2020-2030 SUDBURY FOREST MANAGEMENT PLAN

Plan Text

January 30, 2020

The Vermilion Forest Management Company Ltd.

Forest Management Plan – Title, Certification and Approval Page

FOREST MANAGEMENT PLAN
for the
Sudbury Forest

Ministry of Natural Resources and Forestry's Sudbury District, Northeast Region
Vermilion Forest Management Company, Ltd.
for the 10-year period from April 1, 2020 to March 31, 2030

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

	______________________________	January 31, 2020
[R.P.F. seal]	Scott McPherson, R.P.F. Plan Author, VFM, Ltd.	Date

	______________________________	January 31, 2020
Submitted by:	Mark Lockhart, R.P.F. General Manager, VFM Ltd.	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:

______________________________	______________________
Ross Hart District Manager, Sudbury District, MNRF	Date

______________________________	______________________
Deb Weedon Regional Resources Manager, Northeast Region, MNRF	Date

Approved by:

______________________________	______________________
Grant Ritchie Regional Director, Northeast Region, MNRF	Date

Forest Information Portal Submission Identifier: [ID]. _______________

Original signed hard copies are filed at the MNRF Sudbury District office and the VFM office.

Application of Section 18 of the Endangered Species Act

FOREST MANAGEMENT PLAN
for the
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Ministry of Natural Resources and Forestry's Sudbury District, Northeast Region
Vermilion Forest Management Company, Ltd.
for the 10-year period from April 1, 2020 to March 31, 2030

The Minister (or Minister's delegate) has formed the opinions specified in ss. 18(1)(e)(iii) of the *Endangered Species Act, 2007* with regard to this forest management plan, which has the same effect as a permit issued under section 17 of that Act in respect of the following species:

Not applicable at this time. The FMP is not designated as an ESA Section 18 Overall Benefit Instrument.

Forest Management Plan - Title and Certification Page

FOREST MANAGEMENT PLAN
for the
Sudbury Forest

Ministry of Natural Resources and Forestry’s Sudbury District, Northeast Region
Vermilion Forest Management Company, Ltd.
for the 10-year period from April 1, 2020 to March 31, 2030

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

Name and Job Title	Section(s) Prepared	Signature	Date
Derrick Romain Regional Planning Biologist, MNRF	6.1 (t)		
Michael Liukko, R.P.F. Regional Planning Forester, MNRF	2.2, 3.7.5, 6.1 (e) 6.1 (k), 6.1 (m)		
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Jim Gomm LCC Chair	6.1 (l)		

Original signed hard copies are filed at the MNRF Sudbury District office and the VFM office.

Forest Management Plan - List of Exceptions

FOREST MANAGEMENT PLAN
for the
Sudbury Forest

Ministry of Natural Resources and Forestry's Sudbury District, Northeast Region
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All silvicultural treatments in the silvicultural ground rules 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.

Description of Exception	Specific Section of Forest Management Plan
No exceptions are planned	Not applicable

Forest Management Plan Contributors

FOREST MANAGEMENT PLAN
for the
Sudbury Forest

Ministry of Natural Resources and Forestry's Sudbury District, Northeast Region
Vermilion Forest Management Company, Ltd.
for the 10-year period from April 1, 2020 to March 31, 2030

PLANNING TEAM MEMBERS

Planning Team Member	Affiliation	Position/Broad Role on Planning Team
Scott McPherson, R.P.F.	VFM	Plan Author
Mark Lockhart, R.P.F.	VFM	Chair / VFM General Manager
Mike Liukko, R.P.F.	MNRF Northeast Region	Regional Planning Forester (Project Manager)
Tim Lehman, R.P.F. / Shelley Straughan, R.P.F.	MNRF Sudbury District	Management Forester
Derrick Romain	MNRF Northeast Region	Regional Planning Biologist
Mike Hall / Jean Enneson	MNRF Sudbury District	Management Biologist
Jim Gomm	LCC	Chair
Jacob Gervais	Gervais Forest Products	Forest Industry Representative
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Tim Harvey	Mattagami First Nation	Mattagami First Nation
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Glen Bateman / Brianne Gauvreau	Wahnapitae First Nation	Wahnapitae First Nation Representative
Kathleen Migwanabi / Keith Nahwegahbow / Stephen McGregor	Whitefish River First Nation	Whitefish River First Nation Representative
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Forest Management Plan Contributors, Cont.

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Forest Management Plan Contributors, Cont.

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Interest group	Primary Member	Alternate Member
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Canoeists	Tom Brown	Patrick Morris
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The Local citizens committee's statement of support is included in the report of Supplementary Documentation 6.1 (I).

Forest Management Plan Contributors, Cont.

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Index to the components of the Forest Management Plan that relate to the Section 18 Overall Benefit Instrument

ESA, Section 18 Overall Benefit Instrument Related Components	Section of Forest Management Plan	Page Number
Species		
Not applicable	- The FMP is not proposed to be considered a Section 18 Overall Benefit Instrument.	

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1.0 INTRODUCTION

Sustainable forest management is an important contributor to the social, economic, and environmental well being of Ontario. At the social level, sustainable forest management contributes to livelihoods through employment and income generation, recreational opportunities, and the enjoyment of natural spaces. At the environmental level, it contributes to important services such as water, soil and biodiversity conservation, as well as carbon sequestration. Well-managed forests also support a multitude of recreational and tourism opportunities, and support important cultural heritage values. Sustainable management of the Sudbury Forest is enabled by developing a strategic forest management plan that provides long-term direction for continual benefits for current and future generations.

Forest management activities on Crown land in Ontario must be carried out in accordance with a forest management plan that is approved by the Ministry of Natural Resources and Forestry. Forest management plans are a statutory requirement of the *Crown Forest Sustainability Act* and must be prepared by a professional forester registered under the auspices of the *Professional Foresters Act, 2000*.

The *Crown Forest Sustainability Act (CFSA)* and the decision of the *Environmental Assessment Board on MNRF's Class Environmental Assessment for Timber Management on Crown Lands in Ontario* provide legal direction for the management of Ontario's Crown forests. Declaration Order MNR-75: Environmental Assessment Requirements for Forest Management on Crown Lands in Ontario provides more direction and clarification for forest management activities. The MNRF's *Statement of Environmental Values (SEV)* under the *Environmental Bill of Rights, 1993 (EBR)* has also been considered in the development of this FMP to further the objective of managing Ontario's natural resources on a sustainable basis. An updated SEV Consideration document is provided in Supplementary Documentation 6.1.(o).

Decisions, such as a general allocation of land or water resources to a particular use or combination of uses, are developed during a separate planning process. The framework for land use and management intents is established in the Crown Land Use Policy Atlas (CLUPA).

The Crown forests of Ontario are divided into management units for the purpose of forest management. The Ministry of Natural Resources and Forestry (MNRF) Sudbury District is the lead district for management of the Sudbury Forest within the MNRF's Northeast Region.

The Sudbury 2020-2030 Forest Management Plan (FMP) establishes the long-term direction and shorter-term operational goals for managing Crown forest resources within the management unit. This includes planned harvest areas, access (i.e., road construction and use management strategies), and silviculture (i.e., renewal and tending) that will take place during this period.

The Sudbury Forest is administered and managed by the Vermilion Forest Management Company, Ltd. (VFM) under the authority of Sustainable Forest Licence (SFL) #542442. The Sustainable Forest Licence (SFL), under the *Crown Forest Sustainability Act, 1994*, is administered by the Ontario Ministry of Natural Resources and Forestry, Sudbury District office, although small portions of the Forest are also within North Bay and Timmins MNRF Districts. Sudbury District reports administratively to the Regional Director of the Northeast Region, based in Timmins, Ontario. The location and geographic extent of the Sudbury Forest is shown in Figure 1.1.

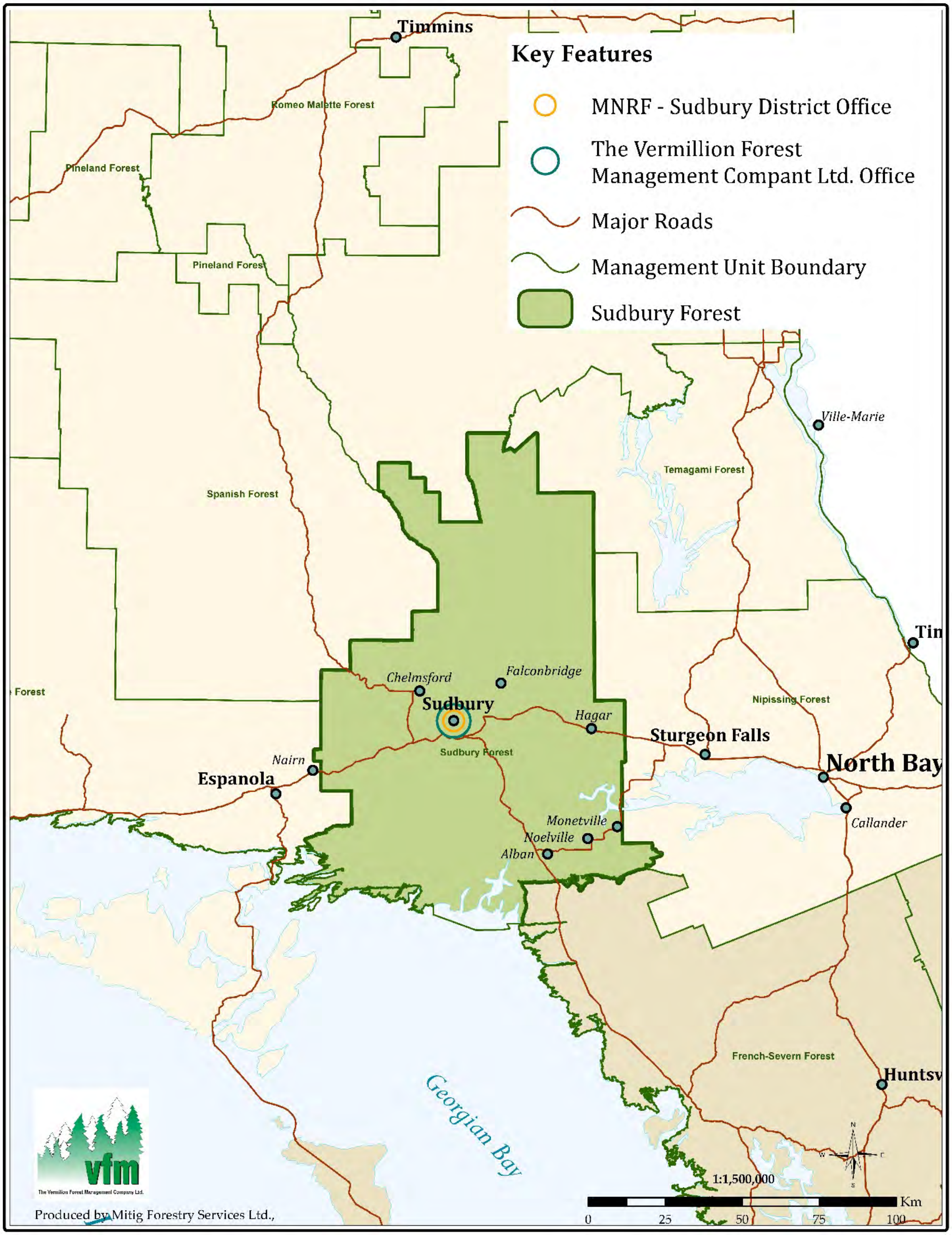
As the SFL holder, VFM is responsible for preparing the FMP and Annual Work Schedules (AWS), conducting forest operations in accordance with approved plans, monitoring operations for compliance, collecting and maintaining planning information for the forest according to the current Forest Information Manual and reporting on operations and objective achievements in the Annual Reports. VFM is a cooperative management company with 8 shareholders who hold overlapping licenses. The responsibilities of these other companies are further described in sections 2.2.3 and Supplementary Documentation 6.1 (r) Compliance Plan.

