indicator, under the objective to minimize loss of Crown productive forest to infrastructure development thereby maintaining harvest levels and related community well-being.

The second roads indicator deals with the abandonment of operational roads. It is desirable for all upgraded or new operational roads to be abandoned unless they are left in place to accommodate other forest users. In these cases, consultation and approval from MNRF are required. The Years 5 and 10 Annual Reports will evaluate how much operational road was reported as constructed and subsequently decommissioned and provide details in the cases where decommissioning has not yet taken place.

Silvicultural success

Post-harvest regeneration success is evaluated on a schedule and to standards described in the SGRs (FMP-4). Depending on the type of harvest and regeneration efforts (natural or artificial), a free-to-grow assessment could occur immediately after harvest (e.g. selection), or up to 10 years after harvest (e.g. shelterwood seeding cut and planted white pine). The result of the assessment will deem the area as a silvicultural success (e.g. dominant in the desired crop regeneration species), regeneration success (e.g. dominant in crop and/or acceptable regeneration species), or silvicultural failure (e.g. dominant in tree species other than crop or acceptable regeneration species or deficient in regeneration overall). This information will be used to assess objective and target achievement. Details of the monitoring program for regeneration success are described in Supplementary Document G.

Harvest utilization

There are two indicators in FMP-10 associated with the objective to *harvest a sustainable and continuous wood supply from the forest that will meet the current recognized industrial demand of the forest*. The first evaluates the actual harvest area by forest unit (% of planned harvest area) while the second evaluates the actual harvest volume by species group (% of planned harvest volume). It is desirable to achieve actual harvest levels greater than or equal to 85% for both planned harvest area (FMP-12) and planned harvest volume (FMP-13). These indicators will be assessed at Years 5 and 10 Annual Reports.

This objective has become increasingly important as the past four terms have experienced a downward trend in harvest utilization. Actual harvest volumes from the years 1996-2021 range from 51% to 66% of planned harvest volume, as was depicted in Section 3.7 (Figure 34). The Year 7 Annual Report for the 2011 FMP discusses the main barriers affecting wood utilization including: species at risk operating restrictions; administrative and communication issues with MNRF; challenging markets; beech bark disease; additional forest operations restrictions imposed by the Crown Land Use Policy Atlas; and other external factors such as weather and ability to find willing and suitable workers to carry out logging operations. Low levels of harvest area/volume have the potential to impact non-timber objectives as well. Wildlife habitat and landscape pattern objectives may be impacted by reduced harvest levels as harvest is able to create young forest which is an FMP objective.

Qualitative objectives and indicators

Two qualitative objectives are identified in the plan, as discussed in Section 3.6.2: *Identify, protect & share information about values of interest with local First Nation communities.* This objective will be assessed through a) the delivery of presentations on annual operations to interested First Nations communities and b) deliver operator training on the identification of First Nation values of interest. The Years 5 and 10 Annual Reports will report the achievement for these indicators.

In a changing climate, maintain or improve the ability of forests to resist pests & pathogens. This objective will be assessed by implementing bi-annual operator training to educate operators about a number of climate-related impacts such as emerging invasive species and mitigative management strategies. The 2021-2031 FMP also includes best management practices for invasive terrestrial plants outlined in the Conditions on Regular Operations (CROs, Section 4.2.2.2). This objective will be assessed at Years 5 and 10 Annual Reports.

Summary of objective achievement

The majority (86%) of indicators that were assessed at LTMD and discussed above were within the targeted ranges (Table 48). The indicators that did not meet the targets were a result of balancing the achievements of other objectives, such as favouring the creation of additional area within specific forest units to achieve management unit level objectives.

Table 48. Summary of indicator achievement assessed at LTMD.

Indicator	Desirable Levels Set	Desirable Levels Met	Achievement	Targets Set	Targets Met	Achievement
Non-Spatial Indicators	123	81	66%	123	115	93%
Spatial Indicators	30	5	17%	30	16	53%
Total	*153*	*86*	*56%*	*153*	*131*	*86%*

3.7.4 SPATIAL ASSESSMENT OF PROJECTED HARVEST AREAS

Objective achievement for wood supply was assessed spatially to provide assurance that harvest area is not disproportionately allocated across spatial zones over the first 40 years of the planning horizon. It is important to ensure there is a balance of economically favourable areas over time, as well as a distribution of harvest to meet ecological objectives.

The projected distribution of harvest for the first four FMP terms is shown in Table 49 for each strategic management zone as described in Section 3.5. Harvest area fluctuates minimally in each zone, relative to the total proportion of area for each zone, thereby providing spatial and economic stability over time.

Figure 44 in Section 3.7.2 portrays the spatial distribution of the harvest area over the first four model terms (40 years) for each zone.

Table 49. Proportion of available harvest area for the first four terms (40 years) by SMZ.

Term	Bancroft SMZ	Minden SMZ	Total
1	69%	31%	100%
2	65%	35%	100%
3	69%	31%	100%
4	74%	26%	100%

3.7.5 SOCIAL AND ECONOMIC ASSESSMENT

A social and economic assessment was done using qualitative analysis based on data from the social and economic description. There was no quantitative (SEIM or other model) assessment done. Instead only a qualitative assessment was done as there is a slight increase (2.3%) in the volumes from the 2011-2021 plan.

In terms of overall annual available harvest volume, the projected harvest volume level for all merchantable species groups is 265,000 m^3/yr for the first 10-year term of the 2021-2031 FMP. This volume is slightly higher (2.3%) than the levels for Term 1 of the 2011 FMP (258,807 m^3). Wood volumes after Term 1 see a steady decline until term 6 where volumes dip just below 200,000 m^3/yr and then slowly rise and remain between 200,000-250,000 m^3/yr from Terms 8 to 15. The overall Industrial Wood Requirement volume of 157,350m^3 is achieved over all terms. This implies that the LTMD volume is adequate to meet annual Industrial Wood Requirements (IWR) in the forest. In terms of overall wood volume, the economic impacts to local mills and employment would remain similar to the 2011 FMP in the short-term (10-yrs) and long-term (100-yrs). However, there is a significant decrease in Tolerant Hardwood volume in Term 1 from 96,600 m^3 in 2011 to 67,739 m^3 in 2021, a decrease of -29.9%. Some of the Tolerant Hardwood sawmills will see a potential decrease in volume, but not necessarily in the product that they are seeking. As previously alluded to, the changes to yield curves and modelled management approaches in the LTMD have decreased the overall available volumes of Tolerant Hardwoods, however, the Product Group volumes are consistently above the desirable level throughout the plan. This indicates that alternative volumes to this species group are available in the and the industrial demand can be met through other means.

The increase in harvest levels should have a positive effect on potential levels of employment and employment income at the primary wood processing facilities. Other external influences on the forest industry (e.g. market conditions, currency exchange, business costs, contractor availability, etc.) may influence the achievement of these levels. With all other factors remaining equal, these direct impacts will lead to the maintenance of jobs, wages, tax revenues and other economic and social indicators for the dependent communities surrounding the Bancroft Minden Forest, providing support for the social and economic sustainability of local economies.

Commercial Forestry

This is a diverse forest which is reflected in the species and products that come from it. Even within the species groupings some species are more marketable than others dependent on market demand. However, the industry seems to have adapted to these trends and operate in this forest as required.

The socioeconomic impact of the LTMD on the Bancroft Minden Forest Management Unit is positive. The jobs it does provide are generally non-seasonal and better paying than that many of the tourism-based industry employment opportunities. The LTMD provides for a relatively stable supply of wood products by species group, although the 37.9% decrease in Tolerant Hardwood species group does have the potential to impact the employment at hardwood sawmills such as McRae who rely on predominately tolerant hardwood from the Bancroft Minden Forest.

The socio-economic analysis based on wood supplied by the LTMD is difficult to directly relate to the true socio-economic conditions in this forest as the full utilization of the available harvest area has never been achieved. The reasons for this often relate to timber that proves inoperable due to costs and logistical realities of accessing many areas and the combination of poor quality/low stocking. As markets change, the ability to harvest areas currently restricted by the latter two reasons may change as well.

In comparison to the 2011 FMP, there is expected to be an increase in both silvicultural revenue and expenditures of 23% from the current 2011 plan. The increased revenue and expenditures for silvicultural activities will benefit local contractors and the economy through forestry employment, spin off benefits and ultimately more future harvest volume to support local mills.

There are no negative socio-economic impacts in communities benefiting from the silviculture program on the Bancroft Minden Forest. The main silvicultural program which benefits local employment is tree marking. Tree marking is directly related to the available harvest area. However, the available harvest area is still much higher than what is typically utilized.

Non-Timber Values

Bancroft Minden Forest (BMF) is used by a diverse group of forest-based industries and groups such as tourism operators, aggregate and mining activities, hunters and trappers. The unique southerly location of the BMF also provides regular recreational use of parks and reserves in the area where canoeists, hikers and cottagers frequent. Table 50 below outlines the potential positive and negative impacts of forestry on non-timber value resources as well as approaches to mitigate impacts over the course of forest management planning and plan implementation.

Table 50. Potential impacts of forest management activities on other forest-based industries and activities in the Bancroft Minden Forest.

Sector	Activity	Potential Positive and Negative Impacts	Mitigation
Recreation and Tourism	Commercial Tourism (Parks, Protected Areas and Crown Land)	Positive: Maintained forest access roads for public access Negative: Remote access appeal diminished with increase in forest access roads, especially for backcountry tourists and outfitters Visual aesthetics of forest operations in vicinity Noise levels from forest operations in vicinity	Area of Concern (AOC) prescriptions and planning, public consultation and Road Use Management Strategies
	Hunting	Positive: Increased access may provide hunting opportunities Maintenance of habitat in harvesting activities through required guides and policies may help maintain game species' populations in some areas Negative: Increased access may lead to overharvesting of wildlife	Road planning and public/Indigenous consultation Stand and Site Guide Forest Management Guide for Great Lakes St. Lawrence Landscapes

		Restrictions on access following decommissioning of roads may restrict hunting opportunities	Road Use Management Strategies
	Fishing	Positive: Increased access to remote lakes and rivers Negative: Increased access may lead to overfishing of sensitive lakes	Consultation with Indigenous communities and the public; use of values data to determine risk Road Use Management Strategies
	Cottaging	Positive: Road maintenance Negative: Visual aesthetics of forest operations within the vicinity as well as noise levels from forest operations within the vicinity; increased traffic on cottage roads	Public consultation; information forums, signs, open house Area of Concern (AOC) prescriptions
Recreation and Tourism	Eco-tourism	Positive: Some tourism providers may benefit from increased access as additional opportunities to access new routes or activities for clients Negative: Remote tourism may be negatively impacted by forestry roads and increased access Increased noise when within vicinity of operations Visual aesthetics may also be impacted	Public consultation; information forums, signs, open houses. AOCs that may include specific management zones and restrictions on timing of operations Road Use Management Strategies
Mining, Aggregate and Power Generation	Mining	Positive: Road access created by forest management activities is generally perceived positively within the mining sector; prospectors can more easily access claims, stake new claims or carry out advanced exploration	BMF Mining and Land Tenure and AMIS Site map and notification of planned and scheduled operations to claim holders

		Negative: The potential removal of mining survey lines and disturbance to claim posts by forest harvesting activities	
	Aggregate	Positive: Access creation and maintenance, can potentially create additional access to aggregates and may lead to additional discovery of resources	
	Power Generation	Positive: Access for hydro generation activities may be provided or maintained through forest management	
Other	Trapping Activities	Positive: Access roads may result in increased or refurbished access which can assist trappers in accessing traplines Negative: Road access may disrupt wildlife or draw other forest uses that might hamper trapping Forest harvesting and silviculture can also potentially damage trails	AOC/CRO; public information centres, notification of planned and scheduled operations to bear management area and trapping licence holders Road Use Management Strategies
	Baitfish	Positive: Road development and maintenance for forest management activities may provide motorized access for operators Negative: Harvest operations close to shorelines or riparian areas	AOC prescriptions and CROs Notification of planned and scheduled operations to baitfish operators

3.7.6 RISK ASSESSMENT

There are risks that some plan objectives may not be fully achieved during the implementation of the FMP, which can impact the future forest condition and desired benefits. Forest management planning also relies on a precautionary approach in dealing with uncertainty and follows an adaptive management process to mitigate risks. This is a foundation of the environmental values considered in the development of the FMP. Discussing the potential risks is a recognized and required part of the FMP process. The planning team was informed of several risks and recommendations outlined in the Year-7 Annual report, with a heavy focus on Beech Bark Disease. Others become apparent through discussions with the team, or from public input during planning. These risks cannot be fully addressed in the context of an FMP, nor are they neatly explained in a single section, as solutions are multi-faceted and affect many aspects of the plan. Thus its important to outline these risks and provide high level insight into how they are managed.

A primary source of risk is the continuation of uncertain and fluctuating market conditions for wood fibre. During the first seven years of the 2011-2021 planning cycle, the level of utilization has been quite low, especially for some forest types and species groups that have high levels of unmarketable volume, e.g., pulpwood. This is largely reflective of market conditions and high costs associated with accessing, harvesting and delivering volumes from planned harvest blocks where the marketable volumes are also low. Simply put, the sustainable and approved harvest volumes were available however, they could not be harvested without incurring a financial loss. Local and global markets, economies, and international trade also affect the implementation of the FMP. The demand for commodity forest products is cyclical and will affect the level of harvest, as seen in previous FMPs. Harvest levels have typically been lower than what is available in each FMP and this trend may continue well into the 2021-2031 period. A consequence of continued under-harvest of approved allocations is the inability to reach the full potential of economic opportunities and related social benefits. Employment levels, in terms of both direct and indirect jobs, and revenues associated with historically low harvests, are significantly lower than could be realized with full utilization of the available harvest.

As part of the scoping exercise during the development of the LTMD, the past and current under-utilization of the forest was analyzed and documented in Section 4.3.1.5 of the Analysis Package. The issue involved constraining the SFMM model to only allocate the harvest area and volume in each future 10-year FMP period for the first 100 years of the modelling horizon at the average annual level realized for the first seven years of the 2011 FMP. The examination included scoping two separate approaches to 'historic wood utilization'. The first was based on modelling recent forest unit harvest area levels and the second on the associated species group volume utilization. The selection harvest forest units were not constrained to utilization levels due to new AHA being close to utilization average harvest area because of changes to forest unit areas and were by default included in analysis and projections of indicators. The forest unit average harvest area is an accurate representation of what has been harvested and reported over the past 7 years, which is 50% of the available harvest for the examined forest units. Future projections of this utilization level provided insight into the impacts of continued low harvest levels on long-term FMP objectives.

Low levels of forest disturbance, whether through harvesting or natural disturbance, may appear to be favourable to objectives that rely on mature and old forest, but cause significant overachievement of old-forest condition when compared to the natural succession of the forest. Intervention in the forest via harvesting and silviculture will favour certain sustainability indicators as a trade-off to others. For example, low disturbance levels are favourable to the creation of old forest, but are also unfavorable to objectives that rely on the creation of young forest and early successional forest types and associated species such as jack pine, poplar, and white birch. Many browse species (moose and deer), as well as, some neo-tropical migrant birds rely on early-succession forest during parts of their life-cycle. The projected plan-end habitat for the modelled wildlife species is based on the assumption that all allocated areas will be harvested and subsequently renewed. In the event that harvest targets are significantly underachieved and natural disturbance continues to be suppressed, species that rely on older seral stages and age-classes will be favoured over time and those that require younger forest age-classes will have their habitat reduced. For example, the Intolerant Hardwood forest class, represented mostly by poplar stands, is projected to decline significantly over time in a low harvest utilization environment.

Underachievement of harvest levels will also have a significant impact on the ability of forest managers to create a future forest that is closely aligned with the Landscape Guide targets. Scoping analysis of the historic, low utilization levels for these forest units at 50% of the available harvest area shows that maintaining forest diversity achievement trends (i.e. moving towards lower SRNV target levels during the planning horizon) remains possible. However, the time required to achieve these targets can extend well beyond the 150-year modelling horizon for some forest diversity and cover indicators. Forest units that rely on current harvest disturbance levels to create future old growth area (as seen in the PWUS PLANFU) will be underachieved, or take longer to reach old growth area targets. The landscape classes that require disturbance to increase and/or maintain their total area on the forest (Spruce-Fir-Cedar, Mixed Pines, White Pine Mixed) show either declines or marginal increases over time. Spatial pattern objectives are also sensitive to actual harvest levels, as less harvesting would result in a longer timeline to reach the desired disturbance pattern. Therefore, low harvest levels will further fragment young forest patch sizes to smaller patches, while simultaneously concentrating the texture of mature and old forests, which has been identified as an issue in the objective assessment.

Current and projected changes in the workforce demographics also present a challenge to maintaining a continuous and predictable supply of wood to mills. Truck drivers, mill workers, and loggers are sometimes in short supply, and the future change-over and recruitment within the workforce could potentially limit the ability to fully utilize the available harvest area. While outside the scope of the FMP, this issue is being considered with Shareholder business planning and recent government initiatives with industry partners.

Recent experience has shown that regulatory changes can have a profound impact on the implementation of FMPs, which is a potential risk to objective achievement. In particular, changes to policy requirements, such as the implementation of species at risk legislation, may result in lower harvest levels within planned operational areas or remove them from harvesting entirely. The regulations and provincial policy that governs species at risk are dynamic and may further reduce the flexibility needed to accommodate other operational constraints such as access or timing of silvicultural activities, creating de-facto reductions in harvesting area unintentionally. There remains a large portion of area that has not been harvested (bypassed), in order to meet the requirements of these regulations. An increase in regulatory complexity could make bypassed area increase, further limiting the ability to manage the forest and compounding the lack of disturbance occurring in the forest. All things considered, Ontario's Forest Sector Strategy seeks to reduce the regulatory complexity and should mitigate the risks associated with regulatory change.

Climate change also poses a potential threat to the health and condition of the forest, especially since the timing and magnitude of effects are uncertain. Weather patterns (e.g., wet autumn conditions, late freeze-up or early winter thaws), may pose a risk to accessing harvest areas that require the use of winter roads or frozen ground or timing restrictions to avoid critical species at risk breeding periods. This may constrain the availability or feasibility of accessing some winter harvest areas. Annual Work Schedules may, therefore, need to be revised periodically to accommodate increasingly unpredictable weather conditions. The adaptive management process of monitoring and subsequent planning is an important aspect of addressing climate change. The recent incidence of wildfires has been relatively low in the forest, although there have been periodic fluctuations in fire occurrence. The incidence of fire under natural (without fire suppression) and managed conditions are estimated and accounted for in strategic modelling and the LTMD. However, climate change may result in future increases in the occurrence and severity of fires. This is mitigated through effective, rapid response of the fire control program and fire prevention and preparedness strategies as is described in Section 4.8. Salvage opportunities also offset the impacts of fire, insect, disease, and weather-related damages through the recovery of damaged trees. Planned harvest and renewal activities also mitigate the accumulation of higher fuel loads with the dispersion of young forest and hardwood to create a landscape pattern that better emulates natural levels. The FMP has included an objective to train operators on the impacts of a changing climate so that evolving conditions can be tracked and new science can be shared with the front line workers. The overall risks to successfully implementing the FMP are mitigated through a well-balanced strategy and adaptive management process. A mid-term evaluation of the plan progress as required in the FMPM will be undertaken to ensure successful implementation, or potentially a need for revised direction. The periodic planning cycle for forest management, requiring a re-evaluation and new plan every 10 years also provides the opportunity to respond to unforeseen challenges or risks.

Invasive species are a significant risk to the plan as well. Current threats, such as Beech Bark Disease, are accounted for in the LTMD with input received from local practitioners and scientific literature. For probable future threats (e.g. Hemlock Woolly Adelgid, Oak Wilt, etc.), the timing, duration and intensity of these threats are difficult to account for in a long-term deterministic model, as the science and practitioner experience is still developing. However, the adaptive management approach within FMPs, which are re-written every 10 years, allows for emerging invasive species to be addressed as new information becomes available. Additionally, increasing forest diversity increases the resilience of the forest by reducing the over-representation (and thus vulnerability) of particular forest types, such as Tolerant Hardwood.

Ownership changes influence the amount of landbase available in the LTMD and thus pose a risk if significant changes occur. Changes in the tenure of planned allocations during plan implementation normally result in the approved harvest area being removed from harvest. The known tenure changes to Unopened Municipal Road Allowances (UMRAs) and other land claims have been accounted for in the LTMD model. Additionally, the proportion of area reserved from harvesting creates scenarios where positive management intervention cannot outpace negative changes in reserves. Ownership changes generally reduce the amount of Available Crown Forest, as ownership tends to either create reserves through parks or privatize areas (such as UMRAs) and pose a risk by removing a larger proportion of Crown land from management.

Access limitations can pose risks to accessing the allocations outlined in the LTMD. Due to a large amount of private land and the fragmented nature of the available crown land, reliance on private land access creates uncertainty for many harvest allocations. In the event that planned access to approved harvest blocks is not available, primary, branch or operational road planning may require a plan amendment and/or an Annual Work Schedule revision. Also, when economically feasible access is unavailable, the harvest block area may be dropped entirely or replaced with contingency area.

Finally, the LTMD incorporates irregular shelterwood as the primary means of managing Tolerant Hardwoods, which is a significant change from the previous plan. The IFA recommended that this silvicultural approach should have greater consideration in the 2021 plan, as many of the prescriptions appeared to be irregular shelterwood in application. While this approach to silviculture has been practiced by the SFL in the field, it could not be reported as irregular because the Annual Report and FMP didn't have the proper mechanisms to report the distinction at the time. It is also novel to the modelling process. The modelling changes have allowed for greater clarity of forest structure and age in particular forest types, especially Cedar and Hemlock, which previously had limited means of projecting change through selection management. For these forest types, the 2021 LTMD represents a substantial upgrade in habitat projections.

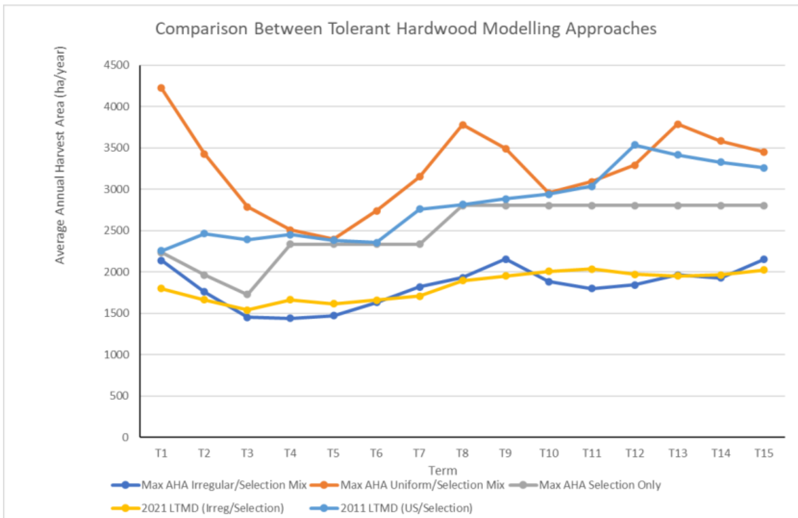


Figure 47: Comparison between Tolerant Hardwood Modelling Approaches

For Tolerant Hardwoods, the shift to irregular shelterwood would cause a large proportion of the managed landbase to change management paradigms. As such, a detailed looks at how this shift would affect disturbance rates was made. These investigations made during the development of the LTMD demonstrate that irregular shelterwood creates modelling scenarios that reduce overall harvest area compared to the previously utilized uniform shelterwood and selection systems, as seen in Figure 47. The graph shows the combined AHA of the Tolerant Hardwood PLANFUs (HDSEL + HDSH/HDUS) in the 2011 and 2021 LTMD. It also shows the results of a scoping exercise conducted that compared the maximum AHA possible if the areas identified as HDSH in the 2021 BMI was modelled as irregular shelterwood (as per 2021 LTMD), HDUS (as per the 2011 LTMD) or as selection (representing a very controlled scenario).

Results show that maintaining the status quo from 2011 (uniform shelterwood) would create much more disturbance on the landbase (as per the grey and orange lines). The 2021 LTMD (Black) and Irregular/Selection Mix (Purple) are conservative in their amount of disturbance. Prevailing opinion during LTMD development was to prefer the conservative outcomes and thus having projections that kept disturbance low were preferred. These modelled parameters also aligned with SFL expectations as irregular shelterwood is expected to emulate a selection harvest moreso than a traditional shelterwood. While this change to harvest area also creates projected volumes that are much less than the previous plans, modelling for irregular shelterwood will best represent the silviculture practices utilized in the field and the data provided throughout the plan will allow for greater modelling clarity in 2031 through adaptive management.

4.0 PLANNED OPERATIONS

4.1 INTRODUCTION

This section described the areas planned for operations for the 2021-2031 plan period. This includes a description and discussion of planned harvest areas (regular, bridging, salvage), renewal and tending, renewal support, as well as details on primary, branch and operational roads and associated AOC crossings. Harvest volumes and wood utilization by mill, contingency harvest area and associated contingency harvest volumes are also discussed in this section.

Operational prescriptions for areas of concern were prepared based on the Stand and Site Guide to protect forest values and are also discussed. Detailed prescriptions can be viewed in FMP-11. conditions on regular operations, also based on the Stand and Site Guide are documented and provide mandatory direction on operations outside areas of concern to ensure protection of the forest and its physical features.

Details on the monitoring and assessment of forest operations, regeneration success, roads and water crossings are described in Section 4.7. A plan for fire prevention and preparedness is included, with additional information specific to annual operations to be provided at the AWS stage. Finally, Section 4.9 includes a comparison of proposed operations to the LTMD to evaluate the sustainability of the planned allocations.

The actual allocations and areas of concern prescriptions were developed using input and assistance from the planning team members. The public was notified and had formal public review opportunities during the planning process; individuals, associations and interested parties suspected of having an interest in the allocations were sought out and asked for their input during the development of the plan.

4.2 PRESCRIPTIONS FOR OPERATIONS

4.2.1 OPERATIONAL PRESCRIPTIONS AND CONDITIONS FOR AREAS OF CONCERN

An Area of Concern (AOC) is a defined geographic area associated with an identified natural resource feature, land use or value that may be affected by forest management activities. An operational prescription for harvest, renewal, tending, or a condition on a road, landing or forestry aggregate pit is developed for an Area of Concern to prevent, minimize, or mitigate adverse effects of forest management operations on the natural resource feature, land use or value. There are 85 AOCs identified in this FMP which can be grouped into the following broad categories:

- **Indigenous Values:** includes values identified through Indigenous community discussions;
- **Cultural Heritage Values:** archaeological potential areas, cemeteries, registered archaeological sites, provincial park boundary, monitoring plots, land use permits, recreational and trapper cabins;
- **Biological Values:** high-potential water features, medium-potential water features, low-potential water features, dens, special features and nests associated with a number of specific species, and species at risk.

Operational prescriptions for areas of concern may be reserves (i.e., prohibition of operations), modified operations (i.e., specific conditions or restrictions on operations) or regular operations (i.e., in accordance with the silvicultural ground rules), individually or in combination. Modified operations may also be regular operations with conditions (e.g., timing, equipment), or unique prescriptions that are developed to protect or manage specific natural resource features, land uses or values.[3]

The Operational Prescription for Areas of Concern (FMP-11) provides the AOC ID that corresponds to the feature as it appears on the operational maps, either through a label or as identified in the legend. A brief description is provided for each value and the table identifies if the AOC applies to a group of features (e.g. all great blue heron nests) or an individual feature (e.g. Kawartha and Frost Centre cross country ski trails). The table also provides the source of the direction used to prepare the AOC prescription, whether or not the AOC is an exception to provincial direction, and whether or not there are conditions on roads, water crossings, landings and forestry aggregate pits within the AOC. The details of the operational prescription, including the dimensions of the AOC are listed in the table.

Confidential values are not shown on FMP or AWS maps available to the public. MNRF shares confidential values with BMFC on a need-to-know basis through a digital transfer of information to

[3] OMNRF. May 2020. Forest Management Planning Manual for Ontario's Crown Forests. Toronto: Queen's Printer for Ontario. 447 pp.

ensure the protection of the value. BMFC maintains Forest Operation Prescription maps that indicate all Area of Concern prescriptions including confidential values, which will be labelled with a non-identifying code.

During the planning or implementation of operations, previously unidentified values may be encountered, or the actual value in an area of operations may be different than the portrayed value in the FMP. If an applicable AOC prescription is in FMP-11, that operational prescription will be implemented and an amendment to the FMP will not be required. If no applicable AOC prescription is available in FMP-11, an amendment to the FMP and a revision to the AWS will be required to include a suitable operational prescription for implementation. Changes to values or removal of values that no longer exist identified by BMFC prior to and during operations will be communicated via emailing of an up-to-date FOP (map only) and shapefile of changes of values to the MNRF District Forester. The supporting documentation for the value change will be provided to MNRF within 10 days of the completion of operations. Timelines will adhere to the most recent and approved version of FIM Tech Specs. When BMFC identifies a new value, corrects the location of a previously identified value, or confirms a value no longer exists, they will notify MNRF as soon as possible or according to FIM specified timelines and provide the information in the agreed-upon spatial format. At least once per year, documentation supporting all changes to values must be submitted via the NRIP, as per the technical specifications, to update the official version of the AWS and the FMP. These changes may be received as single or multiple submissions.

The source of direction for most ecological AOCs in this FMP is the Stand and Site Guide, which came into effect in March 2010. This guide incorporates direction from a number of past forest management guides, along with the best available science of the day. Direction on historical values came from the Cultural Heritage Guide. Other sources of direction include Indigenous community and planning team discussions, the Crown Land Use Policy Atlas (CLUPA) and input from planning team advisors and Ontario Parks.

When a forest management guide provides specific direction (standards or guidelines) on the prescription to be used for an AOC, it is documented in FMP-11. When an approved guide is not available - as was the case for the multi-species inventory and monitoring plots, remote trout lakes and Indigenous values areas of concern – the planning team develops the prescription by providing two alternatives and reasoning behind the prescribed protection, which is documented in Supplementary Document I. When a Specialist develops an AOC e.g. the Growth and Yield AOC, alternative prescriptions are not required. If an AOC prescription received public comment, it will also be included in Supplementary Document I. If protection measures less than prescribed by the approved guide are planned, an exception monitoring process is required. No exceptions to approved guides are proposed in this FMP.

Several AOC prescriptions allow for flexibility to deviate from direction in the prescription under specific circumstances. Changes to permitted operations are primarily dealt with on a case-by-case basis.

Further information on flexibility provisions and the approval process for deviating from AOC prescriptions can be found in Supplementary Document I.

Communications protocols for the growth and yield plot (GYP) and operating provincial parks (PP) Area of Concern prescriptions were also developed for the 2021-2031 FMP and are included in Supplementary Document I. These protocols provide a structured approach to exchanging information between the Company and other organizations.

Many Area of Concern prescriptions include Modified Management Zones (MMZ) governing the timing of activities or placing additional conditions on operations. These additional conditions are meant to ensure the protection of a non-timber value, and address topics such as soil disturbance, erosion, protection of stream banks, and residual forest retention requirements. During plan implementation, on-site judgments will be made by industry staff regarding the practicality of operating within the additional restrictions in modified management zones. Where the risk of non-conformance with standards is judged too high or the cost of meeting the standards cannot be borne, areas eligible for harvest will be bypassed. This exercise of the precautionary principle in the interest of protection of values is endorsed by MNRF, and is not considered a wasteful practice.

Unless otherwise stated, all conditions on regular operations described in Section 4.2.2.2 apply to all prescriptions in FMP-11.

4.2.1.1 Operational Prescriptions and Conditions for Areas of Concern

One of the information products submitted with this FMP is an Area of Concern spatial layer, in shapefile format as per the FIM FMP Technical Specifications (2020)[4]. This layer contains attributes including:

- AOC identifier (AOCID) which corresponds to the AOC ID listed in FMP-11 and;
- AOC type (AOCTYPE) which identifies if the specific area is to be treated as a modified management zone or a reserve.

The AOC type and identifier can be viewed on the operational maps. Species at Risk values in bridging blocks will use the 2021 AOC prescriptions to ensure the most recent direction on protection is implemented.

[4] OMNR. June 2020. Forest Information Manual: Forest Management Planning Technical Specifications 2020. Toronto: Queen’s Printer for Ontario. 314 pp.

4.2.2 PRESCRIPTIONS FOR HARVEST, RENEWAL AND TENDING AREAS

4.2.2.1 Silvicultural Ground Rules

Silvicultural ground rules (SGR) specify the silvicultural systems and types of harvest, renewal and tending treatments that may be used to manage forest cover on the management unit. The silvicultural ground rules also identify the type of forest that is expected to develop over time (i.e., future condition).

SGRs largely reflect the silvicultural options in the base model since the information contained in the SGR is linked to the inputs used in the Strategic Forest Management Model (SFMM). A good illustration of this relationship can be seen in FMP-5, which shows the post-harvest succession pathways developed in the base model. The values by forest unit/silvicultural intensity align with the SGRs.

SGRs were developed by a registered professional forester who took into consideration experiential knowledge, local forest conditions and relevant science with an emphasis on adaptive management. The SGRs were prepared following a combination of the Phase-in provision (2020 FMPM, A-6, ln 26-30) and the requirements in the 2020 FMPM. Additionally, the Forest Management Guide to Silviculture in the Great Lakes-St Lawrence and Boreal Forests of Ontario (2015) was the main source used in the preparation of the SGRs. No treatments outside those recommended by this guide have been included in the plan. The silvicultural ground rules are described in FMP-4 and contain 43 SGRs for the Bancroft Minden Forest. The prescriptions for harvest, renewal and tending presented in FMP-4 will serve as the prescriptions for operations, including naturally depleted areas that are salvaged, for the 10-year period of the FMP.

Table 51 describes the silvicultural ground rules which will most commonly be used to regenerate each forest unit. However, prescriptions for all known possible site conditions have been documented and it is recognized that certain treatments will be rarely selected for use. FMP-4 presents the entire suite of acceptable silvicultural treatment combinations that are available for implementation.

The forest units and most commonly associated silvicultural ground rule for each area of operations are identified on the operation maps. The information for harvest, renewal, and tending operations submitted with this plan serves as the standard list for those activities.

The monitoring program that describes the methods that will be used to determine the effectiveness of the silvicultural treatments in the SGRs is included in Supplementary Documentation G. Please note that the term ‘free-to-grow’ is equivalent and used interchangeably with the term ‘established’ in the 2020 FMPM.

Table 51. Most common silvicultural ground rules for the Bancroft Minden Forest.

Pre-harvest Forest Unit	Desired Future Forest Unit	SGR Code	Most Common Silvicultural Treatment
HDSEL	HDSEL	HDS-HDS	Single tree selection with natural regeneration to tolerant hardwood. Stand improvement occurs in best quality stands.
HDSH	HDSH	HDI-HDI	Continuous cover irregular shelterwood with natural regeneration to hardwood. May require intensive treatments to manage beech understories.
HESH	HESH	HEI-HEI	Single tree selection with natural regeneration to hemlock.
CESH	CESH	CEI-CEI	Continuous cover irregular shelterwood with natural regeneration to cedar.
INTCC	INTCC	INT-INT	Conventional clearcut with natural regeneration to intolerant clearcut.
MXCCC	MXCCC	MXC-MXC	Conventional clearcut with natural regeneration to mixed conifer.*
MXHCC	MXHCC	MXH-MXH	Conventional clearcut with natural regeneration to mixed hardwood.
PRCC	PRCC	PRC-PRC	After a series of thinning's, clearcut and re-plant to red pine following mechanical site preparation. Chemical ground tending typical.
ORUS	ORUS	ORU-ORU	2-cut shelterwood: seedcut and final removal with natural regeneration to red oak. At the seedcut stage, manual group tending follow-up treatment may be needed to control competition.
PWUS	PWUS	PWU-PWU	2 cut shelterwood: seedcut and final removal. At the seedcut stage, mechanical site preparation followed by planting white pine is common. A chemical ground tending follow-up treatment may be needed to control competition.

** For MXC, a small area was identified for artificial renewal in the model. The Company will work with their supplier (nursery) to procure Pj and Sw or Sb seedlings to increase the amount of MXPRJ on the landscape where suitable conditions allow.

Silviculture Ground Rule Components

The information presented in FMP-4 describes the components that make up an individual SGR. This includes a description of the current forest condition, the future conditions, silviculture monitoring and silviculture treatment options. The intent of this table is to describe the activities that will be carried out on a given stand to allow the current Forest Unit, following harvest, success to the future Forest Unit. The components of an SGR are as follows:

SGR Code

A label composed of the current Forest Unit followed by the target Forest Unit. Once assigned, the SGR code is used throughout the silviculture tracking, reporting and effectiveness monitoring process.

Silviculture System

A silviculture system is "a planned program of silviculture treatments that extends throughout the life of a stand for the purposes of controlling stand establishment, composition, and growth."[5] Silviculture systems used in the SGRs are associated with one of the three silviculture systems described in the MNRF Forest Management Guide to Silviculture in the Great Lakes-St. Lawrence and Boreal Forests of Ontario (2015) (see page 21):

Selection – Periodic partial harvests applied in uneven-aged stands timed based on basal area recruitment using vigor, risk and species preference, to select trees for harvest and retention. In this system, regeneration is either already present and released or established in ≥70% residual cover (or approximately ≤ 30% full sunlight). This system is typically applied as "single-tree selection" but can also be applied through "group selection" where group openings are created uniformly or opportunistically throughout the stand.

Clearcut – Most of the overstory trees are removed over a short period of time to create a fully exposed microenvironment for the establishment of a new even-aged stand. In this system, regeneration is either already present and released or established in >70% sunlight. This system can be applied as a conventional clearcut (requiring a minimum of 25 stems/hectare to be left as residual) or as clearcut with seed trees or "clearcut around advanced growth."

Shelterwood – Most of the overstory trees are removed in a series of two* or more harvests for the purpose of releasing advanced regeneration or establishing and sheltering regeneration under a residual canopy in 30-70% full sunlight.

*A single harvest shelterwood occurs where unmanaged regeneration and/or poles established through natural processes and/or historic harvesting are released in a single harvest. A single harvest shelterwood can be distinguished from a clearcut with advance regeneration based on the proportion of future stems present prior to harvest. As a rule of thumb 80% or more of the future stand should come from stems present prior to harvest to consider it a single harvest shelterwood.

[5] OMNR. 2015. Forest management guide to silviculture in the Great-Lakes St. Lawrence and Boreal forests of Ontario. Ont. Min. Nat. Resources. Queen's Printer for Ontario. Toronto. Silviculture Systems.

Table 52. Silvicultural ground rules for the 2021FMP categorized by silviculture system.

Selection		Clearcut				Shelterwood			
Forest Unit	SGR	Forest Unit	SGR	Forest Unit	SGR	Forest Unit	SGR	Forest Unit	SGR
HDsel	HDS-HDS	MXCcc	MXC-MXC	INTcc	INT-INT	PWus	PWU-PWU	HDsh	HDI-HDI
	HDS-OG-HDS		MXC-PWU		INT-HDI		PWU-ORU		HDI-MXH
			MXC-PRC		INT-PRC		PWU-MXH		HDI-MXC
			MXC-INT		INT-PWU		PWU-MXC		HDI-HDS
		MXHcc	MXH-MXH		INT-MHX		PWU-HEI		HDI-PRC
			MXH-HDI		INT-MXC		PWU-CEI		HDI-PWU
			MXH-PWU	PRcc	PRC-PRC		PWU-INT	CEsh	CEI-CEI
			MXH-PRC		PRC-PWU	ORus	ORU-ORU	HEsh	HEI-HEI
			MXH-INT		PRC-MXC		ORU-HDI		HEI-OG-HEI
					PRC-MXH		ORU-PWU		HEI-PWU
									HEI-HDI

**Two new SGRs were created for Old Growth features managed under the selection system. Despite Hemlock (HEsh) being modeled under the shelterwood system, there is an additional SGR to accommodate the selection system in hemlock stands (HEI-OG-HEI).

Variations within each silviculture system exist to accommodate a range of possible growing conditions (e.g. light). This is especially prominent in the Great Lakes St Lawrence region since it contains a great variety of species and habitats. Based on an understanding of historical natural disturbance dynamics, variations within each silviculture system include differences in the amount, arrangement and size of residual tress retained after harvest and the timing of their removal. Therefore, silviculture in the GLSL reflects a spectrum of forest compositions and structures, whereby different harvest types overlap depending on the silvics of the assemblages of species encountered, their health and vigor and objectives for regeneration (Figure 48).

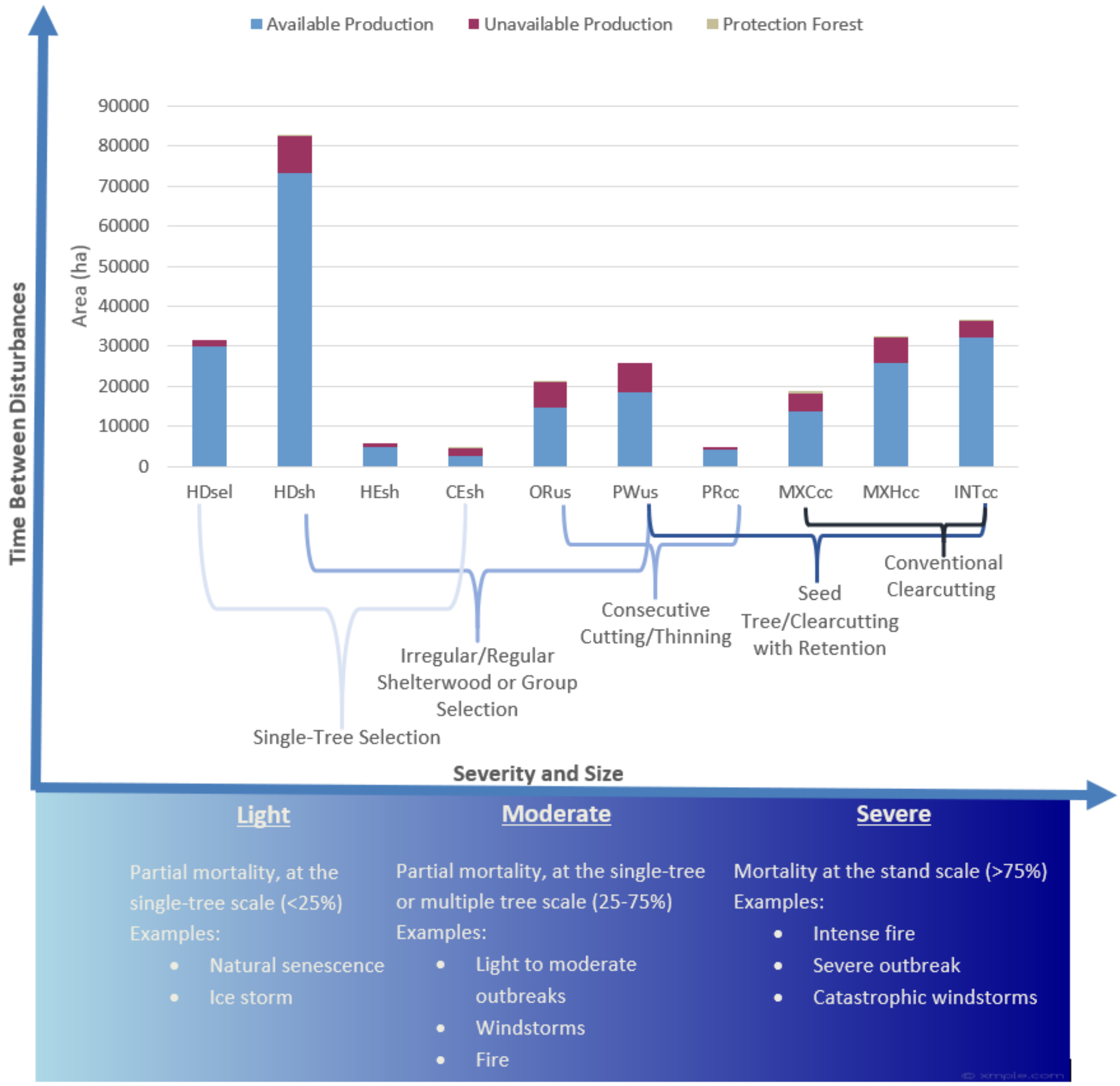


Figure 48. A conceptual framework situating silvicultural systems adapted from Kern et al 2016[6].

[6] Christel C. Kern, Julia I. Burton, Patricia Raymond, Anthony W. D'Amato, William S. Keeton, Alejandro A. Royo, Michael B. Walters, Christopher R. Webster, John L. Willis, Challenges facing gap-based silviculture and possible solutions for mesic northern forests in North America, *Forestry: An International Journal of Forest Research*, Volume 90, Issue 1, 1 January 2017, Pages 4–17

The shelterwood system can be applied in a uniform context that results in even-aged conditions, or in an irregular context that creates a multi-aged future stand, where the regeneration period is >20% of the intended rotation, and the final removal may be delayed or absent. While uniform shelterwood is one of the more well-known silviculture treatment types used in Ontario, irregular shelterwood is gaining popularity in other jurisdictions that manage highly variable hardwood forests e.g. Quebec and the northern U.S.. Irregular shelterwood is a system that couples well with high variability, while uniform shelterwood does not. The allowance for flexibility with variability is largely why irregular shelterwood is applied in the Bancroft Minden forest, as it is typical for this region to have several different forest types within a given area. Irregular shelterwood allows Forest Professionals to make decisions based on site-specific conditions and objectives.

The description of irregular shelterwood is new to the 2015 Silviculture Guide, but not to silvicultural implementation in the BMF. This system is practiced most often in the mid and tolerant hardwoods where established regeneration is present and released at various stages of management within the same stand. This system is ideal for managing a heterogeneous forest with the needed flexibility to apply the appropriate silvicultural treatment to address the multitude of conditions commonly encountered to maintain and encourage diversity.

Figure 48 illustrates the time between disturbance and the severity and size of irregular shelterwood. This treatment type is irregular in nature but often is light to moderate in severity and size through partial mortality. This emulates natural disturbances such as windstorms, natural senescence, and fires. As there is high variability within the system, the time between disturbances varies greatly.

Irregular shelterwood also capitalizes on the “intermediate disturbance hypothesis” (Figure 49) and probably represents the closest analogue to a natural disturbance in the GLSL forest. It is patchy by design and, as a result, capitalizes on a full range of light conditions, which results in theoretically greater opportunities for species diversity as one might expect through both niche and neutral theories of species establishment and growth (Personal communication with Trevor Jones, Research Scientist at the Canadian Wood Fibre Centre)[7].