The MNRF is responsible for collecting and maintaining values information for the Forest, input, review and approval of planned operations in the FMP and AWS, maintaining communications with the public and First Nation and Métis communities with a known interest in the forest, providing direction on provincial policy, guideline and manual implementation, and auditing of operations to ensure that forest operations are in compliance with the approved plans.

The Sudbury Forest (the Forest) covers 10,984 km^2, 70% of which is Crown held. The management unit boundary is based on the Land Information Ontario (LIO) annual update base data delivery, September 2016 version. This boundary represents a significant change for the southern boundary along the Georgian Bay shoreline and islands from the 2010-2020 FMP. As such, there is a reduction in total area, particularly water, between the two FMPs. Refer to Table FMP-1 for a detailed description of area covered by the management unit.

The FMP management strategy and planned operations were prepared in an open consultative fashion by a multi-disciplinary planning team. A team of resource managers, appointed by the District Manager, developed this forest management plan (FMP). The planning team Terms of Reference can be found in Supplementary Documentation 6.1(n). A Local Citizens Committee (LCC) helped prepare the FMP and will continue to advise the District Manager throughout plan implementation. The primary role of the local citizens committee is to communicate local interests to the planning team and to the District Manager, to discuss management options with the planning team and the District Manager and to advise the District Manager on issue resolution. Refer to Supplementary Documentation 6.1 (l) for a summary prepared by the LCC concerning the FMP.

Figure 1.1 Location and extent of the Sudbury Forest.


Key Features
MNRF - Sudbury District Office
The Vermillion Forest Management Compant Ltd. Office
Major Roads
Management Unit Boundary
Sudbury Forest
Timmins
Romeo Malette Forest
Pineland Forest
Pineland Forest
Spanish Forest
Temagami Forest
Ville-Marie
Tim
Forest
Chelmsford
Falconbridge
Sudbury
Hagar
Sudbury Forest
Sturgeon Falls
Nipissing Forest
North Bay
Callander
Nairn
Espanola
Monetville
Noelville
Alban
Georgian Bay
French-Severn Forest
Huntsv
N
W
E
S
1:1,500,000
Km
0
25
50
75
100
vfm
The Vermilion Forest Management Company Ltd.
Produced by Mitig Forestry Services Ltd.,

2.0 MANAGEMENT UNIT DESCRIPTION

2.1 Forest Description

2.1.1 Historic Forest Condition

Forests are dynamic and in a constant state of change due to natural and human-induced causes, particularly in the temperate and boreal regions where natural disturbances are common and industrial activity has been in place for over a century. The Sudbury Forest is an obvious example of this change over time, largely as a result of expanding human settlement, the development of railways, mineral exploration and mining, and early logging practices that preceded modern forestry.

A summary of the historic forest condition, including shifts in species composition over time, is provided in Section 6.1 (a) of the Supplementary Documentation. More detailed reports on the logging history and pre-industrial forest condition are also included in this supplementary documentation.

2.1.2 Current Forest Condition

The entire management unit is described spatially with the planning inventory. The planning inventory is a composite product that shows the location and extent of different physical features such as water, forest, rock, etc. (cover types) as well as administrative categories such as ownerships.

The planning composite inventory (PCI) for the 2020-2030 FMP is a new product that was developed from high-resolution digital imagery acquired in 2008 and 2009. This replaces the previous inventory that was updated periodically from the previous black and white photography from 1989. This new, enhanced forest resources inventory (eFRI) is a complete re-interpretation of the land base, and consequently there are notable differences in the composition of the forest between the two inventory products. This is a result of natural changes and management of the forest over two decades, as well as the upgrade of more accurate base features for interpretation. Ownership information has also been updated for the new PCI resulting in further differences from the 2010-2020 FMP, which are discussed in Section 2.1.3.

The Sudbury Forest is comprised of essentially two Ecoregions, 4E and 5E. An Ecoregions are characterized by a range and pattern of climate. Climate features, such as temperature, precipitation and humidity, influence ecosystem processes and their associated flora and fauna.

Ecoregion 4E is named the Lake Temagami Ecoregion. It is on the Precambrian Shield where the bedrock is mostly granitic and gneissic. Ground moraines are the most common surficial feature, although valley train deposits are found in the numerous north-south flowing river systems. End moraines, Aeolian deposits, lacustrine deposits and eskers can also be found locally.[1]

The boundary that separates Ecoregions 4E and 5E is strongly tied to precipitation, mean annual temperature, mean January temperature as well as to elevation and geology. This boundary was used for the delineation of north-south strategic management zones described in the Supplementary Documentation 6.1 (b) Analysis Package, Section 3.5.

The management unit is also divided north-south by Highway 17 and the city of Greater Sudbury. This developed corridor consists of a large area of patent land and extensive road network. Approximately 27%

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[1] Crins, Williams J., Paul A. Gray, Peter W.C. Uhlig and Monique C. Wester. 2008. The Ecosystems of Ontario, Part 1: Ecozones and Ecoregions, draft, 6pp. and Part 2: Ecodistricts, 76pp.

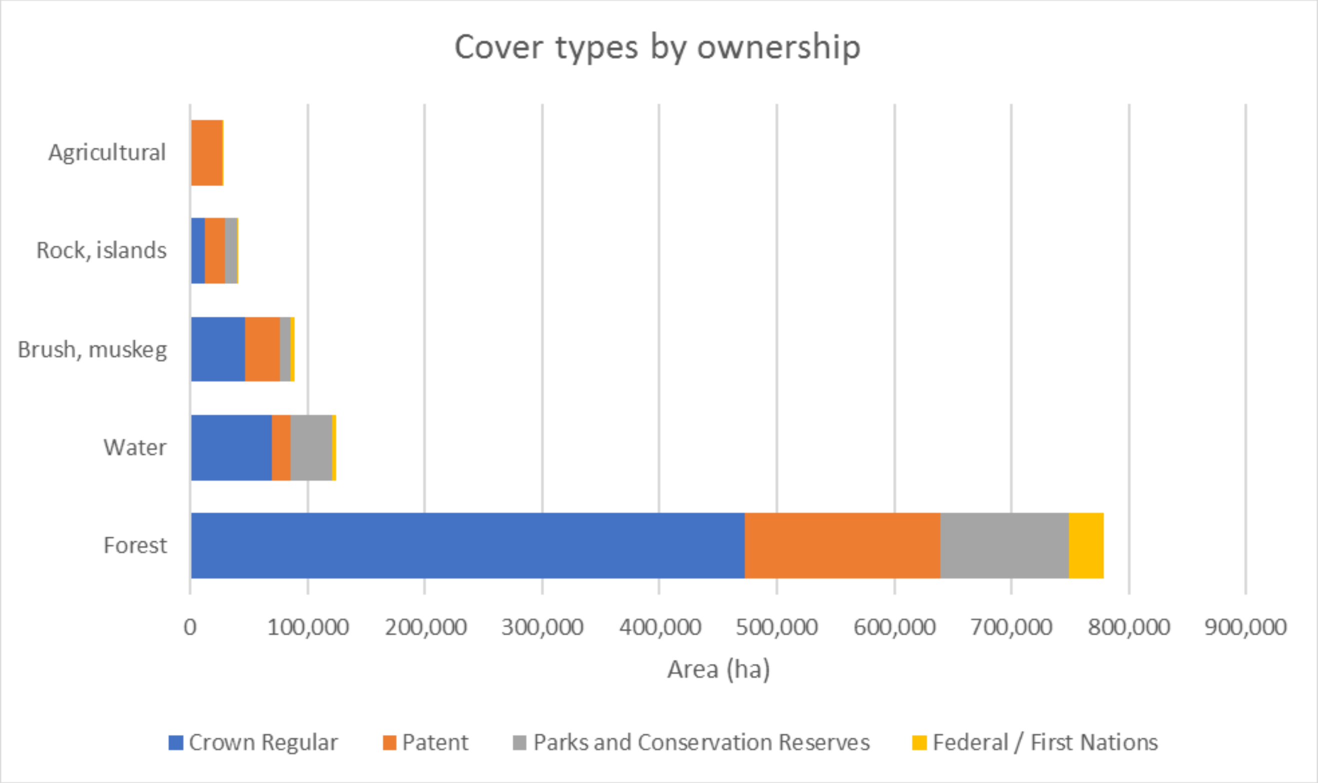
of the management unit area consists of patent land. The distribution of private land presents challenges in both the management of the forest and the achievement of landscape-level objectives due to fragmentation. The development of large landscape patches, for instance, is constrained by the dispersion of private land in the centre core of the management unit. Allocations of harvest areas are also constrained to some extent in the Crown-patent land matrix. This is largely the rationale for the creation of a strategic management zone (SMZ) within this area of the management unit to distinguish between areas where the distribution of patent land is more challenging.

Of the total management unit area, 15% is in regulated parks and conservation reserves, and 3% is within First Nation Reserves and federal lands.

The management unit is overwhelmingly dominated by forest cover, and most of this is on Crown land. The forested area is interspersed with non-productive cover types such as open and treed muskeg, brush and alder swales, and rock. The majority of the unproductive rock areas are within the core of patent land within the centre of the management unit. As a result, there is a significant area of productive forest surrounding the Greater Sudbury area on Crown land that is available for forest management. This information is summarized in Table FMP-1 and Figure 2.1.1.

The Supplementary Documentation 6.1 (b) Analysis Package, Section 1.0 describes the development of the planning inventory products and the manner in which forest cover information is updated and forecasted.

Figure 2.1.1. The distribution of total management unit area by cover types and ownerships



The forest is described in the inventory by development stages, e.g., recently disturbed (harvested or by fire or insect), regenerating, or other stages of management. Of the total Crown forest (including parks and conservation reserves), 91% is in a mature or established state, i.e., it has either not been managed or has been fully regenerated. Approximately 4% is in a managed shelterwood condition with two distinct cohorts (a partial harvest has occurred, but not a final overstorey removal). One percent of the forest has been recently disturbed by either harvest or natural means, and 4% is newly regenerated by natural means or planted and has not yet reached an established state (Figure 2.1.2).

The overall age-class distribution on the forest is highly skewed to mature ages (Figure 2.1.3). This is largely a function of effective fire suppression over many decades, coupled with under-utilization of the available harvest area. Much of the forest was disturbed in the earlier part of the previous century with the expansion of industrial activity, development and railroads. As such, there is an abundance of area that is between the ages of 70 and 120 years old, and relatively low amounts of young and very old forest. This presents challenges in maintaining an even flow of harvest area over time while at the same time meeting long-term objectives for maintaining mature and old forest on the landscape. These challenges are discussed further in Section 3.6 of this document

Figure 2.1.2. The distribution of Crown forest area by development stages.

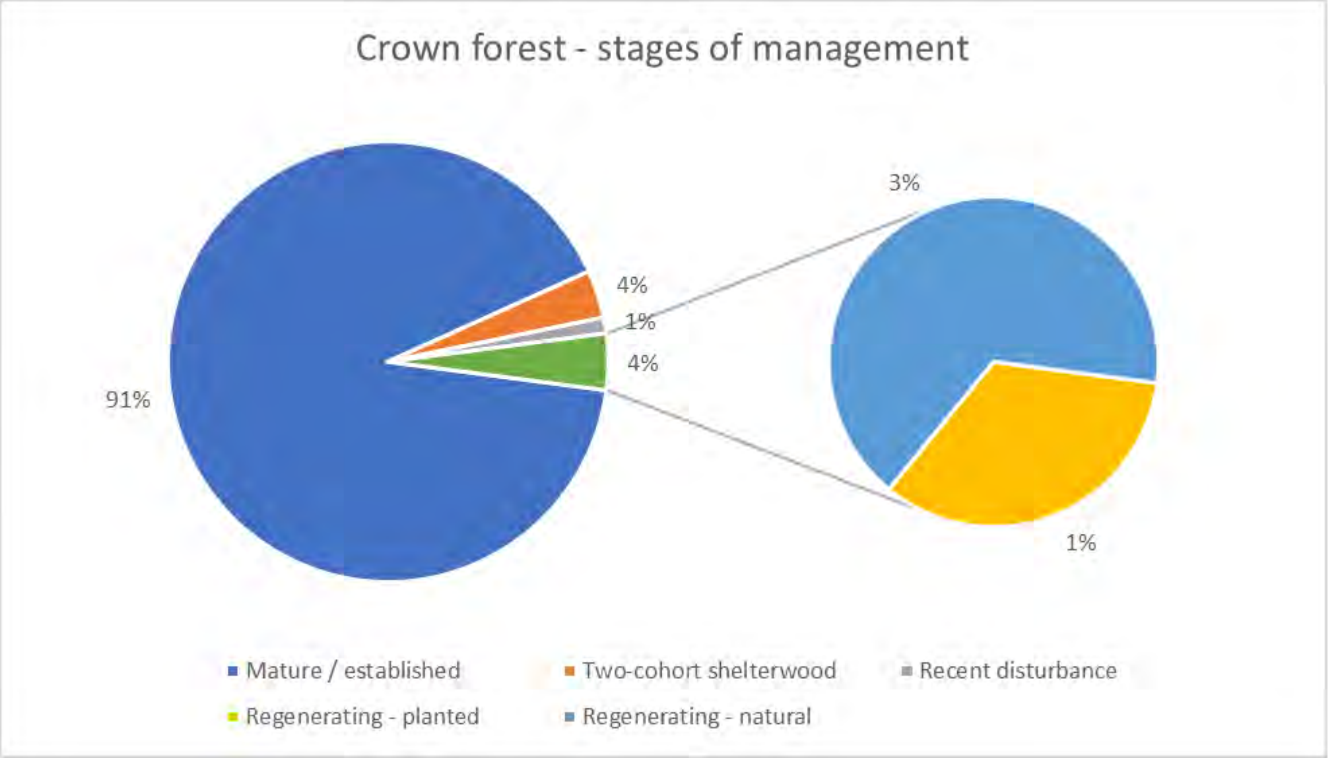
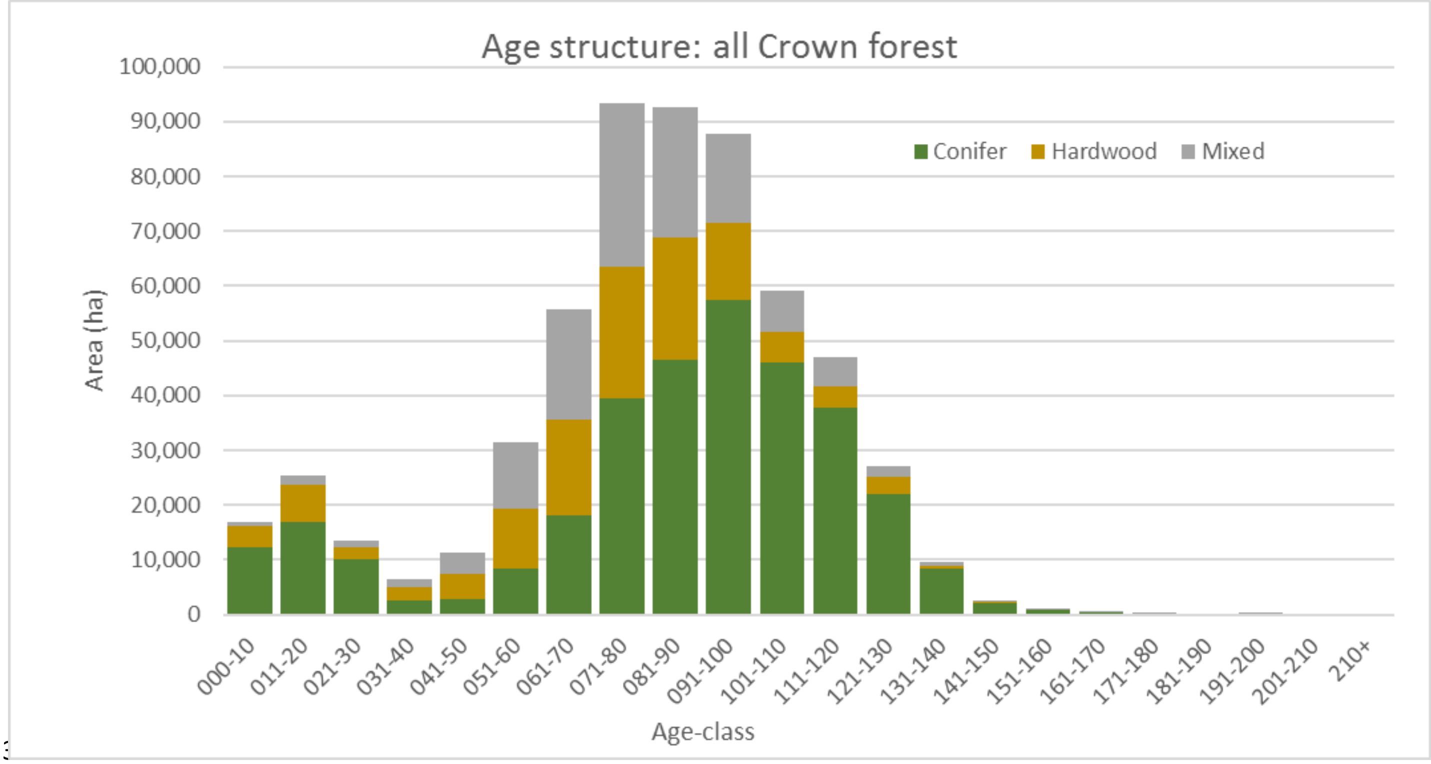


Figure 2.1.3. Age-class Distribution of the Crown Forest by Forest Type.



2.1.3 Forest Classification

2.1.3.1 Forest Units and Analysis Units

Forest Units

A Forest Unit is a classification system that aggregates forest area for management purposes that will normally have similar species compositions and develop in a similar manner, and is managed with a consistent silvicultural system. Forest units used in the plan (PLANFU), described in Table FMP-2, are the primary method of accounting forest composition and provide the basis for harvest allocations. The plan forest units also link to landscape classes and regional standard forest units in order to develop and track indicators of biodiversity at the landscape and site scales in accordance with the Forest Management Guide for Great Lakes-St. Lawrence Landscapes and the Forest Management Guide for Conserving Biodiversity and the Stand and Site Scales. This is achieved through the use of a habitat matrix, as described in the Analysis Package, Supplementary Documentation 6.1 (b), Section 3.3.4.