[7] Trevor Jones, Research Scientist at the Canadian Wood Fibre Centre from a presentation entitled: “Ecology & Silviculture of the Great-Lakes St. Lawrence Forest” delivered at the Adaptive Silviculture for Climate Change Workshop hosted in part by CWFC in Pembroke on July 16, 2019.

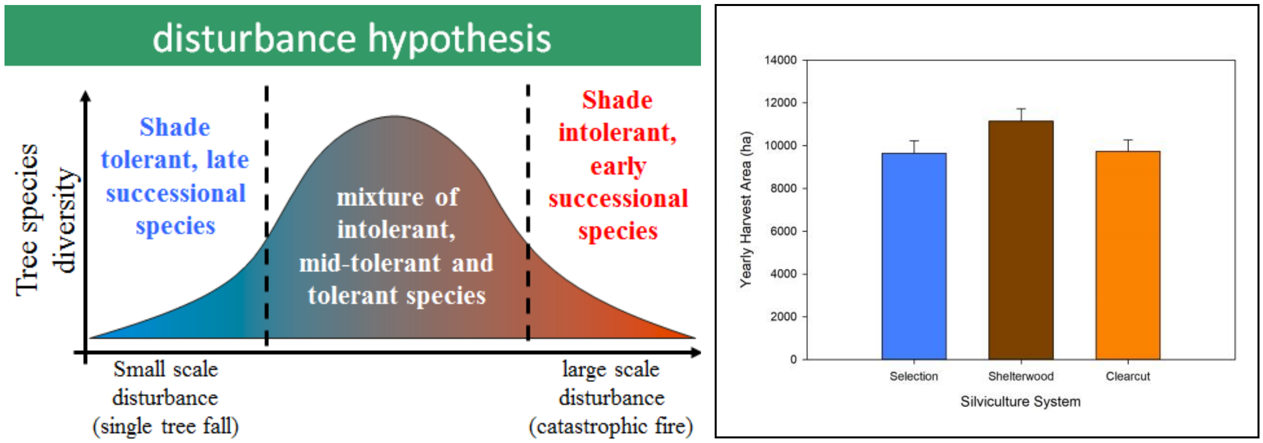


Figure 49. Disturbance hypothesis.

The majority of conditions in the GLSL fit within the intermediate part of the curve which matches the trend of the yearly harvested area in the GLSL by silviculture system.

Prior to any silviculture practiced, a Registered Professional Forester (RPF) performs a site assessment and gathers data to confirm or update the PLANFU and stand description from the Forest Resource Inventory. The RPF then determines which appropriate SGR to apply which outlines the suite of silvicultural options to achieve the desired future forest condition. Where the need for tree marking is determined, specific tree marking direction is also described which identifies the future silvicultural objectives for that site. Tree marking is carried out by certified tree markers. The tree marking direction may include (but is not limited to):

- Tree species to manage e.g., those to retain or target for removal.
- Target stand structure, residual basal area and/or crown closure or crown spacing.
- Any Area of Concern prescriptions or conditions on regular operations that apply.
- Any stand variables that may be encountered.
- Any site limitations that may exist e.g., rocky, steep, wet.
- Any stand improvement or thinning activities to occur during regular harvest operations.
- Any follow up silvicultural activities.

Current Condition

The current condition describes the average species composition, stocking and site class for the forest unit. A listing of the range of ecosites in order of the most to least prevalent for each forest unit is also shown.

Future Condition

The future condition describes the target forest unit that is expected to result from the application of the prescribed silviculture treatments. Depending on the SGR, the future forest unit may differ from the pre-harvest forest unit. Stand characteristics including the average species composition, average stocking and average site class are also documented. The Development Information describes the silviculture stratum, the expected net merchantable volume at operability age, and for some SGRs the cutting cycle. This information is based on Provincial Growth and Yield data used in MIST and was informed by local knowledge and expert opinion provided by BMFC and MNRF staff.

Silviculture Monitoring

To measure the effectiveness of silviculture treatments, specific regeneration and management standards have been included in the SGRs. Regeneration standards are criteria used for determining the status of regenerating stands under the clearcut and shelterwood silvicultural systems. These serve as benchmarks to determine the success of silviculture treatments. For a stand to be declared a success it must meet or exceed the target site occupancy for both acceptable and crop species and meet the minimum height requirements. Management standards are applied in scenarios where harvesting practices release existing regeneration that meet the regeneration standards or retain a residual canopy that is sufficiently stocked to generate a stand description e.g. selection silviculture system. Irregular Shelterwood uses a combination of regeneration and management standards based on the pre-harvest conditions encountered. Further details surrounding the assessment methodology for regeneration and management standards are described in Supplementary Documentation G.

Silvicultural Treatments

The silviculture ground rules identify the acceptable combination of treatments that can be applied to the site. Treatment combinations include details on the type of harvest method, the logging method, site preparation, regeneration, and tending. It is important to note that the *Most Common Treatment Package(s)* in each SGR will represent the most likely treatment. This information represents the best estimate of proposed operations at the time of plan preparation and will not limit the selection of any other acceptable alternative silviculture treatments in the SGRs at the time of implementation. Other possible treatments available to reach the future condition in the SGR are identified as *Acceptable Alternative Treatments*.

Logging Method describes the components of a tree that will be removed during harvesting and the degree of processing that occurs at the stump. The logging methods typically used in the Bancroft Minden Forest include full-tree, tree-length, and log-length (Table 53).

Table 53. Description of the logging methods used in the BMF.

Logging Method	Description
Full-tree	The removal of the entire crown and bole to the roadside where the tree is chipped whole or limbed and topped with cutting-to-length (aka slashing) occurring at roadside or offsite.
Tree-length	The removal of the main stem to roadside with limbing and topping occurring at the stump and cutting-to-length (aka slashing) occurring at roadside or offsite.

Logging Method	Description
Log-length	The limbing, topping, and cutting-to-length (aka slashing) of trees at the stump followed by removal of the logs to roadside.

Harvest Method describes the variation in the amount or pattern of retention within a silviculture system. Not all harvest methods are applicable to all silviculture systems and are often constrained by the definition for each silviculture system. Table 54 provides a definition of the harvest methods considered in this plan and the silviculture system to which they are normally applied.

Table 54. Description and applicable silviculture system for common harvest methods applied in the Bancroft Minden Forest.

Harvest Method	Description	Applicable Silviculture System(s)
Conventional	The removal of all stems from a large contiguous area.	Clearcut
Seed Tree	The removal of most trees from a large contiguous area, with a sufficient number of individual trees retained to contribute seed to the regeneration of the future stand.	Clearcut
Careful Logging Around Advanced Growth (CLAAG)	The removal of most trees from a large contiguous area, using careful logging techniques to protect advanced regeneration.	Clearcut
Commercial Thinning	Partial removal of merchantable trees at multiple interventions before the final clearcut or seed tree harvest.	Clearcut, Shelterwood
Uniform/Single	Individual trees are removed at more or less regular intervals with no clear patches or edges created.	Shelterwood, Selection
Group	The removal of a small group of trees, in an area normally less than 2 tree heights in diameter, in a single entry or progressive fashion, within a matric of mature forest canopy.	Shelterwood, Selection
Irregular	Partial removal of the overstory in successive regeneration cuts with a long and indefinite regeneration period (≥20% of the intended rotation). The final removal is delayed or absent, and the resulting stand is typically multi-aged.	Shelterwood

Site Preparation refers to the methods that will be used to create suitable conditions on site usually following harvest for the establishment of desirable regeneration. Generally, this involves the disturbance of the forest floor, upper soil horizons and/or competing vegetation prior to regeneration. Treatments include manual, mechanical, chemical, and prescribed burning used alone or in combination.

Table 55. Description of site preparation techniques used in the BMF.

Site Preparation Type	Description
Mechanical	Uses machinery and/or attachments to modify onsite vegetation, logging debris and surface organic matter. On the BMF typically a bulldozer or skidder blade is used. The aim is to expose mineral soil to create suitable microsites for the germination of desirable seed while removing competing vegetation to facilitate tree planting.
Aerial/Ground Chemical	May use broadcast applications or selective applications. Herbicides can be applied from aircraft (helicopter), ground machine (skidder mounted air-blast), or using manual tools (backpack sprayer).
Prescribed Burning	A controlled fire is used to reduce onsite vegetation, logging debris and surface organic matter to facilitate tree planting.
Intentional soil disturbance using skidding equipment	Where site conditions make site preparation machinery impractical, but soil disturbance is beneficial for establishing regeneration, intentionally site disturbance using skidder blade or dragging logs may be an acceptable alternative for accomplishing site preparation goals.

Prescribed burning is used as a silviculture tool to help achieve various silvicultural objectives. This method may be used during site preparation to:

- Reduce litter layer (duff) thickness and harvesting debris (slash).
- Reduce the density and growth of competing vegetation.
- Promote species with fire adaptive traits.
- Be an alternative vegetation treatment to chemical site preparation.

Although prescribed burning is included as an acceptable alternative treatment for the majority of SGRs, it is most commonly considered to assist with red oak regeneration efforts. However, it can also be used to reduce competition in conifer stands by removing small balsam and hardwood competition. No areas are identified for this treatment on operational maps because the site-specific requirements for this activity are difficult to evaluate without a detailed site analysis by SFL and MNRF staff. Areas identified for prescribed burning will be identified in the proposed Annual Work Schedule and are subject to approval by the MNRF.

Regeneration is the establishment of the target or acceptable species by natural or artificial means. Natural regeneration is the most commonly used treatment on the Bancroft Minden Forest. Typically, only white pine and red pine are artificially regenerated. In some circumstances, combinations of both natural and artificial regeneration may be used. A description of the regeneration methods included in the SGRs can be seen below.

Table 56. Description of the regeneration methods used in the BMF.

Regeneration Type	Description
Natural	Target or acceptable species is established by natural seeding, sprouting, suckering, or layering.
Scarification	Method used to assist natural regeneration. Creates a more desirable seedbed for the target and/or acceptable species.
Seeding	The manual or mechanical application of seeds to include both broadcast (aerial) and precision (skidder-mounted) seeding approaches.
Planting	The establishment of regeneration by physically planting out seedlings, transplants or cuttings of the target and/or acceptable species.
Supplemental Plant	Low density planting used to augment existing natural regeneration on the site

Tending involves the control or removal of undesirable competition that is impeding the growth of target and/or acceptable species. Some of the treatments are similar to site preparation but are generally carried out for the benefit of an already established forest crop (Table 57). Two new tending treatments have been included in the 2021-2031 Bancroft Minden FMP to facilitate silviculture operations and ensure renewal obligations are realized:

1) Manual tending for the felling of merchantable stems to be left on site at the stump. The intention is to release established desirable regeneration that would otherwise become suppressed. This treatment would target mid-story material that was not utilized during the regeneration cut. Although a component of this mid-story material would be considered merchantable, it is not economically feasible to harvest and utilize these stems. If these stems are left standing, they will impede light requirement and occupy growing space intended for more desirable species.

2) Chemical tending basal bark treatment for hardwood selection and hardwood shelterwood forest units to treat un-merchantable beech stems. The purpose of this basal bark treatment is to mitigate root suckers and stump sprouting associated with beech bark disease and ensure productive forests are renewed. The intention of a basal bark treatment is to selectively manage undesirable beech stems

which will serve as a chemical release treatment when existing desirable stems are present or to create conditions suitable for natural recruitment when desirable stems are absent.

Table 57. Description of the tending methods used in the BMF.

Tending Method	Description
Manual Cleaning	Use of brush saws or other manual means to reduce non-crop vegetation (woody) to facilitate crop tree survival and growth.
Mechanical Cleaning	Use of mobile equipment (mulchers, brush clearers) to facilitate crop tree survival and growth.
Thinning	Felling of unmerchantable and/or merchantable trees for mid-story removal.
Improvement Cut	Felling of unmerchantable and/or merchantable trees for stand improvement.
Aerial/Ground Chemical	Air or ground applied herbicides to reduce competitive non-crop vegetation (herbaceous and woody) to facilitate crop tree survival and growth.

Aerial herbicide application is a treatment option for both site preparation and tending. This treatment will ensure the adequate renewal of desirable species and habitat conditions. Areas identified for aerial chemical site preparation and tending will be identified annually in the proposed Annual Work Schedule and are subject to approval by MNRF.

Other Changes to the SGRs

Some previous SGRs have been re-developed or removed and new SGRs have been created to replace them. The 2021 SGRs have been developed based on knowledge gained through the development and analysis of post-harvest transition rules and adaptive silviculture techniques to facilitate renewal obligations and consider forecasted forest management challenges. Ten new SGRs were created and are described below.

The three clearcut SGRs (HDI-MXH; HDI-MXC & HDI-PRC) are newly proposed tools in the silviculture toolbox to be applied in degraded hardwood irregular shelterwood (HDSH) stands, specifically those containing a significant component of American Beech in which shelterwood management is not appropriate. More intensive silviculture treatments (e.g., heavier harvest and/or artificial renewal investments) will be applied intentionally in these instances to transition degraded stands or stands of low merchantability to a more productive future forest condition. The intolerant hardwood component on the forest has been decreasing through time and is forecasted to decrease into the future. Intolerant hardwoods are important for supplying the Trenton pulp mill and managing for intolerant hardwoods was identified as an important goal for the FMP. It was noted that few SGRs existed that allowed a transition to intolerant hardwood. As a result, three new SGRs were created to promote intolerant hardwoods where appropriate conditions allow.

1. **HDI-MXH**: The intention is to promote a future forest dominated by mixed intolerant hardwood, primarily through natural renewal methods. This is generally accomplished by removing most of the mature canopy to release the existing mixed intolerant hardwood understory. This transition was modelled to occur 5% of the time (see FMP-5 post-harvest renewal transition rules)

2. **HDI-MXC**: The intention is to promote a future forest dominated by mixed conifer through natural or artificial renewal methods. This is generally accomplished by removing most of the mature canopy to release the existing mixed intolerant conifer understory. This transition was not modelled as a post-harvest renewal transition rule but could be encountered on a limited basis given the appropriate conditions.

3. **HDI-PRC**: The intention is to convert these sites into red pine dominated stands. This SGR would be applied strategically on high valued, accessible sites that historically supported pine.

4. **HEI-PWU**: the function of this SGR will allow hemlock dominated stands to succeed into white pine stands. There may be several useful applications in which this SGR will be prescribed. Primarily as a release treatment when white pine regeneration is encountered under hemlock. Secondly, with the threat of invasive species, such as Hemlock Woolly Adelgid (HWA) it is beneficial to have various renewal options to manage hemlock or promote other desired species if this threat becomes a reality.

5. **HEI-HDI**: The function of this SGR will allow hemlock dominated stands to succeed into mixed tolerant/mid-tolerant hardwood stands. Yellow birch is a common associate of hemlock. This SGR will be a beneficial tool to promote yellow birch and manage off-site hemlock stands where a transition to hardwood is desired or the recruitment of hemlock is not practical.

6. **PRC-MXH:** to be used in scenarios when renewal towards red pine dominated stands is not operationally feasible (size, location, site conditions, etc.), this SGR will allow for the succession of intolerant conifer into mixed intolerant hardwood.

7. **PWU-MXC:** lower concentrations of white pine are typically managed through clearcut with seed trees where the objective is to maintain or increase the white pine component in a matrix of other species (see pg. 229 of the 2015 Ontario Silviculture Guide). In some cases, previous attempts to renew white pine (mostly through natural regeneration) were not always successful. These stands present a renewal challenge because they often do not support the volume e.g., have a low pre-harvest component (4 to 12m^2/ha Basal Area) of dominant-co-dominant white pine and other crop species or quality of crop species required to prescribe a second follow-up uniform shelterwood regeneration cut. Often, these sites have an understory dominated by advanced mixed conifer regeneration that is uneconomical to remove to create the open conditions needed to facilitate pine removal and which has the potential to develop into a desirable forest unit at maturity. This SGR will allow the transition of white pine into mixed conifer by means of removal cutting and the release of advanced understory regeneration. On sites ideal for white pine regeneration, all efforts will be considered to apply the PWU-PWU SGR, including application for FFT funding to offset the cost of harvest (e.g. un-merchantable mid-

story removal). In the 2011 FMP, this same treatment was described using the PWU-MXH SGR, however now that the white pine seed tree (PWST) regional forest unit is associated with MXCCC this new SGR has been created but reflects the currently approved PWU-MXH SGR. This transition was modeled to occur 7% of the time (see FMP-5 post-harvest renewal transition rules).

8. **MXH-INT:** a tool to be prescribed on mixed hardwood sites that are eligible for clearcut and that support enough pre-harvest poplar and white birch volume to meet renewal objectives associated with an intolerant hardwood dominated future forest. This SGR will rely on natural regeneration by means of root suckers, stump sprouts and natural seeding.

9. **MXC-INT:** a tool to be prescribed on mixed conifer sites that are eligible for clearcut and that support enough pre-harvest poplar and white birch volume to meet renewal objectives associated with an intolerant hardwood dominated future forest. This SGR will rely on natural regeneration by means of root suckers, stump sprouts and natural seeding.

10. **PWU-INT:** a tool to be prescribed in low quality white pine sites, stands that do not support the volume or quality of crop species required to prescribe a second follow-up uniform shelterwood regeneration cut, stands that contain enough pre-harvest poplar and white birch volume to meet renewal objectives associated with an intolerant hardwood dominated future forest, and where renewal operations may be limited by site influences such as shallow, rocky terrain or Species at Risk timing restrictions.

11. **HDS-OG-HDS**: A tool to be prescribed when uneven-old growth conditions are encountered in tolerant hardwood forest areas. The function of this SGR is to maintain and promote the development of old growth characteristics within this forest type. This is achieved by retaining a higher proportion of large and extra-large sized trees, create variably sized gaps in the canopies, and by more closely emulating natural disturbances that occur in old growth forests.

12. **HEI-OG-HEI**: This SGR is applied to hemlock dominated stands with uneven-aged old growth characteristics. As stated above, this tool is intended to promote and maintain old growth features in this forest type. The guiding management principles for this SGR; as well as the other Old Growth SGR (HDS-OG-HDS) are detailed below under “uneven-aged old-growth”.

In addition to the creation of ten new SGRs (detailed above), four previously available SGRs were removed from the toolbox. These SGRs have been made unavailable since they have not been implemented often or at all and post-harvest transition rules or Silvicultural Effectiveness Monitoring (SEM) data demonstrates a low success rate in meeting the associated renewal obligations. The following four SGR’s have been removed; HDU-ORU (hardwood shelterwood to oak), HDU-HES (hardwood shelterwood to hemlock), MXH-ORU (mixed hardwood clearcut to oak), ORU-HES (oak to hemlock).

The Company has adapted its management approach for eastern hemlock, eastern white cedar and hardwood shelterwood forest units. Traditionally, eastern hemlock and eastern white cedar have been managed under the single-tree selection silviculture system while hardwood shelterwood has typically been managed under the uniform shelterwood silviculture system. Moving forward, it will be preferred to manage cedar and hardwood shelterwood forest units under the shelterwood silviculture system with a reliance on irregular shelterwood as the primary harvest method. Selection will continue to be relied upon as the preferred treatment to manage hemlock dominated stands, however irregular shelterwood is an option in anticipation of hemlock woolly adelgid. Refer to section 2.3 of the Analysis Package for further details on the factors influencing this decision and Supplementary Document G for a more detailed description of how these treatments differ.

Uneven-aged Old Growth

There are two uneven-aged forest units in the Bancroft Minden Forest: the tolerant hardwood selection forest unit (HDsel) and the hemlock forest unit (HEsh selection). These forest types are managed under the selection silviculture system, which emulates single and multi-tree disturbance gaps created by trees dying and windthrow in the tolerant and mid-tolerant hardwood forests of the Great Lakes-St. Lawrence Forest. However, intensively managed stands may differ from old growth hardwood stands in terms of temporal creation of gaps, variability in size of gaps, mean basal area of all trees, mean basal area of large trees, maximum tree size, and density of snags.

The Forest Resource Inventory (FRI) provides approximate age for uneven-aged forest unit areas; however, because these areas are uneven-aged, they do not necessarily represent actual forest conditions. For the purposes of forest inventory, the forest age is determined by recording the average age of typical dominant or co-dominant canopy trees. For uneven aged forest units, age is not updated in the FRI following a normal selection harvest, as these practices retain the structural component of uneven-aged stands to ensure retention of all size and age classes.

Uneven-aged stands managed under the selection system with the following characteristics will be managed to maintain old growth conditions:

- Age greater than 130 years old as identified in the FRI
- Initial basal area in the range of:
  - 28 to 30m^2/Ha for HDsel
  - 40 to 48m^2/Ha for HEsh (selection)
- Significant representation of large trees (>=50cm DBH)
- Multi-layered canopy

Old growth conditions will be maintained by:

- Retaining a minimum basal area of 20m^2/Ha (or a range of 20-24m^2/Ha) for HDsel and 34m^2/Ha (or a range of 30-34m^2/Ha)for HEsh (selection)

- Adjusting stand structure targets to increase average stem size according to the following targets:
    - Poles (10-24cm DBH): 25%
    - Small logs (26-36cm DBH): 25%
    - Medium logs (38-48cm DBH): 25%
    - Large logs (50-60cm DBH): 15%
    - X-large logs (>60cm DBH) 10%
- Creating some group openings from 0.02Ha to .20 Ha to create variability in canopy gap size
- Increasing the cutting cycle to achieve higher stocking and longer periods without disturbance (based on site 25-40 years)
- Increase the normal cavity tree requirements to 12/Ha, preferably >40cm DBH
- Retain some dead and dying trees (subject to OHSA) and encourage cull stems to be retained

A modified tree marking prescription will be prepared as described above when candidate areas are identified (See the Map “MU220_2021_FMP_MAP_HEOG_00.pdf” that portrays hemlock stands older than 130 years from the Operational Planning to identify candidate stands for consideration for the hemlock old growth SGR).

Many stands that have been identified as mature stands and potentially showing some key habitat and aesthetic features of old growth by the FRI (age exceeding 130 years) will not meet these characteristics. Conversely, there will be stands that exhibit old growth characteristics that will not be identified in the FRI. The professional discretion of the FOP writer will be used to determine if these management practices are appropriate for a given site.

4.2.2.2 Conditions for Important Ecological Features

The AOC task team also developed Conditions on Regular Operations (CROs) for important ecological features based on the direction prescribed in the Stand and Site Guide. These conditions are applied in areas of harvest, renewal and tending operations, conducted in accordance with the Silviculture Ground Rules (FMP-4), to maintain or protect features that are not addressed by operational prescriptions for areas of concern (e.g., grouse nests, wildlife trees) or to implement specific operational standards and guidelines (e.g., rutting). Best Management Practices are also provided that suggest operational methods that, where appropriate, may help meet the standards. All CROs as well as conditions on roads, landings and aggregate pits for important ecological features are documented in this section. Some may be supplemented by Conditions on Roads, Landings and Aggregate Pits (CORLAPs) in Section 4.5.

CROs described in this section are:

- 4.2.2.2.1 Standard Operating Practices in Water Areas of Concern
- 4.2.2.2.2 Woodland Pools
- 4.2.2.2.3 Mapped Permanent Non-Forested Wetlands

- 4.2.2.2.4 Wildlife Tree Retention
- 4.2.2.2.5 Bat Maternity Roosts
- 4.2.2.2.6 Downed Woody Material
- 4.2.2.2.7 Nests of Songbirds/Small Birds Containing Eggs or Young
- 4.2.2.2.8 Waterfowl, Grouse, or Wild Turkey Nests
- 4.2.2.2.9 Dens of Furbearing Mammals in Enduring Features
- 4.2.2.2.10 Dens of Furbearing Mammals in Transitory Features
- 4.2.2.2.11 Uncommon Forest
- 4.2.2.2.12 Rich Lowland Hardwood Forest
- 4.2.2.2.13 Butternut Trees (Species at Risk)
- 4.2.2.2.14 Good Neighbour Policy
- 4.2.2.2.15 Residual Forest
- 4.2.2.2.16 Clearcut Harvest Layout Planning
- 4.2.2.2.17 Salvage Operations in Natural Disturbances
- 4.2.2.2.18 Biofibre Harvest
- 4.2.2.2.19 Logging Damage
- 4.2.2.2.20 Site Disturbance
- 4.2.2.2.21 Deer Wintering Emphasis Areas (DEA)
- 4.2.2.2.22 Moose Emphasis Areas (MEAs)
- 4.2.2.2.23 Terrestrial Invasive Plants
- 4.2.2.2.24 Canoe-Grade White Birch and Cedar Trees
- 4.2.2.2.25 Non-Operating Provincial Parks and Conservation Reserves
- 4.2.2.2.26 Areas of Natural and Scientific Interest

4.2.2.2.1 Standard Operating Practices in Water Areas of Concern

This direction applies to Areas of Concern for the following water values:

- Large, medium and small lakes, and rivers (HPW)
- Streams of high, moderate and low sensitivity to forest operations (HPW, MPW, LPW)
- Ponds of high, moderate and low sensitivity to forest operations, incl. beaver ponds (BP)
- Wetlands or wetland complexes identified as provincially significant (PSW)
- Groundwater recharge areas associated with known brook trout spawning sites (GWR)
- Brook trout spawning and nursery habitats associated with HPS streams (BTSP, BTNU)

Standards (S) and Guidelines (G)

<u>Defining the Inner Boundary of Water Areas of Concern</u>

1) Water AOCs will be measured in the field from the edge of vegetation communities that provide an effective barrier to the movement of sediment into the adjacent water feature.

- This will normally be those communities with ≥25% canopy cover of trees, or tall (≥1 m high) woody shrubs such as alder or willow, or low (<1 m high) woody evergreen shrubs such as Labrador tea or leatherleaf.
- For mapping purposes, the AOC may be measured from the edge of polygons identified as FOR, TMS, or BSH. If the inner edge of the AOC will be ≥300 m from the shoreline of a water feature (e.g. edge of open water) when these criteria are used, an AOC is not required adjacent to those sections of shoreline, unless the intervening wetland is known to provide components of fish habitat for which there is a high species' dependence (e.g., spawning habitat).

<u>Requirements for Operations within Water AOCs</u>

2) No harvest, renewal, or tending operations are permitted adjacent to water values that will result in damage to littoral zones (beds) or shorelines of water features or associated stabilizing vegetation, or deposition of sediment within water features (S).

   Operations specifically prohibited include:

   - Machine travel within 3 metres of a water feature.
   - Felling of trees into a water feature or within 3 metres of a water feature. Trees accidentally felled into a waterbody will be left where they fall.
   - Excessive removal or damage of sapling-sized trees (<10 cm dbh) and shrubs within 3 metres of a water feature.
   - Disturbance of the forest floor that leaves ruts or a significant area of exposed mineral soil within 15 metres of a water feature. Ruts and significant patches of exposed mineral soil will be promptly rehabilitated to prevent sediment from entering a water feature. Patches of mineral soil exposed by natural events are excluded from this standard.
   - Disturbance of the forest floor that disrupts hydrological function (i.e. impedes, accelerates, or diverts water movement) within recognizable ephemeral streams, springs, seeps, and other areas of groundwater discharge connected to the water feature.
   - Harvest that does not retain residual forest (i.e. conventional clearcut) on slopes greater than 30%.

3) Harvest, renewal, and tending operations will follow appropriate operating practices to minimise rutting, compaction, and mineral soil exposure that could lead to erosion and subsequent transport and deposition of sediment in water features. (G)

4) Extraction trails may cross streams subject to conditions (G).
   a) Crossings will be minimised and will follow operating practices to minimise rutting, compaction, and mineral soil exposure that could lead to erosion and subsequent transport and deposition of sediment in streams.
   b) Reasonable efforts will be made to ensure that extraction trails will not cross recognizable ephemeral streams, springs, seeps, and other areas of groundwater discharge when not solidly frozen. When these features are crossed, special care will be taken.

c) Temporary water crossing structures that do not impede, accelerate, or divert water movement will be used when appropriate (i.e. bridges or skid bridges). Full-span (open bottomed) structures must be used when crossing:
   - High sensitivity streams (HPS), permanent moderate sensitivity streams (MPS),
   - any streams (intermittent, ephemeral) or MPS/LPS streams that are flowing; or
   - streams known to contain critical/sensitive fish habitats (i.e. BTSP, BTNU AOCs).

d) Standards for installation and removal of temporary bridge / full-span crossings in MNRF/DFO Water Crossing Protocol (Supp Doc H) and CORLAPs for water crossings apply (Section 4.5.5).

e) Approval is required for water crossings (including extraction trails) that will be using closed-bottomed structures as per the MNRF/DFO Water Crossing Protocol.

5) Harvest, renewal, and tending operations will, to the extent practical and feasible, encourage perpetuation of the distinctive character of the shoreline forest while emulating natural disturbances and/or succession (G).

a) Retaining residual shoreline forest that maintains internal and external connectivity. To the extent practical and feasible within the AOC, a relatively continuous corridor (average width of gaps <50 m; maximum width of gaps <200 m) of residual forest at least 30 m wide will be retained along the length of rivers and streams to connect special habitat features (e.g., osprey nests, MAFAs) associated with the river or stream and link with residual forest on connected lakes, ponds, rivers, and streams.

b) Retaining residual shoreline forest that has the highest likelihood of escaping natural disturbances such as wildfire. For example:
   - Preferentially retaining residual shoreline forest on the leeward side of a river.
   - Preferentially retaining residual shoreline forest comprised of less flammable forest types (e.g., hardwood, lowland conifer).
   - Preferentially retaining residual shoreline forest where there is an opportunity to incorporate it into a larger patch of residual forest (see Section 4.2.2.2.15).

c) Within the inner 15 m of the water AOC, at least 10 trees/100 m of shoreline spaced about 10 m apart will be retained as a potential source of future aquatic coarse woody material. Living trees with the following characteristics will be preferentially retained:
   - At least 15 m tall (or the tallest of those available).
   - Close to the shoreline (ideally within ½ the height of the tree).
   - Leaning toward the shoreline.
   - Coniferous supercanopy trees, scattered conifers, and veterans, especially large cedars, white pines, red pines, hemlocks, white spruces, red spruces, and jack pines.

d) Within the remainder of the water AOC, the general direction for retention of WILDLIFE TREES in harvest areas will be followed. However, the focus will be on living trees with preferential retention of windfirm trees that provide the following special habitat features for wildlife:
   - Supercanopy trees (all forest units), of value to eagles and ospreys such as white and red pines.
   - Large living hardwood trees with existing cavities or the potential to develop cavities (all forest units).
   - Scattered coniferous trees (selection forest units) or veteran trees (clearcut and shelterwood forest units).

6) No contamination of water features by foreign materials is permitted (S). Specifically,
   a) The use and storage of fuels will be carried out in accordance with the *Liquid Fuels Handling Code*[8].
   b) No equipment maintenance (e.g., washing or changing oil) is permitted within 15 metres of the high-water mark of water features.
   c) Aerial application of pesticides for renewal, tending, or protection is permitted within the AOC but will follow spray buffer zones for significant areas or sensitive areas (see below) as prescribed in the *Ontario Ministry of Environment/Ontario Ministry of Natural Resources Buffer Zone Guidelines for Aerial Application of Pesticides in Crown Forests of Ontario*[9]. Machine-based ground application of herbicides (e.g., air-blast sprayers mounted on skidders) is permitted within the AOC; spray buffer zones will be 30 m for significant areas and 60 m for sensitive areas. Machine based equipment is only allowed in the AOC subject to the conditions in CRO-01-02. Hand-based ground application of herbicides (e.g., back-pack sprayers) is permitted within the AOC; spray buffer zones will be 3 m. All spray buffer zones will be measured from the water feature or water's edge.

      Definition of significant and sensitive areas for herbicide spray buffers zones

      Significant areas include:
      - large, medium and small lakes (LL, ML, SL);
      - rivers (RVR);
      - ponds of high and moderate potential sensitivity (HPP, MPP); and
      - streams of high and moderate potential sensitivity (HPS, MPS).

      Sensitive areas include:
      - Provincially Significant Wetlands (PSW);
      - known critical fish habitat (e.g. spawning areas, nursery areas);
      - fish sanctuaries;
      - fish hatcheries;
      - stocked lakes and rivers;
      - threatened and endangered aquatic species habitat; and
      - patented land

4.2.2.2.2 Woodland Pools

Direction applies to woodland pools (recognizable temporary bodies of open water) encountered during operations that have a surface area ≥ 500 m^2 (25 metres in diameter), are not ponds (i.e. <0.5 hectares in size) and are not connected to a stream or associated with a mapped non-forested wetland.

Standards (S) and Guidelines (G)

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[8] Liquid Fuels Handling Code 2007, adopted document of Ontario Regulation 217/01, Liquid Fuels, Technical Standards and Safety Act 2000 (Ontario)

[9] OMOE/OMNR. February 1992. Ontario Ministry of Environment/Ontario Ministry of Natural Resources Buffer Zone Guidelines for Aerial Application of Pesticides in Crown Forests of Ontario. Toronto: Unpublished.

1) No harvest, renewal, or tending operations are permitted that will result in deposition of sediment within, or reduction of the water-holding capacity of woodland pools (S).

Operations specifically prohibited include:

- Machine travel within 3 metres of the high-water mark of pools during the frost-free period.
- Excessive removal or damage of sapling-sized trees (<10 cm dbh) and shrubs within 3 metres of the high-water mark of pools.
- Felling of trees into pools or within 3 metres of the high-water mark of pools during the frost-free period. Trees accidentally felled into the waterbody cannot be moved and no further disturbance to the 3 metre area or water feature can occur. If the bole or trunk of the tree extends beyond the 3 metre area into the forest, then the bole can be harvested beyond the 3 metre area as long as there is no possibility to further damage to the 3 metre area or water feature. If harvesting the bole will move the tree inside the 3 metre area or water feature then the entire tree should be left where it fell.
- Disturbance of the forest floor that leaves ruts or a significant area of exposed mineral soil within 15 metres of the high-water mark of pools. Ruts or significant patches of exposed mineral soil will be promptly rehabilitated.

2) Retention of residual forest within and adjacent to pools will be based on forest unit as follows (G)*:*

- *Selection and shelterwood forest units* – Trees will be retained in and within 3 metres of the high-water mark of pools to provide ≥70% canopy cover; residual forest will be retained within 15 metres of the high-water mark of pools to provide amphibian cover.
- *Clearcut forest units* – Unmapped residual patches will preferentially be connected to pools. When connecting residual patches to pools, trees will be retained in and within 3 metres of the high-water mark to provide overhead shade and residual forest will be retained within at least 15 metres of the high-water mark to provide amphibian cover.

3) No contamination of pools by foreign materials is permitted (S). Specifically,

- The use and storage of fuels will be carried out in accordance with the *Liquid Fuels Handling Code.*
- No equipment maintenance (e.g., washing or changing oil) is permitted within 15 metres of the high-water mark of pools.

<u>Conditions on Roads, Landings and Aggregate Pits:</u>

4) Landings and aggregate pits are not permitted within 15 metres of the high-water mark of pools (S).

5) New roads are not permitted within 15 metres of the high-water mark of pools 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 (G).

4.2.2.2.3 Mapped Permanent Non-Forested Wetlands

Direction applies to mapped, open wetlands, treed wetlands and brush and alder wetlands. In the field, the boundary between non-forested wetlands and forest is defined where the canopy cover of trees ≥10 cm dbh is ≥25% or the canopy cover of trees ≥ 1.5m tall is ≥30%. Standards (S) and Guidelines (G)

1) No harvest, renewal, or tending operations are permitted that will result in significant damage to wetland vegetation or disruption of hydrological function (S).

   Operations specifically prohibited include:

   - Machine travel during the frost-free period within 3 metres of those portions of the wetland dominated by open water or non-woody vegetation (i.e., vegetation communities with <25% canopy cover of trees, tall (≥1 metre high) woody shrubs such as alder or willow, or low (<1 metre high) woody evergreen shrubs such as Labrador tea or leatherleaf).
   - Excessive removal or damage of sapling-sized trees (<10 cm dbh) and shrubs within 3 metres of those portions of the wetland dominated by open water or non-woody vegetation.
   - Felling of trees during the frost-free period into, or within, 3 metres of those portions of the wetland dominated by open water or non-woody vegetation. Trees accidentally felled into those portions of the wetland dominated by open water or non-woody vegetation cannot be moved and no further disturbance to the 3 metre area or water feature can occur. If the bole or trunk of the tree extends beyond the 3 metre area into the forest, then the bole can be harvested beyond the 3 metre area as long as there is no possibility to further damage to the 3 metre area or water feature. If harvesting the bole will move the tree inside the 3 metre area or water feature then the entire tree should be left where it fell.
   - Operations that leave ruts, a significant area of exposed mineral soil, or disrupt hydrological function within the wetland itself or forest that is within 15 metres of those portions of the wetland dominated by open water or non-woody vegetation. Ruts or significant patches of exposed mineral soil will be promptly rehabilitated.

2) MNRF approval will be required to cross wetlands with extraction trails during the frost-free period. During all seasons, crossings will be minimized and will follow appropriate operating practices to minimize potential site damage and effects on hydrological function. (G)

3) No contamination of wetlands by foreign materials is permitted (S). Specifically:

   - The use and storage of fuels will be carried out in accordance with the *Liquid Fuels Handling Code.*
   - No equipment maintenance (e.g., washing or changing oil) is permitted within 15 metres of non-forested wetlands.

<u>Conditions on Roads, Landings and Aggregate Pits</u>:

4) Aggregate extraction is not permitted from new or existing pits within 15 metres of non-forested wetland (S).

5) Landings are not permitted within the wetland itself, or within adjacent forest that is <15 metres from those portions of the wetland dominated by open water or non-woody vegetation. Use of existing landings is not permitted within 15 metres of non-forested wetlands. (G)

6) Reasonable efforts will be made to avoid construction of new all-weather roads within wetlands or portions of wetlands characterized by open water or non-woody vegetation. Construction of new all-weather roads within wetlands or portions of wetlands characterized by open water or non-woody vegetation requires MNRF approval. When construction of all-weather roads in wetlands is necessary, it will follow appropriate design principles for roads within Areas of Concern and water crossing design and location to minimize risk of sediment entering the wetland and disruption of hydrological function. (G)

4.2.2.2.4 Wildlife Tree Retention

Direction applies to all forest operations outside and inside Areas of Concern where operations are allowed. Wildlife Trees are retained to provide habitat for wildlife both while they stand and after they have fallen and become downed woody material.

All harvest operations shall retain ‘as available’, Wildlife Trees that provide for structural diversity and special wildlife habitat features, according to the silvicultural system and stage of management. This includes Biofibre Harvest. Standards (S) and Guidelines (G)

<u>General Wildlife Tree Direction (S)</u>

1) All Wildlife Trees must be ≥10 cm dbh and ≥3 m in height, but there are specific size requirements for specific features:
    - Cavity trees, mast trees, diversity trees, veteran trees and supercanopy trees should normally be >= 25 cm dbh (ironwood mast trees excepted).
    - Supercanopy trees should ideally be >= 60 cm dbh.

Definitions and further information on each category and/or attribute of a wildlife tree is provided in the Glossary of the Stand and Site Guide (2010). Illustrative examples may be found in the *Ontario Tree Marking Guide.*[10]

2) Wildlife Trees can include standing healthy, dead, or dying trees, including trees killed by stubbing or tending operations. While it is sometimes desirable to retain standing dead trees as Wildlife Trees, such trees will only be kept if it is deemed safe to do so.

3) A single wildlife tree with more than one special attribute can be counted and used to achieve multiple objectives. For example, a large oak tree with the appropriate characteristics could be identified and counted as a mast tree, a cavity tree, and a supercanopy tree. However, a wildlife

[10] OMNR. 2004. Ontario Tree Marking Guide, Version 1.1. Toronto: Queen’s Printer for Ontario. 252 pp. (Section 4.3)

tree with multiple special attributes only counts as one tree with respect to the minimum numbers of Wildlife Trees required for retention for a given silvicultural system.

4) Wildlife Trees should be windfirm.

5) Wildlife Trees will generally be well dispersed. The average number of Wildlife Trees, or specific type of Wildlife Trees, will be in reference to any given 20 hectares area within an operational block where harvest has occurred, or for the entire operational block when the operational block is less than 20 hectares. In a clearcut harvest area, any uncut or partially cut area greater than or equal to 0.1 hectares that meets the definition of residual forest (Section 4.2.2.2.15) will not contribute to individual wildlife tree requirements.

6) Because the trees or stems desirable as Wildlife Trees may not always be present, all of the standards and guidelines in this CRO are subject to the 'when available' provision. In situations where the trees available for retention are too small to meet the standards or guidelines, trees or stems representing the largest diameters available in any given harvest location can be substituted.

Wildlife Tree Requirements by Silvicultural System and Stage of Management

For Clearcut Harvest:

- Retain an average of ≥25 stems/ha (S).
- Wildlife trees will generally be well dispersed. Retain an average of at least 15 individual stems/ha; the remaining stems may occur in clumps (G).
- Retain an average of ≥10 large stems (≥ 38 cm whenever possible as per BMP) or large stubs/ha with a minimum of 5 large living trees on each hectare (S). Large stems are defined as ≥25 cm dbh (based on the minimum diameter requirements of medium and large-bodied cavity users).
- Large wildlife trees will be a mix of living cavity trees, stubs, supercanopy trees, veteran trees, mast trees (i.e. oak, cherry and basswood), diversity trees, and safe dead trees (G). The following 'ideal' distribution, which implies overlapping attributes, will be used as a guide:
    - >=10 living cavity trees or large stubs/ha, with a minimum of 5 living cavity trees/ha
    - >=10 veteran trees/ha on average; with a minimum of 5 veteran trees on each ha
- When the number of large wildlife trees averages <25/ha, additional wildlife tree requirements may be met by retaining small safe standing dead trees, small stubs, or any other living trees(G).
- Specific direction on mix of wildlife trees is identified for winter deer emphasis areas and bat maternity roosts, and specific AOC prescriptions where appropriate.
- Wildlife trees that fall to the ground, or are purposely felled for worker safety reasons, become downed woody material and no longer contribute to wildlife tree targets (S). Reasonable efforts will be made to avoid knocking down standing wildlife trees during renewal and tending treatments (G).

Best Management Practices

- Up to 5 wildlife trees/ha may be stubbed (≥ 3 metres). A stub height of 5 metres is preferred.
    - Do not stub existing cavity trees.
    - Do not stub trees being relied upon as a seed source.

    - Do not stub trees that are better suited to other wildlife functions such as supercanopy trees and mast trees.
- Oak, hemlock and diversity trees are good choices for retention.
- Large hollow trees and those providing existing nesting or denning sites are preferred as cavity trees.

<u>For Selection Harvest / Irregular Shelterwood and Seedcut Shelterwood Harvest:</u>

- Retain an average of ≥10 living cavity trees or stubs/ha with a minimum of 5 living cavity trees on each hectare (S).
- Wildlife trees that fall to the ground, or are purposely felled for worker safety reasons, become downed woody material (S).
- Wildlife trees will generally be well dispersed. Retain at least half as individual stems; the remaining wildlife trees may occur in clumps (G).
- Retain an average of ≥10 mast trees/ha (i.e. oak, cherry and basswood) (G).
- Retain an average of ≥10 scattered coniferous trees/ha (G).
- Retain an average of ≥1 supercanopy tree/4 ha (G).
- Reasonable efforts will be made to avoid knocking down standing wildlife trees during renewal and tending treatments (G).

Best Management Practices

- Up to 5 wildlife trees/ha may be stubbed (≥ 3 metres). A stub height of 5 metres is preferred.
    - Do not stub existing cavity trees.
    - Do not stub trees being relied upon as a seed source.
    - Do not stub trees that are better suited to other wildlife functions such as supercanopy trees and mast trees.
- Mast trees, living cavity trees, large stubs, and scattered conifers should be ≥38 cm dbh whenever possible.
- Supercanopy trees ≥60 cm dbh are preferred.
- Large hollow trees and those providing existing nesting or denning sites are preferred as cavity trees.

<u>For Shelterwood removal Harvest/White Pine and Red Pine Seed Tree Harvest:</u>

- Retain an average of ≥25 stems/ha (S).
- Retain an average of ≥10 living cavity trees or stubs/ha with a minimum of 5 living cavity trees on each hectare (S).
- Retain an average of ≥10 veteran trees/ha; a minimum of 5 veteran trees will be retained on each hectare (S).
- Wildlife trees that fall to the ground, or are purposely felled for worker safety reasons, become downed woody material (S).
- Wildlife trees will generally be well dispersed. Retain an average of at least 15 individual stems/ha; the remaining wildlife trees may occur in clumps (G).
- Retain an average ≥1 supercanopy tree/4 ha (G).
- When the number of large living cavity trees, large stubs, veteran trees, and supercanopy trees averages <25/ha, additional wildlife tree requirements may be met by retaining safe standing dead trees, small stubs, or any other living trees (G).

- Reasonable efforts will be made to avoid knocking down standing wildlife trees during renewal and tending treatments (G).

Best Management Practices

- Up to 5 wildlife trees/ha may be stubbed (≥ 3 metres). A stub height of 5 metres is preferred.
    - Do not stub existing cavity trees.
    - Do not stub trees being relied upon as a seed source.
    - Do not stub trees that are better suited to other wildlife functions such as supercanopy trees and mast trees.
- Living cavity trees, large stubs, and veteran trees should be ≥38 cm dbh whenever possible.
- Supercanopy trees ≥60 cm dbh are preferred.
- Large hollow trees and those providing existing nesting or denning sites are preferred as cavity trees

4.2.2.2.5 Bat Maternity Roosts

The following direction applies to harvest, renewal and tending activities occurring between June 1 to July 31 in these seral stages and forest units:

- Mature and Old Growth development stages
- Tolerant Hardwoods (HDSEL, HDSH and ORUS)
- Intolerant Hardwoods (INTCC)
- White Pine Mixedwood (PWUS and MXCCC)
- Mixedwood (MXHCC) and Hemlock (HESH)

The direction for protecting bat maternity roosts is as follows:

- Any tree known to be occupied by bats and any tree encountered during forest management operations observed to have bats flying in/out will be retained.
- Wildlife tree retention in clumps/residual patches is preferred, wherever possible. If a clump of cavity trees is encountered, all cavity trees within the clump should be retained.
- When selecting wildlife trees, the tallest living cavity trees with DBH ≥ 38 cm should be retained whenever possible (i.e. only retained if it is deemed safe to do so).
- If the stand contains many tall and large living cavity trees, it is expected that the average tree retention will be greater than the average/minimum numbers identified in Section 4.2.2.2.4.
- If additional trees are needed to meet the required wildlife trees (i.e. if more trees are needed or desired to be retained), trees exhibiting 1 or more of the following features (features most likely to provide suitable bat roosting habitat) should be retained:
    - Tree exhibits cavities or crevices most often originating as cracks, scars, knot holes or woodpecker cavities, particularly when that cavity is high in the tree (>10 metres)
    - Tree has the diameter at breast height of at least 25 cm
    - Exhibits early stages of decay (for example, heartrot where tree is living or freshly dead)

    - Tree has evidence of loose, peeling bark
- Trees retained for maternity roosts will not be stubbed unless required for health and safety.

If additional trees are needed to meet Wildlife Tree retention (i.e. no/few trees meeting the above requirements), follow direction as per Section 4.2.2.2.4.

4.2.2.2.6 Downed Woody Material

This direction applies to forest operations outside and inside Areas of Concern where permitted.

Downed woody material (DWD) has many important ecological functions:
- contribution to nutrient cycles through the storage of nitrogen and carbon;
- provision of micro-sites for forest regeneration;
- contribution to soil formation;
- reduction of erosion; and
- provision of biodiversity and horizontal habitat structure for wildlife.

Downed Woody Material is defined as sound and rotting branches, boles, logs, stumps (generally >=7.5 cm in diameter at the small end), stems and twigs (generally <= 7.5 cm in diameter at the small end) above the soil and on the ground.

All harvest operations shall retain downed woody material 'as available' to provide for structural diversity and special wildlife habitat features, according to the silvicultural system and stage of management. Standards (S) and Guidelines (G)

1) Trees identified or purposely retained as wildlife trees that fall, or are felled for worker safety reasons, become downed woody material and will be left on site (S). Moving these trees for silvicultural purposes is permitted.
2) Downed trees (or pieces of trees) present prior to harvest will be left on site (G). Where windstorms or other natural events (e.g., snow, ice) have recently caused damage to forest stands, trees leaning and downed by the recent disturbance may be harvested and utilized.

Best Management Practices

3) Consider modifying operations to:
    - minimize the crushing of large, downed logs
    - minimize covering large downed woody material with soil or finer material
    - minimize windrowing of downed woody material. Where windrows are necessary, breaks should be placed to allow for human and wildlife access. A 10 metre break per 100 metre windrow is an appropriate target.
4) Piles of woody material may be burned when appropriate.

5) When compatible with the logging method being used, unmerchantable portions of trees should be left at the stump.
6) Standing dead trees (chicots) that are felled for safety considerations should be left on site.

4.2.2.2.7 Nests of Songbirds/Small Birds Containing Eggs or Young

Direction applies to known nests of songbirds or other small birds containing eggs or young encountered during operations. Standards (S) and Guidelines (G)

1) Known nests of songbirds or other small birds containing eggs or young encountered during operations will not be destroyed; in this context, destruction means the complete or partial damage of the nest structure or its contents (i.e., attendant birds, eggs, or young). (S)

2) Minimize disturbance of known nests of songbirds or other small birds containing eggs or young encountered during operations using one or more of the Best Management Practices listed below or other means to achieve the same protection; in this context, disturbance means the incidental interference with breeding activities such as egg laying, incubation, brooding, or feeding of young. (G)

Best Management Practices

3) Harvest, renewal, and tending operations will be avoided within 3 metres of known nests containing eggs or young. Specifically,
    - Retain trees within 3 metres of known nests containing eggs or young.
    - No felling of trees into the area within 3 metres of known nests containing eggs or young.
    - No travel with heavy equipment within 3 metres of known nests containing eggs or young.

<u>Conditions on Roads, Landings and Aggregate Pits</u>:

4) To minimize disturbance of known nests of songbirds or other small birds containing eggs or young encountered during operations, reasonable efforts will be made to avoid constructing new roads, landings and aggregate pits and extraction of aggregate from existing pits within 3 metres of known nests containing eggs or young. (G)

4.2.2.2.8 Waterfowl, Grouse, or Wild Turkey Nests

Direction applies to nests of waterfowl, grouse, or wild turkeys containing eggs or young encountered during operations. Standards (S) and Guidelines (G)

1) Known nests of waterfowl, grouse, or wild turkeys containing eggs encountered during operations will not be destroyed; in this context, destruction means the complete or partial damage of the nest structure or its contents (i.e., attendant birds, eggs, or young). (S)

2) Minimize disturbance of known nests of waterfowl, grouse, or wild turkeys containing eggs encountered during operations. In this context, disturbance means the incidental interference with breeding activities such as egg laying, incubation, brooding or feeding of young. (S)

Best Management Practices

3) Harvest, renewal, and tending operations will be avoided within 10 metres of known nests containing eggs. Specifically,

   - Retain trees within 10 metres of known nests containing eggs.
   - No felling of trees into the area within 10 metres of known nests containing eggs.
   - No travel with heavy equipment within 10 metres of known nests containing eggs.

Conditions on Roads, Landings and Aggregate Pits:

- To minimize disturbance of known nests of waterfowl, grouse, or wild turkeys containing eggs encountered during operations, reasonable efforts will be made to avoid construction of new roads, landings and aggregate pits and extraction of aggregate from existing pits within 10 metres of known nests containing eggs. (G)

4.2.2.2.9 Dens of Furbearing Mammals in Enduring Features

Direction applies to 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, and wolves) at least once with in the past 5 years, known before, or found during, operations. Standards (S) and Guidelines (G)

1) Harvest, renewal, and tending operations are not permitted within 20 metres of the den entrance (S).

Conditions on Roads, Landings and Aggregate Pits:

2) New roads, landings and aggregate pits are not permitted within 20 metres of the den entrance (S).

3) Road construction and aggregate extraction from existing pits is not permitted within 20 metres of occupied dens, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process (G).

4) Hauling and road maintenance operations are not permitted within 20 metres of occupied dens unless the road predates the den, is required for safety reasons or environmental protection or except in extraordinary circumstances as specifically identified and justified through the FMP AOC approval process. (G)

4.2.2.2.10 Dens of Furbearing Mammals in Transitory Features

Direction applies to dens in tree cavities, hollow logs, brush piles, or other transitory features that are known to be occupied by furbearing mammals (other than red fox, skunks, and wolves) and that are encountered during operations. Standards (S) and Guidelines (G)

1) Known occupied dens encountered during operations will not be destroyed; in this context, destruction means the complete or partial damage of the den structure or its contents (i.e., adults or young). (S)
2) Minimize disturbance of dens known to be occupied that are encountered during operations. (G)
3) Harvest, renewal, and tending operations will be avoided within 3 metres of dens known to be occupied. (G) Specifically, reasonable efforts will be made to:
    - Retain trees within 3 metres of dens known to be occupied.
    - Not fell trees into the area within 3 metres of dens known to be occupied.
    - Not travel with heavy equipment within 3 metres of dens known to be occupied.

<u>Conditions on Roads, Landings and Aggregate Pits</u>:

4) To minimize disturbance of dens known to be occupied that are encountered during operations, reasonable efforts will be made to avoid constructing new roads, landings and aggregate pits and extraction of aggregate from existing within 3 metres of dens known to be occupied. (G)

4.2.2.2.11 Uncommon Forest

The combination of harvest, renewal, and tending treatments applied across the forest will be selected to maintain existing tree species diversity at the forest stand level. This will include maintenance or renewal of minor components such as red spruce, white oak, burr oak, shagbark hickory, bitternut hickory, and butternut. (G)

4.2.2.2.12 Rich Lowland Hardwood Forest

Direction applies to mapped stands of rich lowland hardwood-dominated forest and pockets of rich lowland hardwood-dominated forest ≥0.5 ha in size encountered during operations.

The lowland hardwood group includes green and black ash, white elm, yellow birch and common associates growing on hydric substrates. Species vary from shade intolerant to intermediate to tolerant. Harvest will follow direction for rich lowland dominated forest found in MNRF's silvicultural guides (S). Therefore, management approaches should be matched to species present but typically includes some form of partial harvesting. Clearcut harvesting is not recommended as it can result in excessive/extended watering up and compromise regeneration objectives. Standards (S) and Guidelines (G)

1) No harvest, renewal, or tending operations are permitted that exceed the rutting and compaction standards for *selection, shelterwood, and commercial thinning* operations or disrupt hydrological function (see Section 4.2.2.2.20 on Site Disturbance). (S)
2) MNRF approval will be required to cross rich lowland hardwood-dominated forest with extraction trails during the frost-free period. During all seasons, crossings will be minimized and will follow appropriate operating practices to minimize potential site damage and effects on hydrological function. (G)

Conditions on Roads, Landings and Aggregate Pits:

3) Aggregate extraction is not permitted from existing pits (G).
4) New aggregate pits are not permitted in rich lowland hardwood-dominated forest (S).
5) Landings are not permitted in rich lowland hardwood-dominated forest (S).
6) No construction of new roads in rich lowland hardwood-dominated forest without MNRF approval. When necessary, road construction will follow the design principles in section 4.5.5.1 for roads in AOCs and water crossing design and location to minimize disruption of hydrological function. (G)

4.2.2.2.13 Butternut Trees (Species at Risk)

The direction in the condition on regular operations applies to all Butternut trees unless identified as not retainable by a certified Butternut Health Assessor. Direction applies to plants at all life stages including seedlings, saplings, and trees known before, or found during, operations.

1) Harvest, renewal and tending operations shall not destroy or cause damage to butternut trees except as provided for through the Butternut Health Assessment procedure. (S)
    a) No healthy[11] butternut trees will be marked for removal or harvested unless authorized under the Endangered Species Act.
    b) Non-retainable butternut trees may be marked for removal by a designated Butternut Health Assessor and will be accompanied by appropriate Butternut Health Assessment documentation.
    c) Harvest of marked trees will only occur after appropriate MNRF approval has been received.
    d) No extraction or skid trails are permitted within the dripline of healthy butternut trees.
    e) Crown, stem, and roots of healthy butternut trees will not be damaged by forest operations (careful logging practices).
    f) Opportunities for regeneration of butternut will be identified when consistent with other silvicultural and ecological objectives.

Best Management Practices

2) Forest Operation Prescriptions will identify how silvicultural practices are to be modified to encourage regeneration of butternut based on the following direction:

[11] The term healthy is considered synonymous with the term retainable used in *Endangered Species Act regulations.*

For Selection Harvest:

a) Pockets (≥0.5 ha) within stands with 5-15 healthy butternut trees/ha
   - Group selection openings (30-70 m diameter circular opening) should be created to encourage regeneration.
   - Healthy butternut seed trees should be retained along the edge of openings.
   - Within openings, all stems should be felled, except healthy butternut trees.
   - Competition should be controlled within openings as necessary.

b) Pockets (≥0.5 ha) within stands with >15 healthy butternut trees/ha
   - Follow direction for uniform shelterwood harvest (below).

For Shelterwood Removal Harvest:

a) Pockets (≥0.5 ha) within stands with >5 healthy butternut trees/ha
   - The uniform shelterwood system with full crown spacing should be applied.
   - Depending on crown size, a total (including species other than butternut) of 30-60 crop trees/ha should be retained, with bole spacing ranging from 12-20 m.
   - Competition should be controlled within the pocket as necessary.

4.2.2.2.14 Good Neighbour Policy

The Bancroft Minden Forest Company Inc. shares Crown forests of the management unit with many other groups and individuals. There are countless parcels of patent lands and many provincial parks and conservation reserves adjacent to the Crown's managed forest. Given the proximity to Ontario's major population centres, the use of Crown land is high. A "good neighbour" policy is intended to provide direction that protects the interests of all stakeholders.

Forest management boundaries between Crown and Private Property will be established in accordance with MNR/MNDMF Forest Licensing, Wood Allocation and Measurement General Procedure FOR 05 01 04 (August 2004) - Marking the Limit of Forest Operations Adjacent to Private and Crown Properties. (S)

Existing roads are heavily used by seasonal and permanent residents, visitors and tourist outfitters, hunters, fishermen and recreational vehicle clubs. There are many undocumented trails used for recreation or trapping activities. In recognizing the interests of other stakeholders, the management plan will strive to ensure existing access is not unduly affected.

Where the other stakeholder can be identified e.g., known snowmobile club, contact will be made to discuss the timing and extent of operations. For general high-use areas e.g., busy cottage lake prior to Thanksgiving weekend, signs will be posted along access routes at the Annual Work Schedule stage to give the public notice of operations soon to start-up and provide a final opportunity for engagement. Modifications to operations may be implemented in consideration of other users to resolve public safety, future access or joint-use concerns. Written agreements will be encouraged to clarify verbal discussions. This is particularly relevant to forest roads maintained by permanent or seasonal residents. Roads will be left in an "as found" state unless otherwise discussed. Trails used for access may be widened for machine travel but will be left "debris free" to the extent reasonably possible.

New road construction will make reasonable efforts (e.g., clearing of logging debris, avoid steep ditching) to ensure that recreational portage routes, recreational trails, and trails used for accessing and working traplines are left in an acceptable condition following forest management operations.

Long established and recognized cross-country ski trails have unique protection requirements. Conditions on operations adjacent to Kawartha Nordic and the Frost Centre Trails are described in Table FMP-11 Area of Concern Prescriptions.

Hydro One will be contacted when activity is planned adjacent to a hydro corridor. The Ontario Forest Resource Licensee (OFRL) or contractor is to ensure operations adjacent to electrical transmission lines are conducted in a manner that will not damage lines, supports, or equipment and will not block or restrict access for normal maintenance of these utilities. Permission must be obtained from the respective utility to use/operate on their right of way. Proof of permission (letters, permits, or documentation of verbal permission) shall be provided by the OFRL upon request by MNRF or BMFC. (S)

The Ministry of Transportation or local Municipality will be contacted regarding any proposed intersection with or near a provincial or municipal highway. Existing entrances will be used wherever possible; entrance permits will be obtained from MTO or the Municipality for all new entrances or upgrades to existing entrances and retained on file. (S)

Forest operations on and adjacent to mining claim areas will be conducted in accordance with MNRF/MNDMF Forest Licensing, Wood Allocation and Measurement Licensing Procedure FOR 05 03 17 (March 2005) - Mining Claims and the conditions of the SFL or OFRL licence. (S) The licensee shall ensure that all blazed claim lines, survey lines, corner posts, trenches and other grid markers cut or otherwise established by markers, or any other property of the person who has staked the mining claim that may be located on the licensed area, are not damaged or altered by operations controlled by the licensee.

4.2.2.2.15 Residual Forest

The term residual forest is used in several places in the FMP.

Conceptual definition:

- Residual forest is a forested patch that generally functions more as habitat for wildlife that inhabit older forest than as habitat for wildlife that inhabit younger forest. The words “older” and “younger” are used in a relative sense. Residual forest is not synonymous with mature, old or old growth forest. Residual forest can include some immature (i.e. neither young nor old) forest.

Quantifiable definition:

For all forest:

- Crown productive forest and free-to-grow
- ≥35 years or ≥ 10m tall
- Minimum patch size 0.1 ha

For recent (<20 years)/planned harvest:

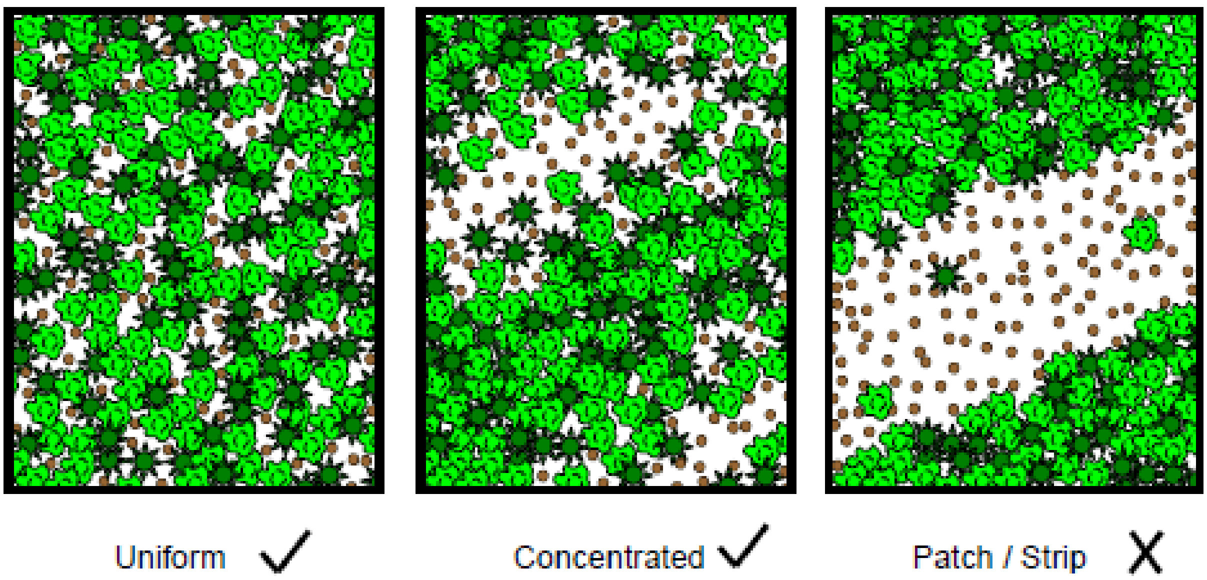
- >50% crown closure based on dominant/codominant trees
- Acceptable sub-stand pattern (see below)

For planned harvest:

- Maintain species composition, stem diameter, quality or as specified in silvicultural ground rules, AOC prescription, Condition on regular operations.

Residual Forest Pattern:

- Pattern will resemble older forest with small gaps rather than a mixture of discrete young and old forest patches:



4.2.2.2.16 Clearcut Harvest Layout Planning

This direction only applies to areas harvested using the clearcut silviculture system. Clearcut harvest areas where the forest immediately following harvest is greater than 3m and free-to-grow are exempt. All stages of selection and shelterwood management are exempt. This direction will be applied in areas where a species-specific emphasis has not been identified. When operating within a defined area with a species-specific emphasis (deer or moose management zone) refer to the specific operational planning direction for these areas. Standards (S), Guidelines (G) and Best Management Practices (BMP)

1) Implementation of the harvest plan will ensure that any point within a new clearcut harvest area will have at least 0.5 hectare of residual within a 50 hectare circle (or hexagon) about that point. (S)
2) If mapped residual forest has been identified in the FMP to meet strategic coarse-filter objectives and a specific area is not serving any other purpose (AOC, specific habitat function, etc.), and would otherwise be available for harvest, it can be moved during operational implementation provided:

- The direction in this CRO is respected.
- The planned harvest area is not exceeded.
- The FMP specifically identifies those mapped residual polygons that are eligible for movement.

3) Movement of mapped residual that is identified in the FMP as movable will not normally require an amendment, revision, or special reporting. The mapped area must be replaced by one of better or equal value in location: shoreline of a lake, pond, river, or stream that is within, or directly adjacent (<200 metres) to, the planned harvest area with a preference for areas of hydrological linkage (e.g., ephemeral streams, springs, seeps, groundwater discharge, etc.). Otherwise, additional mapped residual may be connected to known values or located to encompass uncommon forest types.
4) When locating unmapped residual forest (i.e., 0.5 hectare in 50 hectare), give preference to locations connected to habitat features encountered during operations such as bird nests, furbearer dens, woodland pools, or preferentially retain uncommon forest types or locations connected to known values such as water or bird nests. (BMP)

4.2.2.2.17 Salvage Operations in Natural Disturbances

The direction applies to areas both inside and outside Areas of Concern. Standards (S) and Guidelines (G)

1) Salvage harvest will normally retain a minimum average of ≥25 stems/ hectare ≥3 metres in height and ≥10 cm dbh. This is the minimum average for the harvest block (or minimum average per 20 hectares if the harvest block ≥20 hectares) contingent upon sufficient numbers and types of standing stems being available and, in a condition suitable for retention. (S)
2) Salvage operations will consider strategic landscape objectives. (G)
3) When finalizing boundaries of a salvage operation that results from wildfire, the area of undisturbed forest included in the salvage operation will be minimized. (G) Boundaries of a salvage operation that result from blowdown, insect infestation, or other factors (e.g., ice storms) can include undisturbed forest. When salvage operations include undisturbed forest, residual pattern and residual forest will be retained consistent with the relevant CROs (section 4.2.2.2.15).
4) The trees retained following salvage operations will have a range of distribution patterns (relatively even spaced to some clumping), recognizing operational limitations, and subject to the availability of standing trees. (G)
5) Adjust the timing of entry and/or other operational factors to minimize unnecessary site disturbance that could potentially result in ecological damage (e.g., avoid salvaging a swamp in the frost-free period). (G)
6) Reasonable efforts will be made to avoid windrowing or crushing of downed woody material. (G)
7) Where possible trees retained following salvage harvest will be the same species and size classes as trees that would have been retained following normal harvest. (BMP)
8) When leaving unsalvaged patches of disturbed forest, give preference to areas adjacent to, or near, the undisturbed forest. (BMP)

9) Attempt to limit or concentrate extraction trail coverage when salvage operations are extended for more than 3 years, particularly in fire salvage areas. (BMP)
10) In fire salvage areas, preferably retain conifers as wildlife trees. (BMP)

4.2.2.2.18 Biofibre Harvest

This direction applies to all planned harvest areas regardless of the product derived (S).

Forest biofibre refers to forest resources from Crown lands that are not being utilized for other forest products (e.g. sawlogs) and that are made available under an approved forest management plan (FMP) and in accordance with MNRF Forest Directive 03 02 01. Biofibre may be the primary (e.g., otherwise unmarketable stand of low-grade hardwoods) or secondary (e.g., undersized material after optimizing recovery of veener and sawlog) product of a planned harvest operation.

Forest biofibre is comprised of:

- unmerchantable timber such as undersized wood, cull trees or portions of trees,
- individual trees and stands of trees that are merchantable, and
- trees that may be salvaged as a result of a natural disturbance.

1) Stumps and all below ground portions of a tree are not available for utilization as a forest product. Movement or removal of stumps and roots associated with normal operations (construction of roads, landings, and skid trails; renewal and tending; slash piling; etc.), including incidental movement or removal during harvest operations, is permitted but will be minimized to that required for efficient operations. Removal for forest health purposes is permitted. (G)

2) Organic matter (including boles, branches, roots, bark, leaves, needles, debris, soil carbon, etc.) that is not part of the harvested tree will remain on site. Movement of such material for access or silvicultural purposes is permitted. (G)

4.2.2.2.19 Logging Damage

The direction applies to harvest areas both inside and outside Areas of Concern.

1) Logging damage standards apply to all operations (shelterwood and selection harvests) where there is a residual basal area following harvest of $10m^2/ha$ or greater, with $4m^2/ha$ or greater of AGS stocking. (S)
2) Where the residual basal area criteria following harvest has been met, not greater than 15% of the total residual basal area and not greater than 10% of the residual AGS basal area may have major damage. (S)
3) Trees felled for roads, main extraction trails, or landings will not be counted as damaged trees.

Table 58. Logging damage definitions and standards.

Injury Type	**Major Tree Injury/Damage (trees > 10 cm DBH)**
Bark Abrasion	Trees 10-31 cm dbh: Any wound greater than the square of the dbh (e.g. for a 10 cm dbh a major wound is greater than 100 cm^2.
	Trees 32+ cm dbh: Any wound greater than 1000 cm^2.
	Note: If the wound has ground contact (and for yellow birch) a major wound is considered to be 60% the size shown above for all size classes, (e.g. 60 cm^2 for a 10 cm dbh tree or 600 cm^2 for any tree 32+ cm dbh.
Broken Branch	More than 33% of the crown is destroyed.
Root Damage	More than 25% of the root area exposed or severed.
Broken Off	Any tree with the crown broken off.
Bent Over	Any tree tipped noticeably. (**suggest >10º lean as in marking guide**)

4) Preplan the extraction trail system within the harvest block. Minimize trail coverage to the extent necessary to efficiently harvest the block. Keep trails straight or gently curving, avoiding long down grade stretches and wet areas. (BMP)
5) Precut the main extraction trails. Leave all trees marked for removal adjacent to skid trails. This is particularly important on trail corners and intersections. Use these trees as well as tree stumps to align hitches along trails and to swing trees during winching; remove these trees last. (BMP)
6) In most cases, start the harvest at the back of a block. Begin operations at the end of main extraction trails, progressively work toward the landing. In some cases, such as at the beginning of a winter cut, it is advantageous to start at the front of the cut. This will allow for frost penetration into the trails. Frost penetration can be enhanced by equipment travel on the trail one to two days in advance of skidding or forwarding. (BMP)
7) Branch trails should join main skid trails at 45 degrees or less to minimize damage due to treelength sweep. (BMP)
8) Use directional felling techniques to prevent damage to regeneration and residual trees when felling. Directional felling also results in reducing stand damage during skidding operations. (BMP)
9) Remove all tree tops and limbs prior to skidding. Tree lengths with excessive sweep or crook should be bucked to maintain compact loads. This will reduce damage to trees adjacent to trails. (BMP)
10) Extraction trails should be ± 50 metres apart. When using cable skidders, ensure a sufficient length of mainline is maintained to allow felled trees to be winched to the trail. (BMP)

4.2.2.2.20 Site Disturbance

These conditions apply to all harvest, renewal and tending operations; but do not apply to roads, aggregate pits, landings, or roadside work areas. Site disturbance may be cumulative from different operations on the same site, the resulting cumulative site disturbance will be assessed in this direction.

Table 59. Definition of terms associated with site disturbance.

Term	Definition
Rut	Continuous trench or furrow created by machine traffic that is ≥4 m long and ≥30 cm deep. When operating on shallow soils the lesser of depth to bedrock/large boulders or 30 cm will be used. Ruts may be empty, filled with water, or filled with varying amounts of intermixed organic and mineral soil/debris. Furrows, scalps, trenches, etc., created specifically for site preparation purposes are not considered ruts.
Extraction trails	Anywhere a machine being used for extraction (skidder, forwarder, etc.) has traveled within the block (excluding roads, landings, and roadside work areas).
Significant mineral soil exposure	Patches of mineral soil exposed by machine traffic that are individually larger than $4m^2$ in size or have an aggregate area that exceeds 5% coverage. The percent coverage of exposed mineral soil will be measured over a 15 m by 15 m area when operating adjacent to water. The percent coverage of exposed mineral soil will be measured in the area harvested of other AOCs.
Disruption of hydrologic function	Alteration of the physical characteristics of a site such that the natural flow of water, on or below the surface, is significantly impeded (e.g., by damming), accelerated (e.g., by channelization), or diverted (e.g., by ditching). The natural “watering up” process associated with the removal of forest cover is not considered a hydrological disruption.

4.2.2.2.20.1 Rutting and Compaction

Rutting and compaction will be minimized during all active forestry harvest operations by following the Standards (S), Guidelines (G) and using Best Management Practices as needed.

All silviculture systems:

1) The area of rutting and compaction will be minimized (G).
2) No more than 50% of any 0.1 hectare circle is permitted in ruts (S).
3) No ruts permitted that channel water into, or within 15 m of lakes, ponds, rivers, streams, woodland pools, or those portions of mapped non-forested wetlands dominated by open water or non-woody vegetation (see Section 4.2.2.2 for more details). (S)
4) In advance of any operations, MNRF and industry compliance staff will agree to an approach to measuring the percent coverage, depth, and length of a rut, definition of roadside work area, and percent coverage of extraction trails (G).
5) Ruts on long slopes, or on short steep sections, can cause significant erosion that can degrade sites and prevent future use of extraction trails. Long ruts on all types of terrain may impair forest productivity, interfere with natural forest drainage patterns. Local criteria will be developed to identify when stabilization, repair, and/or work stoppage must occur to mitigate effects. (G)
    a) Ruts longer than 20 metres on slopes greater than 20% are to be stabilized and rehabilitated upon completion of operations.
    b) Continuous ruts longer than 60 metres will be rehabilitated upon completion of operations.
6) Compliance inspectors will identify when stabilization (during active operations) or rehabilitation (upon completion of operations for the Annual Work Schedule) must occur to mitigate effects. It is not always possible to stabilize rutting during active operations or on slopes during active extraction trail use. In these cases, stabilization and rehabilitation will occur promptly upon completion of operations. Stabilization and rehabilitation would include practices such as levelling, brush matting, restoration of natural drainage patterns or other techniques appropriate to the circumstances.
7) SFL and MNRF Compliance inspectors will document in the regular forest compliance reporting schedule where site stabilization or rehabilitation has been requested or completed. For the purpose of assessing the rutting standards in this section, any rut that has been stabilized or rehabilitated is a rut.

Selection, shelterwood, and commercial thinning:

8) No more than 2% of any 20 hectare area (or the area of the operating block if less than 20 hectares) is permitted in ruts (S).
9) Area in extraction trails will be minimized and will not exceed the following values unless a higher value is required to meet objectives and specified in this FMP (e.g. silviculture ground rule, *conditions on regular operations*, etc.) (G):
    a) 20% for selection
    b) 30% for shelterwood and thinning

Clearcut silviculture system (excluding commercial thinning):

10) *Shallow soils* (Average soil depth <30cm): No more than 5% of any 20 hectare area (or the area of the operating block if less than 20 hectares) is permitted in ruts (S).

11) *All other soils:* No more than 10% of any 20 hectares area (or the area of the operating block if less than 20 hectares) is permitted in ruts (S).
12) Where advanced regeneration is a significant contributor to future forest development, the area in extraction trails will be minimized. On sites susceptible to rutting, the achievement of this direction needs to be balanced against the increased rutting that may occur when extraction is concentrated on fewer trails. (G)
13) Field staff, particularly equipment operators, should be trained in the identification of susceptible sites (e.g., SSG Figure 5.2c), rutting, and compaction. (BMP)
14) When applying the second guideline in this section (develop an approach to measuring ruts), foster a common understanding at a level broader than the management unit (e.g., regional) to gain efficiencies and maximize consistency. (BMP)
15) Identify susceptible sites in advance of operations (e.g., via ground reconnaissance, air photos, remote sensing). An approach to dealing with these areas should be developed and communicated to operators and supervisors. (BMP)
    a) The site disturbance susceptibility table in SSG Appendix 5.2b can be used as a starting point.
    b) Where available, predictive modeling tools (e.g., flow accumulation models, topographic index (SSG Figure 5.2d), etc.) can be used as an additional source of information for the possible location of susceptible sites. The outputs of these tools are not to be thought of as values requiring verification, but equally they should not replace normal field reconnaissance.
16) Develop a local list of standard operating procedures to prevent or minimize disturbance for various site type and machine combinations that may potentially result in compaction and rutting. (BMP)
17) Selection of areas for harvest should be made in recognition of susceptible sites and a balance sought between stands in which operations can occur at any time of the year and those where operations are best carried out in the winter or the driest part of the summer. (BMP)
18) Where other factors allow, summer/winter balance should be maintained during implementation such that flexibility is maintained across multiple years. (BMP)
19) When selecting areas for harvest, the availability, flexibility, and limitations of equipment in relation to susceptible sites should be considered. (BMP)
20) When practical and feasible, access should be planned to prevent or minimize site damage (e.g., build roads well in advance of operations so lack of access is not a recurring reason for off-season operations on susceptible sites). (BMP)
21) Where practical and feasible, maintain a choice of operating blocks within an economical floating distance to be able to move from susceptible areas during periods of abnormal environmental conditions (e.g., high rainfall, early thaw, late freeze) with minimal interruption in production. (BMP)
22) Encourage advanced planning of access within the block (i.e., skid trails and landings) by the operator and/or supervisor. Identify and locate primary trails and convergence zones where the ground has the greatest load-bearing capacity. Limit and flag the number of main skid trails and ensure all operators are aware of their location. (BMP)
23) In fully mechanized operations, limit travel of forwarder and skidder to harvester trails. (BMP)
24) On main trails or on convergence zones, consider strengthening with slash matting where damage is likely to occur. In some cases, gravelling of main skid trails should be considered. (BMP)
25) Keep skid trails as straight or as gently curving as possible. (BMP)

26) In clearcut systems, normally distribute skid trails widely, while avoiding wet pockets or other susceptible areas. In partial cut systems, normally concentrate skid trails to minimize the extent of damage to residual stems. (BMP)
27) Forwarding/skidding should not deviate from designated extraction trails. (BMP)
28) When only a few machine passes can create a significant risk of compaction or rutting, concentrate machine traffic on main trails and mitigate any damage that occurs (i.e., do not disperse traffic). (BMP)
29) Recognize some damage to main trail areas is expected as a cost of minimizing damage to residual trees and the rest of the site and have a plan to mitigate damage on main trails. (BMP)
30) In partial cut systems, winch as much wood as possible to the skidder to minimize the extent of skid trails. (BMP)
31) Use high floatation equipment if summer logging chances include large areas of organic soil and monitor closely to ensure damage is minimal. (BMP)
32) On sites susceptible to compaction and rutting, use slash matting on equipment traffic areas; e.g., place slash in front of machines when using cut-to-length systems that limb and top on site. (BMP)
33) Recognize that the use of slash matting or other mitigative techniques may disguise some types of soil disturbance and consider moving blocks if excessive use of mitigation is required. (BMP)
34) In general, during harvesting and site preparation operations, minimize the disturbance/removal of soil organic layers and topsoil. (BMP)
35) Operations should be allowed or discontinued based on the actual compaction and rutting which is occurring. (BMP) As examples:
    a) in the late winter/early spring, it may be possible to operate on night shift and until mid-morning, if frost conditions are satisfactory, and then stop operations when the ground warms up in the afternoon,
    b) a shut down for a few days may be required after a period of high precipitation.
36) Whenever possible, non-productive areas (such as rock outcrops) or other relatively high load-bearing soils should be selected for landing sites. (BMP)
37) Proper day-to-day on-site planning is important. Operators need to be competent, trained, and aware of the objectives and plans for specific sites. (BMP)
38) Continually monitor during and after operations to mitigate any damage that may occur and better forecast where future problems may occur. (BMP)
39) In winter conditions where the soil is not adequately frozen, compacting the snow with a feller-buncher prior to wood extraction, or blading off some snow from trails and landings before use, will allow the frost to penetrate deeper. Sufficient wait time at sub-zero temperatures (at least overnight) must be allowed for the soil to freeze properly before the benefit can be realized. (BMP)
40) Skid or forward wood as soon as possible to avoid the “watering up” that can occur quickly (days) after felling. (BMP)
41) Where possible locate roads and landings so that skidding can occur in a downhill direction. Adjust this strategy when working on erosion-prone soils. (BMP)
42) Where possible, turn machinery on the road or other high strength soil rather than in forest (BMP).

43) Where machine design allows (e.g., some forwarders) travel empty in reverse to avoid soil damage caused by turning in the block. (BMP)
44) On high hazard sites, or when conditions are such that rutting can occur, reduce loads on the skidders to distribute the weight evenly to all four wheels (rule of thumb – 2/3 of a full load). (BMP)

4.2.2.2.20.2Erosion

The objective of this section is to provide direction that prevents, mitigates, and/or rehabilitates erosion associated with forest management operations. Erosion can be defined as the overland movement of soil particles by water, wind, or gravity. Erosion result from natural causes or human site alterations.

1) Decommission main skid trails constructed on steep slopes by installing water bars, diversion ditches, straw bales, etc. at appropriate intervals or critical landform junctures to filter runoff water through surrounding vegetation (G).
2) Minimize mineral soil exposure to that required for efficient operations and effective silviculture, consistent with SGR for the site (G).
3) Mitigate or rehabilitate areas of significant erosion that are transporting, or are likely to transport, sediment into a water feature (G).

Best Management Practices

4) Where safety permits, skid across slopes and avoid skidding with the slope.
5) Avoid road and landing layout that requires skidding or forwarding up or down steep slopes.
6) Where skidding or forwarding with the slope is necessary:
   - consider dispersing traffic so repeat traffic does not cause rutting and/or compaction.
   - use chains or other implements to increase traction to avoid tearing the root mat and organic layers.
   - avoid turning on the slope to minimize tearing of the root mat and organic layers.
7) Consider extremely steep slope areas as inoperable and avoid machine travel. The specific steepness threshold should be determined locally, based on site conditions and available machinery.
8) Consider the use of winter-only operations on very high-hazard sites (e.g., very fine sand with thin organic layers).
9) Avoid harvesting areas that clearly will erode as a result of the removal of trees (e.g., discontinuous shallow organic layer over bedrock).
10) Where possible, use low or no mineral soil exposure renewal options such as straight planting, hand scalping, seeding, and natural regeneration in steep and/or erosion-prone areas.
11) Where safety permits, ensure site preparation runs across the slope and avoid aligning with the slope.
12) Site prepare to provide the minimum amount of mineral soil exposure to achieve silvicultural objectives. On high-hazard sites, favour discontinuous scalp over continuous trench site preparation methods.
13) Within the limits of operational efficiency, use the smallest prime-mover possible to achieve site preparation goals.

14) On high-hazard sites, avoid broadcast site preparation (e.g., ploughing, summer blading) that exposes excessive amounts of mineral soil.
15) Favour fast-growing species and immediate renewal in steep or erosion-prone areas;
16) Identify ruts or furrows on slopes that are channeling runoff and causing erosion. Limit further erosion by filling these ruts with slash, debris, or non-erodible soil.
17) Divert mid-slope ruts that are, or are likely to, channel water with cross drains, obstacles, or berms (i.e., water bars). This is particularly applicable to extraction trails in partial harvest systems.
18) On high-hazard sites, monitor soil condition during and after operations to mitigate any damage that may occur and better forecast where future problems will occur.
19) Where possible, disperse unutilized slash over areas that are prone to erosion (e.g., fine sands that are easily eroded by wind and on slopes).
20) Identify susceptible sites (see SSG Appendix 5.2b for a starting point) and develop standard operating procedures to minimize the risk of erosion on those sites.
21) Communicate the nature and, if possible, the location of susceptible sites to field supervisors and equipment operators, including silviculture operators.
22) Train field staff, especially equipment operators, in the recognition and significance of soil exposure and erosion.
23) Areas susceptible to mass wasting (riverbanks, soil over steep bedrock, etc.) should be treated carefully. Silviculture ground rules, or individual plans specific to the area, should be developed and include specific measures to minimize erosion potential.
24) On broad sloping alluvial areas, care should be taken not to orient the cut blocks such that the entire width (with slope) of the area is cut in a single operation.
25) Rehabilitate areas where soil has been deposited on the roots of residual trees and an impact on productivity is likely.

4.2.2.2.20.3Loss of Productive Land

The objective of this section is to provide direction that minimizes, and accounts for, the loss of productive land associated with forest management operations. Loss of productive land can be described as the conversion of previously productive forest land to a long-term or permanently non-forested condition as a result of forest management operations. Some loss of productive land through the conversion to other land types (e.g., permanent roads) is inevitable in even the most efficient forest operations.

1) Minimize the amount of area being converted to non-forest (e.g., roads and landings) to that required for efficient operations (G).
2) Unutilized woody material, which accumulates at roadside, is smothering productive land, and is expected to remain unutilized, will be piled, redistributed, or otherwise treated to increase the area available for regeneration (G).

3) As a rule-of-thumb, strive to keep the area of roads and landings to less than 4% on a per block basis (it is recognized that operational constraints may require more road in some circumstances and that less road may be possible, and therefore desirable, in others). (BMP)
4) Avoid piling unutilized fiber on productive non-forest cover types (e.g., brush and alder). (BMP)
5) Area converted to non-forest or non-productive forest (slash/debris piles, operational roads, landings, flooding, etc.) should be quantified and monitored for recovery into productive land. Use existing process (e.g., free-to-grow survey) as much as possible to obtain this data. The results should be used to further refine forecasts of area converted to non-forest and non-productive forest. (BMP)
6) All roads should be marked on the ground in advance of construction, preferably the corridor as well as the center line. (BMP)
7) Develop a block plan for operational roads and communicate the plan to the operators. Alternatively, encourage operators to develop a block plan in advance of harvesting and construction. (BMP)
8) Locate branch and operational roads to ensure operators are skidding the maximum cost-effective distance. (BMP)
9) Avoid excessive use of turnarounds and loop roads. (BMP)
10) Use winter-only access options where delivery schedules and silviculture requirements permit. (BMP)
11) Pre-determine the number and location of landings and communicate with the operator. Identify contingency landings to adapt to localized situations, such as encountering susceptible areas or unmapped streams that may change the skidding plan. (BMP)
12) Use shovel equipment (excavator, backhoe, etc.) rather than bladed equipment (dozers, etc.) to build roads to minimize the width of disturbed areas. (BMP)
13) Whenever possible, non-productive areas (such as rock outcrops) should be selected for landing sites. When doing so, ensure they are far enough from natural drainages and other values to minimize the risk of introducing sediment. (BMP)
14) Where feasible, use equipment combinations that can maximize the distance between roads (e.g., forwarders). (BMP)
15) Where feasible, select machinery combinations that maximize within-block processing to minimize slash and debris piles. (BMP)
16) Practice environmentally friendly, zero discharge maintenance and re-fueling to ensure no soil contamination occurs. (BMP)
17) Pile roadside wood as high as safety permits to minimize the area of landings. (BMP)
18) Keep bush inventories low by using “hot logging” to minimize the number of landings. This approach should be balanced with the potential for rutting and compaction as a greater area of the block converges on fewer landings. (BMP)
19) Within the bounds of road-use strategies, site prepare and otherwise regenerate operational roads, ditches, and landings that are no longer needed. (BMP)
20) Educate supervisors and operators on the short- and long-term effects of excessive conversion to non-forest to enable informed planning and decision-making. (BMP)
21) Where safety permits and other values will not be compromised, burn piles of slash, debris, and unutilized fibre. (BMP)

22) Where possible, re-distribute unutilized slash and chipper waste back over the cut area in a manner that will not interfere with silvicultural or diversity objectives. (BMP)
23) Do not use site preparation techniques that rely on piling slash in unproductive windrows or mounds unless these will be burned. (BMP)
24) Maximize the use of unutilized processing debris for road construction. (e.g., brush matting swamp crossings, fill wet holes, stabilize steep road banks, stabilize ditches). (BMP)
25) Encourage the use of unutilized processing debris to rehabilitate gravel pits, borrow pits, or other human-caused unproductive sites (BMP)

4.2.2.2.20.4Hydrological Impacts

The objective of this section is to provide direction that prevents and/or minimizes hydrological impacts associated with forest management operations. Hydrological impacts can be described as changes in the potential rates and/or patterns of surface and shallow groundwater flow through various parts of the forest ecosystem.

1) Based on local conditions, explore reasonable alternatives to crossing organic and saturated mineral soils during the frost-free period. When crossing during the frost-free period cannot be avoided, mitigation measures could include techniques such as: placement of corduroy, snowpack, brush matting, geotextile materials, manufactured crossing structures and other techniques appropriate to the circumstance. Where there is potential for acceleration, impediment or disruption of water movement, natural drainage patterns will be restored to the extent required following operations. (G)
2) Take reasonable precautions to ensure harvest, renewal, and tending operations will not result in disturbance of the forest floor that impedes, accelerates, or diverts water movement within recognizable ephemeral streams, springs, seeps, and other areas of groundwater discharge connect to lakes, ponds, rivers, or streams. (G)

Best Management Practices

3) Train field staff, especially equipment operators, in the recognition and significance of disruption of hydrological function.
4) Use hydrological modeling tools (e.g., flow accumulation, topographic index, etc.) to help identify possible unmapped drainage, localized wet areas, mapped drainage that is misplaced or may not exist, or hydrological linkages (i.e., ephemeral streams, springs, seeps, and other areas of groundwater discharge). The outputs of these tools are not to be thought of as values requiring verification, but equally they should not replace normal field reconnaissance.
    a) Communicate the location and importance of these features to supervisors and operators in advance of commencing operations in the local area.
    b) Avoid building roads or skidding through areas of accumulated flow, particularly when near a water feature.

5) On very dry sites, careful logging practices that retain some trees, shrubs, advanced growth, and slash can reduce overall ground temperature and reduce excess drying.
6) Where possible, locate roads and landings so skidding and forwarding does not have to cross natural drainage patterns.
7) Regenerate susceptible sites as quickly as possible to restore transpiration and moderate hydrological changes.
8) If it is not possible to completely avoid susceptible wet areas such as swales, seeps, and wetlands;
    a) reach into them with a felling head or winch wood out of them using conventional cut and skid systems;
    b) use feller-bunchers to cut and bring bunches back to solid ground;
    c) use "hoe-chucking" (e.g., excavator) to move wood to solid ground;
    d) use brush and tops to increase the load-bearing capacity of the soil, recognizing some disturbance may occur;
    e) if machine traffic must enter the swale area, avoid crossing the entire width, but rather approach from both sides and reach into the middle;
9) Identify sites within operating blocks susceptible to site disturbance in advance of operations.
10) Pre plan the harvest timing of susceptible sites to frozen or the driest site conditions possible.
11) Where possible, plan for alternate contingency areas for forest operations. Alternate operating blocks may be used when weather and site conditions are unfavourable for site disturbance.

4.2.2.2.20.5Nutrient Loss

The objective of this section is to provide direction that prevents and/or mitigates unintentional nutrient loss associated with forest management operations. Nutrient loss can be described as the release and off-site transport of nutrients following forest management operations.

Best Management Practices
1) Give preference to logging methods that leave debris and unutilized fibre in the cut area (e.g., cut-to-length, tree length, etc.) over logging methods that process and pile debris and unutilized fibre at roadside (e.g., full-tree).
2) Use winter harvest operations to conserve nutrients on site (leaf fall and root stores).
3) Where possible, re-distribute unutilized slash and chipper waste back over the cut area in a manner that will not interfere with silviculture or diversity objectives.
4) Maintain a diversity of tree and plant species on site, including hardwood and alders, to improve the capture and cycling of nutrients.
5) Leave some trees (potentially non-crop trees) un-harvested to serve as nutrient sinks to capture mobile ions made available immediately following harvest and site preparation.
6) Consider delaying the use of herbicide to release young conifer plantations (e.g., spruce) until they are ready to capture the nutrients on the site.
7) On very shallow sites, or sites with undulating topography, use high flotation (low impact) equipment to maintain the integrity of the surface organic layer, and prevent rutting or compaction in the deeper

soil inclusions. This is especially important during wet weather conditions when the organic layer or soil is saturated.