Forest unit definitions were, for the most part, unchanged from the 2010-2020 FMP. This provides an advantage for analysing long-term trends by having the same number and general definition from one plan to the next. This also maintains reasonable consistency with the 2005 FMP forest units. As with the previous FMPs, the regionally endorsed standard forest units (SFU) were used as the foundation for the plan forest units (PLANFU). Analysis units were not deemed to be necessary for the 2020-2030 FMP as the forest units provide the appropriate level of classification.

One significant change for the 2020-2030 FMP is the placement of stands that fall in the SP1 SFU into its own unique forest unit whereas in the 2010-2020 FMP these stands were grouped in with the PJSB PLANFU. The PJSB forest unit represented 12% of the Crown forest area in the 2010-2020 FMP, and the combined PJSB (6%) and SP (5%) forest units make up almost the same area in the 2020-2030 FMP. Another change was to switch areas in the HDSL2 SFU to the HDUS PLANFU. Specific criteria for forest units are provided in the Analysis Package, Supplementary Documentation 6.1 (b), Section 2.1.

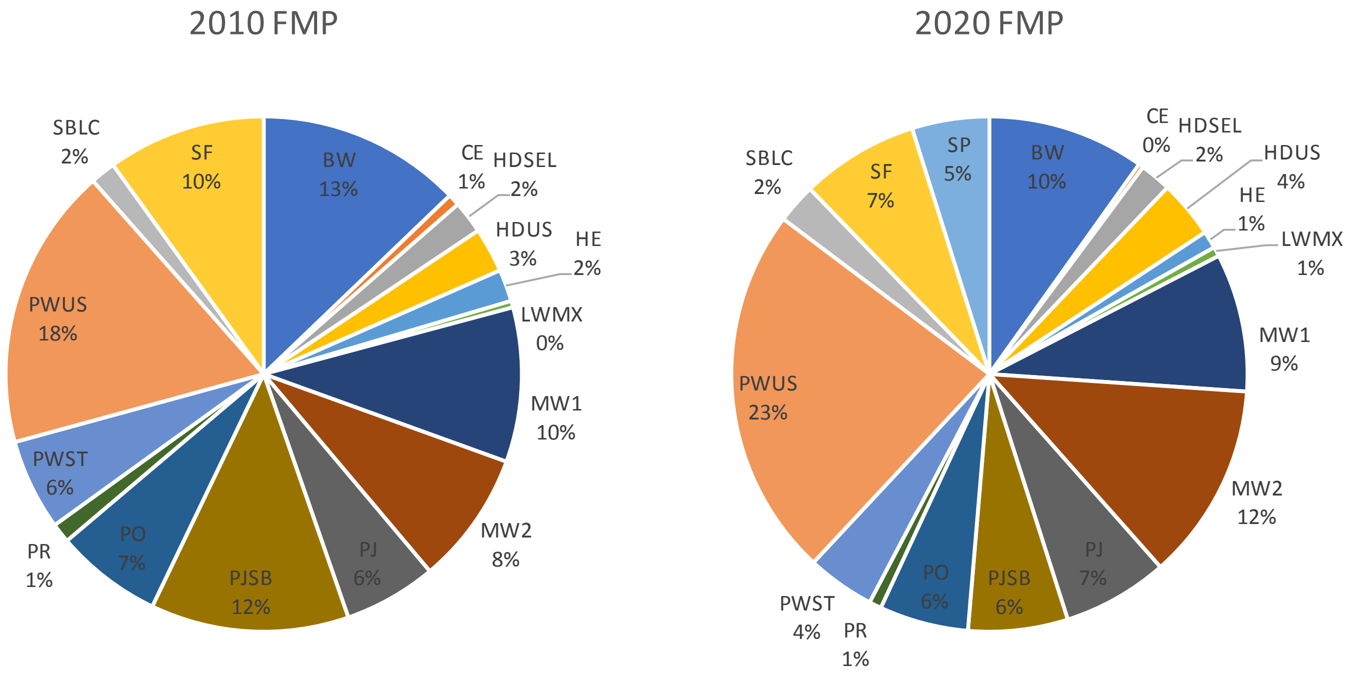
As described in Section 2.1.2, the PCI for the 2020-2030 FMP is an entirely new product and reflects a considerable amount of change that has occurred on the forest over the past decades. It is also based on more accurate imagery and, therefore, it is not surprising that there are changes in the distribution of forest units from the previous FMP. The most notable differences in distribution of area between the (Figure 2.1.5) amounts of rich mixedwood sites (MW2) and white pine. Both the white pine shelterwood forest unit (PWUS) and MW2 has increased in abundance with concomitant reductions in white pine seed tree (PWST) and white birch (BW).

Figure 2.1.4. Forest classifications summary.

LG Class	SFU	PLANFU	Description
IH - Intolerant Hardwoods	PO1	PO	Poplar
	BW1	BW	White Birch, Hardwood Mix
MP - Mixed Pines	PR1	PR	Red Pine
	PWUSC	PWUS	White Pine Uniform Shelterwood
	PJ1	PJ	Jack Pine
	PJ2	PJSB	Jack Pine Upland Black Spruce Mix
MW - Mixedwood	HE1	HE	Hemlock
	LWMW	LWMX	Lowland Mixedwood
	MWUS	MW2	Moist Mixedwood (Rich)
	MWR	MW2	Moist Mixedwood (Rich)
	MWD	MW1	Dry Mixedwood
SFC - Spruce/Fir/Cedar	CE1	CE	Cedar
	SB1	SBLC	Conifer Lowland - Black Spruce
	LC1	SBLC	Mixed Conifer Lowland
	SP1	SP	Spruce / Pine - Mixed Conifer Upland
	SF1	SF	Spruce / Fir - Mixed Conifer Upland
TH - Tolerant Hardwoods	BY1	HDUS	Tolerant Hardwood Uniform Shelterwood
	OAK	HDUS	Tolerant Hardwood Uniform Shelterwood
	HDSL2	HDUS	Tolerant Hardwood Uniform Shelterwood
	HDSL1	HDSEL	Tolerant Hardwood Selection
	HDUS	HDUS	Tolerant Hardwood Uniform Shelterwood
WPM - White Pine Mixedwood	PWUS4	PWUS	White Pine Uniform Shelterwood
	PWOR	PWUS	White Pine Uniform Shelterwood
	PWUSH	PWUS	White Pine Uniform Shelterwood
	PWST	PWST	White Pine Seed Tree

The forest is further categorized by age-class for each forest unit in Table FMP-3 for the available and unavailable areas of Crown forest. Areas that are unavailable for management due to parks and protected areas, protection forest, and withdrawals cannot be harvested but can still contribute to FMP objectives for biodiversity. Areas designated as protection forest are areas that meet the definition for forest stands but are unproductive due to shallow or wet soils (e.g., Site Class 4).

Figure 2.1.5. Forest unit comparison: 2010 vs 2020 FMP.



The age-class distribution among many forest units presents a challenge in meeting objectives for emulating a more natural distribution of seral stages, i.e., a need for more young and old forest conditions and less in the mature age range. It also affects the ability to allocate an even distribution of harvest area over time without a significant drop in available volume in the short term. It is primarily for this reason that wood supply declines in future decades, followed by increases towards the end of the planning horizon. The degree to which this occurs varies by forest unit, however it is a consistent trend not only on the Sudbury Forest but provincially as well, as shown in the Provincial Wood Supply Strategy (2008). The 2020-2030 FMP, as with previous plans, has been developed with this as one of the main constraints to wood supply and habitat modelling.

2.1.3.2 Forest Landscape Classes

The forest landscape is classified in many different ways to meet various requirements for analysis, reporting, and policy implementation. The link between forest classifications is shown in Figure 2.1.4.

Landscape classes are groupings of forest units by development stage. They were developed based on cluster analyses of used and preferred habitat types depicted in MNRF's habitat matrices.[2] 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.

Landscape class indicators are developed from direction in the Forest Management Guide for Great Lakes-St. Lawrence Landscapes and the Ontario Landscape Tool (OLT) to provide management direction in relation to the landscape condition at the start of the management plan. The distribution of landscape classes is portrayed on the landscape pattern map MU889_2020_FMP_MAP_LandPat_01.PDF of Supplementary Documentation 6.1 (u).

The plan-start conditions for each of the landscape classes have significant implications in the development of the FMP. Landscape classes are highest in the hierarchy of biodiversity objective achievement in accordance with the direction in the Landscape Guide, i.e., movement towards the desired levels is a high priority. Harvest and renewal levels that are prescribed in the long-term management direction are, therefore, highly dependent on achieving the desired levels for the landscape class indicators.

This presents many challenges in that it constrains the amount of area that can be harvested for forest units that belong to landscape classes that are starting below the desired levels for mature and old forest. Likewise, for forest units where there is an abundance of mature and old forest an accelerated harvest (i.e., higher than historic amounts) is required to meet the desired levels within the planning horizon milestones. Figure 2.1.6 summarizes the starting conditions for each landscape class, and the desired levels are represented by the ranges (whiskers of the box-and-whisker chart). The most significant challenge is for the white pine mixedwood class where the current level of mature and old forest requires establishing a balance between desirable harvest levels and increasing mature and old forest over time. This is exacerbated by the present lack of immature forest, meaning that this indicator is most difficult to achieve several decades in the future. The challenges posed for these indicators is discussed further in Section 3.6 of this document.

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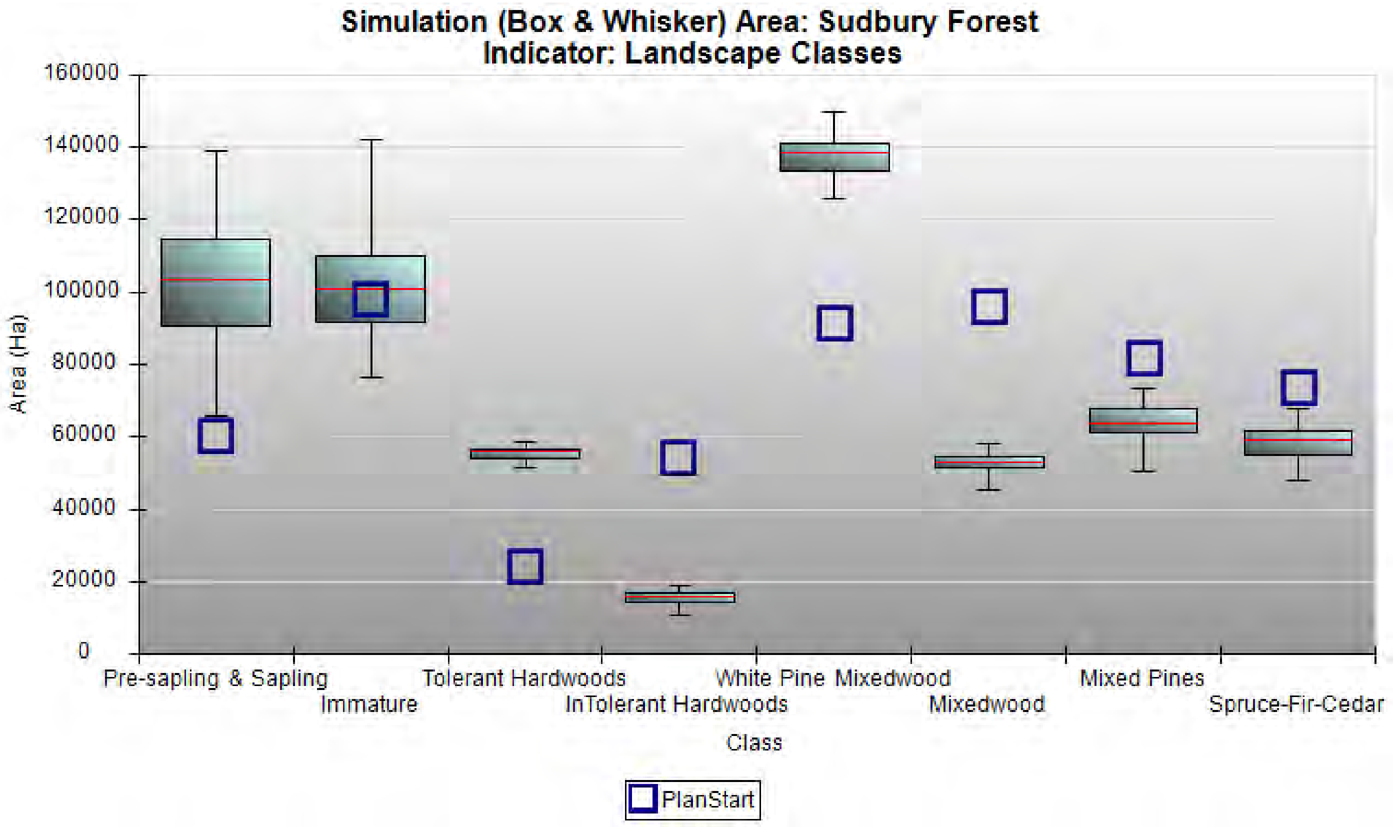
[2] Holloway, G., B. Naylor, and W. Watt, Editors. 2004. Habitat Relationships of wildlife in Ontario – revised habitat suitability models for the Great Lakes-St. Lawrence and Boreal East Forests. OMNR, Science and Information branch, Southern Science and Information and Northeast Science and Information. Joint Technical Report No. 1. Queen's Printer for Ontario. 120 pp.

Figure 2.1.6. Landscape class simulated ranges and plan start levels.

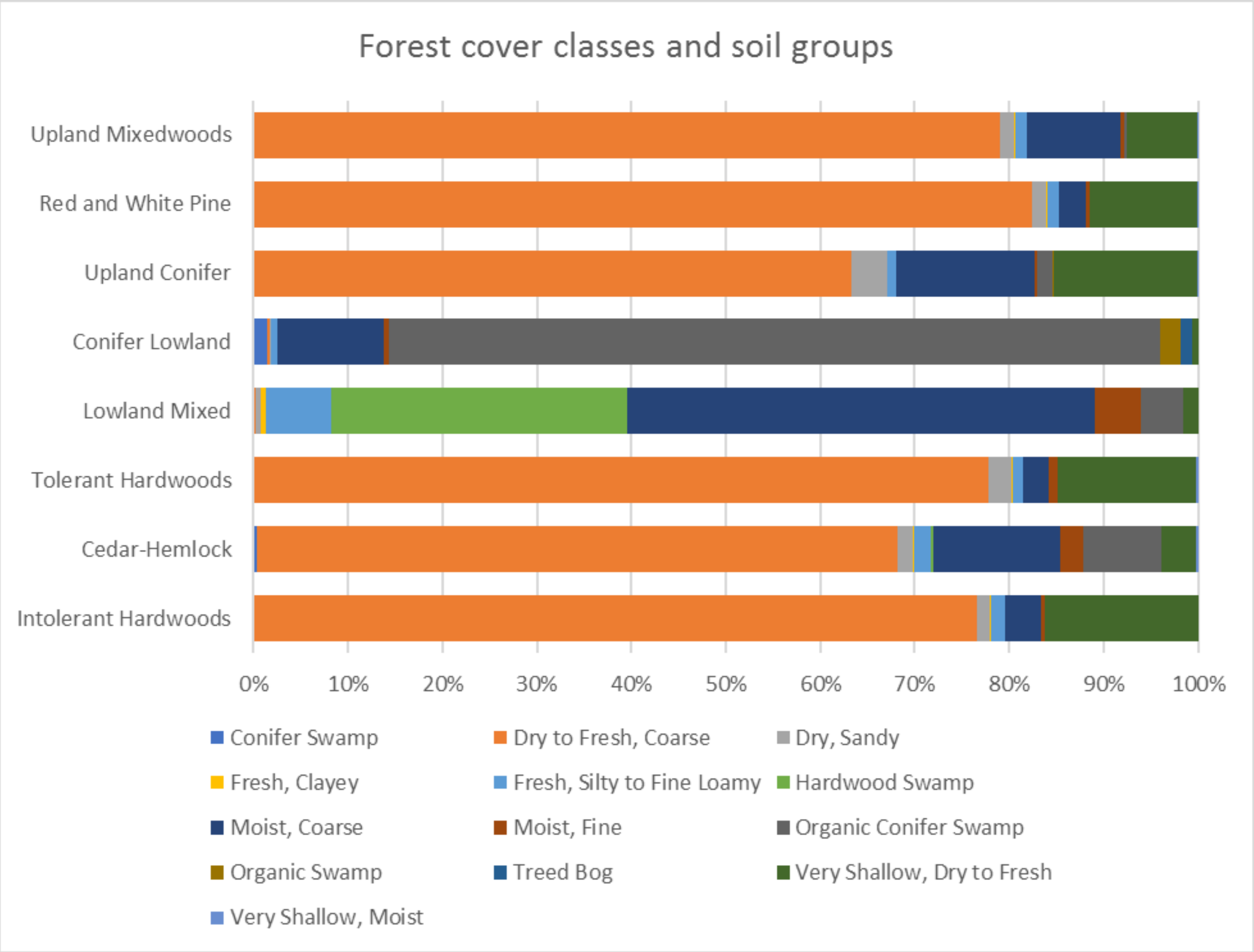


2.1.3.3 Other Forest Classifications

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 regional Forest Ecosystem Classification (FEC) systems. This past assignment was based on tree species composition and site class. The new provincial ELC is determined during the inventory production based on interpreted soil conditions and vegetation, as calibrated from ground-based plots. The end results provide a stand-level description of site types that can be used for broader purposes than just traditional forest units. Broad soil types based on the ELC description in the new inventory are shown in Figure 2.1.7 in relation to general forest cover types.

The ELC soil mapping is done at a much finer resolution than traditional mapping of surface geology and is therefore not conducive to composite scale maps. The ELC information, however, complements the broader-scale mapping of surface geology presented in the MU889_2020_FMP_MAP_LandPat_00.PDF map series.

Figure 2.1.7. Broad forest cover classes and ELC soil groups.



2.1.4 Forest Resources

2.1.4.1 Inventories and Information for Species at Risk

A variety of approaches are used to provide for the needs of species at risk (SAR). The habitat requirements for the identified species are primarily addressed at the landscape level by ensuring appropriate forest types and seral stages are present across the landscape in approximately natural amounts (i.e., the coarse filter approach – natural range of variation). The quality and quantity of habitat is also addressed at a localized level. Area of concern (AOC) prescriptions or conditions on regular operations (CRO) will be used to protect sites of particularly high SAR value and sensitivity such as nesting, spawning or denning sites. Table FMP-11: Operational Prescriptions for Areas of Concern and Conditions on Roads Landings, and Forestry Aggregate Pits and the conditions on regular operations (CROs) in Supplemental Documentation 6.1 (q) provide the fine-filter direction for protecting SAR values. The species at risk list is continually updated as new information becomes available.

The Natural Heritage Information Center (NHIC) contains information on the location of individual occurrences and habitat of species listed as endangered on the Species at Risk in Ontario List. The MNRF has local information on other known occurrences and habitats.

The occurrence data for endangered species is considered sensitive data and is not shown in this FMP.

Endangered species known or suspected to be on the management unit include:

- Butternut
- Spotted Turtle
- Wood Turtle
- Loggerhead Shrike
- Golden Eagle
- Eastern Cougar
- Eastern Small-footed Myotis
- Little Brown Myotis
- Northern Myotis
- Tri-coloured Bat
- Gypsy Cuckoo Bumble Bee
- Riverine Clubtail
- Transverse Lady Beetle
- Shortnose Cisco
- Lake Sturgeon

The NHIC also contains information on the location of individual occurrences and habitat of species listed as threatened on the Species at Risk in Ontario List. The MNRF has local information on other known occurrences and habitats.

The occurrence data for threatened species is considered sensitive data and is not shown in this FMP.

Threatened species known to be on the management unit include:

- Shortjaw Cisco
- Blanding's Turtle
- Eastern Foxsnake
- Eastern Hog-nosed Snake
- Eastern Massasauga Rattlesnake
- American White Pelican
- Bank Swallow
- Barn Swallow
- Bobolink
- Chimney Swift
- Eastern Meadowlark
- Eastern Whip-poor-will
- Least Bittern
- Algonquin Wolf

Land Information Ontario (LIO) contains element occurrence data on species listed as special concern on the Species at Risk in Ontario List. MNRF has local information on other known occurrences and habitats.