8) Post-harvest prescriptions and renewal efforts should be carried out as quickly as possible on shallow soil sites to encourage full site occupancy. This should also help to prevent problems with erosion and loss of nutrients.
9) Lower nutrient-demanding species, such as jack pine, should be matched to nutrient-poor sites. The use of fast-growing species is advisable to ensure rapid reforestation and reduce the erosion risk.

4.2.2.2.21 Deer Wintering Emphasis Areas (DEA)

This direction applies to all forest stands within the two deer emphasis areas (DEA) on the Bancroft Minden Forest; Baptiste and Mephisto deer yards (Figure 32). The intent of this direction is to protect, maintain and/or enhance critical thermal cover, provide browse and access cover to browse production areas through time and space, and maintain important stand level values within deer wintering areas. Each DEA has core deer wintering areas (Stratum 1) and general deer wintering areas (Stratum 2).

Standards (S) and Guidelines (G)

1) Silvicultural prescriptions will be consistent with deer habitat management objectives (S).
2) Increase the availability of critical thermal cover to a target level of 15% and work towards an even distribution of critical thermal cover in each of the two deer wintering areas (G).

Candidate critical thermal cover (CTC) stands have been pre-identified by MNRF using a combination of aerial photography, surveys, and/or landscape GIS modeling (e.g. Ontario Landscape Tool or cover quality queries) using the forest resource inventory to the desirable levels and distribution for each deer yard. If any candidate CTC stands identified by MNRF are determined to be unsuitable as cover or higher quality cover stands have been found, they may be substituted or removed from designated CTC with approval from the MNRF Biologist.

Each designated CTC stand will be mapped as an individual treatment area on Forest Operation Prescription (FOP) Maps and displayed as “modified” or “bypassed” based on prescriptions for Designated Critical Thermal Cover Stands. Identifying them as modified or as retained forest will also facilitate operational road planning relative to critical thermal cover stands (See DEA CORLAPs below).

With consideration of immediately surrounding stands, each forestry harvest block will need 15% critical thermal cover spaced no further than 200-800 m apart with approximately 10 hectares of CTC in each 50 hectare area and connected by stands with sufficient amounts of conifer access cover. For the purpose of describing the CTC distribution pattern in each deer yard, cover patterns that meet the desired spacing will be referred to as “even” and those not meeting the desired spacing are “uneven”.

Any 50 ha area of the stratum 1 deer yards that has <10% critical thermal cover is automatically considered a cover deficient area. The long-term silvicultural objective for cover deficient yards is to increase the conifer component to at least the minimum requirement of 10% (G). If it is not possible to locate potentially suitable conifer stands using available photography or in the FRI, the most suitable cover patches found during operations will need to be retained (See Direction to Increase CTC in Cover Deficient Areas below) or the planting of conifer should be considered.

Large patches of conifer retained as critical thermal cover (CTC) during operations will be identified as unique prescription areas on Forest Operation Prescription Maps when found in advance of operations and/or added into the Forest Resource Inventory when updates are being made.

A. Designated Critical Thermal Cover Stands – Silvicultural Direction and Options (G):

Critical thermal cover (CTC) stands in Stratum 1 will receive either modified silvicultural treatments, alternate SGRs or deferral as per direction below (S). If any CTC stands identified by MNRF are pine dominated, determined to be unsuitable as cover, or higher quality cover stands have been found, they may be substituted or removed from designated CTC with approval from the MNRF Biologist.

Cedar and Hemlock:

- Group Selection, shelterwood or narrow strip cuts (20 m wide cut strips, 40 m wide leave strips) that retain 60% conifer canopy closure in trees at least 10 m tall.
- Final removal cuts with shelterwood harvesting not to occur until regeneration has 60% canopy closure and is at least 5 metres tall.
- Focused removal of hardwoods is permitted if done without compromising the residual conifer canopy closure. Careful logging practices will be used to remove hardwood dominated areas while leaving conifer dominated areas intact.
- Regeneration of cedar and hemlock in the presence of high deer numbers may not be possible due to browsing. Therefore, defer management of hemlock and cedar stands until deer numbers are low, or until deer distribution changes, or plant with an alternate species such as red spruce.

Pine, Spruce and Fir:

- Designated CTC stands within these forest units must be deferred until other suitable critical cover stands or patches are available to replace it in the immediate vicinity (within 200-800 m). Pine plantation thinnings that meet the CTC criteria are permitted but the final removals must be deferred until other CTC stands are available in the immediate vicinity (within 200-800 m).
- Focus on the removal of hardwoods ensuring that the residual conifer canopy closure is not compromised. Careful logging practices will ensure conifer dominated areas are left intact while harvesting hardwood dominated areas
- Follow up renewal and tending activities must also maintain the conifer crown closures >= 60% using trees at least 10 metres in height that were left during harvest.

B. Direction to Increase Critical Thermal Cover (CTC) in Cover Deficient Areas (S&G):

- In Stratum 1 non-conifer dominated areas (HDsel, HDus, ORus, INTcc, MXHcc), unmapped conifer patches greater than 0.04 hectares (20 m x 20 m) will be retained as conifer cover as follows:
  - Hemlock and Cedar patches >=0.04 hectares (20 m x 20 m) shall be maintained at conifer crown closures >=60% with trees >5 m tall when discovered during operations.
  - Pine, Spruce, Fir patches >=0.04 hectares (20 m x 20 m) shall be maintained at conifer crown closures >=60% with trees >10 m tall when discovered during operations.
- These patches will be identified during block layout, tree marking or harvest operations. The order of priority for retention is hemlock, red spruce, cedar, white spruce, white pine and balsam fir.
- When critical cover is limited or not regenerating well, consider regenerating 1-10 hectares patches to conifer cover species. Order of priority is: hemlock, cedar, red spruce, white spruce, and white pine. Red or white spruce may work well on landings in intolerant hardwood or mixedwood stands where conifer cover is locally deficient or not regenerating well.

3) Access cover will be retained in all stands not identified as critical thermal cover within deer yards unless otherwise specified and/or approved by MNRF (G).

C. Access Cover and Browse Production - Silvicultural Direction & Options (G)

For all stands that are not identified as CTC, in Stratum 1 and 2, stand specific direction regarding the retention of access cover will be written into the treatment area prescriptions based on the direction provided below. Regular harvest of mixedwood, hardwood, tolerant hardwood, and intolerant hardwood stands will provide browse production areas, making the retention of conifer patches within them important so deer can access them during winter conditions. Access cover will be identified during tree marking following the specific instructions provided in the Forest Operations Prescription.

Order of priority for the retention of access cover species is: hemlock, red spruce, cedar, white spruce, white pine and balsam fir. Where choices exist, conifer access cover patches should be retained on ridges, knobs, south facing slopes, next to forest openings, over deer beds, along shorelines, and along visible wildlife trails (worn walking paths in summer or worn snow-packed trails in winter). Conifers kept along major travel corridors, wildlife trails, and over bedding areas may contribute to stand-level access cover requirements when access patch spacing requirements are met (see ‘General Principals’).

<u>Harvest Options (must choose at least one for each stand or treatment area)</u>:

i. Retain access patches of at least 3-5 conifers (following the order of priority for retention hierarchy when choices exist) with interlocking crowns that are >=10 m tall; spaced 30 to 60 m apart as available (this equals a minimum of 4 access patches per hectare). Also retain solitary conifers at least 10 m tall that link access patches and critical thermal cover or if they are the only conifers present in hardwood dominated areas. No final removal cuts in shelterwood management areas until conifer regeneration is at least 10 m tall unless access cover patches are retained or suitable conifer cover is present within 200 m.

ii. Use SGRs that create forest openings <10 hectares in area and/or are configured to be <60 m wide and/or that maintain suitable conifer cover to cover distances of 200 m (suitable conifer cover has canopy closures >60% of trees >10 m tall in patches >=2 ha). Delay return cuts and final removals until the conifer regeneration is >10 m (>5 m for Ce and He) in height and >60% conifer crown closure when suitable cover is not available within 200 m. Access cover patches are not required in forest openings <10 hectares and <60 m wide when suitable conifer cover is present directly adjacent or makes up the residual matrix of the stand. The creation of forest openings <60 m wide are encouraged next to access cover patches or critical thermal cover stands whenever possible.

iii. Use any of the following deer yard compatible SGRs: Clearcuts <10 ha, Strip-clearcuts (20 m take: 40 m leave), Strip-Shelterwood, Patch-Clearcut, or Group Selection. For example, clearcutting or shelterwood harvest could be done in narrow strips (20-40 metres wide) or patches (< 1 hectare) with return cuts occurring in 5-7 years or when regeneration has outgrown the height for browsing deer (>2 metres).

iv. Other SGRs or custom harvest prescriptions without access cover provisions developed in consultation with and approved by the MNRF Biologist. This will only be considered in areas where winter deer browsing has been demonstrated to be compromising regeneration success or in areas that are not needed to meet critical habitat supply levels for the yard.

Recommended SGRs and access cover provisions by forest type:

Cedar or hemlock:

- Shelterwood preparatory and regeneration cuts will maintain adequate access cover.
- In first and final removal cuts retain clumps of 3-5 conifers (at least 10 m tall) with interlocking crowns spaced 10-30 m and no further than 60 m apart, unless regeneration is at least 5 m tall.

Pine, spruce and fir:

- Shelterwood preparatory and regeneration cuts will maintain adequate access cover.
- In first and final removal cuts retain clumps of 3-5 conifers (at least 10 m tall) with interlocking crowns spaced 10-30 m and no further than 60 m apart, unless regeneration is at least 5 m tall.
- For clearcuts use either:
    a) patch (<1 hectare) or strip clearcut (ideally 20-40 metres wide) with return cuts not to occur until regeneration is at least 10 metres in height; or
    b) retain clumps of 3-5 conifer trees (at least 10m in height) with interlocking crowns and spaced 10-30 metres and no more than 60 metres apart.

Tolerant hardwood:

- Focus on removal of hardwoods and maintain hemlock, red spruce and cedar.
- Retain shelter patches of at least 3-5 conifers, at least 10 metres tall, with touching crowns. Shelter patches should be 10-30 metres apart and no more than 60 metres apart.

- Retain solitary conifers at least 10 metres tall that link aggregations and shelter patches of conifer.
- Small, well-dispersed patch cuts (group selection openings) within selection or shelterwood stands can increase the deer carrying capacity. The size of the openings should be about 1-2 times the height of the stand, located close to access or thermal cover, and integrated with other silvicultural objectives.

Intolerant hardwoods and mixedwoods:

- Small cuts are preferred (1-10 hectares) to produce pockets of browse accessible to deer. Maintain access cover as described for forest openings less than 10 ha (in ii above)
- For larger (>10 hectares) clearcuts: maintain shelter patches of 3-5 conifers at least 10 metres tall with interlocking crowns, spaced 10-30 metres but not more than 60 metres apart; and retain solitary conifers at least 10 metres tall that link aggregations and shelter patches of conifer.
- Alternatively, clearcutting could be done in narrow strips (20-40 m wide) or patches (<1ha); return cuts could occur within 5-7 years or when regeneration has outgrown the height for browsing deer (> 2 m). Maintain access cover as described above for strip/patch and return cuts.

Tending and Renewal Activities:

i. Follow up renewal and tending activities (including site preparation) must maintain the conifer access cover patches, bedding area cover, travel corridor cover, linking solitary conifers, and mast trees that were retained during harvest.
ii. There are no restrictions on the types of tending that can be used in deer yards. However, the following guiding principles should be followed whenever possible to prolong the browse supply:
    - In stands where the competing vegetation is dominated by preferred browse species (all deciduous shrub or young tree species except American beech, raspberries, gooseberries, and alder), tending should be planned when the majority of the browse is >2 m in height whenever possible to help prolong the availability of browse.
    - Manual cleaning or stem specific herbicide is encouraged if tending is required when browse is at an optimal height for deer (<1.5 m) and it is within 200 m of critical thermal cover stands.
iii. When access cover is limited in hardwood dominated areas, consider regenerating 1-10 hectares patches to conifer cover species. Order of priority is: hemlock, cedar, red spruce, white spruce, and white pine. Red spruce may work well on landings in intolerant hardwood or mixedwood stands where conifer cover is locally deficient or in areas where deer are preventing the regeneration of cedar or hemlock. This may be the only option for creating access to browse in severely cover deficient areas.
iv. Within areas that are severely browse deficient or access cover deficient it would be valuable to develop custom tending and renewal plans in consultation with the MNRF Biologist.

General Principals

Stratum 1 and 2:

4) Timing Requirements: Where practical and feasible, and where it is consistent with the applicable SGR, schedule harvest operations within deer wintering emphasis areas for the winter season (G). Harvest operations should be conducted between November 1 and March 31 for areas where preferred browse production stands (tolerant hardwoods, hemlock and cedar) make up the majority of the harvest. Operations may commence before November 1st in areas with preferred species, if the operations will continue past Nov 1st and throughout the winter.
5) Mast Trees: Follow regular direction in Wildlife Tree CRO, but preferentially retain oak as mast trees. Individual or patches of oak trees encountered in non-oak stands should be managed for enhanced crown expansion and mast production whenever feasible.

Stratum 1:

6) Major Travel Corridors and Trails: Winter tree marking or at least marking of major travel corridors is strongly recommended before winter operations commence. Maintain 80% conifer crown closure or all conifer clumps with touching crowns and linking solitary conifers within 10 m along both sides of major travel corridors when visible during winter. Keep deer trails free of debris. MTCs are generally associated with thick conifer on knobs, ridges, guts, and south facing slopes. For operations proposed during the snow-free season, the strategic retention of conifer access cover along visible wildlife trails (look like worn walking paths) or along ridges, guts, south facing slopes, forest edges, and shorelines, may also be adequate for maintaining travel corridors in areas when they are less visible. Conifers kept along major travel corridors and wildlife trails contribute to stand-level access cover requirements when access cover patch spacing criteria are met.
7) Deer Bedding Areas: Maintain 80% conifer crown closure within 10 m or retain at least 3-5 conifers >10 m tall with touching crowns over beds visible during winter operations. Conifers kept over bedding areas contribute to access cover requirements if spacing criteria are met.

Best Management Practices
Within Stratum 2, to the extent possible:

8) Maintain conifer canopy closure along known travel routes and in, or adjacent to, suitable night and day bedding areas, such as hemlock ridges and 'knobs' with south-facing slopes. In these areas, maintenance of conifer canopy closure of 80% is desirable, although 60% is often adequate when the conifer species are cedar or hemlock, and trees are 10 metres or more in height; clusters of 3-5 conifers with branches touching is desirable.
9) Maintenance of conifer canopy closure along known travel routes and in, or adjacent to, suitable night and day bedding areas should be prioritized to areas in Stratum 2 immediately adjacent to Stratum I to account for shifts in deer use patterns (i.e., the area of the yard identified as Stratum I will likely change over time).

Conditions on Roads, Landings and Aggregate Pits (CORLAPs):

10) When planning primary and branch road corridors, avoid high value wildlife habitats such as ungulate wintering areas (G) (such as critical thermal cover in deer wintering areas).

11) The development of permanent roads is discouraged within deer wintering areas (G). Temporary low quality or winter roads should be used whenever possible within operational areas (G). The construction of loop roads in high value wildlife habitats, or in the deer wintering area, should be avoided (BMP).

12) New roads, landings and pits will avoid high quality (hemlock, cedar, and/or spruce dominated) critical thermal cover stands whenever possible (G).

13) Disturbed soils associated with temporary roads, skid trails, water crossings, landings, and rehabilitated aggregate pits that are at risk of erosion should be stabilised as needed (G) preferably using native seed mixes of cool-season forbs to provide enhanced sources of early spring forage for deer (BMP).

14) Do not place windrows or grubbing materials across known migration paths of wildlife (=Major Travel Corridors in deer wintering areas) in a manner that could impede their travel (G). When roads are in use during the winter, snowbanks should be winged back following heavy snowfalls and snowbanks kept low over the course of the winter (BMP).

4.2.2.2.22 Moose Emphasis Areas (MEA)

Four Moose Emphasis Areas (MEA) have been identified (South Algonquin, Cashel, Hindon, and Kawartha, Figure 33), within which the following direction will be applied to enhance habitat suitability for moose. The focus will be on the retention of conifer cover. Standards (S) and Guidelines (G)

Silvicultural prescriptions will be consistent with moose habitat management objectives (S). To assist with cover management, the Operational Management Zone (OMZ) field in Operational Planning Inventory (OPI) is populated with MEA identification codes.

Summer Cover

Maintain the best summer cover habitat available (stands or parts of stands) within planned harvest areas throughout MEAs (S&G), by choosing stands on flat terrain within 200 metres of Rank 2, 3, and 4 Moose Aquatic Feeding Areas and wetlands (BSH, OMS, or TMS) according to the following specifications:

1) ≥ 3% (15 hectares) of summer cover habitat in any given 500 hectares
2) summer cover habitat in at least two distinct patches within any given 500 hectares with a minimum patch size of 2 hectares, and preferred patch size of ≥ 10 hectares.
3) the best summer cover habitat available should be retained. In general, lowland conifer >upland conifer> lowland or upland hardwood > mixed wood. High quality summer cover habitat is comprised of stands that:
   - are ≥35 years old and ≥10 metres in height,

- have canopy closure ≥70% dominated by cedar and/or spruce > hemlock, conifer mixedwoods and/or white and red pine > tolerant hardwoods and/or intolerant hardwoods, with a preference for lowland conifer-dominated forest when present; and
- have an open understory (i.e. low shrub density).

Winter Cover

Winter cover is normally stands or patches of mature conifer-dominated forest with a conifer canopy component that is ≥10 metres in height (mature preferred), is comprised of tree species that are capable of intercepting snow*, and has ≥60% conifer canopy closure (≥30% canopy closure may be acceptable if the conifer component of the stand is hemlock, red spruce or cedar and occurs in clumps of ≥3-5 trees with interlocking crowns). *Retention hierarchy for conifer cover is: (high) hemlock, red spruce, cedar, (moderate) white spruce, balsam fir, white pine, upland black spruce, (low) lowland black spruce, red pine, jack pine. (S&G)

Retain/maintain the best winter cover habitat available (stands or parts of stands) within planned harvest areas throughout MEAs using the following criteria:

1) Patches of winter cover should be distributed so that:
    - any point within productive forest that does not meet the definition of residual is <200 metres from a patch of winter cover (i.e., 400 metres cover-to-cover distance) that is ≥5 ha in size (≥10 hectares preferred), and
    - any point within productive forest that does meet the definition of residual is <500 metres from a patch of winter cover (i.e., 1000 metres cover-to-cover distance) that is ≥2 hectares in size (≥5 hectares a preferred).

2) The size and distribution criteria noted above should result in approximately the following amount of winter cover within MEAs:
    - ≥15% winter cover in areas where the dominant silvicultural systems used create forest that does not meet the definition of residual (e.g., conventional clearcut), and
    - ≥2% winter cover in areas where the dominant silvicultural systems used create forest that does meet the definition of residual (e.g., single tree selection).

In areas where cover habitat with these characteristics does not exist, retain the next best available conifer cover stand to meet the patch size and distribution criteria.

Any moose summer or winter cover patches intentionally retained during harvest also need to be maintained during follow up renewal and tending activities, until other suitable cover patches become available to replace them. Moose cover patches may contribute to the achievement of landscape residual forest retention targets and AOC residual forest retention requirements if strategically retained.

A spatial moose conifer cover analysis, using the above criteria for stand characteristics, size, amount, and distribution, will be completed by MNRF to assist with the strategic retention of moose cover during operational planning. The product of this analysis will be an operational planning layer (or spatial coverage of candidate cover stands) showing the locations of potential moose cover stands, so they can be worked into Forest Operation Prescriptions for each operational area. Candidate conifer cover can be substituted for better cover identified during operations with approval from MNRF biologist.

MNRF will look at proposed harvest within MEAs at the AWS stage and provide advice on where winter conifer cover (patch size, distribution, amount) needs to be maintained or improved. MNRF will work with BMF to develop a process for cover maintenance that is operationally feasible and that meets the MEA objectives. MNRF will continue to identify and verify cover patches during winter aerial surveys.

Best Management Practices:

- When suitable summer cover occurs in stands <10 hectares in size, retain residual forest contiguous with the summer cover to increase the total stand size retained to at least 10 hectares.
- Stands that are retained in harvest areas for summer cover should be well-spaced, with a regular distribution pattern.
- Stands retained or maintained for suitable summer thermal shelter and/or winter cover, should have moderately high stocking (e.g., 70-80%). Stands with low or very high stem densities are not desirable.
- Develop forest operation prescriptions for feeding habitat, such as along the edges of areas of operations where 'feathering' has occurred and manage these sites as high-browse production sites.
- Even shallow soiled, nutrient-poor sites are of value to moose as feeding habitat during early successional stages following disturbance. The most common and acceptable alternative silvicultural treatments on such sites will be to provide for a hardwood component of >10% in the early development stages of the stand (i.e., for the 20-year period following harvest).
- When applying herbicides on rich mixedwood sites use hand application methods (i.e. backpack sprayer) to avoid spraying shrubs that are preferred by moose as browse (e.g., dogwood, willow, mountain ash) and are not directly competing for resources with crop trees.
- When planning aerial chemical tending operations where there is an emphasis on moose habitat management, or where moose are the primary cervid do not treat more than 500 contiguous hectares in any given year. A five-year time frame between commencement and completion of tending operations in large, contiguous clearcuts (e.g., 000s hectares) is recommended.

<u>Conditions on Roads, Landings and Aggregate Pits:</u>

1) The following use management strategies apply to branch and operational roads to minimize access in MEAs (G):
    - New roads are high priority for abandonment within MEAs unless on established snowmobile trails;
    - Number of roads will be minimized where possible. New roads should not be constructed if existing roads are nearby that access the same allocation;
    - Branch and operational roads will be kept to lowest standard possible (e.g. winter roads).

2) When planning primary and branch road corridors, avoid high value wildlife habitats such as ungulate wintering areas (G).

3) Roads should be planned and constructed to avoid (BMP):
    i) splitting of stands retained as winter or summer cover, and

ii) high quality MAFAs (e.g. roads should be >120m away MAFAs ranked 3 or 4that are >4 ha in size).

4.2.2.2.23 Terrestrial Invasive Plants

The health and biological diversity of Ontario's forests are increasingly threatened by the introduction and spread of a variety of invasive species. There are several terrestrial invasive plants found throughout the Bancroft Minden forest, including Phragmites or Common Reed (*Phragmites australis subsp. australis*), Japanese Knotweed (*Polygonum cuspidatum*), and Garlic Mustard (*Alliaria petiolata*). Extra caution is required if Giant Hogweed (*Heracleum mantegazzianum*) and/or Wild Parsnip (*Pastinaca sativa*) are present, as they pose significant safety risk to forest industry workers as the sap causes serious burns to skin and eyes (potential for blindness).

Invasive plants impact biodiversity by out-competing native species for space, sunlight, and nutrients. The resulting ecological changes can have profound effects on wildlife habitat, recreational activities, and forest productivity. Some invasive plants also pose safety risks. More information about invasive species, including how to identify them, removal techniques, and distribution maps, can be found at http://www.invadingspecies.com/.

Invasive species can spread to new areas when contaminated mud, gravel, water, soil and plant material are unknowingly moved by equipment used on different sites. Once established, invasive species are difficult and costly to control or eradicate. The following standard operating practices will be applied to minimize the spread of invasive species through forest management activities.

1) Operators will become familiar with the identification of invasive plants commonly found in the Bancroft Minden forest through participation in operator training sessions.
2) Staff should wear protective clothing such as pants, long-sleeved shirts, gloves and eyewear.
3) Operators will watch for and avoid patches of invasive species during operations.
    - Apply and mark a 2 m modified zone around patches of invasive plants present on site.
        - Machinery and personnel should avoid going through this zone if possible.
        - Felled trees must not be placed or dragged through the zone.
        - Trees accidentally felled into the patch will be left where they fall. Trees can be removed if no fragments of invasive species are moved outside the patch.
    - When avoiding patches of invasive plants is not operationally feasible, mitigation measures will be applied to minimize the potential spread of the species. Mitigation measures can include:
        - Eradicate the patch prior to operations occurring. More than one treatment may be required to adequately eliminate viable plant material.
        - Thoroughly clean all equipment immediately after working within the patch, prior to travelling to other areas within or outside of the operational area.
    - Patches of invasive species found will be reported to MNRF.
4) Equipment will be inspected and cleaned as the per the Clean Equipment Protocol for Industry to prevent the unintentional spread of invasive species by forestry equipment.
        - Clean Equipment Protocol for Industry: https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol_June2016_D3_WEB-1.pdf

- Before leaving a site, all equipment and vehicles will be visually inspected, inside and out, and any plant material and soil will be removed.
    - If invasive species are known to occur at a site, a very thorough visual inspection and cleaning of equipment will be needed. Equipment should then be pressure washed before being deployed to another site.
    - Washing should occur on a gravel or paved surface, or regularly mowed grassy area. If suitable washing equipment and location are not available on site, washing may occur off-site, but will be completed before equipment accesses another remote location.
    - During winter operations, if washing is not feasible either on or off-site, an emphasis will be placed on avoiding patches of invasive species, and extra care will be taken during inspections and manual cleaning.

5) When patches of invasive plants are identified prior to or during operations, MNRF and SFL staff will work together to consider options and develop a plan for avoidance, eradication, and/or other mitigation measures.

4.2.2.2.24 Canoe-Grade White Birch and Cedar Trees

These values will be identified during operations as well as through Indigenous values collections. It is essential that the locations of these values identified through operations be communicated to the Indigenous community as soon as possible. Trees must be available and accessible in June or July when bark peels the easiest.

Suitable white birch:

- Trees are to be identified with flagging tape to avoid any damage to the bark
- Mature white birch trees with a minimum diameter at breast height of 30 cm (12 inches)
- Straight, healthy bole minimum of 10 feet
- Branchless bole with relatively few branch scars

Suitable white cedar:

- Trees must be mature and healthy with a minimum diameter at breast height of 36 cm (14 inches)
- Bole must be straight and as straight-grained as possible (not twisted); and
- Relatively free of any large limbs at a minimum of 10 feet.

NOTE: There are potentially large numbers of trees meeting these criteria. The Indigenous community will identify geographic areas of potential interest for cedar (e.g. harvest blocks). The SFL will advise the Indigenous community of suitable cedar groves that meet the criteria. Cedar stands will also be part of the notification however cedar stands are generally not harvested on BMF.

Operational Conditions:

- Harvest and access operations will be conducted in a manner that will not damage the tree including the root systems
- When the value has been removed (harvested by an Indigenous canoe builder) the protection no longer applies.

4.2.2.2.25 Non-Operating Provincial Parks and Conservation Reserves

This direction applies to all regulated non-operating provincial parks and conservation reserve boundaries within the forest management unit. All non-operating provincial parks and conservation reserve boundaries will be established by the forest industry as per General Procedure FOR 05 01 04 and will include any protected area boundary markers established by MECP.

See Provincial Park and Conservation Reserve Communication Protocol (in Supp Doc I, Section 6) about seeking additional input on operations during plan implementation.

Standards:

- Forest management boundaries between Crown and Private Property will be established in accordance with MNR/MNDMF Forest Licensing, Wood Allocation and Measurement General Procedure FOR 05 01 04 (August 2004) - Marking the Limit of Forest Operations Adjacent to Private and Crown Properties.
- Boundaries to be clearly marked by the forest industry. Ambiguous or hard to locate boundaries should be reviewed and approved by the responsible Superintendent.
- All new and existing provincial park and conservation reserve boundary markers are to be protected.
- As per the communication protocol, the SFL will notify Ontario Parks Staff of planned operations at the AWS stage and provide an opportunity to identify concerns.
- For operations deemed ‘high risk’ to impacting visitor experience, Ontario Parks Staff may request the SFL contact them during detailed operational planning to review the prescription so they may identify values that may require additional consideration.

Guidelines:

- If the harvest is visible from trails or campsites, partial harvest silviculture is preferred (e.g. selection, shelterwood or commercial thinning). Clearcut harvest should maintain a minimum of $9m^2$/ha in tree >10cm DBH.

4.2.2.2.26 Areas of Natural and Scientific Interest

There are two Areas of Natural and Scientific Interest (ANSI) on BMF.

- Crowe River Swamp, Life Science ANSI
- Egan Chute, Life Science ANSI

When operations are proposed in or within 120 m of these ANSIs, it will be necessary to consult with MNRF and/or MECP (if associated with a Park or Conservation Reserve) to identify if there are any applicable policies to follow. Forestry operations may be permitted in some ANSIs subject to conditions. It may also be necessary to manage access and to decommission new roads.

4.3 HARVEST OPERATIONS

4.3.1 HARVEST AREAS

The planned harvest areas for the 10-year period of the plan are based on the available harvest determined by the LTMD (FMP-8). Section 3.7.2 describes the selection of areas for harvest criteria used in this plan. The aim is to ensure that harvest selections are feasible and support management objectives for landscape level biodiversity. The available harvest area and planned harvest area for the 10-year period are documented in FMP-12 by forest unit, age class and stage of management.

Of the 33, 078 ha available for harvest during the 10-year term 30,872ha (93%) of the area has been allocated. Figure 50 compares the available and planned 10-year harvest area by forest unit. The 2020 FMPM requires that the total AHA and AHA by forest unit may not be exceeded. Both of these requirements are met by the 2021-2031 FMP and are illustrated below. Areas allocated range from 47% (HESH) to 99% (HDSH).

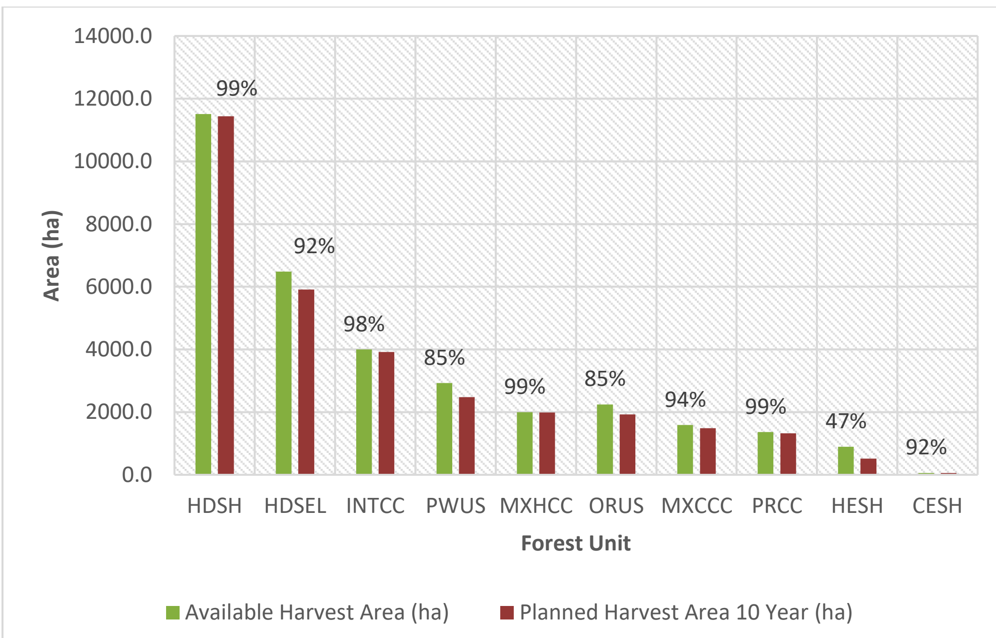


Figure 50. Available and planned 10-year harvest area by forest unit. (Percentages represent the proportion of area allocated in the 2021-2031 FMP).

The hectares of planned harvest area identified as THINCOM by forest unit, are as follows; PRCC (932.0 ha), PWUS (360.4 ha), and MXCCC (53.7 ha). ORUS has an AHA for THINCOM but no suitable areas were identified for allocation. Of interest is the PRCC commercial thinning areas as they are high value investments. The small nature of the PRCC forest unit makes it difficult to find harvest area. As a result, almost 72% of the PRCC planned harvest area consists of commercial thinning. As a result of operational planning field assessments, some areas that were assigned to be to be clearcut based on the BMI were judged to be better suited for commercial thin. The updated attributes are found in the OPI.

The MNRF guides applicable to the Bancroft Minden Forest were considered in the planning of harvest operations. The guides include the Forest Management Guide for Great Lakes-St Lawrence Landscapes, Conserving Biodiversity and the Stand and Site Scales, and the guide for Silviculture in the Great Lakes-St Lawrence and Boreal Forests of Ontario. An emphasis was placed on landscape level planning to move the structure and composition of the forest towards the SRNV desirable levels. Old growth and young forests are examples of landscape level planning direction that can be influenced through harvest operations. Reserves created by these considerations are identified via a separate overlapping layer that is used to exclude the areas from planned harvest.

Generally, large clearcut areas are not conducted in the Great Lake St Lawrence region. However, the Stand and Site Guide identifies requirements for the conservation of biodiversity relative to maintaining patches of residual forest within areas managed with the clearcut silviculture system. The Evaluate Forest Residual Tool (EFRT) was used to assess the amount of residual forest associated with stand replacing disturbances such as clearcut harvests. The requirements are that within any 500 ha polygon, at least 25 ha are to be retained as residual forest. The EFRT identified one area near Aylen Lake (Figure 51). Based on results of secondary assessment that considered the identified AOC modified reserves were treated as uncut, the required residual component is achieved. This specific area will be further reviewed during the development of the Forest Operations Prescription (FOP) to ensure that the residual stand area requirement is satisfied. Direction regarding layout of pre-planned residual forest identified by EFRT is found in 4.2.2.2.16 (CRO-16) Clearcut Harvest Layout Planning. EFRT only identifies the minimum amount of 5% required by the SSG, where as much as 15% will be required in allocations located in DEAs and MEAs. No additional residual issues were identified for this FMP period.

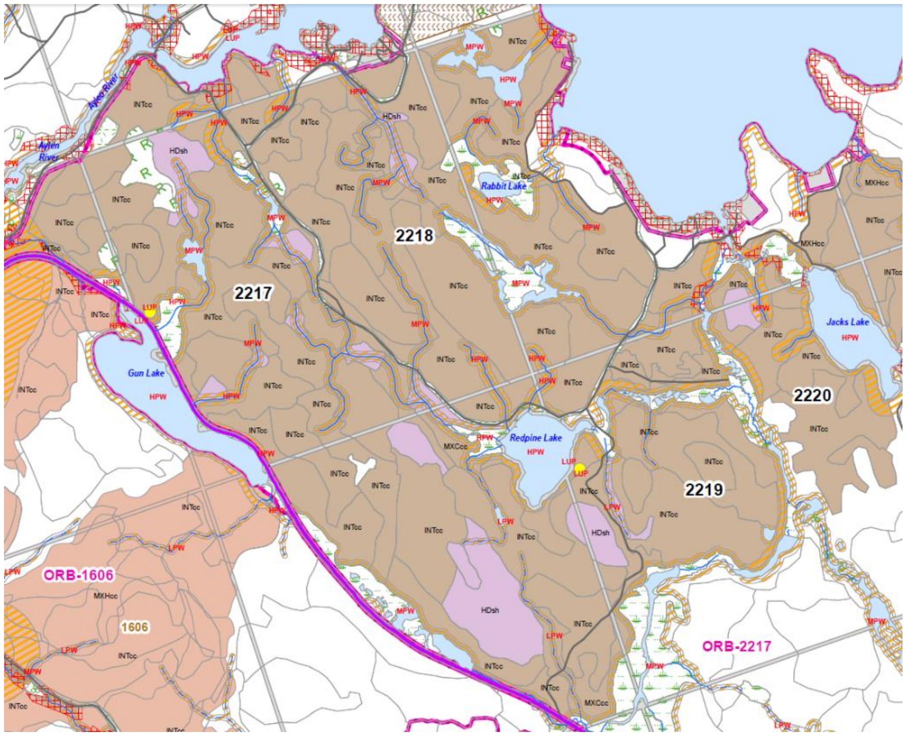


Figure 51. Description of the area identified by EFRT.

The distribution of planned harvest area by licensee is recorded in FMP-14 and displayed graphically in Figure 52. There are currently 9 licensees and 2 groupings of independent logging companies within the Bancroft Minden Forest. While it may appear that the Minden District Forest Service (MDFS) and the Bancroft Forest Company Ltd. (BFCL) hold a significant amount of harvest area, they consist of an assemblage of independent forest companies. It is important to note that the approval of the FMP does not represent an agreement to make harvest areas available to a particular licensee.

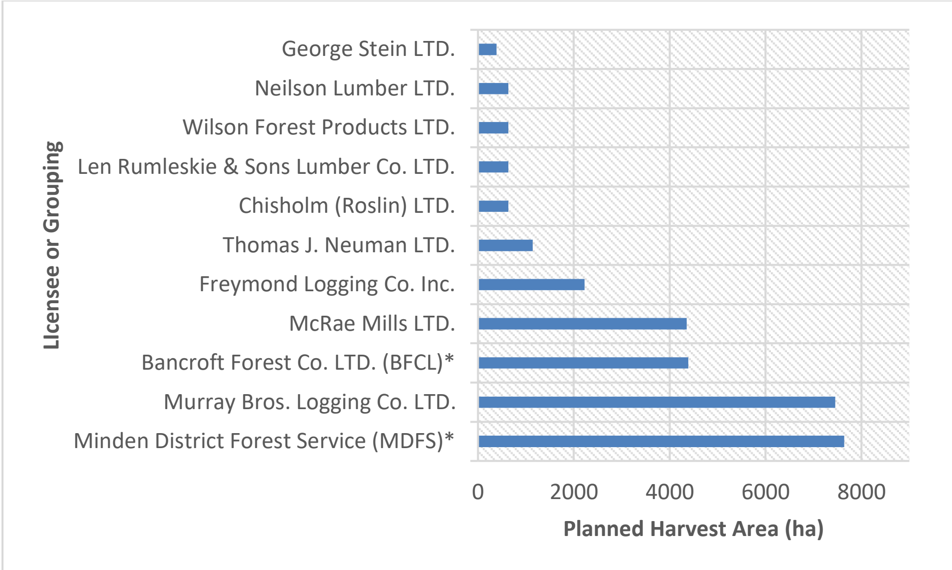


Figure 52. Distribution of planned harvest area by licensee or grouping. *indicates grouping of independent loggers.

Mapped allocations portray regular harvest, contingency harvests, and bridging area (on-going operations from the 2011 FMP). Locations where fuelwood can be obtained will be identified in each Annual Work Schedule.

4.3.3 COMPLETION OF ON-GOING HARVEST OPERATIONS FROM PREVIOUS PLAN

There may be situations where harvest operations from the previous FMP are not completed before the expiry of the plan. As a result, areas may be carried over from the 2011-2021 FMP to allow for harvest during the new 2021-2031 FMP period. These areas are described as bridging areas.

Bridging areas do not contribute to the 2021-2031 FMP AHA and volume projection. They can however improve the viability of the forest once all operations are combined. By carrying over all of the remaining areas from the 2011-2021 FMP, wood improved utilization is expected and will lead to a positive effect on all associated management plan objectives of the 2011-2021 FMP and 2021-2031 FMP.

Under the 2020 FMPM, the amount of bridging area and time for completion of bridging harvest is defined by the FMP planning team. The Planning Team agreed that all areas remaining to be harvested or require completion of harvest from the 2011-2021 FMP may be scheduled and eligible for harvest for the first 5-years of the 2021-2031 FMP and must be completed by March 31, 2026. Bridging operations will be prioritized in the first 5 Annual Work Schedules over regular harvest operations to complete them. A detailed analysis of the bridging areas will be described in the Year 5 Enhanced Annual Report.

There are 12,149 ha of 2011-2021 FMP bridging area included in the FMP for 2021-2022. This may appear to be a large amount of bridging area but it is important to note that only full harvest allocations can be bridged.

Many of the bridging areas are already partially harvested, meaning that the actual area remaining is closer to 7,000 hectares. For bridging operations, the operational prescriptions, conditions for areas of concern and the applicable SGRs from the 2011-21 FMP may be used if the bridging operation already has a harvest operations (silvicultural) prescription which was developed in the 2011-21 plan and has already had values collection surveys completed by MNRF staff. For any bridging operations where no harvest prescription has been developed and where values collection surveys are not complete, the operational prescriptions, conditions for areas of concern and the applicable SGRs from the current approved FMP may be used. The operational prescriptions and conditions for areas of concern will be documented in accordance with the FIM. The operational prescriptions and conditions will be identified, and where practical portrayed. In addition, the applicable SGRs from the current approved FMP will be identified. Second-pass harvest operations do not occur in the Bancroft Minden Forest due to the prevalence of partial harvest systems with small areas managed using the clearcut silvicultural system. Second-pass harvest operations would likely result in excessive stand and site damage. There are no areas planned for second-pass harvest for the 2021-2031 FMP.

4.3.5 HARVEST VOLUME

The available harvest volume, and an estimate of the planned net merchantable volume, and undersized and defect that may be available for bioproducts for the planned harvest area, for the ten-year period, is recorded in FMP-13. The planned harvest volumes were derived from the application of yield curves based on the MNRF MIST tool. Yields were then applied to the area harvested by PLANFU, Age Class, Stage of Management and the excepted proportions removed to provide the planned harvest volumes. For additional information on yield curves and proportions removed see Supplementary Documentation B.

The total available harvest volume for the 2021-2031 FMP is 2, 897, 135 m^3, of which 2, 650, 000 m^3 is net merchantable and 247,135 m^3 is undersize/defect volume. Of the planned net merchantable harvest volume, 1, 614, 649 m^3 is hardwood and 827, 404 m^3 is softwood (conifer).

The available and planned net merchantable harvest volumes are similar; the planned volumes are 93% of the available (96% for hardwood and 86% for conifer). Planned harvest volumes for conifer are lower than available primarily because the planned harvest area is slightly less than the available harvest area (90% of available). PWUS and HESH make up most of this difference. PWUS because of the difficulty in assigning stands that meet the specific stage of management area available. HESH was deliberately under allocated to address concerns regarding old growth and to reflect the relatively low utilization to this PLANFU. These underallocations create most of the 14% difference observed between planned and available volumes.

Table 60. Differences between merchantable available harvest volumes and planned harvest volumes.

	Hardwood	Conifer
Available Harvest Volume (m^3)	1, 689, 478	960, 521
Planned Harvest Volume (m^3)	1, 614, 649	827, 404
Difference	-74, 829	-133, 117
% Difference	-4%	-14%

While the difference in conifer volume may seem substantial, the SPF, OC and PWR species groups are not high demand species group on the forest. The IWR was achieved and surpassed for all species groups. The total planned harvest volume surpassed the IWR by 56% with the PWR volumes experiencing the most significant overachievement (a weighted increase of 17%). The trends for each species group are displayed below in Table 61 and Figure 53.

Table 61. Differences between the IWR and planned harvest volumes.

	OC	BW	SPF	PWR	PO	TOL	Total
IWR	10,000	1,500	52,500	256,000	600,000	640,000	1,573,500
Planned Harvest Volume	48,147	148,737	266,486	512,771	814,224	651,668	2,442,054
% Change	385%	991%	407%	101%	36%	2%	56%
Weighted %	2%	9%	14%	17%	14%	1%	

**This table contains all Regular Harvest Area, including Commercial Thinning. Volumes are merchantable (do not include undersize and defect).*

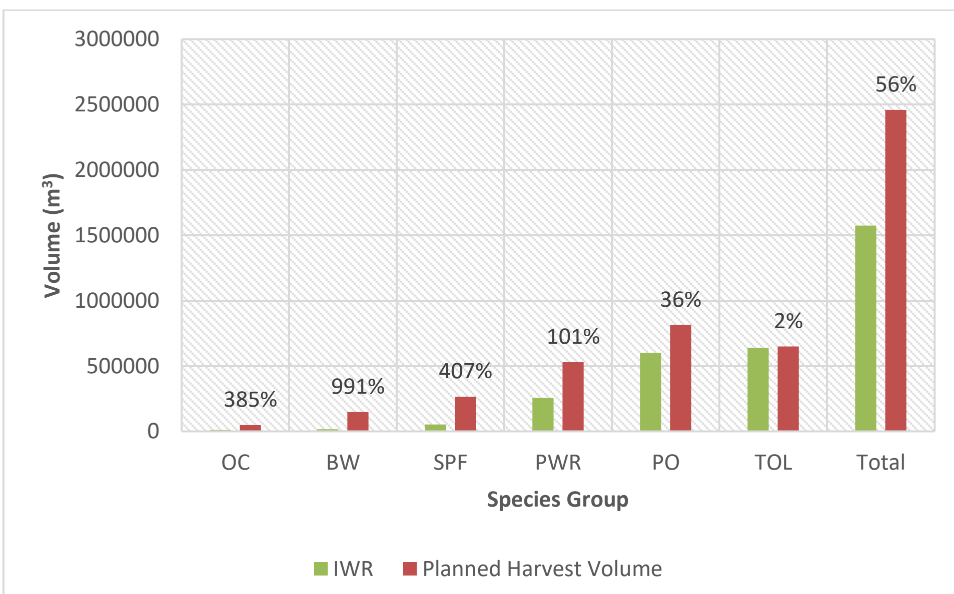


Figure 53. Differences between the IWR and planned harvest volumes.

Actual allocations may result in slightly higher or slightly lower volumes than strategically modelled, depending upon the level of residual areas maintained through meeting applicable guidelines, or if yield curve projections prove to be conservative. Ultimately, the accuracy of estimated volumes associated with the planned harvest is considered the best estimate and is sufficient to meet the industrial wood requirements.

Estimates of undersize and defect volume were calculated using MIST (Model Inventory Support Tool). This model takes into consideration the proportions of stem wood, stem bark, branches, twigs, and leaves. Out of the possible biomass components, only the undersized tops were used for the undersize calculations since they are expected to make it to roadside. Defect and small diameter harvest volumes may be utilized to meet any existing market demand. Other volume types may be recoverable but were not included. Section 5.3.1 in the Analysis Package (Supplementary Documentation B) describes the process further.

Table 62. Planned undersize/defect volumes.

SPF	PWR	OC	Conifer Subtotal	TOL	PO	BW	Hardwood Subtotal	Total
34, 915	46, 149	4, 333	74, 466	58, 652	73, 280	13, 386	145, 318	219, 785

4.3.6 WOOD UTILIZATION

Projected wood utilization by species and species groups is presented in FMP-14. As mentioned in the preceding section, the total planned volume is 2.46 million m^3, of which an estimated 0.22 million m^3 is undersize and defect volume. Over half of the planned net merchantable volume is expected to be sawlog quality. The balance of net merchantable volume is lower quality pulpwood or fuelwood products (Figure 54).