Special concern species known to be on the management unit include:

- Monarch Butterfly
- West Virginia White
- Yellow-banded Bumble Bee
- Northern Brook Lamprey
- River Redhorse
- Eastern Musk Turtle
- Eastern Ribbonsnake
- Northern Map Turtle
- Snapping Turtle
- Bald Eagle
- Black Tern
- Canada Warbler
- Common Nighthawk
- Evening Grosbeak
- Golden-winged Warbler
- Olive-sided Flycatcher
- Peregrine Falcon
- Red-headed Woodpecker
- Rusty Blackbird
- Short-eared Owl
- Yellow Rail

Separate map products (not publicly available) show the locations and extent of AOCs for species at risk.

2.1.4.2 Fish and Wildlife Inventories

The abundance and distribution of fish and wildlife resources are important factors considered in the development of the forest management plan. As such, this section outlines a summary of occurrences of fish and wildlife species based on inventory and habitat

a) Known fish and wildlife species on the management unit

Fish species present and known fish habitats are identified in LIO data layers which are maintained by the Ministry of Natural Resources and Forestry (MNRF). LIO data layers that contain thermal regime characteristics of lakes may help determine what fish species are likely to be present in cases where no fish species data are available.

The Sudbury Forest has a mixture of warm and cold water lakes and streams, and the fish communities within the forest reflect this. Common fish species on the forest are as follows:

Warm water thermal regime:

- Walleye
- northern pike
- small and largemouth bass
- muskellunge
- yellow perch

- pumpkinseed
- rock bass.

Cold water thermal regime:

- brook trout
- lake trout
- lake whitefish
- lake herring
- burbot.

A variety of minnow species are present within lakes and streams in the Sudbury Forest (darters, dace and shiners).

There are 228 lakes within the Sudbury Forest that are stocked. These lakes are stocked with fish such as brook trout, lake trout, rainbow trout, splake and walleye.

There are 88 lakes in the Sudbury Forest that are classified as self-sustaining lake trout lakes.

Wildlife species present and known wildlife habitats are identified in LIO data layers maintained by the MNRF. The Sudbury Forest is a diverse forest with both the Great Lakes-St. Lawrence and Boreal Forest types present. The landscape also provides habitat for a variety of fauna including approximately 50 mammal species, 20 reptile and amphibian species and 170 bird species.

b) Fish and Wildlife Species of Local Concern

Elk – Wildlife Management Unit (WMU) 42 is home to approximately 150 elk. The local elk currently share their range with moose and, to a lesser extent, deer. The Sudbury Elk Restoration Committee (SERC) maintains that harvest practices and AOC prescriptions that benefit moose and deer will also be beneficial to elk.

c) Known invasive and native forest pests on the management unit

A variety of invasive and native forest insects and diseases are known to be on the management unit. They include: white pine blister rust, gypsy moth, European spruce sawfly, white pine weevil, Dutch elm disease, European pine needle midge, forest tent caterpillar, spruce budworm, jack pine budworm, spruce and pine sawflies, sugar maple borer, *Nectria* canker and *Armillaria* root rot. Emerging invasive species that may be of interest or concern include: hemlock looper and wooly adelgid, western gall rust, emerald ash borer, and beech bark disease.

2.1.4.3 Values Information

The values maps provide a summary of the geographic locations of known values for the Sudbury Forest, which are considered in forest management planning. The maps are prepared in accordance with the Forest Information Manual Base and Values Technical Specifications (2017).

Existing roads and approved primary road corridors, as well as roads with access restrictions, are also portrayed on the values maps. The values maps are intended to be used primarily as background information for planning, and will also be used for display purposes and to solicit additional information about MNRF values.

The values maps are continually updated as information is assembled during the FMP production and public consultation process, and during the implementation of the forest management plan. Sources of information used to develop the maps include field survey data, historical records, stakeholder information, reports from the public, and data from other ministries. The MNRF will update and provide the most current, relevant information available on natural resource features, land uses and values, including cultural heritage resource sites and features, for use in forest management planning.

The information contained in the values maps is used to help ensure the sustainability of fish and wildlife resources and other resources dependent on forest cover and also in landscape level planning such as for moose emphasis areas, road layout and harvest allocation planning.

Where a known value may be affected by forest management activities, the Forest Management Planning Manual requires that a defined geographic area adjacent to the feature be established. The defined geographic area is called an "area of concern" (AOC). An operational prescription is developed for each AOC or group of AOCs to prevent, minimize or mitigate adverse effects of forest management operations on the value. Operation prescriptions for AOCs may be reserves (e.g., exclusion of operations), modified operations (e.g., specific conditions or restrictions on operations) or regular operations (e.g., in accordance with the silvicultural ground rules), individually or in combination. Additional information regarding the development of operational prescriptions for AOCs associated with known values on the Sudbury Forest is provided in section 4.2.1 Operational Prescriptions for Areas of Concern.

The values maps are found in the Supplemental Documentation, section 6. (u). The standard series of values maps (scale – 1:150,000 paper and digital copy) are titled as follows:

- MU889_2020_FMP_MAP_ValWild_00.PDF: Natural Resource Features Values – Wildlife and Forestry
- MU889_2020_FMP_MAP_ValFish_00.PDF: Natural Resource Features Values – Fisheries and Wetlands
- MU889_2020_FMP_MAP_ValRec_00.PDF: Resource Uses Values
- MU889_2020_FMP_MAP_ValLand_00.PDF: Land Values
- MU889_2020_FMP_MAP_ValBMA_00.PDF: Bear Management Areas
- MU889_2020_FMP_MAP_ValTrap_00.PDF: Trapline Areas
- MU889_2020_FMP_MAP_ValRBT_00.PDF: Resource-Based Tourism Values
- MU889_2020_FMP_MAP_ValCult_00.PDF: Cultural Heritage Values.

The implications to the development of the management plan with respect to natural resource features, land uses, and values include the placement of the various road restrictions on the Forest, in accordance with the higher land use policy direction such as the Crown Land use Policy Atlas (CLUPA); the development of the AOC prescriptions to protect various values; the selection of the location of primary, branch and operational roads and road corridors; and extent, pattern and placement of harvest allocations.

Land use areas

The land-use areas are defined in the MNRF's Crown Land Use Policy Atlas (CLUPA) which generally describes conditions on:

- Commercial Activities: Aggregate extraction, bait fishing, angling, fur harvesting, power generation development, timber harvest, tourism, energy transmission and communications corridors, mineral exploration and development, wild rice harvesting;
- Land and Resource Management Activities: Crown land dispositions, fire suppression, fish habitat management, fish stocking, insect/disease suppression, inventory/monitoring, prescribed burning, private recreation, road development and maintenance, vegetation management, water control, wildlife population management; and
- Recreation Activities: Aircraft landing, all-terrain vehicle use off trails, all-terrain vehicle use on trails, public road use, campgrounds, horseback riding, hunting, motor boat use, mountain bike use, non-motorized recreation travel, rock climbing, canoeing, snowmobiling, sport fishing, trail development.

Prior to CLUPA the source for land-use direction was MNR District Land Use Guidelines (DLUG) for the three areas, e.g., Sudbury, (Gogama) District Land Use Guidelines (OMNR 1983) and the Temagami Land Use Plan 1997.

There are number of individual land-use areas that form part of the Crown Land that the Sudbury Forest covers. The areas include enhanced management areas, provincial parks and conservation reserves, organized communities, and General Use areas. Enhanced Management Areas (EMA) have been zoned to recognize particular features of the area from natural heritage (life or earth science values), areas with high recreational value (remote and non-remote), areas that are currently remote and there is a need to maintain this (remote access) and the Great Lakes Heritage Coast. Forest Management activities, such as harvesting and road construction, are permitted uses but may need to be modified to protect or minimize the impact of the activities to the values that are in the area. Natural heritage EMAs are intended to protect areas with significant natural values, while allowing a range of resource activities, including forestry to occur. Recreation EMAs are areas of high recreational use or significant recreational values, particularly for activities such as angling, hunting, motorized and pedestrian trail use, and canoeing. Remote access EMAs are intended to maintain the remote character of selected areas; whereas, the Great Lakes coastal EMAs are areas where ecosystem protection and the promotion of recreation and tourism are the primary land use and resource management goals. General use areas allow the widest range of both commercial industrial and non-industrial and non-commercial uses on the landscape but may also have a focus on a particular activity such as aggregate production, farming, or recreation.

Individual reports for each designated area are available on-line https://www.ontario.ca/page/crown-land-use-policy-atlas and are also referenced where applicable in Supplementary Documentation 6.1. (i) for direction on road access.

Resource-based Tourism Areas

The Sudbury Forest provides many benefits and is an important resource for commercial tourism operators. There are also Recreation Enhanced Management areas and Remote Access Enhanced Management areas where industrial activities are to be modified to minimize impacts to the recreational uses of the area.

Tourist operators use the Sudbury Forest for a variety of commercial recreational activities such as fishing, hunting, canoeing and canoe tripping, kayaking, boating, bird watching, hiking, back country tripping, sightseeing, all-terrain vehicle riding, and snowmobiling. Tourism experiences and opportunities range from the more well off sailing enthusiasts at Killarney to remote water access lodges catering to fishing enthusiasts, to a plethora of drive to resorts and lodges along the French River and on inland lakes providing services to fisherman, hunters and general outdoor enthusiasts, to a few remote fly in outpost camps, and a growing number of businesses offering semi remote to remote back country excursions. Many people come to the Sudbury Forest to enjoy and experience the fishing and hunting opportunities, boating excursions, canoeing and hiking adventures, and the unique landscape and terrain present on the forest.

There are very few areas on the Sudbury Forest where you will not find some kind of tourism business using the land for some part of its operations. There over 110 tourist establishments plus tourism businesses that offer guiding services but do not have a main base lodge. These businesses are located along the French River system in the south, on many of the larger and some small lakes scattered across the forest, use extensively the Chiniguichi, Matagamasi, Sturgeon River interconnecting lake and river systems, and use remote fly-in lakes in the north-west corner of the forest.

The tourism business on the Sudbury Forest is quite varied and extensive. The FMP is committed to maintaining the viability of the tourism industry by protected tourism values in the forest management planning process through the application of the MNRF's approved forest management guides. The Resource Stewardship Agreements (RSA) are part of this commitment to maintain the viability of the tourism industry.

Bear Management Areas were established in 1989 in Sudbury District enabling those operators with this privilege the opportunity to provide bear hunts to non-resident hunters. In 2016 there were 31 active Bear Management Areas (BMAs) on the Sudbury Forest.

Also refer to Section 2.2.3 of this document for additional information on recreational uses on the forest.

Mineral, Aggregate and Quarry Areas

The Sudbury Forest Management Unit (FMU) lies within the Canadian Shield, an extremely large area underlain by ancient sedimentary, igneous and metamorphic rocks. More specifically, the FMU transects the Grenville Front is underlain by rocks that constitute the Southern Province of the shield and rocks of the Central Gneiss Belt. Generally speaking, all of these rocks formed between 0.9 and 2.5 billion years ago. The southern half of the FMU is underlain by the gneisses of the Central Gneiss belt that are approximately 1.0 billion years in age. The central part of the FMU is occupied by the Sudbury Intrusive Complex that is dated at 1850 million years. The remaining 25% of the FMU is underlain by metasedimentary and metavolcanic rocks of the 2.2 billion to 2.5 billion-year old Huronian Supergroup. This group of rocks occurs in an area extending south-westward from north of the City of Sudbury to Whitefish Falls. Minor amounts of older, Archean bedrock (>2.5 million years) are found north of Sudbury in an area centred by Howey Township. All rock types are cross cut by younger diabase dikes which have intruded along faults and lineaments.

Overlying the bedrock is a sequence of glacial deposits developed during the retreat of the Labrador sector of the Laurentide Ice Sheet. Numerous glacial advances and retreats occurred in this area. The oldest glacial advance occurred approximately 150,000 years ago and the latest glacial retreat approximately 9,000 years ago.

Historically, Canadian nickel production has been dominated by the output from the Sudbury Basin. Presently, there are twelve operating nickel-copper-cobalt-platinum group element mines in the FMU and there are 3 advanced nickel-copper exploration projects underway. The FMU is also home to silica and granite quarries. The FMU also hosts 44 past-producing nickel-copper mines, 1 past producing iron mine and 1 past producing copper-lead-zinc mine. Approximately 75% of the FMU is presently staked or held as mining leases or patents and is undergoing active exploration. Most exploration is taking place within, or adjacent to, the Sudbury Basin in areas that have historically had the most productive targets. The main commodities of interest within the FMU are nickel, copper, cobalt and platinum group elements.

There are over two hundred of aggregate permits (Crown Land) and licenses (Private Land) issued on the Sudbury Forest for the extraction of sand, gravel, and quarry stone. Quarry stone is frequently quarried for decorative stone uses. Like mining, the majority of the permits and licenses are concentrated in the Sudbury Basin but there are minor concentrations associated with the major highways (69, 17, 144, and 637) and with the communities of Markstay-Warren and French River.

The CLUPA has recognized the importance of mineral, aggregate and quarry activities on the Sudbury Forest by zoning specific areas (G2052, G2053, and G2054) where these are the dominant uses and other areas (G2043, G2047, and G2050) where these are one of a number of primary uses.

Crown Land Recreation and Cottaging

The Sudbury Forest provides a wealth of opportunities for outdoor recreation for the casual and avid outdoor enthusiasts. There are many lakes that only have a few cottages on them to still many more that are highly developed with extensive cottage properties (Panache, Windy, Armstrong, Ministic, Trout, Nepawassi, Vermilion, and Kukagami lakes, for example). Cottage lakes and Crown Land recreation takes place across the whole forest although cottaging is more concentrated along the French River, within and adjacent to the Greater City of Sudbury, and in the south western, middle west, middle east and south east areas of the Forest.

In addition to the cottages, there are a number of private recreation camps and hunt camps scattered across the Forest. These are generally land use permit holdings and tend to occur in isolation of each other. The vast majority of private recreation camp and hunt camps holdings were authorized during the 1950's to 1970's.

Increased quality and quantity of access roads can create demands for new cottage subdivisions and also increase the marketability of potential and existing cottage sites. Seasonal cottages may also be more frequently used or transition to permanent residences with improved access. Other long-term results include the use of old roads as hiking, ATV and snowmobile trails, and the maintenance of healthy, vigorous forests. Ongoing forestry operations may detrimentally affect the audio aesthetics. Forestry operations may also detrimentally affect the visual aesthetics and recreational experience of the area in the short term, until regeneration reaches an aesthetically desirable age. Forestry operations are usually perceived to be undesirable because cottages (or potential cottage locations) in the immediate vicinity of the operations may have reduced marketability. It is also perceived that the risk of vandalism increases with increased accessibility.

Crown land camping is permitted across the Sudbury Forest (except a few specific locations where it is prohibited). Generally, this activity is found in the vicinity of a waterway. Some areas are more heavily used (Wahnapitae North River, Judge Lake) than other areas but most lakes on Crown Land with access experience frequent use for camping. Other lakes and river systems (Matagamais/Chiniguichi/Sturgeon

River, Wahnapitae, and French River for example) with poorer access are frequently and intensively used by canoe tripping enthusiasts for back country excursions.

Recreational opportunities account for a significant number of uses and users of the forest. With outdoor pursuits such as hunting, fishing, boating, snowmobiling, ATV riding, bird and wildlife viewing, berry picking and a growing interest and participation in self-propelled pursuits like canoe tripping, hiking and kayaking.

Improved access to underutilized lakes will have the potential to satisfy the area's increasing demand for outdoor recreation opportunities. Regeneration restores aesthetics of recreation locations and helps to create diversity of age classes. Protection of existing aesthetics can be accomplished through insect and disease control, and area of concern planning. New road access development may result in the exploitation of newly accessed fish resources. Forest operations also have the potential to diminish the experience of outdoor recreation enthusiasts through noise, dust and the perception of unsightly harvest areas

Forest management plan activities are not permitted within parks and conservation reserves: these land-use types are excluded from the area available land base for forestry operations but are used to achieve landscape objectives. On the rest of the Crown land there is significant potential for user conflicts between forest management activities and cottaging, recreation, trapping and private land. Many of these conflicts are minimized or resolved through further reductions in the area available (reserves as part of area of concern prescriptions) for forestry or by changing the way forest activities are carried out (timing restrictions, modifying how harvesting is done). There are also frequent conflicts on use of public roads with safety and maintenance concerns being raised. Constraints adopted to resolve or minimize these conflicts often result in higher operating costs for the forest industry.

Provincial parks and Protected Areas

There are 23 Provincial Parks, 9 Conservation reserves and 4 Forest Reserves in, or partially within the Sudbury Forest. The purpose of protected areas is to permanently protect a system of provincial parks and conservation reserves that includes ecosystems that are representative of all of Ontario's natural regions, protects provincially significant elements of Ontario's natural and cultural heritage, maintains biodiversity and provides opportunities for compatible, ecologically sustainable recreations. Provincial Parks and Reserves within the Sudbury Forest cover include:

Provincial Park	Class	Area (ha)
Chiniguchi	Waterway	9,368
Daisy Lake Uplands	Nature Reserve	600
Fairbank	Recreation	105
Windy	Recreation	118
Wanapitei	Natural Environment	3,413
French River	Waterway	73,530
Killarney Lakelands and Headwaters	Natural Environment	15,346
Killarney	Wilderness	49,325
Killarney Coast and Islands	proposed Waterway	39,337
Mashkinonje	Natural Environment	2,041
Obabika	Waterway	20,520
Solace	Waterway	5,943

Provincial Park	**Class**	**Area (ha)**
Sturgeon River	Waterway	7,876
Total		227,522

Conservation Reserve	**Area (ha)**
Atlee	263
Atlee Central Forest	286
Cherriman Township	1,003
Eden Township Forest	145
Garson Forest	204
MacLennon Esker Forest	368
North Yorston	13,183
Pinetorch Lake	3,622
Tilton Forest	725
Total	19,799

Forest Reserves	**Area (ha)**
Wolf Lake Old Growth	2,470
Kukagami	3,510
Killarney North	3,228
Chiniguchi Waterway	135
Total	9,343

Included in the FMP Old Growth Strategy, Supplementary Documentation 6.1 (p), is the identification of Significant Ecological Areas (SEA) on the MNRF values maps (LIO non-sensitive values data). The Haentshcel, Demorest, and Marconi areas do not have overlapping Park, Forest Reserve or Conservation Reserve status. These SEAs were established due to concentrations of older red and white pine and are identified as 'no-cut' deferral areas where they fall outside of regulated Parks or Reserves:

Name	**Area (ha)**	**Status**
Haentshcel	564	Unregulated, no-cut
Demorest	908	Unregulated, no-cut
Wolf Lake	2,539	Forest Reserve
Marconi	69	Unregulated, no-cut
McCarthy	1,107	Within Provincial Park (Chiniguchi Waterway)
Scollard	928	Within Provincial Park (French River)
Cherriman	742	Within Provincial Park (French River)
Cow Bay	576	Within Provincial Park (French River)
Total	7,433	

Areas identified in the available forest inventory as old growth red and white pine and that are outside of the mapped Significant Ecological Areas or protected areas may be available for management in accordance with the FMP Old Growth Strategy, Supplementary Documentation 6.1 (p). The strategy provides direction for increasing old growth red and white pine over time, and conserving old growth features at multiple scales.

Wetlands

Wetlands of various sizes and types are scattered throughout the Sudbury Forest. They are often associated with lakes, rivers and streams. Wetlands are some of the most biologically productive ecosystems on the Sudbury Forest. They provide critical habitat for many plant and wildlife species, including species at risk.

There are a number of Provincially Significant Wetlands on the Sudbury Forest. There are likely more Provincially Significant Wetlands on the management unit and further evaluation is required to identify these wetlands. Verified Provincially Significant Wetlands include:

Wetland Name	**Township(s)**
Vermilion River	Hanmer, Lumsden, Morgan, Balfour, Dowling, Fairbank
Mashkinonge	Haddo
Sucker Creek	Haddo, Martland

Trapping (commercial fur)

There are 81 trap lines on the Sudbury Forest. Forty-eight are Registered Trap Lines (SU) and 33 are Fur Management Units (FMU) surrounding the Greater City of Sudbury on large plots of mining land. These trap lines are registered to almost 200 licensed trappers. There are no concentrated areas where this land use is practiced more than in other areas. Trapping is practiced across the whole forest and the local trappers are a fairly active presence on the land base. Trapping efforts are focused mainly on beaver and marten, with fisher and lynx also contributing significantly to number of pelts harvested and revenue generated.