The utilization of planned harvest volumes as shown in FMP-14 supports the achievement of the majority of management objectives and progress toward the desired forest condition. Estimates of unutilized species or products, which are available from the 10-year planned harvest area, are also summarized in FMP-14. The utilized volumes represent the volume (and associated area) needed to best meet the IWR and are also shown in FMP-15. Volumes not required to meet the IWR are considered unutilized for the sake of these tables, as they represent volume that is not required to meet the IWR.

Significant amounts of unutilized volumes exist in nearly every species group except tolerant hardwoods. As such, utilization within the tolerant hardwood PLANFUs will likely be high (such as HDSH and HDSEL). Tolerant hardwoods are the most likely species group to experience a shortfall in volumes, specifically in sawlog products. This should push for the harvesting of tolerant hardwood rich blocks to be higher. Coincidently, these are the most critical forest units to be disturbed, as most habitat targets require the transition of hardwood to conifers over time, meaning that many trends observed in the LTMD will likely be favoured by a high demand for tolerant hardwoods. Intolerant hardwood (PO & BW) pulp demand is high as well, meaning that the INTCC and MXHCC units are likely to be utilized, though not to the degree of tolerant hardwoods. The long-term elimination of intolerant hardwoods on the landscape is also necessary for several habitat objectives, this continued demand of PO and BW favours long term trends. Conifer utilization is relatively low, though the demand for PWR volumes is likely to expand. Neighbouring units such as MLFI and OVF are project to have near full utilization of their PWR sawlogs and BMFC could potentially provide additional volume. However, low utilization of conifers favours habitat targets, as the conifer forest units tend to be the most difficult to create. Lower disturbance of PWUS, MXCCC and HESH would help their associated landscape target if they remain at a low level of utilization.

A portion of total stand volumes associated with the allocations will not be available at the time of harvest. Current calculations are based on known values and difficult terrain. However, newly discovered wildlife, terrain and associated AOC applications will reduce the amount timber expected to be left on the currently allocated sites. The company intends to utilize all merchantable, live trees from allocated stands. However, certain areas may have residual wood left on site after logging operations have been completed, due to operating conditions such as steep slopes, wet sites or areas made economically unfeasible through newly identified AOCs. Projected unutilized harvest volumes remain available for utilization to support industrial proposals.

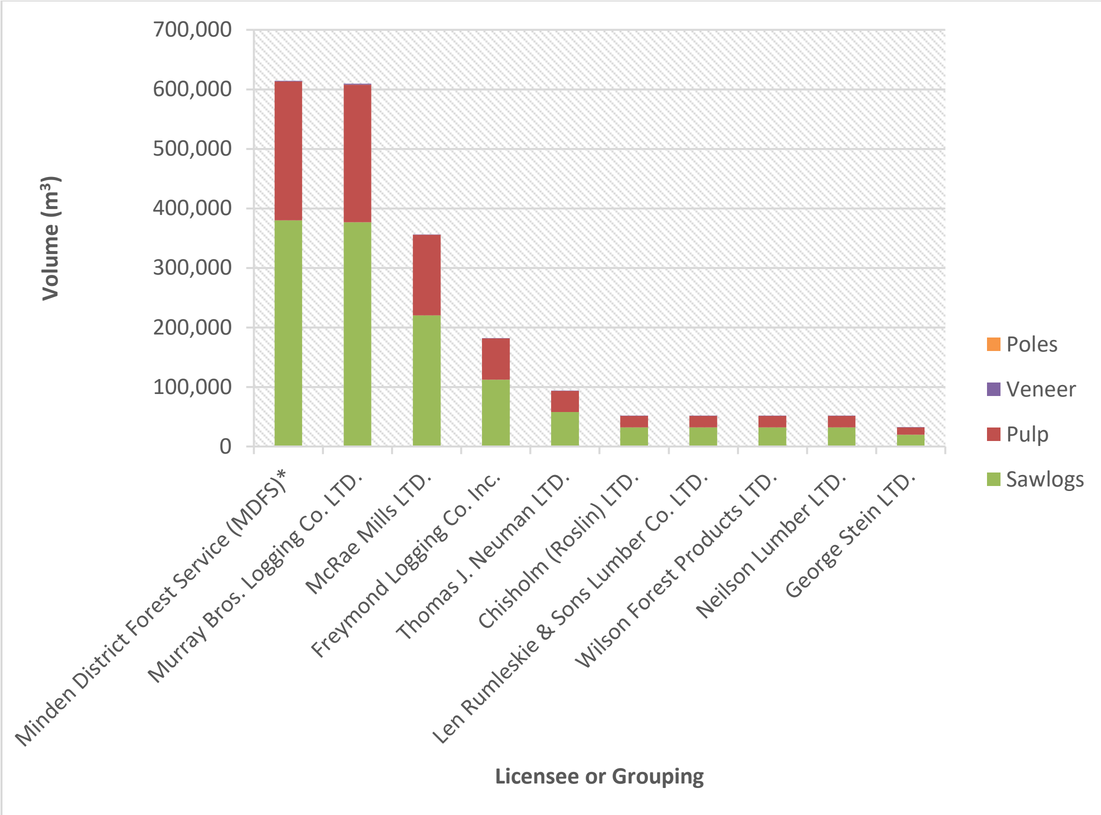


Figure 54. Projected volume by licensee/grouping.

FMP-15 details projected wood deliveries by mill for planned net merchantable and undersize/defect volume and estimates wood utilization for each destination by species or species group and product type. These estimates are based mostly on the business relationship, with some consideration of past experience. Approximately 555, 000 m^3 is projected as Open Market, in part reflecting special conditions of the SFL license and estimates of available fuelwood. Unutilized volumes are not included in FMP-15. The Industrial Wood Requirements are used to form the basis of the targets and desirable levels used in the plan. The plan seeks to provide 500,000 m3 of pulp, 200,000 m3 of PWR Sawlogs and 500,000 m3 of TOL Sawlogs (for a total of 700,000 m3 Sawlogs) to meet specific mill demands. The plan also seeks to provide species group volumes based on the table below.

Species Group	Volume (m3)
SPF	193,000
PwPr	455,000
Tol	969,000
OC	91,000
PO	713,000
BW	165,000

These two objectives created the basis of the Industrial Wood Requirement (IWR) and were used a benchmark to satisfy with the allocations. Based on the chosen allocations, the forest is not able to fulfill the total volume needs for the mills included in FMP-15. Figure 55 below summarizes the data by mill. While the vast majority of volumes have been achieved, the volumes associated with the allocations cannot supply sufficient wood fibre to satisfy hardwood sawlog demand. The objective to supply hardwood sawlogs was met, meaning that the objective achievement of the plan had been met. No specific objective to supply Tolerant Hardwood sawlogs exists. However, the mills in question specifically sought tolerant hardwood sawlogs. McRae Mills LTD and Murray Brothers Lumber Company LTD thus will need other volume types make up for hardwood sawlog volume shortages. The FMP planned volumes could supply sawlog quality PWR or PO in place of the Tolerant Hardwoods, or could supply pulp quality Tolerant Hardwoods. This shortfall points to a potential long term issues regarding Tolerant Hardwood sawlogs; while the plan is able to provide general Tolerant Hardwood volumes, or general sawlog volumes, it struggles to provide this specific product. Long term projections show a declining Tolerant Hardwood volume trend, which could cause issues in future plans. However, 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.

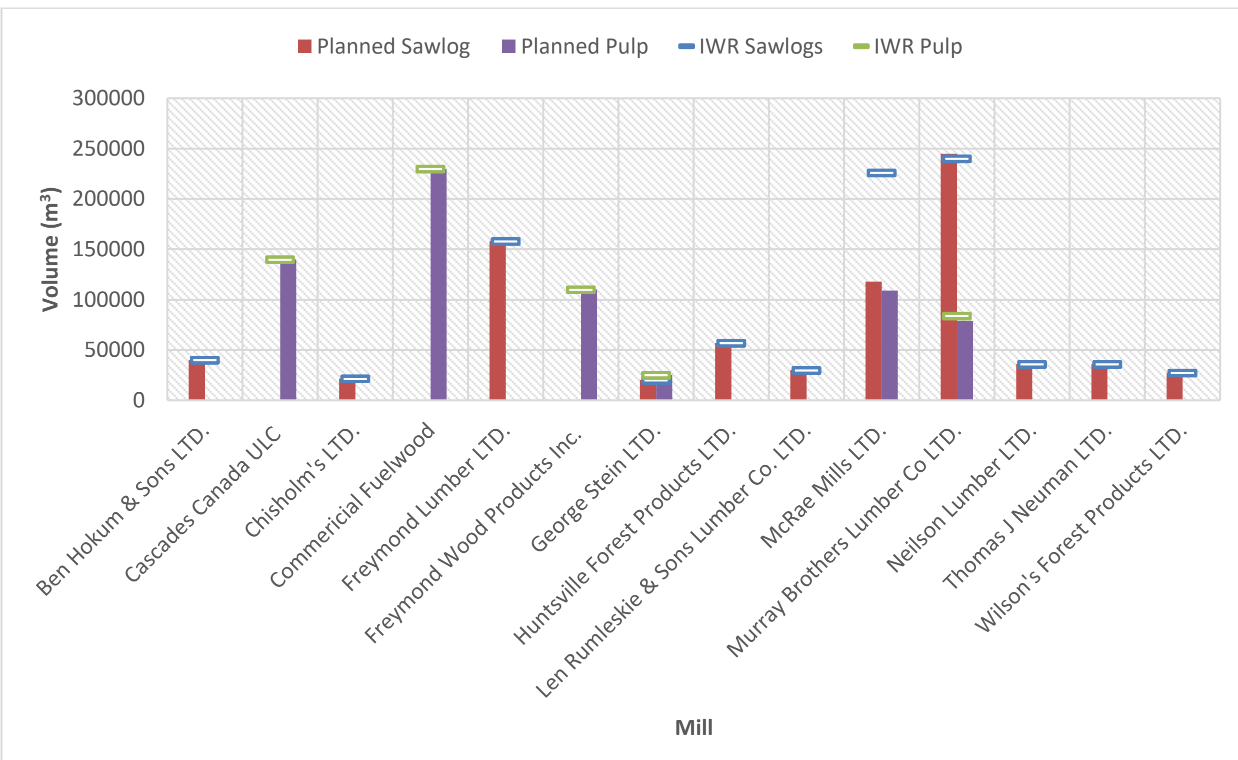


Figure 55. Projected wood utilization by mill.

4.3.6.1 Strategies for unutilized planned harvest volume and mitigation of impacts to silviculture objectives

The following strategies will allow the harvest of sawlog product to continue while mitigating any impacts on the silviculture objectives of the site from reduced utilization of pulpwood and low value species. The objective of these strategies is to ensure that the regeneration and management standards set out in FMP-4: Silvicultural Ground Rules (SGR) are met. The SGRs are consistent with the corresponding guides including the Ontario Tree Marking Guide and the Forest Management Guide to Silviculture in the Great Lakes St. Lawrence Forest Region.

Partial harvest silviculture systems comprise most forestry operations in the BMF. Silviculture objectives for regeneration and achieving desired forest stand conditions are achieved through the harvest. Silviculture objectives achieved through a harvest are; individual tree selection, harvesting to remove volume down to a desired basal area, size class distribution, increase quality by removing unacceptable growing stock, create growing space for individual trees or groups of trees, and scarify the forest floor to promote natural and artificial regeneration. The equipment used to conduct the felling and extraction in a harvest will greatly impact the silviculture objectives of the forest operations prescription.

To meet the silviculture objectives in a partial harvest system, stand improvement work is generally required. Stand improvement refers to the felling or killing of individual stems down to 10 cm DBH for all undersize and defect material and merchantable material for which there is no market. This material is left to decompose on the site as coarse woody debris as opposed to being competition for the desirable regeneration. Successful application to the Forestry Futures Trust Committee for funding has allowed for payment to be made to operators for stand improvement work undertaken on non-merchantable material. This funding promotes the silviculture objectives and is in addition to the stand improvement required to be undertaken by an operator as part of regular harvest operations. The forest operations prescription will indicate when and how stand improvement will be completed. The method used will depend on site conditions, weather, available equipment and personnel, and safety considerations. Utilization of this material is likely not economically feasible without a biomass market or stronger pulpwood demand. The probability of achieving the desired forest condition at the site because of the stand improvement work is greatly increased and must be considered when considering utilization of this material.

Silviculture objectives that meet the corresponding SGR may provide an opportunity to strategically leave unmarketable but merchantable trees standing. A Registered Professional Forester will document in the forest operations prescription the parameters (e.g. species, minimum DBH, size class, percent cull, groupings of stems) for identification and selection of leave trees. Visual quality objectives and fire risk to nearby values may also be used to delineate the area where trees will be left.

Scenarios in which it would be advantageous to leave unmarketable trees standing include pockets of balsam fir in tolerant hardwood forests which provide winter rest areas for ungulates travelling through deep snow. Pockets of pole and small sawlog size balsam fir and soft maple in pine forests are difficult for licensees to utilize because of the individual piece size, effort required to harvest and extract the wood and the low value product they produce. Regardless of stand improvement efforts in these pockets of balsam fir and soft maple, it may not be possible to convert the area to grow pine or spruce. Retaining these pockets of balsam fir and soft maple provides diversity to the site and allows licensees to focus stand improvement efforts on areas with a higher probability of successful regeneration to pine or spruce. High utilization of material may be required regardless of economic feasibility if it is determined that the fire risk is increased due to stand improvement work leaving more than a desirable level of downed woody debris or ladder fuels from both coarse woody debris and leaving trees standing. Reducing fuels and providing an aesthetic visual quality to dwellings, rural communities, municipal and private roads may require high utilization of a harvest area to be delineated around these values.

Utilization of planned harvest area dominated by pulpwood or species that have poor current market demand can be achieved by strategically selecting areas which meet the spatial and timing requirements for an economically viable harvest. It would not be prudent to expect licensees to harvest an area that is not economically viable. Harvest area dominated by pulpwood and low value species has been strategically allocated adjacent to higher quality stands in order to promote utilization when market conditions permit. Larger areas of pulpwood and low value species can be held until demand for these products increases and the harvest areas allocated are large enough for economies of scale to make a harvest viable.

Strategic allocations have been made whenever possible to improve the operability of traditionally underutilized forest units. They have generally been made adjacent to more desirable forest units and in some cases larger sized blocks have been created to provide for more critical mass of the allocations to make them operable. For instance, road costs will often be similar for a 40 hectare area as a 140 hectare area. If a marginal market exists for products from those areas, the small allocation may not be viable whereas due to economies of scale the larger block might be a viable harvest. However, the ability to make those allocations is highly dependent upon the size and distribution of forest types and private land within the forest.

At times, the SFL may propose changes to the plan through plan amendments to increase the utilization of specific forest units There have been instances where a licensee working in a more desirable tolerant hardwood stand has found a market for less desirable species. Although it may not be feasible to completely move an operation, if a suitable area was found nearby, a licensee may quickly and efficiently move their operation to such a block. For example, when wet weather conditions occur that would make it difficult or impossible to meet site damage standards in a tolerant hardwood stand. A licensee may be able to drive equipment to a nearby clearcut stand where soils are normally more conducive to wet weather operations. Such clearcut stands are either included in planned harvest areas or would require an amendment of harvest area to the plan. These proactive approaches improve wood utilization and increase the workdays available to the forest industry.

Note that none of these utilization improvement strategies are designed to high-grade forest stands. For instance, beech, soft maple, ash and basswood are much less valuable species than yellow birch, black cherry and hard maple. There is no intent to avoid marking all beech, soft maple and basswood and only mark yellow birch and hard maple for removal. The quality, structure and regeneration of a harvested area will be maintained or improved. The future desired forest condition as determined by the Long-Term Management Direction is a target that will not be met within the expected timeframes unless there is 100% utilization of the AHA, something that is seldom if ever achieved in any management unit in Ontario.

There are two broad level post-harvest treatment options available for each forest unit through the SGRs and are used to meet the desired forest condition for the harvest area. The most commonly applied treatment option is natural regeneration. Natural regeneration is used in the selection silviculture system, most stands managed under the shelterwood system and is the recommended treatment option for the clearcut silviculture system to promote regeneration back to the original forest unit species composition. The second treatment option is ground based site preparation, artificial regeneration and tending. Ground based site preparation and tending may be mechanical or chemical and utilize large, mechanized equipment or hand held equipment. The specific requirements for treatment will vary from site to site and it is possible that a combination of these treatment options may be used. Wood utilization during the harvest will have a significant impact in which treatment option is used and the timing of the treatment to improve the probability of achieving the silviculture objectives. The general wood utilization strategies by forest type and forest unit groupings are summarized below.

Clearcut Forest Units (INTCC, MXHCC, MXCCC)

Materials that may not be marketable: Large quantities of low quality pulpwood of many species, usually with low amounts of high value material available in the harvest.

General Strategy: Pursue markets wherever possible. Promote business to business arrangements so licensees with existing markets may better utilize another licensees harvest area. However, given distance to most pulp mills, frequent high access costs and low stocked nature of these stands has historically meant low utilization of these forest types. This would continue.

Pine Forest Units (PWUS, and PRCC - excluding thinning)

Materials that may not be marketable: In securing the pine sawlog material, pine pulpwood, other conifer pulpwood such as balsam fir, intolerant and tolerant hardwood (particularly soft maple) are produced as a byproduct of the harvest. Stands previously harvested since 1999 with stand improvement occurring will likely have smaller quantities of the unmarketable fibre.

General Strategy: To meet silvicultural objectives to secure appropriate growing conditions for pine regeneration (existing or planned) require these trees to be felled. While site preparation might achieve some removal of this undesirable overstory, the emphasis will be on felling at time of harvest and if no markets exist, then stems will be left in the forest.

Pockets of dense undesirable species (e.g. dense balsam fir, poplar) can be left in the stand as those microsites will be extremely difficult to convert to pine. Felled but unutilized trees can impact the ability to carry out some silvicultural treatments if there is too much material. Specifically, the creation of logging slash can impede ground treatments such as mechanical site preparation and ground based herbicides treatment as well as reducing the number of planting sites.

Each stand would be assessed for the appropriate treatment or operations postponed until market conditions improve.

Pine Seed Tree (MXCCC)

Materials that may not be marketable: Similar situation to the pine shelterwood yet likely to have more of the off-species as byproducts of the harvest.

General Strategy: Markets may exist for some of the minor species but not for others resulting in only modest amounts of unmarketable material be left behind. Similar comments to white pine shelterwood cuts apply.

Hardwood and Oak Shelterwood (HDSH, ORUS)

Materials that may not be marketable: These stands are highly variable in the amount and size of hardwood pulp produced. In addition, amounts of conifer species (e.g. balsam fir) may be produced.

General Strategy: Some hardwood pulp (and balsam fir) might be felled but not utilized to achieve silvicultural objectives such as removing major defect from the stand and creating more favourable light conditions. With ORUS stands, the objective is normally to create light conditions suitable for mid-tolerant species. Therefore, the emphasis will be on felling all stems prescribed for removal. Due to the past history of these stands, there can be an abundance of midstory trees which may be merchantable but unmarketable and they should be removed for silvicultural growing space objectives. Those stands with a very low sawlog:pulpwood ratio may be bypassed.

Hemlock (HESH)

Materials that may not be marketable: These stands are either associated with white pine or tolerant hardwoods. In either case, it is the hemlock that is most difficult to market but similar to HDUS stands where fair amounts of poor quality pulp of different tolerant hardwood species may also be generated from the harvest.

General Strategy: If hemlock regeneration and saplings exist, better quality hemlock with the ability to produce sawlogs may be prescribed to be removed from the stand before pulp quality overstory hemlock trees. Tolerant hardwood stems that are unmarketable will be dealt with on a case by case.

Stem selected for removal normally will best release desirable regeneration and are assessed to have the least risk of ring shake which significantly reduces the value of the sawlog.

Tolerant Hardwood (HDSEL)

Materials that may not be marketable: Tolerant hardwood pulp or firewood is the product that is sometimes difficult to market. Of particular concern is the pulp material unsuitable for firewood (i.e. hollow or internal rot) as well as some sawlogs of species such as beech and basswood can be difficult to market. The amount of pulpwood material is usually less than that encountered in an HDUS stand.

General Strategy: Silvicultural objectives for all selection stands is to fell all material prescribed in the silvicultural prescription. Some material might be left behind if markets do not exist. Most of the time there are no planned follow-up treatments that felled material would interfere with carrying out.

Stockpiling

Stockpiling wood at roadside or processing yards is a potential strategy which will be discussed with industry, the SFL and MNRF. This would only occur if it were demonstrated that a strong potential existed for markets for the material in the near future. The risk is that unsightly piles of material will be left for extended periods which take area out of the productive landbase. There is also a negative public perspective and a perception of wasted wood when piles of material are left stockpiled for prolonged periods of time. Best management practice is to leave unutilized wood in the forest to mitigate the negative public perspective and add coarse woody debris to the forest floor.

Fuelwood

Fuelwood will continue to be made available to the public by MNRF from completed harvest areas that have open access and where wood has not been stockpiled. There may be a higher proportion of fuelwood on landings and adjacent to the road due to heavier topping, abandoned tree lengths due to cull and pure stand improvement projects. Commercial fuelwood will continue to be a significant user of hardwood pulpwood. This requires that markets continue to receive wood from this forest, even if pulpwood markets are high in order to maintain those markets when pulpwood markets may be low.

4.3.6.1.1 Implementation of Utilization Strategies

An important step in implementing this strategy is for BMFC and MNRF 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 MNRF staff with compliance monitoring and ongoing monitoring and assessment. In addition, if unmarketable volume is going to be left on site, Annual Reports will document the strategies used, the market conditions at the time and the locations of modified utilization standards implemented (e.g. the area affected by FU and the estimated unmarketable species, products and volumes unharvested/felled and not utilized). Identification of potential issues will be ongoing as BMFC implements their harvest program. BMFC will initiate joint visits to sites where utilization issues are identified. Formal review should occur when markets improve, but a timeline for this is unknown and unpredictable. The aim is to ensure that joint understanding, collaboration, and consensus is developed. It is further expected that calibration of operations may be required during implementation and these joint visits help ensure understanding of acceptable levels and desired outcomes. The goal is for collaboration between all parties to create positive results. When unexpected very low-market conditions arise during the implementation of an FMP, sufficient evidence of wood market limitations can be submitted for annual MNRF review and approval. Supporting rationale can demonstrate that a lack of markets for a species/product justifies the implementation of measures outlined in these Strategies. The four aspects below form the basis of supporting rationale:

1) **Species and product quality of the unmarketable fibre:**

- The forest unit(s) affected by market conditions
- The block locations in the Annual Monitoring Plan (AMP)

2) **Investigation of markets:**

- Provide a list of mills within a reasonable market distance that have been contacted to purchase the unutilized fibre;
- Any advertisements relating to the availability of fibre
- Opportunities to conduct product trials within company operations
- Supporting evidence showing the economics of wood flow

3) **Supporting information from Forest Industry Division (FID):**

- Management Unit Available Wood Report
- Information on markets
- Implications to any affected wood supply agreements and or commitments
- Wood measurement implications

These will be discussed by licensees, BMFC and the MNRF District staff to arrive at specifications that are understandable, appropriate for the market conditions, respect social values, adhere to FMP-11 Areas of Concern requirements and do not impede silviculture objectives. These specifications could vary from one year to the next. In many years, these modified standards may not be required. Modified utilization standards may present an opportunity to utilize harvest area that would otherwise not be economically feasible and therefore not harvested. For example, market conditions may indicate a viable market for spruce, balsam fir, white birch and soft maple but no market for poplar. A modified utilization standard for poplar would make it feasible for a licensee to harvest the area and achieve the greatest possible utilization for the harvest area as opposed to bypassing the area which would result in no utilization. Areas of concern requirements indicated in FMP-11 will always be met and values protected. Modified utilization standards will not result in increased removals from an AOC or a change to the tree selection requirements from the Tree Marking Guide. Silviculture objectives will not be negatively impacted by modified utilization standards. For example, red and white pine harvest area will generally have a large component of conifer polewood which will at times be unmarketable. Utilization of this conifer polewood may make a harvest operation not economically feasible. A modified utilization standard would allow for conifer polewood to be felled and left on site as coarse woody debris. Such a modified utilization standard permits for the harvesting of the area without restricting the planting spots or regeneration success due to the application of specific treatment options. The post-harvest treatment option of aerial site preparation, artificial regeneration and aerial tending would ensure that there are enough planting spots and competition is held back long enough to promote red and white pine regeneration on the site.

Step 2 of “Towards Resolving Utilization Issues: A Process to Manage Unutilized Fibre” – Final Report (Joint Industry/MNR Utilization Task Team, 1999), which involves determining the extent of the utilization issues, will be implemented on an annual basis through annual work schedules or revisions to those annual plans. Evidence that markets do not exist will be provided by the SFL and the forest industry in accordance with the 5 elements identified in the Final Report. The District Manager will contact regional Timber Allocation and Licensing Section staff for support in making this determination.

BMFC will continue to encourage its operators to seek new markets for unwanted wood and will work with MNRF to endeavor to remove any obstacles to initiatives that could increase wood utilization. Through the MNRF initiative of producing Available Volume Reports, it is hoped that demand for material will increase, even modestly which may allow more wood to be utilized within the boundaries of the cut as well as making pockets and even whole stands of low quality or low value unmarketable wood operationally feasible.

4.3.6.1.1 Monitoring Utilization Strategies

Successful implementation of these strategies to increase fibre utilization will require good communication between harvest operators, company compliance inspectors, the SFL and the MNRF. It is essential that the SFL, the licensee and the MNRF conduct joint forest operations inspections of harvest areas early at or before the operation starts and arrive at a common understanding of acceptable levels of utilization under these strategies. The forest operations inspections program will be used to ensure that monitoring during harvest operations and after completion of harvest operations meets the requirements of the modified utilization standard.

Monitoring the success of the harvest operation in working towards achieving the silviculture objectives for the forest unit as described in FMP-4 SGRs will be completed as part of the assessment of regeneration success program described in section 4.7.3. Modified utilization standards themselves will not result in a harvest area requiring an exceptions monitoring program because the harvest area will continue to be managed as per the forest units silviculture objectives described in FMP-4.

4.3.7 SALVAGE

There are no salvage operations forecast for the 2021-2031 plan period.

If natural disturbance events occur that warrant salvage harvest, these areas will be amended into the plan, revised into the Annual Work Schedules under the salvage harvest category and then reported in the subsequent Annual Report. FMP-14 would be the source for any salvage operations.

4.3.8 CONTINGENCY AREA AND VOLUME

During the ten-year period of the FMP circumstances (e.g., wildfire, blowdown, SAR AOCs) may cause some of the planned harvest area to be unavailable for harvest. In order to accommodate such circumstances, contingency area for harvest operations has been identified from the operational harvest areas and planned. This harvest area meets the same eligibility criteria as those areas selected for regular harvest. The contingency area will serve to replace area for harvest during the ten-year period of the FMP and will only be used if required. Sufficient contingency area has been selected to support almost two years of harvest operations. An amendment to the FMP is required to allow forest operations to proceed in contingency area.

The area and volume of the contingency area are summarized in FMP-16. A total of 6318.3 ha has been selected as contingency area and has been included in the harvest are information products including operation maps. The identified contingency allocations represent ~19.6% of the ten year planned harvest area and is therefore slightly less than the maximum allowance of 20% of the available harvest area (6, 615.8 ha) (Table 63). Individually, some forest units were allocated >20%. Contingency area is biased towards PLANFUs that are more likely to require it. The high frequency of PRCC thinning is opportunistic and thus having contingency area available allows for these stands to be managed where it is most beneficial. HESH area has proven to be contentious, thus having alternate areas for harvest will allow for smoother reallocation in the future. Additionally, one large allocation (predominately HESH) was moved from regular to contingency due to public concerns.

Table 63. Contingency area and projected volumes by Forest Unit.

Forest Unit	Contingency Area (ha)	Contingency Harvest Volume (m^3)		
		Conifer	Hardwood	Total
HDSEL	636.4	1,839.8	16,548.0	18,387.8
HESH	610.3	22,185.9	10,832.6	33,018.5
CESH	17.3	968.9	86.5	1,055.4
HDSH	2,725.9	29,125.1	127,191.2	156,316.3
INTCC	238.1	3,542.6	29,133.1	32,675.7
MXHCC	384.3	8,459.9	21,487.5	29,947.4
MXCCC	168.7	13,326.0	4,881.5	18,207.5
PRCC	546.8	64,994.8	5,697.0	70,823.9
ORUS	433.7	6,988.7	19,757.7	26,769.9
PWUS	556.8	61,914.3	18,152.2	80,066.5
Total	*6,318.3*	*213,346.1*	*253,767.3*	*467,113.4*

4.3.9 HARVEST AREA INFORMATION PRODUCTS

Operations maps associated with all areas scheduled for harvest identify and portray:

a) Harvest block identifier
b) Harvest category (regular, salvage, contingency)
c) Operational prescriptions for areas of concern, described in FMP-11
d) The silvicultural system/plan forest unit
e) If applicable, stand level residual requirements.

Information products for harvest area provided in this FMP include:

- A planned harvest layer: MU220_21PHR00
- A composite AOC layer: MU220_21AOC00
- An FMP Index map: MU220_2021_FMP_MAP_Index_00
- A series of FMP 1:20,000 scale operations maps: MU220_2021_FMP_OPS****_00

4.4 RENEWAL AND TENDING OPERATIONS

4.4.1 RENEWAL AND TENDING AREAS

Areas for renewal and tending operations are identified and mapped for the ten-year period. These include: all of the areas selected for harvest; areas previously harvested during the term of the current or previous forest management plan(s) and not yet renewed; areas of natural disturbances which require renewal; and areas that may require tending. The analysis of past silvicultural activities and performance, described in Sections 3.3.1 and 3.3.2 provided the foundation for the planned renewal and tending operations. Adjustments were made to net down the actual area of treatment based on professional knowledge of average treatment conditions. The planned levels of renewal and tending operations associated with harvest and natural disturbance are summarized by treatment in FMP-17. The associated expenditures required to achieve renewal and tending objectives are summarized by activity type in FMP-19 and total an estimated $12.8 Million for the 10 year period.

Information products associated with all areas scheduled for renewal, tending and protection will be submitted with the AWS in accordance with FIM. However, all possible areas that may be eligible for renewal and tending operations for the 10-year period are shown on the proposed operations summary and proposed silviculture maps. The areas shown on the maps include:

- All areas selected for harvest during the 10-year plan;
- All areas previously harvested or naturally disturbed during the current or previous FMPs and not yet renewed and/or not yet declared established;
- All areas scheduled for renewal and tending; and

- Tree improvement areas

There will be a proportion of required treatments from the 2011-2021 FMP that carryover into the 2021-2031 FMP. These carryover activities are derived from field level identification of renewal and tending needs based on the previous plans harvest areas and any tending needs that have been identified resulting from the previous plan's renewal efforts. In addition, cutover areas that have received full or partial renewal treatments in the past, will be selected for renewal work as required. Areas requiring treatment, supplemental treatment, or re-treatment may be identified through the silvicultural success monitoring program that may not have been identified at the time of writing the FMP. It is important to note that there are no planned renewal and tending operations for natural disturbance in the 2021-2031 FMP. This is because there has not been a significant natural disturbance on the landscape since 2009.

4.4.1.1 Renewal

Forest renewal activities include regeneration, by natural or artificial means, and site preparation. Descriptions of the regeneration methods used on the BMF are presented in Section 4.2.2.1. Of the 31, 044 ha planned for harvest, approximately 29, 781 ha (96%) are planned to be regenerated assuming 100% utilization. Natural regeneration is the most commonly used treatment, making up 90% of the total planned regeneration area. Artificial regeneration is most commonly used to regenerate red and white pine through planting. Even though seeding is not a planned regeneration treatment for the 2021-2031 FMP, it is included as an option in some SGRs. Supplemental planting is planned for 216 ha to augment existing natural regeneration on the site. This mainly occurs in Pw Seedcut areas, where the density of natural regeneration is not sufficient to meet free-to-grow standards. Supplemental planting will increase the Pw stocking and ensure that these stands meet the assigned regeneration standard.

Site preparation is planned for 3, 441 ha with the majority (87%) being mechanical site prep. Mechanical site prep primarily takes place in Pr and Pw harvest blocks that require artificial regeneration. Most often, a bulldozer equipped with a straight blade is used to expose mineral soil and arrange slash into small, scattered piles. This exposes sites for tree planting and provides a seedbed for natural regeneration. The remainder of site preparation area (422 ha) consists of ground chemical treatments. Chemical site prep is most often used to treat areas that are scheduled for Pr and Pw planting. Pioneer species (ie. Po) will colonize these areas very quickly and have rapid growth rates. These species are treated with chemical herbicides to provide a competitive advantage to Pr and Pw seedlings. BMFC employs an Integrated Pest Management approach to using chemical herbicides.

Planting retreatment is planned for 111 ha. This occurs in areas where the survival of planted seedlings is low and predicted to not meet regeneration standards in the future. These stands are identified through post-harvest survival and tending surveys. Several factors may inhibit seedling survival, including competition, insects, and disease.

4.1.1.2 Tending

Tending treatments are planned in association with planned artificial renewal treatments anticipated to occur, along with treatments in past plans that are not yet free-to-grow and require further tending. A large amount of area has been included for hardwood improvement cutting (61%), concurrent with a proportion of actual harvest area that has received improvement cutting from 2011-2021. Stand improvement may occur in sequence with a regular harvest as an incentive paid to operators to fell unmerchantable stems, or in hardwood areas that are not yet eligible for regular harvest but would benefit from a thinning.

Manual cleaning is planned for 1, 373 ha. BMFC primarily uses brushsaws and chainsaws for manual cleaning operations. This treatment type is used to selectively remove competing vegetation (usually poplar, red maple, white birch, ironwood, balsam fir etc.) from recently planted or early stage, naturally regenerating crop species (most often pine and oak). This provides a competitive advantage to desired species and aids in achieving silvicultural success. Chemical ground cleaning is planned to take place on 1, 302 ha. Chemical herbicides are applied to competing vegetation to assist the establishment of recently planted crop species. Ground cleaning applications are generally in the form of either foliar herbicide spray, or stem-specific basal bark treatment. BMFC utilizes an integrated pest management approach to chemical herbicide applications and adheres to best management practices.

It should be noted that actual renewal treatments will vary from planned based on a number of factors:

- Actual area encountered that warrants receiving renewal treatment. Conditions encountered during FOP writing may differ from those predicted by the eFRI and more or less regeneration effort may be required. Tending on treatments from previous plans will be completed as required and may equal more or less than the planned amount. All possible candidates that could be identified at the time of plan development were included in the renewal layer.
- Natural regeneration is always the preferred renewal treatment, to encourage the maintenance of natural genetic diversity. If conditions surrounding harvest indicate natural regeneration might be successful, artificial regeneration may be required less than planned.
- Artificial regeneration may occur at a small scale for atypical situations that are not planned, in accordance with the SGRs.
- Areas with a significant amount of Beech regeneration may be added to chemical ground cleaning area.

4.4.2 RENEWAL SUPPORT

BMFC primarily plants red and white pine and will occasionally plant red oak. White pine seed can be obtained from one of two seed orchards knowns as the Snowden Seed Orchard (in Snowden township – see OPS Map MU220_2021_FMP_MAP_Ops2730_00) and the Crowe River Seed Orchard (in Cardiff township – see MU220_2021_FMP_MAP_Ops2877_00) within the management unit or, if needed, from harvest areas. In 2017 BMFC collaborated with the Forest Gene Conservation Association to undertake a thinning and seed collection operation in the Snowden Seed Orchard. This resulted in the collection of a large quantity of white pine seed. Thinning within the orchard was carefully planned to retain genetic diversity and promote crown growth and future seed production of retention trees. Red pine seed is generally collected during harvest on high quality sites. When seed stock is needed, harvesting can be coordinated with bumper seed crop years. Red oak acorns have a short storage viability making frequent collection necessary. When possible, collection will occur in coordination with harvest during a seed year, or acorns will be collected as they fall on high quality sites.

Collection of other less common seed may be undertaken at any time during the term of this management plan to maintain a seed stock that would allow planting to take place if suitable conditions are encountered. Species such as jack pine, yellow birch, red spruce, white oak and white cedar may be targeted for collection.

All attempts will be made to maintain long-term seedling stock production within the Southern Region. Currently, all tree seed has its origins in seed zones 28, 29, 30 and 31. In 2020, the MNRF introduced the Ontario Tree Seed Transfer Policy. This policy specifies how far seed can be transferred from the area it was collected to the planting site. The purpose of this policy is to ensure that Ontario's tree species will be well adapted to a changing environment. Under this new policy, seed zones are replaced by ecodistricts and the movement of both seed and planting stock will occur within approved seed transfer areas.

Seedling requests are done on an annual basis for the production of container stock. Post harvest surveys are completed in site prepared areas and other areas that require planting. These surveys allow for an accurate estimate of container stock needed to meet regeneration standards and to avoid wasted seedlings. Planting continues to represent a small portion of regeneration activities on the management unit. The main focus is on the natural regeneration of forest stands but is supplemented where regeneration objectives are specific for a given site.

BMFC will endeavour to work within available resources to maintain and enhance conditions (brushing, pulling stakes, eliminating blister rust infected trees, etc.) at the Snowdon and Lowrie Lake Seed Orchards if needed. Doing so will protect the initial investment and at the same time facilitate future seed collection when demand for white pine seed increases. No specific tree improvement operations are planned for the Lowrie Lake or Snowden Seed Orchards during the 2021-2031 plan term.

Based on planned allocations for the 2021-2031 plan, the following is an estimate of nursery stock to be planted:

Table 64. Estimated nursery stock for planting in the 2021-2031 FMP.

Species to be Planted	Number of Seedlings for harvest areas

Pw	2, 516, 000
Pr	585, 000
Or	185, 000

Note: a small amount of Pj and Sw or Sb seedlings may be planted to increase the amount of MXPRJ on the landscape where suitable conditions allow.

4.5 ROADS

The Bancroft Minden Forest has a landscape of fragmented road ownership which includes Crown, provincial, district, municipal and private roads. All conditions on the road use, maintenance and construction within the 2021-2031 FMP apply only to the roads that are subject to the Public Lands Act. Other roads, such as municipal roads and highways, are outside the jurisdiction of the MNRF and are not subject to the conditions of the 2021-2031 Bancroft Minden FMP, nor the requirements of the Forest Management Planning Manual. The 2020 FMPM defines a road as any access right-of-way that can be reasonably driven in a 4X4 truck and only requires road maintenance to make it suitable for forestry operations. There are three classes of roads for forest management:

Primary – A road that provides principal access for the management unit, and is constructed, maintained, and used as part of the main road system on the management unit. Primary roads are *normally* permanent roads.

Branch – A road, other than a primary road, that branches off an existing new primary or branch road, providing access to, through or between areas of operation on a management unit.

Operational – A road, other than a primary or branch road, that provides short-term access for harvest, renewal and tending operations. Operational roads are normally not maintained after they are no longer required for forest management purposes.

The guiding principle for forest access roads planning is to use both existing and abandoned (i.e. retired) access roads, including water crossings, whenever possible. There are many retired roads or access trails on the landbase which can be described as any right-of-way through the forest that can only reasonably be traversed with an ATV or modified 4x4 vehicle. Access trails will generally require road construction to make them usable for forestry operations. Many mapped access trails may be determined to be roads upon field inspection, in which case they may only require road maintenance to be useable for forestry operations. To be eligible for maintenance, roads used for forestry operations must be identified in FMP-18 as wither an existing road or proposed corridor (ORB). A portage route or sanctioned recreation trail would not be considered an access trail for forestry purposes except in instances when these have been established over old forestry roads and/or no other feasible alternative for road location exists.

A decision was made at the Steering Committee Meeting on October 16, 2020 to defer some of the roads planning requirements regarding road classifications for existing roads, clarification and direction on road responsibility and developing a road transfer protocol. No later than 30 days following the approval of the 2021-2031 FMP, the SFL-holder and MNRF shall form a joint task team (the “Joint Task Team”) to reassess the matters specified above (the “Reassessment Work”). The SFL-holder shall participate in the Joint Task Team and shall carry out or assist with components of the Reassessment Work on an equal basis with MNRF. The Reassessment Work shall be completed by the Task Team no later than the first anniversary of date of the approval of the 2021-2031 FMP. The Task Team’s work shall not extend to the preparation or submission of a plan amendment as provided for in the paragraph below which shall be the sole responsibility of the SFL-Holder.

The SFL-Holder’s Plan Author shall submit the completed Reassessment Work to MNRF Bancroft District in the form of a proposed FMP-amendment that satisfies the requirements of Part C, Section 2.0 of the FMPM. The amendment submitted to MNRF Bancroft District must include the following:

- Updated documentation to Section 4.5 of the 2021-2031 FMP;
- Revised table FMP-18;
- Updates to Supplementary Documentation H (as determined by the task team);
- Updated Existing Road Use Management Strategy and Existing Road Water Crossing Layers, and
- Updated FMP maps.

4.5.1 PRIMARY AND BRANCH ROAD CONSTRUCTION

The following is a summary of primary and branch road construction planned for the 2021-2031 FMP. Proposed road corridors from the 2011-2021 FMP that were not constructed have been confirmed and are being carried over to the 2021-2031 FMP. Supplementary Documentation H contains the rationale management strategy for each primary and branch corridor. Reasonable alternatives and environmental analysis are also included for Primary Road corridors. FMP-18 identifies each primary and branch road planned for construction, its associated road use management strategy and associated road length. Lengths are based on GIS estimates, which do not consider terrain/elevation; actual road lengths will be documented in the Annual Report for the year of construction.

Primary and branch road corridors are portrayed on the composite and operations maps. As per the FMPM, primary and branch road corridors are 1 km in width. Road construction includes activities that are meant to create or increase the width of a road right-of-way and may take place anywhere within the approved corridors in accordance with direction from any identified AOCs. All Primary and Branch roads proposed for construction fall in the category of ‘increasing the width of a road right-of-way’ and follow an existing road or trail. Road construction activities include:

- road layout and engineering;
- right of way clearing;

- grubbing;
- rock drilling, blasting and excavating;
- cut and fill;
- drainage and ditching;
- culvert installation;
- bridge site preparation and installation;
- bridge/culvert acquisition;
- crushing of granular material;
- corduroy swamp treatment and brushing;
- supply and placement or granular material;
- erosion and sediment control measures.

Where a new primary, branch road or landing does not intersect an area of concern for a value, any conditions on the primary road, branch road or landing as described in MNRF's guide(s) (e.g. guide relating to conserving biodiversity at the stand and site scales) will be followed as described in section 4.5.5 (conditions on roads landings and aggregate pits).

4.5.1.1 Primary Roads

Primary roads form the backbone of access needs for harvest, renewal and tending operations. Because of a long history of forest management within the Management Unit, access to Crown land is generally well established. As a result only one new primary road, identified as Nephton Road, is being planned for construction. This road was planned for during Phase Two of the 2011-2021 FMP and is being carried forward as it was never constructed. The construction of Nephton road is of high priority as it will establish practical, long-term access to 4, 640 ha of Crown land that has not yet been harvested. Two alternative corridors: Little Jack Lake and McCoy Bay Road were selected from the original seven discussed at Phase 2 planning. The location and road use strategy have not changed, and the road corridors/alternatives have been confirmed. However, selection of the final primary road corridor will be deferred until final plan submission to allow time for further consultation regarding potential impacts to Aboriginal values and develop mitigation measures if needed.

Documentation of the environmental analysis of the alternative corridors for the Nephton Primary road and associated use management strategy is included in Supplementary Documentation H – Roads & Water-crossing Documentation.

There are 13 Primary roads where access controls or restrictions apply. They can be viewed in FMP-18. Access restrictions on these roads are all due to their location within an enhanced management area (EMA); the associated EMA code is documented in FMP-18 and further described in Supplementary Documentation H. No primary roads are planned for transfer during the 2021-2031 FMP period.

4.5.1.2 Branch Roads

Branch roads are roads that fork off an existing primary or branch road, providing access to, through or between areas of operations on a management unit. The planned branch road corridors are intended to provide long term access to future harvest areas for a period of over 10 years. For each new branch road, a one kilometre wide corridor was identified based on consideration of:

a) the degree to which the physical conditions, identified values and significant engineering or safety factors in the area, act as constraints or provide opportunities, including possibilities for development of other resources;
b) any other planning initiatives that deal with access in the area; and
c) the results of consultation with known affected persons, organizations, and First Nations and Métis communities.

Between the 7 branch road corridors, there are a total of 52.7 km of roads planned for construction during this FMP. The branch road corridors are listed below with their associated proposed construction lengths. All are planned for construction to access harvest areas in the current FMP and in some cases to access harvest areas associated with potential future allocations. None of the roads are planned to traverse a provincial park or conservation reserve.

Roads with access restrictions or provisions are identified with the associated rationale. One of these branch roads (Monkshood Road) is being carried forward from the Phase 2 2011-21 FMP. The majority of the branch roads proposed for construction are either extensions of existing roads or upgrades to existing roads or road-beds and in some instances existing trails. The SFL intends to maintain responsibility for all new roads constructed. Where silvicultural activities are anticipated beyond the 2021-2031 FMP period the SFL does not intend to transfer the road to MNRF during this FMP period.

Proposed Branch Road Corridors:

- **Airport Branch Road (4.8 km)** – Faraday Township.
- **Berrycan Branch Road (4.9 km)** – Hindon Township.
- **McEwen Lake Branch Road (5.3 km)** – Ridout Township – located within G421, the Leslie M. Frost Natural Resource Centre and intersected (at the far north end) with Eg5r-2, the Black River – Frost Centre Enhanced Management area. This corridor is also within the Hindon MEA where CORLAP #16 applies.
- **Monkshood Branch Road (1.5 km)** – Dickens Township – located within E52a, the Aylen Lake West and Upper Madawaska River Enhanced Management Area (EMA) and subject to access restrictions. This corridor is also within the South Algonquin MEA where CORLAP #16 applies.
- This road is intended for transfer to MNRF during the 2021-2031 FMP.
- **Murray-Wicklow Branch Road (11 km)** – Wicklow, Lyell Township - located within the South Algonquin MEA and subject to CORLAP #16.
- **North Pencil Lake Branch Road (18.7 km)** – Cavendish, Anstruther Township – located within GUA340/RA1 and the Kawartha MEA and subject to access restrictions and CORLAP #16;

- **Sherborne Branch Road (6.5 km)** – Sherborne Township – located within GUA G421, the Leslie M. Frost Natural Resources Centre and E64a-2, the Clear Lake- Frost Centre Enhanced Management Area (MEA). This corridor is also within the Hindon MEA and subject to access restrictions. This road is intended for transfer to MNRF during the 2021-2031 FMP.

Detailed descriptions and rationale including any associated CLUPA direction or access restrictions are provided in Supplementary Documentation H which includes the results of consultation with known affected persons, organizations and First Nation and Metis communities for each new branch road corridor and associated use management strategy. Detailed maps of the individual corridors are also included in Supplementary Documentation H. All Branch road corridors are portrayed on composite and operations scale maps. Use management strategies for all new branch roads are described in FMP-18.

All proposed Primary and Branch roads planned for construction are subject to the conditions on roads and landings described in section 4.5.5.1.

4.5.2 OPERATIONAL ROADS

Operational roads are generally meant to provide access for the duration of active forestry operations and/or subsequent renewal treatments. Operational roads may not provide suitable access for other forest users as they are built to a minimal standard and may only be seasonably passable. Existing roads and corridors are used preferentially; however operational road boundaries (ORBs) are identified within which operational roads might be constructed. The specific location of operational roads is not planned at the FMP level.

The Areas Selected for Operations Maps portray the Operational Road Boundaries (ORBs), which delineates the possible locations for operational roads which were delineated to provide flexibility in operational road location where necessary (e.g., terrain limitations). An operational road boundary may include planned areas of operations, and the area from an existing road or planned road corridor to the planned areas of operations within which an operational road is planned to be constructed. Each ORB has been assigned a unique identifier that corresponds to the block number it surrounds i.e. ORB-#### which is identified in FMP-18. Once constructed the ORB will be subject to the principles common to the Operational Road Use Management Strategy (described below) and any relevant access restrictions or CLUPA direction indicated in FMP-18.

All operational roads on Crown land in the Bancroft Minden Forest are subject to a common road use management strategy, consistent with the provisions and practices of all previous forest management plans since the SFL took management responsibility for the Management Unit. Industry responsibility for any part of the operational road network begins when operations commence and end upon the completion of decommissioning activities. These transfers take place progressively, location by location as parts of the network as used and retired. The principles common to the operational road use management strategy are as follows:

- construct and maintain roads only to the extent and degree required to support operations.
- make use of existing corridors wherever possible. Maintenance activities typically would include gravelling, grading, brushing, ditching, and repairs or replacements to water crossings.
- monitor roads while in use by industry to ensure any potential safety, environmental, or maintenance issues are addressed promptly.
- new operational roads within remote access EMAs will have access restricted applied through Public Lands Act signage or other physical barriers to meet the intent of the Crown Land Use Policy Atlas.
- decommission roads when no longer required for forestry operations. Typically, this involves the removal of water crossing structures and the placement of water bars on erosion-prone slopes, but may also include berming or placing large boulders to prevent access.
- transfer responsibility back to MNRF upon completion of planned decommissioning activities with no further planned maintenance or monitoring by MNRF, or to other identified party through an agreement.

Public access may also be restricted due to CLUPA policy direction or to protect habitat for species at risk which are often discovered during plan implementation. Operational roads are generally decommissioned upon completion of forest operations with decommissioning activities identified in the annual work schedule. However, input from indigenous communities will be considered. Industry is responsible for these roads while in use, with the intention of returning them to MNRF responsibility upon completion of decommissioning activities. Upon decommissioning an operational road, BMFC relinquishes all responsibility of the road. Any party wishing to restore the conditions of an operational road will consult with MNRF on required permits and road responsibility agreements. Additional details are described in Supplementary Documentation H.

Curve Lake First Nation (CLFN) expressed an interest in areas selected for harvest near the Petroglyphs Provincial Park and Jack Lake area (specific to ORB-1100 and ORB-3910). The SFL has committed to working with representatives of CLFN to address their concerns prior to any road construction occurring in this area of interest.

All existing and new operational roads, or landings planned for construction are subject to the conditions on roads and landings described in section 4.5.5.1. Operational roads planned for decommissioning will be described in the applicable Annual Work Schedule and reported in the applicable Annual Report.

4.5.3 AREA OF CONCERN CROSSINGS – PRIMARY AND BRANCH ROADS

Primary and branch roads may need to cross through AOCs to access approved harvest allocations when there is difficult terrain or when no other reasonable alternative exists. Where a primary or branch road is planned to cross an AOC, FMP-11 details the conditions and/or acceptable variation on road and landing construction within the AOC. To minimize the impact on the AOC, the intent is to cross within the modified portion (MMZ) of the AOC and not the reserve portion, wherever possible or feasible. Where primary and branch road corridors are required to cross areas of concern that are not water crossings (i.e. bald eagle nest), construction will be carried out in accordance with specific prescriptions identified in FMP-11. Road construction being proposed within an AOC that does not allow for the construction of new roads (except where no feasible alternative exists) may require consultation and/or approval by MNRF and will follow the AOC approval process for flexibility provisions in Supp. Doc. I.

The Areas Selected for Operations Maps portray the primary and branch road corridors. Any public comments that have been received concerning a crossing of an AOC by The Nephton Road (primary road) have been noted in Supplementary Documentation H (Roads & Water-Crossing Documentation); comments related to a branch road crossings are documented in Part 2 of Supplementary Documentation J (Summary of Public Consultation). No comments have been received regarding the branch road crossing of an AOC.

For each new primary or branch road water crossing to be constructed, the location, crossing structure and conditions on construction will be finalized in the applicable annual work schedules in accordance with the *Ministry of Natural Resources and Forestry/Fisheries and Oceans Canada Protocol for the Review and Approval of Forestry Water Crossings*. Where new water quality values are identified during plan implementation, a values update will be completed and submitted to the MNRF as per the appropriate current direction in order to document the value within the plan.

4.5.4 AREA OF CONCERN CROSSINGS - OPERATIONAL ROADS

Where an operational road is planned to cross an AOC, FMP-11 details the conditions on road and landing construction within the AOC. To minimize the impact on the AOC, the intent is to cross within the modified portion (MMZ) of the AOC and not the reserve portion, wherever possible or feasible.

Any public comments that have been received concerning a crossing of an AOC by an operational road have been noted in Supplementary Documentation J. Conditions on a landing within an area of concern are also documented in FMP-11 and Section 4.5.5.1.

For each new operational road water crossing to be constructed, the location, crossing structure and conditions on construction will be finalized in the applicable annual work schedules in accordance with the Ministry of Natural Resources and Forestry/Fisheries and Oceans Canada Protocol for the Review and Approval of Forestry Water Crossings. This direction is further described in Section 4.5.6. Where new water quality values are identified through plan implementation, a values update will be completed and submitted to the MNRF as per the appropriate current direction in order to document the value with the plan.

4.5.5 EXISTING ROADS

The existing road network is a result of multiple users of forest access roads and partial harvest systems with a relatively short period of time between harvests. Existing roads or road networks that are the responsibility of the SFL and other existing roads that will be used for forest management purposes and which are under the jurisdiction and control of MNRF are documented in FMP-18. The associated use management strategy for each existing road or road network is also summarized in FMP-18 which indicates the intent to transfer road responsibility and associated year and plans for decommissioning (if applicable). Strategies are consistent with that of previous plans and documented in greater detail in Supplementary Documentation H.

4.5.5.1 Conditions on Roads and Landings

A review of Conditions on Existing Roads and Landings was undertaken by the Planning Team. This review resulted in minor wording changes for the purpose of clarity.

The following Conditions on Roads and Landings are described in the section below:

- 4.5.5.1.1 Trails
- 4.5.5.1.2 Roads in Areas of Concern
- 4.5.5.1.3 Roads and Landings outside Areas of Concern
- 4.5.5.1.4 Decommissioning of Roads
- 4.5.5.1.5 MNRF/DFO Water Crossing Protocol and Water Crossing Standards
    - 4.5.5.1.5.1 Design & Location of Water Crossings
    - 4.5.5.1.5.2 Installation and Maintenance of Water Crossings
    - 4.5.5.1.5.3 Decommissioning and Rehabilitation of Water Crossings

4.5.5.1.1 Trails

Trails on Crown land designated and maintained by MNRF and identified in Land Information Ontario (LIO), trails governed under the Motorized Snowmobile Act R.S.O.1990, CHAPTER M.44, and trails maintained by recognized organizations (e.g. cross-country ski trails, dog sled trails) for which custom Area of Concern (AOC) prescriptions have not been developed. The Good Neighbour Policy (**Error! Reference source not found.**) includes further general details of operations around trails. Standards (S) and Guidelines (G)

1) Normal harvest, renewal and tending are permitted along designated trails.
2) Forest operations will be conducted with public safety in mind by installing warning signs, protecting existing signage, removing hazard trees (e.g. leaning or potentially dangerous trees) and keeping trails free of logging debris. (S)
3) Where possible, schedule operations to minimize disruption to other users. Minimize, to the extent practical during periods of heavy use (e.g. snowmobile season), crossings of, or the use of the trails during forest operations. (G)

4) Trails used for access may be widened for machine travel but will be left “debris free” to the extent reasonably possible. Trails should be returned to their “original condition” or found state as a minimum upon completion of operations (S).
5) Warning or Caution signs should be placed at strategic points along the road / trail and within reasonable distance of planned operations to advise the public of ongoing forest operations (G). These signs are to be removed within two weeks of the completion of operations.
6) The use of the road / trail for hauling and occasional skidding is allowed if the traveled portion is kept free of logging debris and is left in a condition consistent with its intended use (G).
7) Changes to existing roads / trails and their abandonment should be discussed with the other users to achieve a mutually beneficial result (transfer of responsibility). (G)
8) Roadside piling is allowed providing all equipment and material is well visible and the material is piled off the traveled portion of the road or trail. (G)
9) Pits will follow the exemption criteria of the Aggregate Act pertaining to safety in relation to a trail (refer to Forest Aggregate Pits Safety Standards). (G)

4.5.5.1.2 Roads in Areas of Concern

This direction applies to the planning, construction and maintenance of roads within Areas of Concern where they are permitted. Standards (S) Guidelines (G)

1) Before construction of any road in an AOC, ensure all considerations with respect to road planning, location, use management strategy and other mitigation techniques are consistent with the specific direction for the identified value. (S)

2) Unless approved by MNRF, construction and maintenance operations that may enter a water feature (i.e., in-water work) or that may potentially cause sediment to enter a water feature, are not to occur in shoreline AOCs during periods of fish spawning, incubation, and fry emergence (S). If warranted local MNRF offices can vary timing dates based on local knowledge. (G)

Timing restrictions for in-water work

Warmwater fisheries	**April 1 to June 30**
Coldwater/ Mixed fisheries	**October 1 to June 30**
Coldwater fisheries	**October 1 to May 31**
Unknown fisheries	**October 1 to June 30**
Critical fisheries habitat	**All year**

3) Fill material placed to build the road below high-water level within the floodplain of a water feature will be erosion resistant and/or protected from erosion. (S)

4) The road right-of-way width within the AOC will be 10 metres unless otherwise directed by the specific FMP-11 for the AOC which may specify a maximum right of- way width within the AOC. It is understood that where ROW widths can be reduced the practice will be encouraged. (G)

5) To maintain drainage patterns and minimize the potential for sediment-laden roadbed or ditch run-off to reach a water feature, use cross drainage culverts whenever a road crosses a gully or other natural drainage feature. (G)

6) To minimize the potential impacts on fish habitat and water quality in shoreline AOCs (G):
   i. fill in or around a water feature will be erosion resistant;
   ii. where soils prone to erosion, use erosion control techniques;
   iii. trees will be felled so they do not fall into water;
   iv. design ditches so they do not discharge directly into a water feature; ditches will divert flow into the bush so the water filters through natural vegetation before entering a water feature unless impractical to do so, and
   v. where it is not practical to disperse ditch water before the ditch reaches a water feature, mitigative measures will be required.

7) Roads built within 15 metres of a water feature and not associated with a water crossing will: use techniques and practices to reduce the possibility of roadbed erosion; avoid grubbing; and, design ditches to minimize the possibility of sediment entering the water feature. (G)

8) Reasonable efforts (e.g., clearing of logging debris, avoid steep ditching) will be made to ensure that recreational portage routes, and trails used for accessing and working traplines, are passable following forest management operations. (G)

Best Management Practices

9) Clearing of the ROW should be done in daylight.
10) Recommend a minimum size of 8” for cross drainage culverts. Different sized culverts can be used as deemed appropriate based on local conditions.
11) Place an additional culvert(s) in the approaches of a causeway to reduce the velocity of the spring freshet through the main culvert in the channel.
12) Have a maintenance schedule to keep culverts clear of obstructions to help avoid fish passage and washout problems.
13) Nuisance beaver activity should be managed to keep culverts clear.

4.5.5.1.3 Roads and Landings outside Areas of Concern

Standards (S) and Guidelines (G)

1) The road-right-of-way width for primary and branch roads will be no greater than 20 metres and no greater than 12 metres for operational roads. It is understood that where ROW widths can be reduced the practice will be encouraged. These limits may be exceeded where traffic safety is compromised. (S)

2) Except for reasonable provisions for terrain considerations, roads and landings are to be located to avoid advanced regeneration and good quality timber. (G)

3) All merchantable material from road construction shall be salvaged and utilised in accordance with the CFSA standards outlined in the Scaling Manual. If merchantable material is utilised in road construction (e.g. corduroy), it shall be measured before use as required by the Scaling Manual. (S)

4) Slash created by road construction is to be lopped within 1 meter from the ground and distributed as evenly as possible or may be buried under 1 foot of mineral soil, unless the debris is suitable to be utilised by the public as fuelwood. (G)

5) Materials moved during construction, such as grubbed or earth fill material, will not be piled where they block drainage courses. (S)

6) Fill material for roads built below the high-water level, within the floodplain of a water feature, will be erosion resistant and/or protected from erosion. (S)

7) Any exposed mineral soil between the height of land and a water crossing, or within 100 metres of a water crossing, whichever is less, will be trimmed to a stable angle and be protected from erosion so sediment will not enter the water after construction. (S)

8) MNRF will ensure that the signs used to identify the use management strategies for roads (e.g., travel restrictions) are maintained. (S)

9) Any haul signs are to be removed within two weeks of the completion of operations

10) The planning, construction, and maintenance of primary and branch road corridors and road network locations, and their applicable use management strategies, will consider (G):

    i. the strategic direction associated with other resource plans, policies and directives (e.g., *Crown Land Use Policy Atlas*);
    ii. the strategic direction being addressed through the use of DEAs (Deer Emphasis Area) and MEAs (Moose Emphasis Area) resulting from the application of the Landscape Guide;
    iii. the management objectives, and emphasis for specific areas (e.g., direction provided by the *Crown Land Use Policy Atlas*; DEAs, MEAs); and
    iv. the potential impact (including benefits) to other natural resource features, land uses, and values (e.g. lakes and streams, cottage sites, boat caches, etc).

11) Ensure engineering safety considerations are incorporated into road planning. (G)

12) Have a monitoring program for roads or road networks and use appropriate mitigation to prevent or stop erosion in ditches, on steep slopes, etc. (G)

13) When all-weather roads must cross wetlands, provide frequent cross drainage culverts to ensure that surface water is equalized on both sides of the road and impacts to hydrologic flow and wetland function are minimized. (G)

14) If recognizable ephemeral streams, springs, seeps, and other areas of groundwater discharge that are connected to lakes, ponds, rivers, or streams, or small unmapped wetlands must be crossed, use construction and maintenance techniques and practices to minimize impacts to hydrologic flow and wetland function. Natural water movements will not be impeded, accelerated, or diverted. (G)

15) Identify and prevent blockage to drainage courses (i.e., surface drainage) through appropriate use of cross drainage culverts. Some of these locations may best be determined the following spring, when ponding is evident at unpredicted locations along a new road. (G)

16) Where ditches leading downhill from rock cuts pass over earth material, use techniques to protect the earth/rock interface from erosion. (G)

17) Grubbing of low vegetative cover between the height of land (e.g., the high point on a ditch line) and a water crossing, or within 100 metres of a water crossing, whichever is less, will be limited to that required to address engineering issues and safety concerns, such as the removal of hazards. (G)

18) Have a plan to ensure rock or earth remains within the right-of-way when explosives and blasting are required. (G)

19) When constructing roads during the bird nesting season, and occupied nests are encountered, follow the appropriate condition on regular operations or Area of Concern prescription for the feature or value. (G)

20) When planning primary and branch road corridors, avoid high value wildlife habitats within DEAs and MEAs. (G)

21) Do not place windrows or grubbing materials across known migration paths of wildlife in a manner that could impede their travel. (G)

22) Reasonable efforts (e.g., clearing of logging debris, avoid steep ditching) will be made to ensure that recreational portage routes and trails used for accessing and working traplines are passable following forest management operations. (G)
23) Existing roads and trails must be kept free of logging debris and are to be returned to “original or better condition when forest operations have been completed. (S)
24) Log landings, loading areas, and turn-arounds should be located on high ground to avoid blockage of drainage paths. (BMP)
25) Grubbed material should be piled and stored so that it can be used to assist in road decommissioning.
26) Soils prone to erosion on steep slopes, or near water features, long ditches without off takes should be stabilized. (BMP)
27) Roads should avoid any wetland without a dense root mat. If wetlands must be crossed consider using temporary winter crossings when the soil is frozen. (BMP)
28) If long windrows of slash or rock area created, breaks should be left to provide access for equipment, people and animals. A 10 metres break for every 100 metres of windrow is a good target. (BMP)
29) In obvious animal migration routes, attempt to minimize the height of the snow banks created at the road crossing site. (BMP)
30) Construction of loop roads in high value wildlife habitats should be avoided. (BMP)
31) Roadside borrow pits should consider safety and take measures to reduce risk of human/animal injury, for example, filling with logging debris or large rocks or sloping edges after use. (BMP)

4.5.5.1.4 Decommissioning of Roads

This direction applies to roads outside and inside Areas of Concern where roads are permitted. Roads and the water crossings on a road system are most often decommissioned at the same time (Refer to the CORLAPs on decommissioning water crossings for additional direction).

1) Where decommissioning is planned, it will be incorporated into the approved use management strategy for roads and road networks as per FMPM requirements. (S)
2) For each road or road network scheduled to be decommissioned, ensure decommissioning is consistent with the approved use management strategy and techniques are carried out in accordance with the Annual Work Schedule. (G)
3) For each road or road network scheduled to be decommissioned, stabilize slopes and areas of the road with known or identifiable hazards (e.g., slopes susceptible to washouts) to prevent erosion and protect public safety. (G)
4) Specific road and road network decommissioning direction is provided in other specific Conditions on Roads, Landings and Aggregate Pits within this table. Where applicable, this direction will contribute to the use management strategy for the road or road network. (G)
5) Decommissioning of roads is usually related to decommissioning of water crossings. Coordinate the schedules for road or road network and water crossing decommissioning. When decommissioning a road or road system, all water crossings on that road or road system should be assessed. (G)

Best Management Practices:

6) Materials which had been moved and piled during construction, such as grubbed or other earth fill materials should be re-distributed so they contribute to the productive land base; e.g., use the material to cover areas of roadbed to aid in the establishment of vegetative cover and in such a way that the material does not erode back into a waterbody. (BMP)
7) Where the use management strategy suggests the road will not be used in the long-term, consider returning the roadbed to the productive forest land base. Roadbeds, log landings, loading areas, and turn-around areas can be treated and planted with trees or other plants appropriate for the site and consistent with other management objectives of the area. (BMP)
8) Plan and construct roads to minimize costs associated with decommissioning (e.g., use temporary re-useable bridges). (BMP)
9) If the use management strategy is to provide for access controls, consider options such as (BMP):
    - signage;
    - placement of a physical barrier such as large rocks or earth berms;
    - a gate;
    - water crossing removal; and/or
    - private land.
10) Remove cross drainage culverts and modify the roadbed to prevent erosion, while allowing water to flow freely across it. (BMP)
11) Use winter crossings if the intent of decommissioning is to limit all-weather access. (BMP)
12) As a safety precaution, ensure the roadbed where any cross-drainage culverts were removed has a gentle slope (i.e., no sudden drops) and is erosion resistant. (BMP)

4.5.5.1.5 MNRF/DFO Water Crossing Protocol and Water Crossing Standards

The Ministry of Natural Resources and Forestry/Fisheries and Oceans Canada Protocol for the Review and Approval of Forestry Water Crossings (MNRF/DFO Water Crossing Protocol) applies to the review and approval of the construction and decommissioning of road water crossings on all permanent and intermittent streams on managed Crown forests.

The MNRF/DFO Water Crossing Protocol is included as a Supplementary Document (Supp. Doc. H) with details describing the area of concern crossings of primary and branch roads located in FMP section 4.5.3, area of concern crossings of operations roads in section 4.5.4, road water crossings in section 4.5.6, and forestry inspection of water crossings is in section 4.7.4.

Section 6 of the MNRF/DFO Water Crossing Protocol outlines the planning, submission, review and approval framework. The Protocol uses a risk-based process.

Forestry operators will plan and submit proposed water crossing information using forms in Appendix 1 of the MNRF/DFO Water Crossing Protocol. The SFL will submit proposed water crossings to MNRF for approval as part of the AWS or as a revision to an AWS.

The MNRF/DFO Water Crossing Protocol provides Water Crossing Standards that meet requirements of the Fisheries Act, Crown Forest Sustainability Act and other relevant legislation. Best management practices are also provided for non-road (equipment only) water crossings. See Section 8 of the MNRF/DFO Water Crossing Protocol for general and structure-type specific water crossing standards.

The Forestry Water Crossing Project Approval Process Flow Chart outlines the approval process for water crossings in place for the 2021 FMP. Site specific review and approval by MNRF is only required where a proponent is unable to utilize a water crossing standard for the installation or removal of a water crossing. More details about the Water Crossing Protocol and preapproved water crossing standards are found in Supplementary Document H.

4.5.5.1.5.1 Design and Location of Water Crossings

These conditions apply to temporary and permanent water crossings on all road categories (primary, branch and operational) and extraction trails.

1) The submission, review and approval of water crossings built under authority of the CFSA will comply with the requirements of the FMPM and all other applicable legislation. (S)

2) The culvert or bridge opening size shall be determined by hydrologic and hydraulic analyses, in accordance with design procedures developed for Ontario use. A water crossing structure with a single span greater than 3 metres is considered to be a bridge; design of all bridges will comply with the requirements in the Crown Land Bridge Management Guidelines and the MNRF/DFO Water Crossing Protocol. (S)

3) The water crossing standard for all culverts is a minimum Q25 opening size design flow using MNRF water engineering/calculation software or equivalent watershed analysis software deemed acceptable by MNRF. (S)
4) There will be situations when the water crossing standard, Q25 opening size, determined by watershed analysis software is significantly larger than the existing channel dimensions. This may result from errors or lack of topographical detail on the maps, porous soils, presence of unmapped streams or for other reasons. In these circumstances, installing a water crossing with a Q25 opening size recommended by the watershed analysis software may negatively impact the stream. A request to install a water crossing with an opening size smaller than what is recommended by the watershed analysis software may be submitted for approval by the District MNRF following the forestry water crossing project approval process flow chart of the MNRF/DFO Water Crossing Protocol (S).

5) When the installation of a water crossing standard is not possible, and a water crossing project is not likely to result in serious harm to fish or fish habitat, approvals will be made on a case by case basis by the District MNRF through the AWS or AWS Revision. (S)

6) Selection of the type of water crossing structure, its location and its capacity to pass water and allow for the movement of fish, will consider (S):
    - possible negative effects on the form and function of the undisturbed natural channel and its floodplain;
    - the fish species present and the impact of the crossing structure on them, as required by the Fisheries Act; and
    - whether the water crossing is over navigable waters.

7) Avoid crossing in areas which affect known critical fish habitat, such as fish spawning, feeding, over-wintering, or nursery areas. (G)

8) Avoid steep high banks or sites where actively slumping banks are evident. (G)

Best Management Practices

9) Choose a site where road approaches are favorable and earth cuts are not required within 100 metres of the water's edge.
10) If past or present beaver activity is a concern, change the crossing location (preferably upstream), or include mitigative techniques to address the probability of future beaver activity for the crossing structure.

4.5.5.1.5.2 Installation and Maintenance of Water Crossings

These conditions apply to all temporary and permanent water crossings on all road categories (primary, branch and operational) and extraction trails.

1) Those responsible for installation and maintenance will monitor operations and select operating practices, materials, and mitigation techniques at each water crossing to prevent the harmful alteration, disruption or destruction of fish habitat or the impairment of water quality. Harmful alteration, disruption, or destruction of fish habitat is not permitted without DFO approval. (S)

2) The MNRF/DFO Water Crossing Protocol outlines the approved water crossing standards and includes best management practices for non-road (equipment only) water crossings in Section 8.

Section 7 includes details for the installation and maintenance of water crossings. The direction in CORLAPs applies to the installation and maintenance of water crossings where operations are permitted in addition to the requirements of the MNRF/DFO Water Crossing Protocol.

3) The installation of a water crossing will not result in the impediment of fish passage; mitigative techniques will be applied if the structure has the potential to impede or block fish migration or passage. (S)

4) At any time of year, the free movement of water and fish will not be blocked or otherwise impeded, except for brief periods during construction and as approved by MNRF. (S)

5) The removal of stream boulders is generally not acceptable, except where necessary for installation of a crossing structure which retains a natural streambed (e.g., a bridge). (S)

6) Construction operations that may enter a water feature (i.e. in-water work) or that may potentially cause sediment to enter a water feature are not to occur during periods of fish spawning, incubation, or fry emergence, unless approved by MNRF. (S) If warranted local MNRF offices can vary timing dates and mitigative measures based on local knowledge. (G)

Timing restrictions for in-water work

Warmwater fisheries	**April 1 to June 30**
Coldwater/ Mixed fisheries	**October 1 to June 30**
Coldwater fisheries	**October 1 to May 31**
Unknown fisheries	**October 1 to June 30**
Critical fisheries habitat	**All year**

7) Fill material required to build the road at the site of the crossing, below the highwater level and within the floodplain of the water feature, will be erosion resistant and/or protected from erosion. (S)

8) Any exposed mineral soil between the height of land and the water crossing, or within 100 m of the water crossing, whichever is less, will be trimmed to a stable angle and be protected from erosion so sediment will not enter water. (S)

9) During construction and maintenance of a water crossing, contamination of a water feature by foreign materials such as lumber, nails, fuel, oil, or herbicides is not permitted (the crossing structure itself, including temporary crossings, can be in the water, if the approved design allows for this). (S)

10) Prevent sediment from entering the water features by using erosion and sediment control techniques. (S)

11) The use of explosives in or near water will normally be avoided. Blasting with a potential impact on fish or fish habitat will only be done following approval from DFO. (S)

12) Upon completion of a water crossing, any temporary fill, culverts, refuse, etc. will be removed from the construction area and properly disposed of in a manner that is satisfactory to MNRF. (S)

13) After construction, on-site inspections will be made by the SFL to confirm these standards are being met. (S)

14) If using temporary winter-only crossings, materials other than ice and snow will be removed from the stream prior to spring break-up. (S)

15) Upon installation, each new water crossing will be incorporated into the approved program for monitoring roads and water crossings. (S)

16) These standards are applicable to previously installed water crossings when they are replaced or upgraded due to sub-standard safety, environmental, or operational reasons. (S)

17) Use techniques and materials appropriate for the conditions encountered at each water crossing, to minimize disturbance of a water feature and significantly reduce the potential for erosion and sedimentation. (G)

18) Ensure logs and brush which may need to be removed or trimmed at the crossing site do not enter the water feature. (G)

19) Grubbing of low vegetative cover between the height of land and a water crossing, or within 100 metres of a water crossing, whichever is less, will be limited to that required to address engineering issues and safety concerns, such as the removal of hazards. (G)

20) When diverting and/or removing water for dry installations, chase away or trap and relocate live fish before completely dewatering the area (note: permits may be required; consult the local MNRF district office for further information). (G)

21) Apply mitigative techniques to provide for fish passage if there is potential to impede or block fish migration during installation of the crossing (G).

22) Begin site stabilization and clean-up as soon as possible after the water crossing has been installed, including the removal of all diversions. (G)

23) Trim fill slopes to a stable angle or use other mitigative stabilization techniques. A person should be able to walk up the slope without causing slumping and sliding of soil particles. When a temporary channel is no longer required, it should be stabilized to avoid long-term erosion. (G)

24) Construct and use fords during the driest time of the year but not during the restricted time of high risk to fish; ensure the ford does not restrict fish passage. (G)

25) Material used within the stream and on the banks to improve the crossing will be clean, non-erodible, and non-toxic to aquatic life. (G)

26) Install culverts on a straight section of stream. When installation of a culvert on a straight section of stream is not possible, minimize the change in stream morphology and impacts on fish habitat (as per Figure 5.1d from SSG). (G)

27) Replace or correct existing water crossings that pose a risk to public safety or to fish passage or fish migration using the guidance from the *'Forest Roads and Water Crossing Initiative Task Team Report'*. (G) Specifically:
    i. Through the existing approved program for monitoring roads and water crossings significant changes and problems will be identified and inventory data bases will be updated.
    ii. Identified problem water crossings will be corrected to current prescribed standards as soon as practical on a priority basis.
    iii. Problems that pose the greatest risk to public safety, fish passage, or fish migration will be given a higher priority for remedial action, while lesser priority problems will be attended to as time and resources permit.

Best Management Practices

28) Use instream sediment control techniques to isolate working equipment from shallow open water.

29) Establish a maintenance schedule to keep culverts clear of obstructions to help avoid potential problems, particularly washouts and obstruction of fish passage.

30) Nuisance beaver activity should be managed to keep culverts clear and provide for the passage of water and fish.

31) On streams wider than 2 metres bridges or arch culverts should be considered.

32) Install culverts with at least 10 % of the diameter of the culvert below the natural stream bed.

33) Maintain vegetation on the approaches and fill slopes by re-seeding or placing sediment/erosion control on road cuts and fills where problems occur.

34) Normally culverts are not recommended for use as temporary, winter-only water crossings. Structures and techniques such as temporary bridges, ice bridges, and snowfills are normally more appropriate.

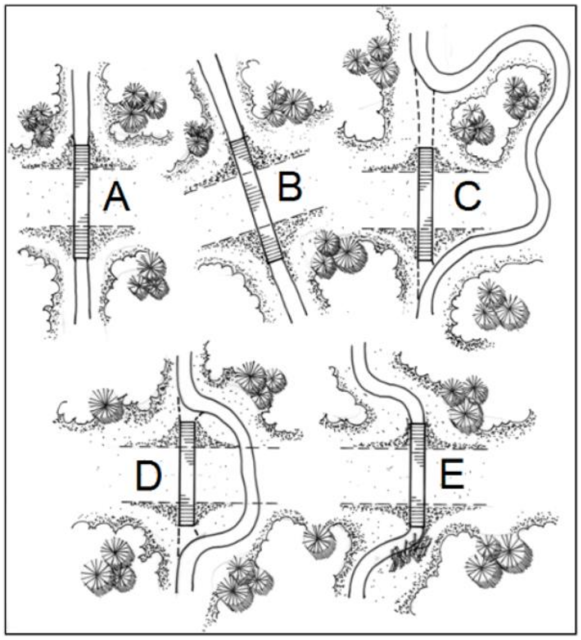


Figure 5.1b from S+S Guide. Fitting a culvert to the creek alignment to minimize change in stream morphology. Examples A, B, and E are preferred. Examples C and D change stream morphology and will likely require DFO approval. (Illustration by Kestevan Design).

4.5.5.1.5.3 Decommissioning and Rehabilitation of Water Crossings

This direction applies to all water crossings being removed.

1) When decommissioning a road, all water crossings on that road will be assessed for decommissioning, especially those that pose a risk to public safety or to fish passage or migration. Water crossings that will no longer be maintained will be formally decommissioned in an environmentally sound manner and approved by MNRF. Decommissioning may or may not require removal of a water crossing. (S)

2) During decommissioning, workers will prevent contamination of a water feature by foreign materials such as lumber, nails, logs, brush, fuel and oil. (S)

3) Decommissioning and rehabilitation operations that may enter a water feature (i.e., in-water work) or that may potentially cause sediment to enter a water feature, are not to occur during periods of fish spawning, incubation, or fry emergence, unless approved by MNRF. (S) If warranted local MNRF offices can vary timing dates and mitigative measures based on local knowledge. (G)

Timing restrictions for in-water work

Warmwater fisheries	**April 1 to June 30**
Coldwater/ Mixed fisheries	**October 1 to June 30**
Coldwater fisheries	**October 1 to May 31**
Unknown fisheries	**October 1 to June 30**
Critical fisheries habitat	**All year**

4) The SFL for decommissioning of water crossings will monitor operations and mitigation techniques to prevent the harmful alteration, disruption, or destruction of fish habitat, the impairment of water quality, and problems related to fish passage. (S)

5) Fill material placed below the high water level within the floodplain of a water feature will be erosion resistant and/or protected from erosion. (S)

6) Any exposed mineral soil between the height of land and the water crossing, or within 100 m of the water crossing, whichever is less, will be trimmed to a stable angle and be protected from erosion so sediment will not enter the water. (S)

7) Upon completion of decommissioning, any temporary fill, culverts, refuse, etc. will be removed from the construction area and disposed of in a manner satisfactory to the MNRF. (S)

8) Following decommissioning, on-site inspections will be made by the SFL to confirm the standards are being met. Problems are to be reported to MNRF immediately. (S)

9) For decommissioned water crossings that have not been removed, have a monitoring program to identify and mitigate safety and environmental issues. (S)

10) Whether and how a water crossing structure is to be removed will be based on an analysis of biological, water quality, engineering, and safety criteria, which considers, at a minimum, the following items (G):

Biological
i) history of beaver activity;
ii) sensitivity of fish species;
iii) whether the structure is currently an impediment to fish migration or may be an impediment to fish migration in the future;
iv) the presence of critical fish habitat and the likelihood of the habitat being impacted should a washout occur; and
v) whether removal activities would cause damage to fish or fish habitat.

Water Quality
i) in the event of a washout or erosion problems, will additions to natural background levels of suspended sediments affect downstream fish habitat or other values.

Engineering
i) the type of the water crossing structure (e.g., culvert, bridge);
ii) the length of time the structure was designed to be functional (e.g., whether the crossing has been designed for a 10-year or 100-year storm event);
iii) the expected life of the materials used in the construction of the crossing structure;
iv) whether the fill material is similar to the streambed/streambank material;
v) whether the road will allow for floodwaters to pass without washing out;
vi) the amount and type of fill used in construction of the water crossing;
vii) impact of removal of the crossing on the use management strategy of the associated road or road network;
viii) costs of removal.

Safety

i) if the water crossing structure failed or if a washout occurred, would a hazardous situation result.

11) Use techniques appropriate for the conditions encountered at each crossing to minimize disturbance of the water feature and the potential for erosion and sedimentation during and after decommissioning. (G)

12) Decommissioning of water crossings is related to decommissioning of roads. Ensure the schedules for water crossing and road decommissioning are coordinated. (G)

13) Decommissioning of the water crossing will be consistent with the vehicular traffic expected by the use management strategy for the road. (G)

14) If continued vehicle passage will occur after removal of the crossing structure, ensure the crossing site is safe and erosion resistant (e.g., installing a ford, as per Figure 5.1e from SSG below) (G).

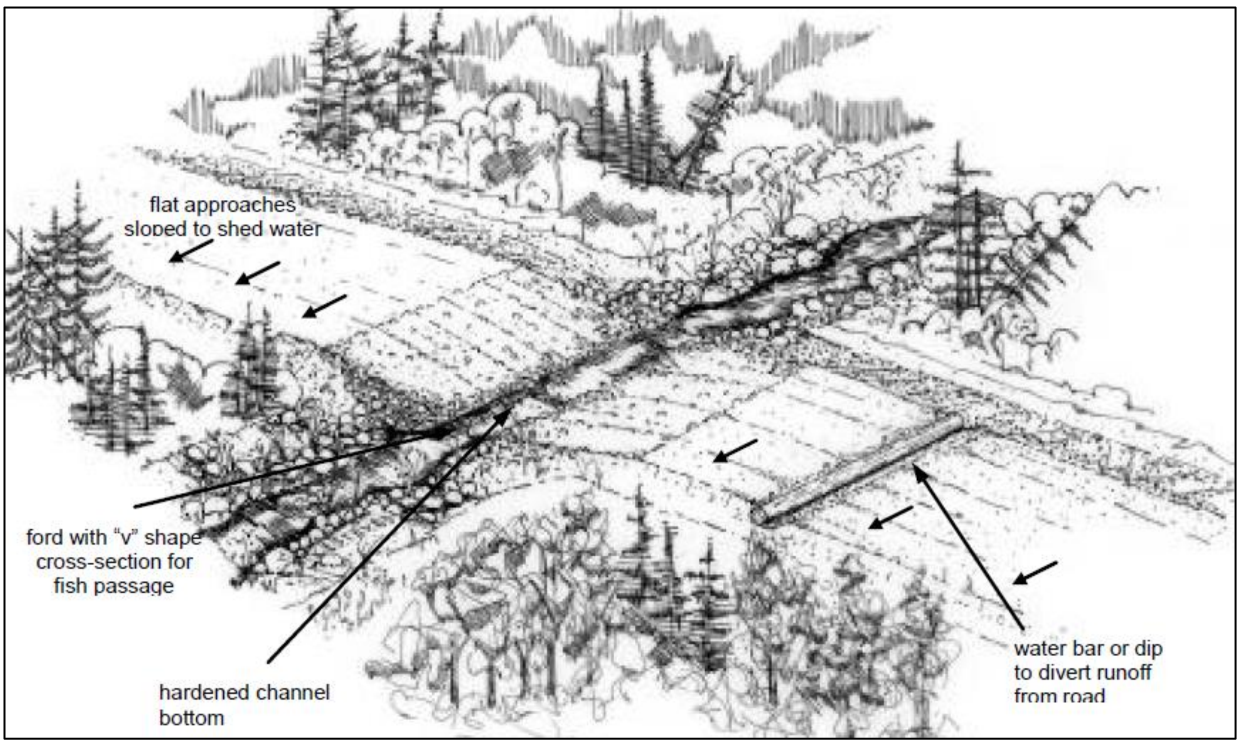


Figure 5.1e. from S & S guide. Typical features of a ford (Illustration by Kestevan Design).

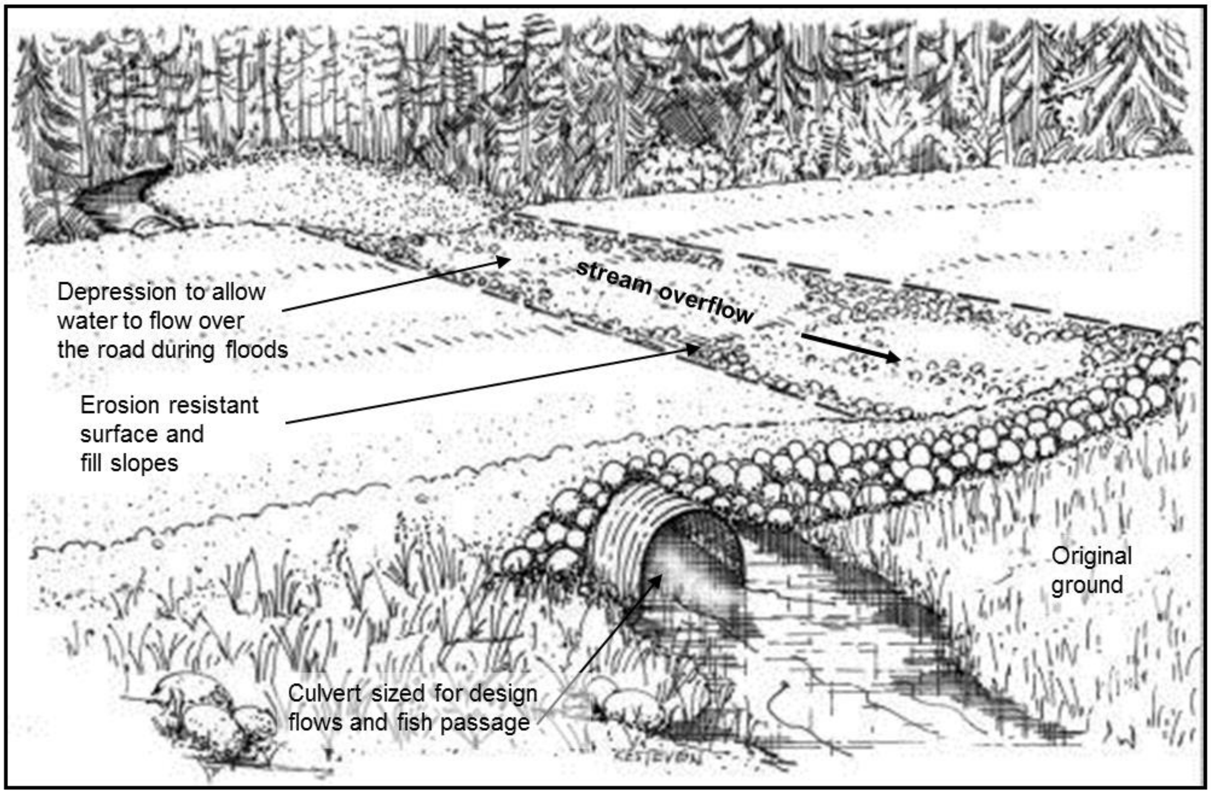


Figure 5.1f. from S & S guide. A Depression beside culvert allows water to spill over the road in the event of a flood or culvert blockage (Illustration by Kestevan Design).

Best Management Practices

15) Where decommissioning may result in unsafe conditions for vehicle travel, physical barriers may be considered.
16) Where culverts are left in place, an adjacent depression may be excavated to allow for floodwater spillover or culvert blockage (as per Figure 5.1f from SSG below). This may require the addition of erosion resistant materials on the downstream side of the road.
17) Use instream sediment control techniques to isolate working equipment from shallow open water.
18) Establish a maintenance schedule to keep culverts clear of obstructions to help avoid potential problems, particularly washouts and obstruction of fish passage.
19) Nuisance beaver activity should be managed to keep culverts clear and provide for the passage of water and fish.
20) On streams wider than 2 m bridges or arch culverts should be considered
21) Maintain vegetation on the approaches and fill slopes by re-seeding or placing sediment/erosion control on road cuts and fills where problems occur.
22) Normally culverts are not recommended for use as temporary, winter-only water crossings. Structures and techniques such as temporary bridges, ice bridges, and snowfills are normally more appropriate.

4.5.5.2 Road Information Products

For roads that are the responsibility of the licensee, this plan identifies and portrays the following:

a) The corridors for primary construction
b) The corridors for branch roads planned for construction (10 years);
c) The operational road boundaries (10 years);
d) The areas of concern within the corridors and operational road boundaries;
e) The 100 meter wide crossing of each Area of Concern within primary and branch road corridors;
f) The roads that will be maintained;
g) The roads and associated water crossings that will be monitored;
h) The segments of roads which will have access controls implemented, and the type of access control activities; and
i) The segments of roads which will be decommissioned, and the type of decommissioning activities.

The road information products include:

- Operational Road Boundaries: MU220_21ORB00
- Existing Road Use Management Strategies: MU220_21ERU00
- Planned Road Corridors: MU220_21PRC00
- A composite AOC layer: MU220_21AOC00
- An FMP Index map: MU220_2021_FMP_MAP_Index_00
- A series of FMP 1:20,000 scale operations maps: MU220_2021_FMP_OPS****_00

4.5.6 ROAD WATER CROSSINGS

The water crossing standards to be implemented will be in accordance with the direction in the *Ministry of Natural Resources and Forestry/Fisheries and Oceans Canada Protocol for the Review and Approval of Forestry Water Crossings* (the Protocol). The decision framework in the Protocol will be used to assist in determining crossings that require an MNRF, and if necessary, a Department of Fisheries and Oceans (DFO) review. Any approved water crossing standards from this Protocol that will be used during forest operations are documented in Supplementary Documentation H. In addition to the applicable construction conditions, all applicable water crossing standards will be documented in AWS-1 (for construction) and AWS-2 (for decommissioning) by their water crossing standard identifier. In instances where a water crossing standard does not exist, an approved water crossing standard cannot be met in its entirety an MNRF review is required. Approval of the crossing and the conditions on construction will occur as a part of the AWS approval, or as a revision to the AWS. More information can be found in Supplementary Documentation H.

4.5.7 FORESTRY AGGREGATE PITS

The extraction of aggregate from forestry aggregate pits for use on forest access roads will comply with the exemption criteria as outlined in the Forest Management Planning Manual, Part A, Section 1.3.6.6. Forestry Aggregate Pits are typically utilized for a ten-year period starting from the initial aggregate extraction from the pit, however in many cases, partial cutting systems are used on the Bancroft Minden Forest, and as a result forestry aggregate pits are needed for periods that exceed 10 years. If forestry aggregate pits are to be used for storage, they must be confirmed to be a forestry pit, not one granted to another licence holder or permittee under the Aggregate Resources Act.

The following criteria will apply to a forestry aggregate pit:

- The aggregate is required for a forest access road in a management unit;
- Aggregate is extracted:
    a) No closer than 1.5 metres above the established groundwater table; or
    b) Closer than 1.5 metres above the established groundwater table if:
        i. The proposed site is remote or isolated; and
        ii. The excavation limit of the site is not within:
            - 500 metres of a coldwater stream;
            - 1, 000 metres of a water well, whether dug or drilled; and
            - 5, 000 metres of a receptor (e.g., residence or facilities where people sleep {nursing homes, hospitals, trailer parks, camping grouds}; schools; day-care centres);
- The pit is established within:
    a) An approved new primary or branch road corridor in the FMP, and identified in the Annual Work Schedule;
    b) An approved area of operations in the FMP, and identified in the Annual Work Schedule;
    c) An approved operational road boundary in the FMP, and identified in the Annual Work Schedule; or
    d) An approved aggregate extraction area in the FMP, and identified in the Annual Work Schedule located within 500 metres of an existing forest access road.

Conditions on Forestry Aggregate Pits

The direction applies to aggregate pits both outside Areas of Concern and within Areas of Concern where operations are permitted. The following operational standards apply to the extraction of aggregate resources for forestry aggregate pits:

1. Topsoil and overburden, where present, will be stripped and stored on site.

2. Aggregate material will be removed only within areas where access, harvest, renewal, tending, or aggregate extraction has been planned and approved, with no removal occurring within 15 metres of the boundary of any planned area.

3. Aggregate material must not be removed from an Area of Concern or within 15 metres of the boundary of an Area of Concern, except:

    a) For a cultural heritage landscape or historic Aboriginal value, as defined in the Forest Management Guide for Cultural Heritage Values, if
        i) FMP-11 of the forest management plan documents conditions on location, construction or use of the Forestry Aggregate Pit, as per the advice of a qualified individual as defined by the *Forest Management Guide for Cultural Heritage Values*, and
        ii) The aggregate material is removed in accordance with such conditions; and
    b) For all other values, if,
        i) FMP-11 of the forest management plan documents conditions on location, construction or use of the Forestry Aggregate Pit, and
        ii) The aggregate material is removed in accordance with such conditions.

4. Notwithstanding standard 3 above, aggregate material will not be removed from an Area of Concern or within 15 metres of the boundary of areas of concern for the following values described in the *Forest Management Guide for Cultural Heritage Values:*
    a) Archaeology site
    b) Cemetery
    c) Archaeological potential area

5. When operating within 15 metres of a proposed roadside ditch, no excavation is to take place below the elevation of the planned depth of the proposed ditch; all excavations will be immediately sloped to no steeper than a 2:1 (horizontal: vertical) angle.

6. During extraction, no undercutting of the working face is permitted and:
    a) the working face must be sloped to a stable angle of repose, or
    b) the vertical height of the working face must not be more than 1.5 metres above the maximum reach of the equipment.

7. All trees within 5 metres of the excavation face must be removed.

8. The maximum active pit area will not exceed 3 hectares. When a pit or a portion of a pit is rehabilitated, it is no longer part of the pit.

9. When the site is inactive, all pit faces will be sloped to a stable angle of repose.

10. Within the excavation area, no ponding will be allowed and offsite drainage will be designed to prevent sediment from entering any water feature.

11. MNRF may direct that a forestry aggregate pit be rehabilitated where the responsibility for the road and associated forestry aggregate pit is being transferred back to MNRF.

12. Final rehabilitation must include:
    a) sloping of all pit faces to a minimum of 3:1 (horiz:vert));
    b) re-spreading of any topsoil and overburden previously stripped from the site; and
    c) mitigative measures, to the satisfaction of MNRF, to prevent erosion (e.g., establishment of vegetation).

13. Existing or proposed Forestry Aggregate Pits within AOCs, or in the vicinity of specified features that are addressed in c*onditions on regular operations*, will not be constructed or operated except in circumstances as identified in the conditions on operations in the forest management Plan. This includes any restrictions on the construction of new pits and timing of aggregate extraction, rehabilitation, or other associated operations in existing pits.

14. Progressive rehabilitation of the site must be ongoing starting from the commencement of the Forestry Aggregate Pit.

15. If a forestry aggregate pit has not been active for a period of five years and the sustainable forest licensee confirms that future use of the pit is not required, final rehabilitation must be completed in accordance with standards above within 12 months of the sustainable forest licensee's confirmation.

    Despite standard 15, if MNRF agrees that access to the pit that requires rehabilitation is not feasible within the 12-month period specified, MNRF and the sustainable forest licensee may agree, in writing, to a longer period.

Best Management Practices

- The on-going rehabilitation of the pit, or the portion of the pit, should occur within one year of the last extraction.
- Vegetative tree cover on rehabilitated sites should be tree species representative of the ecosite.

4.5.7.1 Aggregate Extraction Areas Information Products

Aggregate extraction areas identify known sites of aggregate where a forestry aggregate pit is planned to be established. There are no aggregate extraction areas planned for the 2021-31 plan period Additions to aggregate extraction areas will require an amendment to the FMP.

4.5.8 WOOD STORAGE YARDS

Wood storage yards are sites that are geographically separated from the harvest location that may be used for slashing, sorting, storage and other wood measurement activities of forest resources prior to the movement of final processing destination(s) (e.g., previous harvest blocks, forestry aggregate pits, existing or new wood storage yards). There are no wood storage yards planned for the 2021-2031 plan period. Additions of wood storage yards will require an amendment to the FMP. If wood storage yards are added then Appendix V: Operational Standards for Wood Storage Yards from the FMPM will be followed.

4.5.8.1 Wood Storage Yards Information Products

Since there are no wood storage yards planned for the 2021-2031 FMP, there are no associated information products.

4.6 EXPENDITURES

Planned expenditures are documented in FMP-19 and correspond to the level of renewal treatment planned and described in FMP-17. The forecast of silvicultural expenditures was derived using the planned level of treatments documented in FMP-17 and the associated renewal support forecasts. Those forecasts were then associated with current costs to produce estimated expenditures. An in-depth analysis was done to look at invoices for silvicultural treatments performed in the 2011 plan up until March 31st 2019 to determine the actual costs of the full suite of treatments performed by PLANFU and stage of management and calculated based on a weighted average of the proportion of applied area.

Silviculture costs have been updated to represent average costs on the management unit for specific treatments. Extensive (fixed) costs that apply to the regeneration of all forest units are:

- Harvest/prescription/tree marking direction development
- Boundary and Area of Concern layout
- Tree marking audit/Silvicultural Effectiveness Monitoring
- Silviculture administration

Tree marking is the most common treatment in the forest, as partial harvests are predominant. All forest units except the following three forest units: INTCC, MXHCC and MXCCC receive tree marking 100% of the time. Renewal costs vary widely across PLANFUs. For example, tree marking can vary between $40-75/hectare. Intolerant Hardwood clearcuts (INTCC) receive tree marking about 10% of the time and are the most economical to renew. In contrast, red pine clearcuts (PRCC) receive intensive renewal treatments (e.g. mechanical and chemical site preparation, tree planting, tending, precommercial thinning and tree marking 100% of the time) making them the most costly to renew. A detailed breakdown of the costs associated with renewal is available in Appendix 6 of Supplementary Documentation B. The projected expenditures and revenues are an estimate and rely heavily on the model assumptions of the distribution of management intensity across all forest units.

The planned expenditures associated with forest renewal is $12, 862, 000 for the 10-year period with $437, 000 expected from the Forestry Futures Trust. The costs for the 2021-2031 FMP are higher than the previous plan; 9.5 million vs 12.8 million. With an expected inflation of 2.5%/year [12]over the last 10 years, the 2011 budget would cost 11.7 million today, suggesting that the budgets have only increased

[12] Bank of Canada Inflation Rate for this period was 1.58%.

slightly through time. The modelled expenditures were expected to be 9.4 million, which is significantly lower than the planned expenditures of 12.8 million. This is mostly a product of the additional areas included in FMP-17, which include current silvicultural obligations from the 2011 plan, which the model does not account for. Additionally, the increased commitment to artificial regeneration, as the stands selected for allocations are expected to be well suited for conversions and thus have a higher proportion of artificial regeneration applied than the model assumed.

4.7 MONITORING AND ASSESSMENT

4.7.1 FOREST OPERATIONS INSPECTIONS

4.7.1.1 Compliance Goal

The goal of the Bancroft Minden Forest compliance strategy is "To ensure all Company forest operations are in compliance with legislated standards which contribute to the protection or enhancement of the forest ecosystem."

4.7.1.2 Background

The Bancroft Minden Forest Company is a sustainable forest licence holder with an overlapping licensee harvest arrangement. The SFL Company and the overlapping licensees each have responsibilities within the compliance program.

Bancroft Minden Forest Company is responsible for forest management planning and reporting. The Company also conducts operational planning and co-ordinates silvicultural operations utilizing the services of SFL staff, shareholder companies and silvicultural contractors. BMFC is also responsible for ensuring that forest operations compliance monitoring and reporting are conducted to MNRF standards.

Overlapping licensees are responsible for meeting compliance standards for their harvest and access operations. They are also required to report activities that do not adhere to operating standards.

The compliance strategy will guide and direct all forest operations conducted by BMFC, overlapping licensees and contractors in Bancroft Minden Forest. It will be a source of direction in order to provide natural resource protection and guide improvements within the program into the future.

Since the SFL's inception in 1998 significant efforts have been made to ensure an effective compliance monitoring and reporting program. All compliance monitoring and reporting is conducted by SFL staff members. In addition, the SFL operational staff takes a proactive approach by working co-operatively with harvest operators in access and harvest planning on all harvest blocks and the associated roads. A comprehensive compliance inspection schedule is put in place for all operations in order to provide early detection and prevention or correction of any variance to compliance standards. These additional efforts have assisted in keeping the majority of operations compliant with government standards and guidelines.

The purpose of the Forest Operations Compliance program is to ensure that activities, in forest operations on Crown land, conform to the standards and rules put in place through the regulatory framework (CFSA-FMP-AWS-FOP). This is done so that those operations will result in the benefits planend and simultaneously ensure the long term health of the forest ecosystem. Forest compliance does this by focusing on prevention of loss of, and repair of damage to, Crown forests and the forest ecosystem using a broad range of education, training, encouragement, monitoring, enforcement and corrective actions.[13]

A review of the compliance reports from 2016 to 2019 described in the Annual Reports for the Bancroft Minden Forest indicates that operators have achieved a particularly good compliance record. There were a total of 210 reports submitted of which 8 were reported as non-compliant. This results in 96% of all reports being reported as compliant.

Table 65. Compliance history for the Bancroft Minden Forest.

Compliance Status	**Fiscal Year** 2016	2017	2018	2019	**Count of Inspections**
In Compliance	50	46	48	58	202
Not In Compliance	2	2	1	3	7
Total	*52*	*48*	*49*	*61*	*210*

No significant trends are evident when assessing compliance history for the Bancroft Minden Forest. However, there are topics concerning compliance activity worthy of discussion.

Crown and private land is intermingled in many parts of Bancroft Minden Forest. Crown harvest blocks are commonly adjacent to one or more private properties. A condition of the SFL licence is that the Company is required to delineate the boundary of the licence area. BMFC staff or contractors must establish and mark the limit of the Crown Forest operations abutting private land. Abutting landowners are then contacted to determine their approval of the established boundary. There are also Crown Forest operations adjacent to cottage subdivisions which add to the complexity of boundary delineation. Additional efforts are required in maintaining good communication and positive relations with numerous individual landowners and cottage owner associations.

Non-compliance related to Areas of Concern identified in the FMP appears to have a higher representation than in other activity areas. SFL and MNRF compliance inspections place a high priority on features within access corridors and harvest blocks containing forest values. This priority results in

[13] OMNR. 2014. Forest Compliance Handbook. Directive and Procedure FOR 07 01 03.

more focus and emphasis placed on inspecting all forest operations adjacent to ‘Areas of Concern’. With more intensive and detailed inspection, inaccurate boundary marking and incursions into reserves are more likely to be identified and reported. This priority for inspections follows the concept of risk based priority setting in the overall forest compliance program.

The requirements of the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (OMNR 2010) and the high proportion of species at risk in the BMF adds to the number of values to be protected in forest operations and to the complexity of the measures to protect these values in the 2021-2031 FMP.

There was a finding from the 2017 Independent Forest Audit (IFA) related to Values collection efforts as follows: “Better communication between MNRF and BMFC would allow for more efficient use of MNRFs limited resources and provide the MNRF with the opportunity to focus values collection efforts where they are most essential.” This finding resulted in strategies to share information on harvest priorities with MNRF which will help mitigate potential compliance issues related to AOCs in the future.

Changes in forest management policy and regulation are continuous, remaining current with the government requirements takes considerable effort. Company policy and business practice must regularly adapt to these changing requirements. Shareholders, contractors, and forest workers must be advised of the changes when they occur as they relate to their individual operations to ensure compliance.

There was a finding in the 2017 IFA related to compliance as follows: “evidence of poor operating practices was found on 4 of the 22 blocks sampled.” This finding resulted in the following three actions: 1) Review and adjust training needs on a more regular basis for operators and contractors to respond to emerging trends and changes. This action has also resulted in an FMP objective to hold bi-annual operator training sessions; 2) Emphasize more thorough documentation of unusual circumstances in FOIP; and 3) Initiate joint inspections with district compliance staff.

4.7.1.3 Compliance Objectives

Resource Protection

- Provide protection to the forest ecosystem by ensuring all forest operations are implemented in accordance with applicable legislation and within the approved standards of the FMP and Annual Work Schedule.
- Review the effectiveness of the Company’s compliance inspection program and modify priorities to meet current challenges or identified deficiencies.
- Maintain an open dialogue with MNRF staff, forest operators and licensees for the exchange of information relating to resource management activities.
- To actively collect and update values information on the forest through all phases of operations.
- Contribute to the protection of the forest against fire, insects and disease through monitoring and prevention programs.

Training, Education and Communication

- Educate the shareholders, operators, contractors and Company staff in work techniques that ensure compliance with the established standards and guidelines contained in the FMP and legislation governing forest operations.
- Develop a workplace environment where forest workers are encouraged to report operational concerns or issues in a timely fashion without fear of reprisal.
- Encourage the sharing of training programs and opportunities with forest industry and government agencies.
- Promote the concept that “compliance is everyone’s responsibility”.
- Ensure that all Company compliance inspectors are certified and have the opportunity to upgrade their skills through additional training.

Adapting to Changing Government Legislation, Regulation and Policy

- Conduct all forest operations in a manner that will meet or exceed the established MNRF standards.
- Ensure Company staff, shareholders, operators and contractors remain current on compliance issues, new initiatives, legislation, procedures and policies.

Improving Efficiency of Compliance Activities

- Deliver a cost-effective, practical and efficient compliance monitoring inspection and reporting program.

4.7.1.4 Strategies and Actions

Strategies have been developed to meet the objectives stated above. These strategies will be in effect for the Ten year period after which they will be reviewed to ensure relevance and efficiency in meeting the objectives.

Objective – Resource Protection

Strategy

To conduct a high quality forest management program that includes an effective compliance monitoring and reporting component. This comprehensive program will result in the protection and enhancement of the forest ecosystem.

Actions

- Communication between Company staff, shareholders and their staff will be promoted to provide an understanding of the compliance plan, approved Annual Work Schedule and FMP, as well as applicable legislation for forest operations.
- Experienced and qualified personnel will complete detailed Forest Operations Prescriptions (FOPs) for all harvest operations. FOPs will follow the approved silvicultural ground rules in the FMP. FOPs will be based on stand analysis information obtained from field inspection. Identified and previously unidentified forest features and values will be mapped, and the FMP prescribed protection will be implemented.

- Operational boundaries including the boundaries of AOCs will be clearly identified and marked by trained and capable technical staff or consultants. All personnel conducting this function will have training regarding AOC prescriptions found in the approved FMP.
- Compliance monitoring and reporting will be completed only by certified compliance inspectors.
- All operations on the SFL will comply with the Fire Prevention and Preparedness Plan. BMFC will cooperate with the MNRF in fire prevention and fire suppression.
- The Company will report any insect and disease infestations identified from field observations.
- The Company will promote the exchange of current resource management information.

The annual compliance plans will provide information on the operations for that year and details on the inspection and reporting program.

Forest operations inspections will be completed in accordance with MNRF standards. At least one FOIP report will be submitted for each harvest block or compliance reporting area that had operations during any particular AWS. The direction for compliance inspections and reporting in sections FOR 07 03 04 and FOR 0 7 03 05 of the Forest Compliance Handbook 2014 will be followed.

The following reporting schedule will be used.

Start-up notice (e-mail or fax) for each:

1. harvest block
2. access road
3. renewal/maintenance activity (compliance reporting area)

'Completed' FOIP report for each:

1. harvest block
2. access road
3. renewal or maintenance activity

'Pending or Other' FOIP report can be used at any time during an operation to report:

1. an operational issue
2. to provide an update for in-progress activities before the operation is complete.
3. suspended operation
4. release of any part of an operation for MNRF audit

Objective – Training, Education and Communication

<u>Strategy</u>

Encourage continuous training and upgrading of skills within the SFL, and to encourage information transfer to contractors and shareholders.

Actions

- Develop, provide, and promote training opportunities for staff responsible for conducting compliance inspections and implementing forest operations.
- BMFC will review all non-compliance incidents. Where appropriate, additional training will be provided at the location of the infraction with all involved personnel. Providing training to prevent recurrences of non-compliance is a priority.
- An evaluation of compliance program will be completed annually. Modifications or changes to compliance program priorities will be implemented where deficiencies become apparent. Training will be elevated where compliance trends show problem areas.
- BMFC will actively participate on joint MNRF/Forest Industry training/educational committees.
- Effective communication by Company staff will clearly describe compliance standards to woods workers. A workforce that has been trained in the mandatory compliance standards will reduce incidents of non-compliance.
- Promotion of Best Management Practices (BMPs) regarding conditions on regular operations will be encouraged and utilized where appropriate.

Objective – Adapting to Government Legislation, Regulation and Policy

Strategy

Ensure staff, shareholders, contractors, and forest workers remain current on the information required for their respective jobs.

Actions

BMFC will promote staff training opportunities in resource management and the related legislation and standards.

- Company compliance inspectors will receive inspector certification though the forest competency training program. Refresher/re-certification training will also be required to stay current on the status of the changing regulations relating to forest compliance and forest management.
- Workshops will be developed as needed to update Company staff, shareholders, contractors, and forest workers on current topics related to forest operations.
- BMFC will encourage feedback and maintain an open dialogue with shareholders, silvicultural contractors, and forest workers. In this way all parties may participate in meeting challenges to the increasing complexity meeting the government standards for forest operations. All parties will contribute to finding solutions to ensure operations can be undertaken in compliance.

Objective – Improving Efficiency in Compliance Activities

Strategy

Eliminate duplication of effort and provide consistency by assigning one staff member to act as the Company representative for each operation.

- The Company's compliance monitoring program is conducted by BMFC staff. The same staff member is responsible for all operations on a given harvest block. In this way knowledge of the site is maximized and continuity in communications achieved.
- Clear communication with MNRF compliance personnel and forest operators is necessary for a cost-efficient Company compliance program. Where compliance concerns arise, prompt communication and joint inspection can significantly improve efficiency. Dialogue with MNRF will efficiently utilize staff resources of both parties by avoiding duplicated or repeated inspections required to resolve compliance issues.

4.7.1.5 Roles and responsibilities

- BMFC will prepare the compliance strategy and any updates.
- Only certified compliance inspectors will conduct forest operations inspections. Currently there are no overlapping licensees with monitoring and reporting functions. Should this change an 'Enhanced Compliance Arrangement' would be required.
- All inspection reports will be reviewed and approved by the BMFC Senior Technician or General Manager.
- BMFC is responsible for implementing the compliance program. Prevention, monitoring and reporting, however, is a shared responsibility between all parties. The Company, Shareholders, and any contractor performing work on the Bancroft Minden Forest all have a responsibility to ensure forest operations are conducted in a manner that will meet or exceed the established standards.
- Preventive and mitigation actions and follow up are the responsibility of the assigned Company inspector for that jobsite. The Senior Technician or General Manager will provide advice and support for these compliance functions.
- The Senior Technician is the Company representative for compliance matters.
- Training sessions and workshops will be developed and conducted by a variety of Company, Shareholder, and external sources as required to address any specific need.

4.7.1.6 Notification of the Status of an Operation

- Start-up notices will be e-mailed to the MNRF compliance lead and Management Forester prior to commencing each individual access or harvest operation (FMP allocation) and prior to the commencement of a renewal or maintenance activity. For renewal and maintenance activities, a start-up notice will be provided for: tree planting, mechanical site preparation, chemical site preparation and tending, manual tending etc.
- FOIP reports will be submitted within the required timeframe for suspended and completed reports and when an operational issue is identified.
- In addition, the Company will keep records tracking the current status of all operations for each AWS. This ledger is continually updated and will be forwarded when requested by the MNRF District office. This practice was used in the 2011/21 FMP to transfer operational status information and has worked effectively. In this way the MNRF can be kept up to date on the status of operations at any particular time. MNRF will be provided updates on completed tree marking operations using this ledger. Harvest blocks on which the tree marking has been audited and approved will be updated on the ledger when approved by the Company.

4.7.1.7 Prevention, Avoidance, and Mitigation

- A Company compliance inspector is assigned responsibility for monitoring each forest operation. The first priority for the inspector is to assist with planning, education and prevention measures relating to compliance. During this operational stage clear communication with the people doing the work is paramount. Advice on values locations and operational modifications, harvest boundary and access considerations, timing restrictions, sensitive sites, etc. can be provided at this time.
- Regular on-site inspections will assist in identifying and correcting any actions or trends that may lead to non-compliance.
- When a concern is encountered the Company inspector will evaluate the severity and take the necessary steps to limit or repair damage. If the inspector determines that any continued work at that site will result in environmental harm, all operations will be shut down. Verbal notification to the MNRF will take place and a FOIP report will be submitted reporting an Operational Issue.
- If the concern can be corrected the inspector will advise the operator/ licensee of appropriate corrective or remedial action.

4.7.1.8 Compliance Reporting Areas

Harvest and access inspections will be reported individually in harvest or access reports by block (operational road) or by individual road (primary or branch).

Renewal and maintenance activities will be grouped into compliance reporting areas, by activity. Individual reports will be submitted for:

- Spring tree plant
- Summer tree plant
- Mechanical site preparation
- Chemical site preparation
- Chemical tending
- Manual tending

4.7.1.9 Monitoring Compliance of Forest Operations

BMFC is responsible for conducting all forest operations compliance inspections and meeting the standards in the Company compliance strategy and the Forest Compliance Handbook. Company staff will implement the compliance program and will conduct inspections for all harvest and access operations undertaken by the overlapping licensees as well as for renewal and maintenance operations undertaken by the Company. All inspection reports are documented through the Forest Operations Information Program (FOIP).

In addition, Company staff will report occurrences not related to SFL operations which are assessed as having a negative environmental impact, such as blow down, insect damage, road washouts, trespasses onto Crown lands, etc. MNRF will be promptly provided with observations and information on these conditions verbally. No reports will be submitted through the FOIP system.

4.7.1.10 MNRF District Program for Auditing Forest Operations

MNRF Role

MNRF is the regulatory agency responsible for all forestry activities within Bancroft Minden Forest. MNRF's forestry compliance role is to monitor and audit forestry activities through conducting spot-checks of industry activities in order to ensure compliance with the Crown Forest Sustainability Act, the Forest Management Plan and other existing applicable legislation. MNRF is responsible for investigating and acting on all compliance issues that are discovered or reported by BMFC, MECP, or the public.

Compliance Priorities

The following section describes how the MNRF sets direction for auditing forest operations and forest operations inspections.

Under direction 4.7.1.4 of the Compliance Handbook, MNRF Bancroft District completes an annual compliance operation plan. Compliance plans describe the overall risk management strategy that is being adopted and the evaluation of the analyzed risks, along with the associated accepted risk tolerance. The risk assessment includes:

- An assessment of the inherent risks (environmental and operational) associated with the forest operations proposed during the plan period.
- The operational control system(s) (e.g. supervision, standard operating procedures, forest certification systems) that will be used to minimize the inherent risks.
- The likelihood and magnitude of loss or damage if control system(s) fail and mitigation strategies to be used in response.
- Taking into consideration any findings from the 2011-2017 Independent Forest Audit

A risk assessment is conduct for all planned forestry activities that are identified in the Annual Work Schedule, including access, harvest, renewal, and maintenance activities. Priority inspection areas are identified based on higher risk of the likelihood of loss or damage to occur to the resource or value and the consequences should loss or damage occur. The risk assessment is completed for all forest operations and considers; the complexity of the operation (i.e. site susceptible to site damage; such as, damage to regeneration or rutting), sensitivity of values or habitat types (i.e. species at risk and natural reproducing brook trout lakes), the operator's compliance history and local compliance trends. Through the risk assessment, inspections are prioritized with an emphasis on the forest operations that are assessed to be high risk operations where there is a higher likelihood for compliance issues or where there is a greater impact to a value should a compliance issues occur.

MNRF Compliance Reporting

All MNRF inspections, verifications and remedies are entered into the Forest Operations Information Program (FOIP) and adhere to the direction of the Forest Compliance Handbook.

Silvicultural Activities

As identified in the district ACOP, compliance monitoring will be conducted on renewal and maintenance operations through planned inspections as well as through post-harvest surveys conducted through the district's silvicultural effective monitoring (SEM) program. The district's SEM program will include free-to-grow surveys, tree marking audits and post-harvest surveys.

Responding to Operational Issues and Issues of Non-Compliance

MNRF evaluates all reported operational issues and determines the appropriate course of action including, determining the issue to be in-compliance, correctable, or not-in-compliance. In discussion with BMFC, MNRF compliance inspectors assign corrective action for issues that they have determined to be correctable as well as perform a follow-up inspection to ensure satisfactory completion of all correctable action. For issues that are determined to be not-in-compliance, MNRF is responsible to determine the appropriate outcome (i.e. remedy such as a warning letter, order or administrative penalty). The district compliance review committee meets and discusses the fact surrounding all non-compliant issues and recommends an outcome to the district manager who is responsible for the determining the outcome. The MNRF actively monitors all compliance incidents until the issue has been corrected or resolved through the application of a remedy.

There was a finding from the 2017 IFA as follows: "The number of MNRF compliance inspections fell below planned levels on a consistent basis throughout the term of the audit." This has resulted in the creation of new positions at the Bancroft District for compliance inspectors and a greater emphasis placed on the use of a risk-based approach to the annual compliance operating plan.

4.7.1.11 Opportunities for LCC involvement

The Terms of Reference for the Bancroft Minden Forest Local Citizens' Committee does not contain specific commitments with regards to the involvement of either the LCC in the forest operations inspection program and the MNRF's monitoring of forest operations. However, committee members are provided with an annual overview of the forest operations compliance activities during the presentation of the Annual Report and as needed based on emerging issues and trends. Significant non-compliance issues will be brought to the LCC at regular scheduled meetings in order to keep the members apprised of activities on the forest. Additionally, the LCC has access to Forest Operations Information Program (FOIP) reports upon request and may, when practical, conduct field observations of operations.

4.7.2 EXCEPTIONS

There are no exceptions planned in this FMP that require monitoring programs.

4.7.3 ASSESSMENT OF REGENERATION

Assessment of harvest, renewal and tending operations is an important aspect of regenerating the forest to the desired forest condition. Assessments are conducted on naturally and artificially regenerated areas to determine the status of the forest condition, the effectiveness of silvicultural treatments and the need for any type of remedial action required if an area is not successfully regenerated. The results of these assessments also provide opportunities for continual improvement of activities such as prescription setting, silvicultural treatment, guideline preparation and funding allocation at various levels.

Both formal and informal procedures contribute to an effective monitoring program. Monitoring activities entail post-harvest surveys, plantation survival assessments, regeneration stocking and condition assessments and free-to-grow (FTG) surveys.

Table FMP 20 Planned Assessment of Establishment identifies the level of survey required during the 10-year period of the 2021-2031 FMP to determine regeneration success of stands harvested during the 2011-2021 FMP and previous plan periods. These areas are separated by forest unit, SGR and 10-year plan term. The assessment of regeneration normally occurs by completing a free-to-grow survey in previously depleted areas to confirm that areas have been regenerated in a manner consistent with the applicable SGR under which the stand was depleted.

The planned assessment area in FMP-20 was calculated based on the following:

- Clearcut and shelterwood seedcut harvests (naturally and artificially regenerated) in previous plans scheduled to be assessed during the implementation of the 2021 plan that have not yet been declared free-to-grow.
- Any planned harvest treatments that are expected to be eligible for assessment immediately or shortly post-harvest (e.g., selection forest units).

A total of 10, 176 ha of harvest area is expected to be assessed for establishment in the 10-year period of the FMP (does not include planned harvest areas for the 2021 to 2031 period). Of the total hectares to be assessed for establishment in the 10-year period 3, 680 ha were harvested using the shelterwood silviculture system and require a final removal cut before they can be assessed.

The planned harvest area for the 2021 to 2031 FMP was not included, since it is impossible to forecast at this stage of planning which operations will occur in the first few years of plan implementation. The forecast area to be assessed does not limit additional assessments from occurring. The SFL's internal Silviculture Effectiveness Monitoring record-keeping system keeps track of the year of treatment and is used to plan FTG survey programs annually.

4.7.3.1 Establishment Surveys

Monitoring of renewal areas begins immediately after harvest until the regenerated stand is declared to be established, or FTG. To determine the silvicultural effectiveness of applied silvicultural treatments, periodic observations of the treated area are conducted. Surveyed areas are tracked to determine where the standards for regeneration specified in a silviculture ground rule (SGR) for a particular stand were met, or when the regenerated stand meets standards specified in an approved SGR other than that specified for the particular stand. When a stand does meet the regeneration standards of any SGR in FMP-4, it is deemed not sufficiently regenerated (NSR). When stands are deemed to be NSR, the following interventions may occur:

- Stand will be given more time to meet standards
- Supplementary planting
- Mechanical or Chemical tending/cleaning

The Regeneration Standards section of each SGR defines the standards by which regenerating stands are measured. These standards include a list of managed species, minimum height, target site occupancy and establishment year. The results of FTG surveys will be reported spatially in Annual Reports, with additional focus at Years 5 and 10, as per FMPM and FIM requirements. Management standards are included for single-tree selection and shelterwood forest units, describing desired stand structure, species composition criteria and Acceptable Growing Stock (AGS) improvement.

The survey methods used to assess regeneration success of clearcut and uniform shelterwood forest units are consistent with the Silvicultural Effectiveness Monitoring Manual and are based on the Site Occupancy Index (SOI) method for silviculture monitoring. BMFC uses a tablet-based software program called Renewal Establishment Assessment Program (REAP) to collect data and quantify results of FTG surveys. If stands meet the regeneration standards described in the SGR, then they are declared FTG. The methodology for this survey type is fully described in Supplementary Document G.

Intensive and Extensive ground assessments are used to determine regeneration success. Stands with little variability or obvious pass/fail outcomes can be sampled with less rigor and no loss of confidence. The timing for these assessments will vary by forest unit and silviculture system. The establishment year is detailed in FMP-4 and FTG surveys will be conducted at or before the establishment year. The type of survey conducted will be determined by the variability within the stand. High variability in stocking, species composition, density or canopy stratification will require more plots to provide accurate and precise estimates. Stands with little variability or obvious pass/fail outcomes can be sampled with less rigour, with no loss of confidence.

Stands managed under the selection and irregular shelterwood silvicultural system, as well as stands that receive a commercial thinning or preparatory harvest entry (partial harvest entry) will be assessed using tree marking audits and compliance inspections/post-cut assessments. Tree marking audits are carried out by both SFL and MNRF staff and can be a source of success assessment data. Collected information will help determine if management standards (defined in FMP-4) were met, determine consistency with the marking prescription and will result in a new FRI stand description for an FRI update. If results of compliance inspections/post-cut assessments indicate that the tree marking audit does not represent the post-harvest conditions, a post-harvest plot-based cruise will be conducted (Post-Cut Cruise). A silvicultural monitoring and reporting system that incorporate elements beyond regular annual reporting mechanisms and a guiding principle for Forest Operations Prescription writers and tree markers (Best Management Practice) was developed and is fully described in Supplementary Document G.

Plantations are monitored periodically for survival and stocking and regular tending assessments occur to ensure areas where silvicultural investments have been made receive adequate follow-up treatments. Certified tree markers implement the Forest Operation Prescription and continually assess stand conditions and adjust tree marking throughout each stand to achieve the objectives set out in the prescription. Tree marking in selection and shelterwood area is audited by the SFL and MNRF to ensure appropriate implementation and must achieve the provincial minimum standard. The provincial minimum standard for tree marking quality is 90%, however, an audit result of 93% or less will elicit a review of circumstances and/or remarking to ensure all silvicultural objectives are achieved.

A full description of the monitoring program for regeneration success is included in Supplementary Document G.

4.7.3.2 Performance Monitoring

The monitoring program for Performance (the period between establishment and when projected yield can be assessed) has not been included in the FMP as the FMP was developed under the Phase-in provision (2020 FMPM, A-6, ln 26-30).

4.7.4 ROADS AND WATER CROSSINGS

Monitoring of roads and water crossings is carried out primarily by overlapping licensees and harvesting contractors during active operations. BMFC staff support and supplement their efforts, particularly on road systems that may not have active harvest operations, by communicating situations that are reported to the Company by members of the public and identifying needs during access planning prior to harvest. Safety and environmental concerns are the focus of these inspections, and concerns are noted and addressed on a priority basis regardless of the agency responsible. Washouts are promptly reported to MNRF.

Normal maintenance and monitoring activities for roads which are the responsibility of the licensee are described in Section 4.5. When a road or section of road is being used for access to support silvicultural activities, BMFC staff will be responsible for monitoring and the licensee or Company using the road will be responsible for maintenance. Monitoring of road construction (new and maintenance) and water crossings (new and maintenance) will also be carried out through forest operations compliance inspections and reported through the Forest Operations Inspection Program where activities apply. For details on forest operations compliance monitoring practice, see Section 4.7.1.

When roads are no longer the monitoring responsibility of the SFL, MNRF conducts monitoring activities using a risk-based assessment approach through strategic monitoring on a 3-year basis. The inventory and inspection of bridges are conducted by Regional Engineering Units however, the district road inventory procedure will identify bridges that are in poor condition and not maintained when encountered.

4.7.5 BEECH BARK DISEASE MANAGEMENT STRATEGY

Beech Bark Disease (BBD) was first observed in the Bancroft Minden Forest in 2011 and is now present throughout the management unit. BBD is caused by an insect-fungus complex and it results in the mortality of a large percentage of the trees it infects. A non-native scale insect (*Cryptococcus fagisuga Lind.)*, first observed in Ontario in 1966, feeds on the sap of Beech trees and opens wounds in the bark. This allows native Neonectria fungus to colonize the bark, causing the eventual death of the tree. This has obvious ramifications for wildlife and on the composition of future forests where beech is present. In addition, the mortality of mature beech results in significant root sprouting, leading to beech saplings forming thickets in the understory. These Beech saplings, which will also likely develop BBD, are able to out-compete other hardwood species, such as Sugar Maple and Yellow Birch, leading to less ecologically diverse and less productive future forests.

A Beech management strategy has been developed to deal with the impacts of BBD in the Bancroft Minden forest. The goal of this strategy is to maintain healthy, productive forests on Crown land in the presence of this disease. The main points of the strategy are outlined below:

- For determining the silviculture system and stage of management, Beech is considered unacceptable growing stock (UGS).
- All Beech is eligible for harvest, unless marked for retention.
- Strong emphasis will be placed on retaining mast species other than Beech (Oak, cherry, basswood, ironwood).
- In areas of the forests where BBD has been present for longer periods of time, additional emphasis will be placed on retaining disease resistant trees in the medium and large size classes.
- Significant efforts will be made to tend understory beech thickets, using an integrated pest management (IPM) approach.

A more detailed description of the Beech management strategy in the Bancroft Minden Forest can be found in Supplementary Document G.

4.8 FIRE PREVENTION AND PREPAREDNESS

The purpose of the Bancroft Minden Fire Prevention and Preparedness Plan is to:

- Describe the promotion of wildland fire prevention within the SFL;
- Allow operations to continue to work safely as long as possible as the fire danger risk increases;
- Detect and report wildfires promptly;
- Ensure workers are adequately trained to use available equipment to take safe action that will reduce negative impacts or damage from a fire, should one occur; and
- Ensure workers are adequately trained in the use of the Modifying Industrial Operations Protocol (MIOP) (OMNR, 2011).

4.8.1 PROMOTING FIRE PREVENTION IN THE BANCROFT MINDEN FOREST

Bancroft Minden Forest Company in co-operation with the Ontario Ministry of Natural Resources and Forestry will promote forest fire prevention during the fire season (April 1st to October 31st) to all personnel working on the SFL licence area.

Wildland fire prevention and preparedness is a shared responsibility between the SFL, overlapping licensees, harvest operators, silvicultural contractors and forest workers.

Bancroft Minden Forest Company

Bancroft Minden Forest Company will promote wildland fire prevention and preparedness with anyone working on the SFL licence forest. This includes the steps companies will take to ensure that onsite operators will classify forest vegetation, obtain and review fire intensity codes and modify operations in accordance with sections 20,22 and 23 of the Outdoor Fire Regulation. Ensuring that licensees and silvicultural contractors have their own plans in place for fire prevention, promote training and monitor forest operations.

Compliance monitoring under the Forest Operations Inspection Program (FOIP) includes wildland fire prevention and preparedness. Compliance monitoring inspections will be intensified during periods of elevated wildland fire hazard on high risk and very high risk operations.

Overlapping Licensees, Contactors and Operators in Bancroft Minden Forest

Overlapping licensees, Contactors and Operators must conduct their operations to comply with the Bancroft Minden Fire Prevention and Preparedness Plan, the Forest Fire Prevention Act (FFPA) and the Guidelines for Modifying Industrial Operations in Response to Fire Danger. In addition, overlapping licensees, Contactors and Operators will institute increased fire prevention measures if requested by the MNRF.

For silviculture contractors conducting operations directly for BMFC, the SFL will monitor the fire information and the local fire hazard and advise the contractor when additional modifications are required to forest operations. Regardless of SFL notification contractors are expected to apply due diligence with respect to forest fire safety and modify or curtail operations if, in their opinion, conditions warrant.

Overlapping licensees will monitor the fire information and the local fire hazard (fire weather indices). For Contactors and Operators conducting operations for an overlapping licensee, the overlapping licensee will monitor the fire information and the local fire hazard and advise the contractor when additional modifications are required. This information is available on a daily basis and can be obtained through the internet https://www.ontario.ca/page/forest-fires or by phone (705)-754-3465).

Overlapping licensees will consider the proximity of their individual operations- to obtain information from the most appropriate weather station. There are two weather stations within the management unit, Haliburton and Bancroft.

The Overlapping Licensees, Contactors and Operators will promote and ensure that all employees are aware of the following wildland fire prevention and preparedness measures as outlined by the FFPA R.S.O 1990, c. F.24:

- No person shall smoke while walking or working in a forest area during the fire season. R.S.O. 1990, c. F.24, s. 28; 2009, c. 33, Sched. 22, s. 3 (9);
- No person shall throw or drop, in or within 300 meters of a forest area a lighted match, cigarette, cigar, or other smoking material;
- Operators and contractors are to have no open fires on the license holdings during the fire season with exception to recreational users who are permitted open fires within FFPA parameters;
- Power saws are to be operated and refueled in a safe and legal manner;
- No person shall use or operate any burner, chimney, engine, incinerator or other spark-emitting outlet that is not provided with an adequate device for arresting sparks within 200 meters of a forest. R.S.O. 1990, c. F.24, s. 33; 2009, c. 33, Sched. 22, s. 3 (12);
- All power saws kits must include fire extinguishers rated for ABC types with a minimum of 225 grams of dry chemical;
- Pack-pumps and other hand tools are to be readily available and fully functional;
- Serviceable fire extinguishers must be on or within 5 meters of all mechanical equipment operating in the forest; and
- Equipment operators shall inspect their machines daily and will remove any accumulation of flammable material.

The Overlapping Licensee will:

- Be responsible for knowing the location of local water sources for pack-pumps and power pumps in the event of fire;
- Ensure all operations under their license operate in compliance with the Forest Fires Prevention Act; and

- Ensure that all fire cache equipment is strategically located, functional and is inspected once per month during the fire season.

4.8.2 MODIFYING FOREST OPERATIONS FOR THE PREVENTION OF FOREST FIRES

Operations on the Bancroft Minden Forest will implement the *Modifying Industrial Operations Protocol*. The protocol allows for or restricts forest operations with respect to fire risk. Fire risk is based on a combination of factors to determine the required modifications.

1. Fire suppression equipment (Minimum equipment standards)
2. Fire suppression capabilities (Trained personnel and adequate communication capabilities)
3. Operational risk of specific forest operations (Hazard of ignition due to equipment type and stoniness)
4. Fire hazard (Forest fuel categories)
5. Fire danger (Weather)

Work modifications under the protocol

*Operational modifications (Prevention - P, Short Shift - SS, Restricted Shift - RS or Shutdown - SD) will apply starting at 00:01hrs (local time) on the calendar day for which the modification is identified. *Prevention* is a part of the normal operations and must always ensure compliance to Ontario's Forest Fires Prevention Act, on all operations.

Under *Short Shift* operations are not permitted between 12:00 and 19:00, local daylight savings time. Prevention measures still apply and a dedicated patrol* of the area must be carried out for one hour after operations shut down. Workers will be advised of the increasing fire danger. Machines will be inspected and cleaned of debris daily. Communications equipment and procedures will be checked.

Under *Restricted Shift* operations are not permitted between 08:00 to 22:00, local daylight savings time. Prevention measures still apply and a dedicated patrol* of the area must be carried out for one hour after operations shut down. Identify water sources close to operations prior to commencing any operations. Machines will be inspected and cleaned of debris daily. Spark arresters will be inspected once every two weeks. The fire cache must be within 20 minutes (round trip) of the operation.

Under *Shutdown* no operations are permitted, effective 06:00 local daylight savings time on the first day of shutdown. Operations will remain suspended until conditions change and Prevention, Short Shift, or Restricted Shift is indicated. Prevention measures still apply and a dedicated patrol* of the area must be carried out for one hour after operations cease. Once this initial patrol in complete, lower risk operations working in the vicinity can offer dedicated fire patrols during the shutdown period.

**Operators conducting dedicated patrol must have the ability to immediately report fires.*

Overlapping licensees, contractors and forest workers will adhere to the following measures:

- promote and ensure all employees are aware of the fire prevention and preparedness measures;
- monitor daily fire hazard rating;
- daily communications will be maintained with all wood workers notifying them of the current and forecasted fire hazard situation;
- check all suppression equipment at the beginning of each shift (i.e. ensure back- pumps are full and operational);
- all mechanical equipment (i.e. spark arrestors) is to be checked at the beginning of each shift for potential fire hazards and the corrective action immediately implemented;
- the work area will be patrolled for a minimum of 1 hour after operations cease;
- advise any other forest users within the work area of the high fire hazard.

4.8.3 FOREST FIRE DETECTION AND MNRF NOTIFICATION

All fires detected on the licensed area or any smoke seen elsewhere, will be reported immediately to MNRF at:

Haliburton Fire Management Headquarters (FMH) at (705)-754-3465

The following information will be reported:

- fire location
- access to fire location
- size of fire
- what is burning (forest, building, equipment, grass, cut-over, etc)
- any threat to human life or other values (buildings, forest products, equipment, etc.)
- the location of water sources
- any fire suppression activities underway
- name, address and return telephone number of the person reporting fire

In the Event of a Fire

The overlapping licensee or contractor will contact the Haliburton FMH and commence immediate fire suppression activities using all available equipment and trained manpower.

If the fire is not immediately controlled and assistance by the MNRF or local municipal fire department is required the overlapping licensee, operator or contractor will take direction from that authority and will provide the following information:

- probable cause of the fire;
- on site manpower and equipment working on the fire;
- hours worked (manpower and equipment); and
- the time and method of initial attack.

The forest industry will continue to fight the fire until it is unsafe to do so within the training capabilities of workers, declared out by the MNRF or until MNRF or the local municipal fire department relieves the industry personnel. Any further or extended commitment will be mutually agreed upon between the SFL or overlapping licensee and the local Fire Management Supervisor.

During escalating fire operations, “Forest Fire Operations by Forest Industry” AFFES:FM:2:15 will apply. Fire Operations are escalated when fire danger has increased to a critical level and/or a major fire situation has developed. The MNRF may request industry assistance with sustained action on fires or industry resources placed on alert for response.

4.8.4 FIRE FIGHTING EQUIPMENT

Each piece of mechanical equipment will be equipped with a serviceable fire extinguisher (6A80ABC). The extinguishers must be on or within 5 meters of all machines operating in the forest as per the Forest Fire Prevention Act.

Persons conducting industrial activities in the forest must also have available fire suppression equipment for suppressing wildfires that are started by the operation or are discovered in the course of daily operations. For groups of workers working in the same general area (e.g., cut block) this equipment can be stored in a "fire equipment cache" located centrally to the worksite. The cache must be located as close as possible to but no further than 10km from the operations.

Fire equipment caches are allowed for groups of workers as long as workers are within 10 km of cache. Workers must be able to get equipment to the fire location within 20 minutes by ground transportation.

Fire equipment cache will contain a minimum of:

- 1 pumping unit, and
- 3 shovels

The *Modifying Industrial Operation* requires that the fire plan specify when backpack pumps will be stored in a location other than the machine. Operations on the Bancroft Minden Forest will store backpack pumps in the operators’ vehicles and not on the machines. The reason for storing the packs in the operator’s vehicle is to avoid spills and/or damage to the pump within the cab of the machine.

Table 66. Suppression equipment required by operation.

OPERATIONS	# OF MACHINES	# OF EQUIPMENT CACHES	BACKPACK PUMPS*
Heavy Equipment with tire chains or tracks, working in forest fuels.	1-5	0	1/machine
	6+	1	
OR**:	1-9	0	

Heavy Equipment at work within a 10 km radius of each other (includes hot work).	10+	1	1/machine [stored in vehicle (refer to note in text)] or hot work
Tree plant, manual tending or other labour intensive operations		0	1 for every 4 workers, to a maximum of 10/site

** A serviceable pressurized water delivery system located on a machine can replace a backpack pump.*

*** Only one fire equipment cache will be required on site, providing it is within 20 minutes (by ground transportation) of all equipment.*

4.8.5 COMMUNICATING THE FIRE PREVENTION AND PREPAREDNESS PLAN WITH FOREST WORKERS

Wildland fire prevention will be emphasized during the fire season to all personnel working on the SFL licence area. The responsibilities of all parties will be outlined for SFL staff, overlapping licensees and their staff, operators, silviculture contractors and forest workers. The contents of the FFPPPMN will be discussed with staff and a copy of the plan will be made available upon request to any worker.

Specific training and communication on forest fire prevention or operational planning on woods modification may also be undertaken. These can be in the form of:

- SFL sponsored workshops
- Joint MNRF/ SFL training sessions
- On site practical advice to forest workers during SFL forest operations compliance inspections
- Blanket operator notifications and training messages by the SFL.

4.8.6 FOREST FIRE SUPRESSION TRAINING

All operations on the Bancroft Minden Forest will be undertaken with the status of 'Trained and Capable' as outlined by the Modifying Industrial Operation Protocol. These operations will be trained and capable to suppress any fires that may start. 'Trained and capable' status as it relates in forest fire preparedness has four criteria.

- At least 25% of the forest workers at any particular site have successfully completed a fire suppression training program which meets the MNRF SP-102 standards
- An effective fire prevention plan is in place and is being implemented.
- The required fire suppression equipment by operation type is available as is described in the table on the previous page.
- The ability to communicate and report fires immediately and to receive or obtain updated information on the fire danger. (immediately in this case means two way radio or telephone capabilities to the Company or MNRF office)

SP-102 fire suppression training will be provided to new staff, woods workers, operators or contractors who have not as yet received the training. In this way all operations may be upgraded to 'Trained and Capable' status if there are any deficiencies in the trained staff component.

The SFL in co-operation with the MNRF will provide refresher fire suppression training for industry staff. Refresher training will be provided to ensure that workers with the SP-102 training will receive an update at least once every five years. Refresher of the MNRF SP-102 will provide information updates on the forest fire suppression program as well as explaining any new government initiatives within this program area.

4.9 COMPARISON OF PROPOSED OPERATIONS TO THE LONG-TERM MANAGEMENT DIRECTION

The LTMD provides a strategic foundation for the operational portion of the FMP. As an aspatial model, SFMM uses stand averages and gross areas upon which available harvest areas are based. It does not consider the spatial arrangement of stands on the landbase nor the logistical requirements of having harvest areas at least loosely aggregated into harvest allocations. The selection of harvest areas includes a practical approach to having allocations aggregated in a manner that will facilitate access to the greatest extent possible and have few stands within those allocations that are not allocated unless they are truly not eligible for harvest. As a result, separate operational analysis is necessary as the harvest allocations and inventory data utilized during the development of the LTMD are not representative of the final allocations.

Following consultation with the public, proposed harvest areas were revised and another verification run was executed known as the SFMM 1.3.10 model run (2020 FMPM Section A 1.3.10). The results were re-evaluated based on inventory updates and changes to the allocations. This section outlines considerations given to the areas selected for harvest, and how they continue to progress toward achievement of the LTMD, and any impact on short, medium and long-term objective achievement. Further detail is provided in Section 6 of the Analysis Package located in Supplementary Documentation B.

4.9.1 PLANNED HARVEST, RENEWAL AND TENDING OPERATIONS

The comparison of the Proposed Operations to the LTMD is critical to understanding if the harvest allocations selected for the plan affect the objective assessment. To make this comparison, the proposed areas are aggregated by PLANFU, AGECLASS (AC) and YIELD, which are then manually entered into the model as the first term's harvest schedule. This changes the model's solution to reflect the condition expected if the FMP's harvest schedule is used instead of the schedule forecasted in the LTMD. This updated model solution is often called the "1.3.10", which is a reference to the FMPM section that describes this model and associated analysis. SFMM provides the available harvest area

(AHA) for ten separate forest units, as documented in FMP-8. These AHAs are not to be exceeded. In this forest, the allocations were not allocated up to the full AHA level for some forest units. Notably, HESH has been significantly under-allocated (58%) to address concerns regarding hemlock old growth objective achievement (refer to Section 3.7.3). AOC locations were also added to the inventory used for operational planning. This includes both reserve and modified areas. Reserve areas decrease the amount of area available for harvest that is entered into the model and must be identified as such when entered into SFMM, otherwise whereas the model will apply accumulating reserves on top of these areas. Conversely, the modified AOC area leads to a large amount of area where certain silvicultural systems (shelterwood seedcut, final removal and clearcut), can expect to harvest less volume

Table 67: Term 1 AHA comparison.

Scenario	INTcc	MXCcc	MXHcc	PRcc	ORus	PWus	HDsel	CEsh	HDsh	HEsh
1.3.10 Reg Ops	391	144	200	39	192	212	599	6	1150	50
1.3.10 Thinning		5		95		36				
1.3.10 Total	391	149	200	134	192	248	599	6	1150	50
LTMD Reg Ops	400	150	200	56	221	232	648	6	1151	90
LTMD Thinning		9		80	4	61				
LTMD Total	400	159	200	136	225	293	648	6	1151	90

PLANFUs are close to being fully allocated, but operational concerns such as access and economic feasibility prevent 100% utilization. Particularly HDSEL has been difficult to fully allocate as it is often associated with our most common forest unit HDSH. When trying to create full allocations it was challenging to select HDSEL stands without over-allocating HDSH. Creating small, isolated stands with poor access for the sake of bringing allocations closer to 100% utilization was not considered feasible. Therefore, the 1.3.10 run collectively shows lower AHA for Term 1 compared to the 2021 LTMD (Figure 56). This is somewhat intentional as the complexities of the ownership pattern, access, requirements for partial cut systems and the limitations of the FRI often result in the need to amend areas into the plan. The remaining AHA will allow companies to take advantage of opportunities that may arise throughout the course of FMP. This results in less area and subsequently volume projected for the 10-year plan period, but some of this is supplemented with later plan amendment areas and volumes. As the FMP is implemented, many stands will be determined to be operational bypass (experience is about 25% of an allocation). Area deemed as operational bypass will be amended out of the plan to accommodate additional allocations.

The adjustment to the Term 1 AHA led to changes in the medium term AHA, as seen below. Generally, the 1.3.10 scenario resulted in higher levels of harvest compared to the LTMD after Term 1. This is because a reduction in harvest levels in the short term allows for greater model flexibility in later terms.

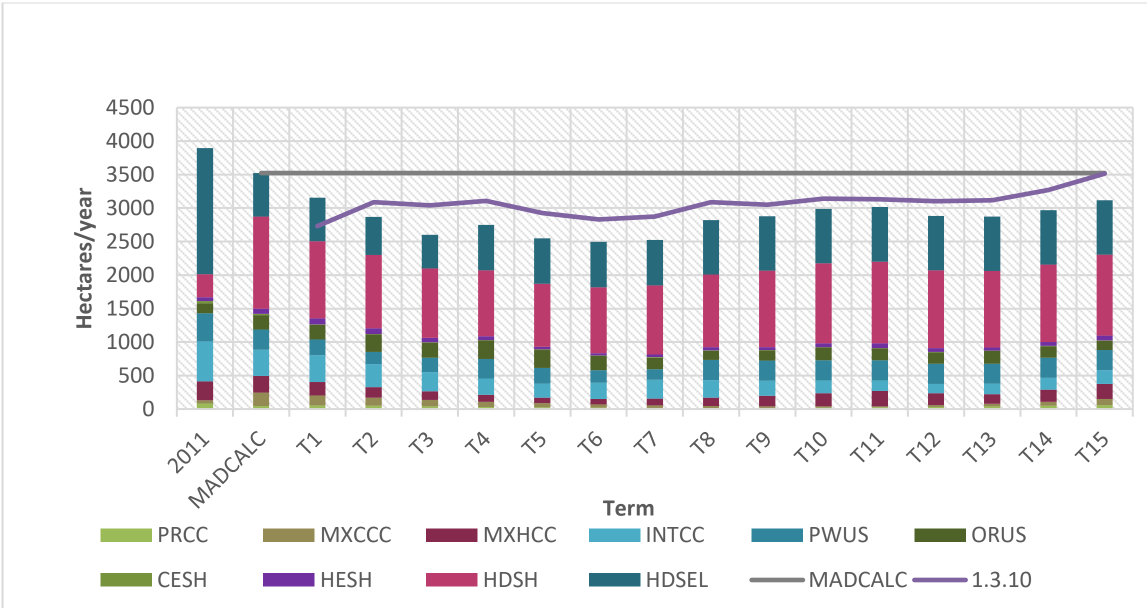


Figure 56. Total harvest area comparison by forest unit.

The Hemlock Shelterwood Old Growth indicator received significant feedback during the LTMD's public review. The LTMD projected a condition where the SRNV could be achieved in the long term, but would have a short term decline and a modest medium term increase. The 1.3.10 predicts a short term increase (compared to a decrease in the LTMD) and a larger medium term increase than the LTMD, representing a significant improvement. The models align by Term 5. The comparison of the projected conditions can be seen below .

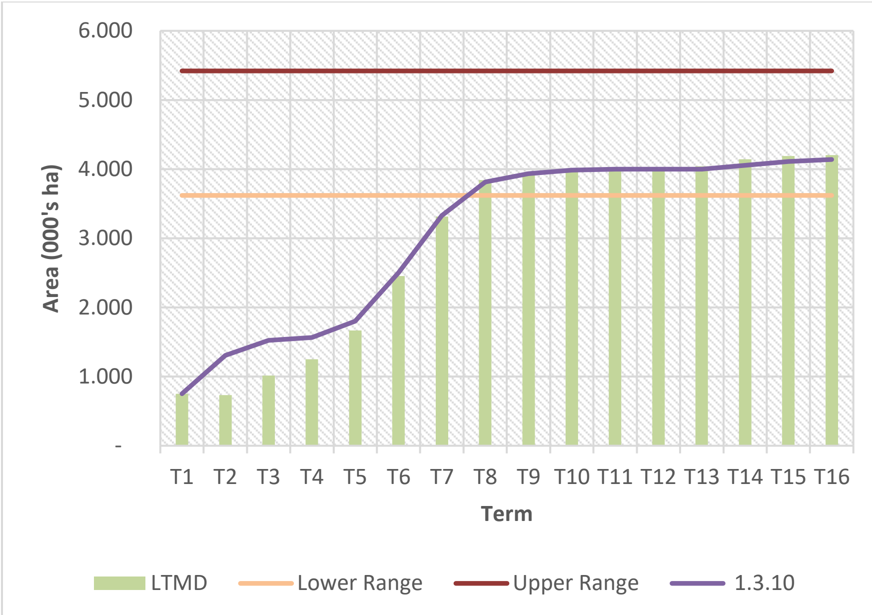


Figure 57. Comparison of the HESH old growth area.

The renewal and tending operations are based on the actual harvest levels. Therefore, less harvesting results in less need for renewal and tending. However, the modelled outcomes of the 1.3.10 will hold the same relative proportions in terms of artificial vs natural renewal and tending as the LTMD as they use the same inputs. FMP-19 lists an planned expenditures of 12.8 million, whereas the modelled expenditures were expected to be 9.4 million. This is mostly a product of the increased commitment to artificial regeneration, as the stands selected for allocations have a higher proportion of artificial regeneration applied than the model assumed. It also assumes that some funding is available for Beech Bark Disease management, which could not be accounted for, as short term burst in funding are not accounting for the projections of an LTMD.

Volume projections were also compared between the LTMD and proposed harvest areas. There are minor differences in the projected volumes due to differing starting conditions (see Section 4.9.3) however, the trends over time are very similar (Figure 58).

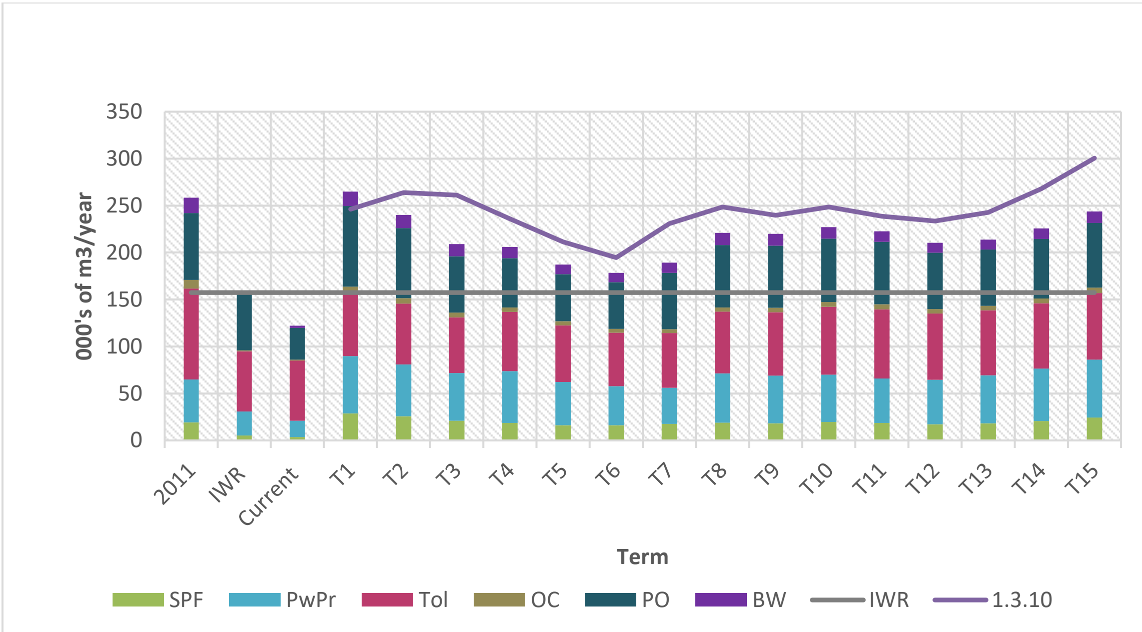


Figure 58. Total volume comparison by species group.

4.9.2 SPATIAL DISTRIBUTION OF HARVEST AREAS

The spatial distribution of harvest area in the 1.3.10 scenario is slightly different than the LTMD. Harvest area in the Bancroft SMZ is expected to increase by 7% in Term 1. The reasons for this shift are two fold;

1. Areas on the Minden SMZ were actively avoided to incorporate public feedback, such as preserving old growth hemlock stands.
2. Concerns regarding Tolerant Hardwood volumes created pressures to increase the number of harvest allocations on the Bancroft SMZ.

Table 68. Changes in harvest area distribution between LTMD and the 1.3.10.

Scenario	Bancroft SMZ	Minden SMZ
LTMD	69%	31%
1.3.10	76%	24%

These changes are not expected to create long term issues, as the 1.3.10 model scenario was still able to maintain a consistent wood supply in both SMZS.

Landscape pattern achievement is very similar to the LTMD, largely due to the initial landscape pattern decisions and fundamental operational considerations consistent in both scenarios. The refined harvest areas were tested using OLT to confirm continued spatially acceptable results related to operations and management objective achievement.

The Texture of Mature and Old Forest are expected to hold the same trends as the LTMD, with both the 50 hectare and 500 hectare scales moving away from the ideal composition. This was expected, as the planned operations contain less harvest area than the LTMD projected. Consequently, mature forest continues to concentrate on the landscape.

In contrast, the Young Forest Patch Sizes are expected to show better achievement compared to the LTMD (Table 69). The 1-100 and 251-500 hectare patch sizes now move towards the desirable levels. The 1-100 hectare patch increased in area, while the 251-500 hectare patch size decreased in area. This represents a net improvement for the indicator.

Table 69. Young forest patch size comparison.

	Patch Size (ha)					
	1-100	**101-250**	**251-500**	**501-100**	**1001-2500**	**2501-5000**
LTMD	73.4%	22.0%	3.5%	0.5%	0.6%	0.0%
Draft Plan	74.9%	22.0%	2.0%	0.5%	0.6%	0.0%
Target	87.0%	10.0%	2.0%	1.0%	0.0%	0.0%

4.9.3 STAND CONDITIONS OF PLANNED HARVEST AREAS

The average stand condition for each PLANFU between the LTMD and the proposed operations is very consistent. The modelled species compositions, stocking and site classes in the LTMD, the 1.3.10 scenario and the stand level volume calculations were consistent to allow for developed yield curves to be applied uniformly. However, the average condition in the OPI did change in each PLANFU, which suggests that the expected condition may differ from the LTMD.

Table 70: Changes to stocking and site class.

PLANFU	Stocking			Site Class		
	LTMD	OPI	Difference	LTMD	OPI	Difference
CEsh	0.8	0.83	0.03	1.33	1.83	0.50
HDsh	0.7*	0.57	-0.13	1.33	1.26	-0.07
HEsh	0.67	0.66	-0.01	1.62	1.45	-0.17
INTcc	0.74	0.74	0.00	2.22	2.17	-0.05
MXCcc	0.69	0.61	-0.08	0.98	1.50	0.52
MXHcc	0.64	0.56	-0.08	1.51	1.56	0.05
PRcc	0.74	0.76	0.02	1.31	0.71	-0.60
HDsel	0.53	0.49	-0.04	0.92	0.85	-0.07
ORus	0.7*	0.63	-0.07	1.78	1.52	-0.26
PWus	0.68	0.66	-0.02	1.77	1.85	0.08

*Highlighted cells represent an adjusted value.

The stocking is generally lower in the proposed operations, but the difference is low. Only the difference in HDSH stocking is significant, which is primarily because the LTMD value was adjusted upward during yield curve development. The site class has more variation, with CESH and MXCCC having notably higher site classes in the OPI and PRCC having a notably lower site class. A comparison between the species compositions is available below.

Table 71: FUSI Comparison

LTMD Species Composition

PLANFU	PW	PR	PJ	SB	SW	BF	CE	LA	HE	PO	BW	MH	QR	YB	OH	MS	BE
INTCC	2	1	0	0	5	6	0	0	0	55	14	4	1	0	11	0	1
MXCCC	10	5	1	17	8	20	8	1	2	10	6	2	2	0	6	0	2
MXHCC	4	1	0	2	8	15	2	0	2	22	12	8	1	2	19	0	2
PRCC	8	68	0	1	2	2	1	0	1	9	2	2	2	0	3	0	0
ORUS	9	1	0	0	1	1	0	0	3	7	1	7	50	0	12	1	6
PWUS	40	12	0	1	4	3	3	0	2	10	4	3	9	0	8	0	1
HDSH	2	0	0	0	3	3	2	0	5	7	3	33	3	5	16	5	14
CESH	2	1	0	22	3	8	49	7	1	2	2	0	0	0	1	0	3
HESH	8	0	0	1	0	1	1	0	53	1	3	10	6	5	9	1	1
HDSEL	1	0	0	0	1	1	1	0	4	4	2	57	1	3	14	0	10

Regular Operations OPI Composition

PLANFU	PW	PR	PJ	SB	SW	BF	CE	LA	HE	PO	BW	MH	QR	YB	OH	MS	BE
INTCC	2	2	0	0	4	5	0	0	0	58	14	4	1	0	1	9	0
MXCCC	30	6	0	7	5	10	4	8	3	7	4	1	1	1	8	4	0
MXHCC	3	1	0	3	8	12	2	0	2	20	13	11	1	2	2	20	0
PRCC	2	80	0	0	3	1	0	0	0	8	2	1	0	0	0	2	0
ORUS	9	1	0	0	2	1	0	0	4	5	1	7	51	1	9	9	1
PWUS	45	13	0	1	2	4	2	2	1	7	4	2	6	1	2	7	0
HDSH	2	0	0	0	2	2	2	0	5	6	3	33	3	5	16	16	4
CESH	1	1	0	17	7	5	51	7	2	1	4	0	0	0	3	1	0
HESH	8	0	0	1	1	1	1	0	50	1	2	14	6	5	1	10	0
HDSEL	1	0	0	0	1	1	0	0	4	4	2	61	0	3	10	15	0

Difference between Scenarios

PLANFU	PW	PR	PJ	SB	SW	BF	CE	LA	HE	PO	BW	MH	QR	YB	OH	MS	BE
INTCC	0	0	0	0	-1	-1	0	0	0	3	0	0	0	0	**-10**	**9**	-1
MXCCC	**20**	0	0	**-10**	-3	**-9**	-3	**6**	1	-3	-2	-1	-1	0	2	4	-2
MXHCC	-1	0	0	1	0	-3	0	0	1	-1	2	3	0	0	**-17**	**20**	-2
PRCC	**-6**	**12**	0	0	0	-1	-1	0	0	-1	0	-1	-2	0	-3	2	0
ORUS	0	0	0	0	1	0	0	0	1	-2	0	-1	1	0	-3	**8**	**-5**
PWUS	**5**	1	0	0	-1	1	-1	1	0	-3	0	0	-2	0	**-6**	**7**	-1
HDSH	0	0	0	0	-1	0	0	0	0	-1	0	0	0	0	0	**11**	**-10**
CESH	-1	0	0	**-5**	4	-3	2	1	1	-1	2	0	0	0	2	1	-3
HESH	0	0	0	0	0	0	1	0	-4	0	-1	4	0	0	**-8**	**9**	0
HDSEL	0	0	0	0	0	-1	0	0	0	-1	0	4	-1	-1	-4	**15**	**-10**

Every PLANFU had a shift of species composition that was greater than 5%, though the shifts fall along expected species. There is a general pattern of having less other hardwoods (OH) and beech expected in operational areas and proportionally more soft maple, with only the MXCCC, PRCC and CESH PLANFU exempted. This shift does not have an impact on modelled volumes, as all 3 of these species provide volume to same product and species groups. The MXCCC operational areas are expected to have much more white pine at the expense of spruce and fir. This represents the commitment to work in MXCCC stands that are well suited for conversions to PWUS. PRCC stands are expected to be more pure, with higher red pine compositions and less white pine, which happens because most PRCC work is expected to occur in established plantations. PWUS is expected to have more white pine and red maple at the expense of other hardwoods and poplar, though the magnitude is small. CESH is expected to have less black spruce and more white spruce, though this change is unlikely to have any impacts as the species are a part of the same species group.

4.9.4 EFFECTS ON AGE CLASS DISTRIBUTION AND PROJECTED HARVEST VOLUME OF PLANNED AREA

The LTMD's projected condition is based on a specific age classes being harvested. Allocations cannot conform to this schedule precisely for operational reasons such as access. The result of this is a low average age of the allocations compared to the LTMD. This shift in age for each PLANFU can be seen below.

Table 72: Average age comparison between models.

Scenario	INTcc	MXCcc	MXHcc	PRcc	ORus	PWus	HDsel	CEsh	HDsh	HEsh
LTMD	85	128	85	94	107	134	122	86	116	154
1.3.10	92	99	92	108	104	118	122	118	107	118

The lower overall age class of the allocations creates a projected volume that is significantly less than the LTMD. This is problematic for the tolerant hardwood objective, which are not expected to meet the target because of the lower age of the HDSH and HESH PLANFUs. However, the lower age class distribution does increase the achievement of the Old Growth objectives, particularly in the HESH objective. Thus, the age class distribution tends to help the habitat objectives, but not volume objectives. In particular, the drop in the average age of the HEsh PLANFU greatly aided in the achievement of the Hemlock Old Growth targets.

Table 73: Comparison of Volumes between LTMD and 1.3.10

Scenario	INTcc	MXCcc	MXHcc	PRcc	ORus	PWus	HDsel	CEsh	HDsel	HEsh
1.3.10 (m3/year)	54641	17690	16237	14567	12218	30227	17815	306	76157	2915
1.3.10 (m3/ha/year)	140	119	81	108	64	122	30	55	66	58
LTMD (m3/year)	9824	13275	9720	5247	58296	8533	44693	521	19901	4451
LTMD (m3/ha/year)	149	265	97	163	70	54	102	34	33	49

Similar to the assessment of objective achievement for the LTMD, the assessment of planned operations was carried out using the Strategic Forest Management Model (SFMM) and the Ontario Landscape Tool

(OLT). A feasible solution in the model is achieved if the same target values for ecological and wood supply indicators can be met as in the LTMD.

In general, the age class distribution of the forecast (planned) harvest area is more widely distributed among age classes and younger on average than the LTMD. This distribution was deemed necessary in order to achieve a balance of harvest allocations that are operationally feasible and consistent with historical cut cycles. The model continues to achieve a feasible solution when run using the forecast harvest areas entered into the model as Term 1 values and objectives and targets continue to be met.

The results from SFMM and OLT were compared to those of the LTMD to evaluate if all objectives and indicators that were achieved at that stage are still attainable with planned operations:

Table 74. Achievement of objective indicators in planned operations compared to the LTMD.

	Desired Levels Met		**Targets Met**	
Indicator	**LTMD Achievement**	**1.3.10 Achievement**	**LTMD Achievement**	**1.3.10 Achievement**
Non-Spatial				
Landscape Classes	6%	6%	94%	94%
Old Growth	22%	22%	78%	81%
Red and White Pine	50%	50%	100%	100%
Young Forest	100%	100%	100%	100%
Species Group Volume	100%	100%	100%	100%
Product Volumes	100%	100%	100%	100%
Harvest Area	97%	97%	97%	97%
Total Non-Spatial	*66%*	*66%*	*93%*	*94%*
Spatial				
Young Forest Distribution	17%	33%	50%	83%
Mature/Old Distribution	0%	0%	20%	20%
MEA Habitat	33%	33%	83%	83%
DEA Habitat	0%	0%	50%	50%*
Total Non-Spatial	*17%*	*20%*	*53%*	*60%*
Total	**56%**	**57%**	**86%**	**88%**

*Mephisto still moves away from the target but not to the same extent as the LTMD.

Indicators with differing results are recorded in red and discussed below. Young forest distribution contains the most prominent changes in objective achievement. The 251-500 ha patch size desired level of 2% has now been achieved. Additionally, the 1-100 ha patch size has increased by 1.5% to move towards the target. In terms of area, the forest now trends towards a texture that better represents a natural young forest patch size distribution. While the targets and desirable levels for DEA habitat remain unchanged, the degree to which the Mephisto deer yard falls short of the desired level is lessened.

Old growth tends were also influenced by proposed operations, as the short and medium term achievement of these indicators has improved. This is directly correlated to the short term under-allocation of AHA. In particular, the reduction in planned harvest area for HESH created a positive short and medium term trend for HESH Old Growth. This is an improvement from the LTMD. Overall, a greater number of objective desired levels and targets were met in the assessment of proposed operations.

4.9.5 EFFECTS OF PROJECTED UNUTILIZED HARVEST VOLUME

Unutilized volumes are primarily in low utilization Species Groups (PWR, SPF, BW, OC) and do not affect the objective achievement of industrial targets. Most of these volume types represent difficult to create conifer habitats, thus as long as the industrial needs are met, unutilized volumes in these groups represent possible improvement in other objectives. The trends and risks associated with low utilization of certain species was explored in detail in Section 5.7.

Unutilized undersized and defect volumes do not affect the outcomes of any habitat objectives. These unutilized volumes could represent a means of alleviating poplar wood supply issues as poplar is primarily used for pulp.

4.9.6 CONCLUSION

Most of the allocations were assigned based on verified suitability from field surveys. The timing of field assessments (after planning inventory and base model inventory completion) meant that the eFRI was not updated to reflect the actual condition of the assigned stands. This led to a certain level of age class and stage of management substitution from the predictions of the LTMD. The proposed operations have been simulated in SFMM to project the effect of this variation on the achievement of the LTMD. The verification run solved and met all ecological targets.

In general, projected volumes for selected operations are lower due to: the under-allocation of the available harvest area; the differences in harvest stand conditions between the LTMD and proposed operations; and the consideration of reduced volume availability in reserve and modified AOC areas. This decrease amounts to 10% of the overall available fibre in the short term.

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. Consequently, there are no significant effects on objective achievement or sustainability.

5.0 DETERMINATION OF SUSTAINABILITY

The overall determination of sustainability is based on the collective assessment of objective achievement, the spatial assessments, the social and economic assessment, the risk assessment, prescriptions and conditions for the protection of values, and conditions on regular operations for the protection of important ecological features. A favourable determination of sustainability allows for the conclusion of forest sustainability and documents how the FMP has regard for plant life, animal life, water, soil, air, and social and economic values, including recreational values and heritage values. A summary of the components considered during the determination of sustainability is described in the following subsections.

5.1 ASSESSMENT OF MANAGEMENT OBJECTIVE ACHIEVEMENT

The achievement of management objectives was assessed using the results of the forest modelling for the proposed operations and spatial assessments. FMP-10: Assessment of Objective Achievement identifies all management objectives, indicators, desirable levels, targets and individual assessment.

Objectives were set based on provincial policy, past forest management plans and results from the Desired Forest and Benefits Meeting. Indicators were set for each objective based on Simulated Ranges of Natural Variation (SRNV) from the Landscape Guide, other scientific information, the Industrial Wood Requirement for wood supply, and various other sources. The desirable levels set the range for the preferred objective achievement, but it is recognized that these levels may not be achievable in the 100-year planning horizon due to the current forest condition and conflicts with other management objectives.

The assessment of objective achievement was based on the extent to which the established desirable levels for each indicator were satisfied within the 10-year period (detailed assessment in Section 3.7.3.). Plan objectives that have been assessed in the LTMD and proposed operations are summarized in the table below:

Table 75: Summary of Objective Assessment

Objective / Indicator	Assessment
Forest Diversity – Natural Landscape Pattern and Distribution	
Texture of Mature and Old Forest (50 ha)	not achieved
Texture of Mature and Old Forest (500 ha)	not achieved

Young Forest Patch Distribution	Partially achieved
Forest Diversity – Forest Structure, Composition & Abundance	
Landscape Class	not achieved
Old Growth	partially achieved
Red and White Pine SRNV	not achieved
Red and White Pine 1995 Levels	achieved
Pre-sapling Development Stage	achieved
Pre-sapling, Sapling & T-stage Development Stages	achieved
Forest Diversity – Habitat for Animal Life	
Browse Producing Habitat	partially achieved
Percent of MEA in Mature Conifer-dominated Forest	partially achieved
Percent of MEA in Hardwood or Mixedwood Forest	partially achieved
Percent of Critical Thermal Cover	not achieved
Compliance Related to SAR Species AOC Prescriptions	future assessment
Silviculture	
Percent of Harvested Area Assessed as Successfully Established (by forest unit)	future assessment
Planned and Actual Percent of Harvest Area Treated by Broad Treatment Type	future assessment
Planned and Actual Percentage of Harvest Area Successfully Regenerated by Target Forest Unit, by Forest Unit	future assessment
Social & Economic – Harvest Levels & Community Well-being	
Available Harvest Area by Forest Unit	achieved
Long-term Harvest Volume by Species Group	achieved
Long-term Harvest Volume by Product Group	achieved
Actual Harvest Area by Forest Unit	future assessment
Actual Harvest Volume by Species Group	future assessment
Crown Forest Area Available for Timber Production	future assessment
Density of SFL Primary and Branch Roads in Productive, Crown Forest	future assessment
Density of SFL Operational Roads in Productive, Crown Forest	future assessment
LCC's self-evaluation of its effectiveness in Plan development	not achieved
Opportunities for involvement of First Nation & Métis communities in Plan development	achieved
Presentation on annual operations to interested First Nation and Métis	future assessment
Operator and Contractor Training on First Nation Values	future assessment
Social and Economic – Healthy Forest Ecosystems	
Percent of Forest Operation Inspections in Non-Compliance, by activity and remedy type	future assessment
Percent Compliance for Site Disturbance/Rutting communities	future assessment
Percent Compliance for Water Quality and Fish Habitat	future assessment
Percent Compliance for Installation and Removal of Water Crossings	future assessment
Communication with Forest Operators	future assessment

1

Of the 34 objective indicators in the FMP:

7	indicators **Achieved** desirable levels or movement towards desirable level through meeting the target level within the FMP period;
5	indicators **Partially Achieved** with achievement of or movement towards target levels (see Section 3.7.3 subsections for discussion of rationale by indicator);
6	indicators do **Not Achieve** desirable or target levels (discussion below); and
16	indicators are measured in the **Future**, after FMP implementation.

The six indicators that do not achieve the desirable or target levels are described below.

Texture of Mature and Old Forest at 50 ha and 500 ha

For both the 50 ha and 500 ha scales, there is an overall movement away from the ideal composition. This is because the majority of the landbase will be dominated by mature and old forest at FMP end. In the LTMD, the solution does not create enough disturbance to significantly shift compositions towards younger age classes. This is a direct result of the predominant reliance on partial cutting silviculture (i.e. shelterwood and selection systems) on the forest and the proportionate low-level application of the clearcut silvicultural system, as well as the existing age class structures that are biased to mature/old, especially in reserves. This bias is a difficult trend to reverse within the FMP timeframe as management intervention is limited. However, the achievement of these indicators is better than would be expected in a natural scenario with no harvesting activity.

Landscape Class

The low achievement of landscape class desirable levels is attributed to the initial age-class structure, the Plan Forest Unit harvest levels and the post-harvest and natural succession rules. These elements collectively correspond to the rate at which the ideal composition can be achieved. Therefore, it will take much longer than the 150 year modelling horizon to achieve the majority of landscape class desirable levels.

Red and White Pine SRNV

The FMP is unable to achieve the Red and White Pine SRNV levels because of the current forest condition. The current forest condition is a result of logging pressures on white pine in the 1800's, followed by consistent fire suppression, which favoured hardwood species and suppressed the natural replenishment of white pine. Since there is far less white pine in the area than would be naturally, the SRNV desired levels for red and white pine is exceedingly difficult to achieve.

Percent of Critical Thermal Cover

The harvest strategy in the Baptiste and Mephisto Deer Emphasis Areas is to maintain a high proportion of conifer cover to enhance deer wintering habitat. The achievement of this objective may be improved through operational planning and harvest block layout during 2021-2031 FMP development. Additionally, Conditions on Regular Operations (CROs, FMP Text Section 4.2.2.2) will be implemented in DEAs to maintain or increase critical thermal cover objectives.

Local Citizens' Committee Self Evaluation

This objective is meant to ensure that the LCC was meaningfully engaged in the development of the 2021-2031 Bancroft Minden FMP. It is difficult to quantify 'engagement' and set targets accordingly, therefore a self-evaluation criterion has been created to evaluate LCC effectiveness in FMP development. Continuous improvement serves as the basis for this indicator as the desirable level is to maintain a score at or above the level achieved for the 2011 FMP.

Unfortunately, the self-evaluation score of 8.0 falls short of the 2011 FMP score (8.6). The category 'Influential' held the lowest average score of 6.8. In contrast, the self-evaluation report reflects high scores for functionality (8.7), representativeness (8.4) and information provided (8.4). The insights provided by the committee suggest that the FMP will be strengthened and improved by thoroughly evaluating their comments, concerns and suggestions.

Overall, plan objectives are being met and progress is projected to be made towards the desired forest condition through the planned implementation of the LTMD.

5.2 SPATIAL ASSESSMENT

Several preliminary spatial assessments were conducted to analyze the achievement of management objectives that are influenced by the location of planned harvest areas. Documentation of these spatial analyses is included in Section 3.7.4, Section 3.7.3, Section 4.3 and Supplementary Documentation B – Analysis Package. Summaries for each analysis follow.

Harvest Areas - Harvest areas were selected to create economically viable allocations throughout the management unit. Fragmentation of stands is minimized as much as possible and other considerations were weighted, such as access. The forest was categorized into two Strategic Management Zones (SMZ), which are used to track the distribution of several key indicators in a spatial context. The former Bancroft Management Unit (MU) and the former Minden MU have been identified as specific SMZ's based on historical MU boundaries and the associated traditional harvest areas of the local forest industry. The allocations are distributed between the Bancroft and Minden SMZ areas for the first 10-year term at 76% and 24% respectively. The harvest distribution pattern has been modelled out for the next 4 terms (i.e. 40 years), at which time the distribution is projected to be approximately 74% and 26%

respectively (Section 3.7.4). The 40-year projection of harvest was considered by the Planning Team to be both operationally and economically feasible and in-line with current shareholder agreements.

Landscape Pattern – Landscape pattern objectives include indicators for maintaining or enhancing natural landscape structure, composition and patterns that provide for the long-term health of forest ecosystems in an efficient and effective manner. The Planning Team relied on MNRF Ontario's Landscape Tool (OLT) projections of the simulated natural forest condition when determining appropriate desirable levels for landscape pattern indicators. Strategic and operational planning considered large, landscape patches, MEAs, DEAs, harvest patch size, and frequency of young forest patches. The spatial distribution of landscape pattern (measured by Ontario's Landscape Tool) is slowly moving towards the natural pattern through the implementation of the planned harvest allocations. The spatial distribution of the projected harvest area for 40 years (2021-2061) was assessed and considered spatially and economically feasible.

5.3 SOCIAL AND ECONOMIC ASSESSMENT

A social and economic assessment was prepared for the LTMD and summarized in Section 3.7.5 to identify the expected social and economic impacts of implementing the management strategy proposed in the LTMD for the development of this FMP. This assessment outlined the expected social and economic impacts associated with the current direction and is based on the qualitative comparison of the annual levels for the 2011-2021 FMP and the levels shown in the LTMD for the 2021-2031 FMP. The proposed LTMD endorsed by the planning team and MNRF, projected a 2.3% increase in volume compared to the 2011-2021 FMP. This could potentially have positive direct and indirect socio-economic benefits to the Bancroft areas and the Province of Ontario. Increased harvest volumes generally result in higher industry output, employment rates and gross domestic product.

The impacts of forest management and operations on other sectors are usually not dependent on the harvest level, but rather on where harvest and roads are planned, and how specific values have been addressed. Stakeholder involvement during FMP development ensured that other forest values were incorporated into the FMP to minimize potential negative impacts from operations.

Overall, the social and economic assessment for the FMP suggests there is a potential for an improvement in social and/or economic benefits for the 2021-2031 FMP compared to the 2011-2021 FMP.

5.4 RISK ASSESSMENT

This section summarizes the risks associated with FMP implementation. The following bullet points describe certain assumptions to the successful implementation of the FMP and the associated risk assessment:

- <u>Uncertain market conditions</u> for wood is the most significant risk to the FMP. This is especially relevant for low demand species groups and their associated forest types. Since planned outcomes are based on a predetermined amount of harvesting activity, there are risks associated with low utilization. However, scoping investigations demonstrated that historic levels of utilization trend towards the targets for many of the objectives set in FMP-10.

- <u>Regulatory changes</u> (e.g. implementation of species at risk legislation) represent a risk as a portion of forested area is currently bypassed in order to meet the requirements of these regulations. An increase in regulatory complexity could make this bypassed area increase, further limiting the ability to manage the forest and compounding lack of disturbance occurring on the forest. Ontario's Forest Sector Strategy seeks to reduce the regulatory complexity and should mitigate the risks associated with regulatory change.

- <u>Invasive species</u> are a significant risk to the FMP as probable future threats (e.g. Hemlock Woolly Adelgid, Oak Wilt, etc.), the timing duration and intensity of these is difficult to account for in a long-term deterministic model.

- <u>Climate change</u> also poses a potential threat to the health and condition of the forest by creating favourable conditions for some species while creating unfavourable conditions for others. Since the timing and magnitude of these shifts are uncertain, it is impossible to model for a particular scenario.

- <u>Ownership changes</u> influence the amount of landbase available for management. Generally, ownership changes remove area from management and pose risks to planned operations, as well as the project outcomes of the models used in the LTMD when significant landbase changes occur (such as the creation of new parks or conservation reserves).

- <u>Access limitations</u> can pose risks to accessing the allocations outlined in the LTMD. Due to the large amount of private land and the fragmented nature of the available crown land, reliance on private land access creates uncertainty for many harvest allocations.

- <u>Implementing irregular shelterwood</u> as the primary means of managing Tolerant Hardwoods, which is a significant change from the previous FMP. While this approach to silviculture has been practiced by the SFL in the field, it could not be reported as irregular because the Annual Report and FMP didn't have the proper mechanisms to report the distinction at the time. It is also novel to the modelling process. The most significant change discovered through the LTMD investigations was that irregular shelterwood creates less Tolerant Hardwood harvest volumes compared to the previously utilized uniform shelterwood and selection systems.

Risk Assessment Conclusion – Many of these risks are outside of the ability of the model to predict or represent. Climate change, invasive species, changes to land tenure and regulatory changes are all important to identify and consider but cannot yet be meaningfully represented in the model nor controlled by the SFL. The approach to managing these risks is to increase the resilience of the forest through continued progress towards a diverse, natural forest condition.

5.5 PROTECTION OF VALUES

Areas of Concern (AOCs) provide a set of prescriptions that can impact harvesting, renewal and tending, access roads, landings and/or aggregate pits in order that forest values are protected and/or enhanced (FMP-11). The prescriptions can be comprised of reserves in which no forestry activities are allowed and modified management zones in which the extent of removal of forest cover is limited by timing restrictions. The prescription and rationale is tied to each forest value that is provided special management consideration through Area of Concern prescriptions. This FMP describes AOCs for Indigenous Values (includes values identified through Indigenous community discussions), Cultural Heritage Values (e.g. archaeological potential areas, recreational and trapper cabins) and Biological Values (e.g. water features, dens, nests, and habitat for species at risk). Information related to the development of AOCs can be found in section 4.2.1 Supplementary Documentation I.

Provincial policy supports or directs the majority of Area of Concern prescriptions with science as the basis for rationale. The Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (Stand and Site Guide) is the primary source of forest policy for AOCs for fish and wildlife including species at risk. The policy includes most direction in the form of standards that must be adhered to and guidelines that are to be adhered except in certain situations with rationale required.

In addition to AOCs, Conditions of Regular Operations (CROs) (section 4.2.2.2) and conditions on existing roads and landings (section 4.5.5) provide direction for values that may occur at a scale that are not reasonably mapped at plan development. Some examples where fine filter wildlife habitat provision through CROs is required are the provision of supercanopy trees, cavity trees and mast producing trees; guidance on water crossings including timing restrictions associated with in-water work for some water crossing installations; guidance on small water features such as vernal pools and seeps; standards to protect soil and damage to trees ensure productivity of the future stand; guidance on protection of indigenous cultural heritage features amongst others. The Stand and Site Guide is the source of much of this direction.

As such, this FMP includes a wide range of prescriptions that protect habitat and habitat features as well as provide for the productivity of the future forest.

5.5 CONCLUSION ON THE SUSTAINABILITY OF THE FMP

Based on the assessment of objective achievement documented in FMP-10 and summarized in Sections 3.7.3 and 5.1, the LTMD and proposed operations present a balance of objectives and projected levels of objective achievement. The greatest risk of implementing this plan is uncertain market conditions, resulting in areas that may not be harvested. This has the potential to impose negative impacts on the achievement of the pre-industrial forest condition. Indicators of objective achievement that could not be assessed during LTMD and proposed operations will be assessed during plan implementation.

Overall, the assessment of objective achievement, the social and economic assessment, the Long-term Management Direction, planned forest activities and provisions for values protection, support that the 2021-2031 FMP for the Bancroft Minden Forest has regard for plant life, animal life, water, soil, air, social and economic values, including recreational and heritage values. As a result, it can be concluded that this FMP provides for the sustainability of Ontario's Crown forest.

6.0 DOCUMENTATION

6.1 SUPPLEMENTARY DOCUMENTATION

Refer to the separate file MU220_2021_FMP_TXT_SuppDoc

6.2 OTHER DOCUMENTATION

The public correspondence related to the development of the FMP will be retained on file at the Bancroft District MNRF office. The Report on the Protection of Identified First Nation and Métis Values will be retained at a location as agreed to in consultation with the First Nation and Métis communities.

7.0 FOREST MANAGEMENT PLAN SUMMARY

An FMP Summary is prepared to facilitate public review of the FMP and public inspection of the approved FMP. The summary will be available for the duration of the public consultation periods. A French language version of the summary is also available.

8.0 FOREST MANAGEMENT PLAN TABLES

Refer to the separate file MU220_2021_FMP_TBL_Tables

9.0 LIST OF ACRONYMS

Acronyms used in the 2021-2031 Bancroft Minden FMP			
AHA	Annual Harvest Area	**HDSEL**	Hardwood Selection Forest Unit
AOC	Area of Concern	**HDSH**	Hardwood Shelterwood Forest Unit
AWS	Annual Work Schedule	**HESH**	Hemlock Shelterwood Forest Unit
BA	Basal Area	**HWA**	Hemlock Woolly Adelgid
BBD	Beech Bark Disease	**IFA**	Independent Forest Audit
BIR	Background Information Report	**INTCC**	Intolerant Clearcut Forest Unit
BMFC	Bancroft Minden Forest Company	**INTOL**	Intolerant Hardwood Landscape Class
BMF	Bancroft Minden Forest	**IS**	Irregular Shelterwood
Bw	White Birch	**IWR**	Industrial Wood Requirement
CFSA	Crown Forest Sustainability Act	**LCC**	Local Citizen's Committee
CLAAG	Careful Logging Around Advanced Growth	**LGFU**	Landscape Guide Forest Unit
CRO	Conditions on Regular Operations	**LTMD**	Long-term Management Direction
DBH	Diameter at Breast Height	**MEA**	Moose Emphasis Area
DEA	Deer Emphasis Area	**MIST**	Modelling and Inventory Support Tool
DFB	Desired Forest and Benefits	**MIXED**	Mixed Hardwood Landscape Class
EBR	Environmental Bill of Rights	**MU**	Management Unit
EFRI	Enhanced Forest Resources Inventory	**MXPRJ**	Mixed Pines Landscape Class
EFRT	Evaluate Forest Residual Tool	**MXCCC**	Mixed Conifer Clearcut Forest Unit
ELC	Ecological Land Classification	**MXHCC**	Mixed Hardwood Clearcut Forest Unit
EMA	Enhanced Management Area	**OC**	Other Conifer
END	Endangered Species	**OFAAB**	Ontario Forest Accord Advisory Board
ESA	Endangered Species Act	**OG**	Old Growth
FFPPP	Forest Fire Prevention and Preparedness Plan	**OLT**	Ontario Landscape Tool
FIM	Forest Information Manual	**OMNRF**	Ontario Ministry of Natural Resources and Forestry
FMP	Forest Management Plan	**ORUS**	Oak Shelterwood Forest Unit
FMPM	Forest Management Planning Manual	**PFR**	Protection Forest Reserve
FMU	Forest Management Unit	**PLANFU**	Plan Forest Unit
FOP	Forest Operations Prescription	**Po**	Poplar
FRI	Forest Resources Inventory	**PRCC**	Red Pine Clearcut Forest Unit

Acronyms used in the 2021-2031 Bancroft Minden FMP			
FTG	Free-to-Grow	**PRESAP**	Presapling forest
ha	Hectare	**PST**	Presapling, Sapling and T-stage Forest
PT	Planning Team	**SPC**	Spruce-Fir-Cedar
PWMIX	White Pine Mixedwood Landscape Class	**SFL**	Sustainable Forest Licensee
PWR	White and Red Pine	**SFMM**	Strategic Forest Management Model
PWUS	White Pine Shelterwood Forest Unit	**SGR**	Silvicultural Ground Rule
SAR	Species at Risk	**SPF**	Spruce-Pine-Fir
SC	Special Concern Species	**SRNV**	Simulated Range of Natural Variation
SEM	Silviculture Effectiveness Monitoring	**THR**	Threatened Species
SEV	Statement of Environmental Values	**TOL**	Tolerant Hardwood Landscape Class

10.0 GLOSSARY