The traplines and trapping activities have localized impact on forest management operations. Harvest pattern and clearcut size may be modified in instances where geographic constraints and topography (lakes, steep cliffs/ravines) may influence the movement patterns of furbearing animals. Concentrated harvest operations can have an impact on the viability of traplines. Road maintenance costs can be influenced by beaver activity and the absence of trapping, and the re-establishment of old road systems may require the removal of old beaver dams. Area of concern prescriptions are developed to ensure the protection of identified trap cabins; and forest operations must not disrupt identified trapline trails.

Private Land

Private land represents approximately 27% of the total land base of the Sudbury Forest. It is concentrated within the bounds of the City of Greater Sudbury, along the Highway 17 corridor, and in the municipalities of Markstay-Warren and French River. The private land is a mosaic of urban areas (inner city and rural town centres), patent mining lands and farm lands. This mosaic and collection of municipalities results in a large interconnecting network of municipal, local road board roads and highways.

Road access and roadless areas

Remote and roadless areas are an important feature of the Sudbury Forest and much of the land base is encompassed by land use policy direction for maintaining or enhancing remoteness. The CLUPA provides specific direction within several Enhanced Management Areas (EMA) for this purpose. Remoteness is also addressed across more than 190,000 ha of General Use Areas that have provisions constraining road use and persistence of driveable roads in support of sustaining fish and wildlife populations, e.g., areas G2044, G2047, G2049 and G2053. This is supported by the use of winter roads and decommissioning of branch and operational roads.

The FMP also has direction for managing road density and remoteness as part of Objective #15. A remote area assessment map (MU889_2020_FMP_MAP_LandPat_07.PDF) and analysis has been developed as part of this objective. Requirements for Moose Emphasis Areas also specify road deactivation strategies to limit access by 4x4 vehicles in specific areas. Refer to Supplementary Documentation 6.1 (t) for documentation of Moose Emphasis Areas.

2.2 Social and Economic Description

One of the components of forest sustainability is the provision for the needs of people who receive benefits from the forest resource. Decisions made in the forest management plan have significant impacts on the local economy and community stability, as well as the regional and provincial economies. Therefore, it is important to be knowledgeable about these social and economic impacts and to measure the magnitude of these impacts on people in our society.

In forest management planning, both knowledge and measurement of these social and economic impacts are obtained by first establishing the baseline socioeconomic profile of the communities impacted by the wood flow from the management unit; secondly, performing the socioeconomic impact analysis of management alternatives, and finally, observing the differences in the socioeconomic impacts among the management alternatives.

Further details on the social and economic description are found in Supplementary Documentation 6.1 (e). The social and economic assessment that associated with the FMP is also provided in Section 3.7.5 of this document.

2.2.1 Overview of Social and Economic Context

Many communities derive substantial social and economic benefits (e.g., employment, municipal taxes) related to management of the Sudbury Forest, and several First Nation and Métis communities are located in or adjacent to the management unit whose interests or traditional uses may be affected by forest management activities.

The socioeconomic profile includes demographic profiles for communities that are dependent on the wood flow from the Sudbury Forest or are affected by management of the forest, and profiles of industrial and non-industrial users of the forest. The socioeconomic profile provides the baseline information on the social and economic environment, which will affect long-term management decisions in the forest management plan.

2.2.2 Summary of Demographic Profiles

The demographic profile gives a snap-shot of the social and economic health of a community and of all dependent communities combined at the forest level. It provides the information on basic socioeconomic indicators, such as employment, and its trends, income, labour force, migration, language and education, information on forest industry and communities' dependencies on different sectors of the economy, including the forest industry. Data in the demographic profiles are derived from the most recent Statistics Canada Census of Population (2011). Demographic profiles of individual communities impacted by wood flow and the management of the Sudbury Forest are provided in Supplementary Documentation 6.1 (e).

The forest industry is identified by the Statistics Canada classification system: North American Industrial Classification System (NAICS, 2017). According to this classification, the forest industry[3] is comprised of:

- Forest Services and Logging
- Support activities for forestry (e.g., forest management; log hauling)
- Wood Product Manufacturing
- Paper Product Manufacturing

Included within "support activities for forestry" are employees working in the forest management sector.

2.2.2.1 Local Communities

Management of the Sudbury Forest affects many communities within the boundaries of the management unit and beyond. Demographic profiles of individual communities impacted by wood flow and the management of the Sudbury Forest are provided in Supplementary Documentation 6.1 (e). The communities include:

- Killarney
- Markstay-Warren
- St. Charles
- Temagami
- Timmins
- Cochrane
- Englehart
- Espanola
- French River (Alban, Noelville, Monetville)
- Gauthier
- Greater Sudbury (Hanmer, Coniston, Wahnapitei, Garson, Falconbridge, Skead, Capreol, Hanmer, Val Theres, Val Caron, Sudbury, Chelmsford, Dowling, Levack, Lively, Copper Cliff)
- Kirkland Lake
- Nairn & Hyman
- Pembroke
- Unorganized North Part of Sudbury District
- Sudbury Census Division
- West Nipissing

The complete demographic profiles, and summaries, are found in the Supplementary Materials 6.1 (e).

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[3] Note: it does not include forestry research, long-distance forest product trucking, and forestry machinery sales and repairs.

2.2.2.2 First Nation and Métis Communities

The Sudbury Forest is also an important resource for local Indigenous communities. It is essential to the Indigenous way of life, providing a source of traditional foods and medicines, and a place where First Nation and Métis peoples conduct cultural practices. Indigenous peoples also participate in the forest economy. Because of the importance of the forest to First Nation and Métis peoples and the potential for impacts to result from forest management practices, local Indigenous communities are invited to participate in the forest management planning process. The communities located in and adjacent to the Sudbury Forest have been identified as:

First Nations

- Wahnapitae First Nation
- Dokis First Nation
- Temagami First Nation (Bear Island)
- Teme-Augama Anishnabai (included in Bear Island)
- Henvey Inlet First Nation
- Wikwemikong Unceded First Nation
- Whitefish River First Nation
- Atikamekshen Anishnawbek (formerly Whitefish Lake First Nation)
- Mattagami First Nation
- Sagamok First Nation
- Matachewan First Nation

Métis

- MNO Sudbury Métis Council
- MNO North Channel Métis Council

Additional community information is also presented in the Supplementary Materials 6.1 (e).

2.2.3 Industrial and Non-Industrial Uses of the Forest

The following section provides descriptions of industrial and non-industrial uses of the Sudbury Forest, including forestry (timber use), recreation and tourism, angling and hunting, mining, aggregates and hydro generation, and other.

Forestry

Forest industry activities include logging, wood processing, road construction, hauling, renewal, maintenance and protection of the forest. The Sudbury Forest is managed under a sustainable forest license (SFL) granted to the Vermilion Forest Management Company Ltd (VFM). VFM is a shareholder cooperative management company with 8 shareholders that form the board of directors for the company. The shareholders also hold overlapping licences and along with a few non-shareholder overlapping licensees they harvest all of the available wood from the forest. Recent and current licensees on the forest are shown in Figure 2.2.1 below:

Figure 2.2.1. Sudbury Forest (889) - Forest Resource Licensees during 2012/13 – 2016/17.

Licensee Name	Licence Type
Goulard Lumber Limited	FRl Commercial (Regular)
William Day Construction Limited	FRL with Exemption under CFSA 29(2), or 47 (Directed)
Gervais Forest Products Ltd.	FRl Commercial (Overlapping a SFL)
Lahie Lumber Ltd.	FRl Commercial (Overlapping a SFL)
H. & R. Chartrand Lumber Ltd.	FRl Commercial (Overlapping a SFL)
EACOM Timber Corporation	FRl Commercial (Overlapping a SFL)
N'Swakamok Forestry Corporation	FRl Commercial (Overlapping a SFL)
D. Lachance Logging	FRl Commercial (Overlapping a SFL)
G. W. Sutherland Contracting Co. Ltd.	FRl Commercial (Overlapping a SFL)
Domtar Inc.	FRl Commercial (Overlapping a SFL)
Lakeland Lodge	FRl Commercial (Overlapping a SFL)
Daniel Hebert	FRl Commercial (Overlapping a SFL)

source: Registration Query 2018-04-27

note: Personal Use FRL's are not listed above.

Additional FRL Information: 2007/08 to 2017/18*

Commercial FRL's issued on the MU during 2007/08 - 2017/18	110
# of Personal Use FRL's issued on the MU during the period	1015

Note reporting period of FRL’s differs by 1 year from Wood volume reports due to availability of information.

Figure 2.2.2 summarizes the amount of total volume utilized by each receiving mill between 2007 and 2017 and the Volume of Wood Harvested from the forest by each receiving mill (m^3). Additional details including species groups is presented in FMP annual reports.

Figure 2.2.2. Volume of Wood Harvested from the forest by each receiving mill (2007/08 to 2016/17)

Receiving Facility	10-year Forest Share	10-year Depend. Ratio	Annual Total Harvest Volume Received										
			2007 2008	**2008 2009**	**2009 2010**	**2010 2011**	**2011 2012**	**2012 2013**	**2013 2014**	**2014 2015**	**2015 2016**	**2016 2017**	**Grand Total**
Longlac Wood Industries Inc.	0.10%	3.54%	2,528	154	0	0	0	0	0	0	0	0	2,682
Rockshield	0.20%	0.94%	0	28	270	817	0	2,041	130	0	0	1,702	4,989
EACOM Timber Corporation	1.30%	0.98%	0	0	0	0	2,251	13,245	0	0	0	19,052	34,548
Georgia Pacific North Woods	1.44%	0.52%	0	0	0	159	0	0	0	0	0	38,043	38,201
Liskeard Lumber Ltd.	0.29%	1.02%	1,112	0	26,660	0	0	0	0	0	0	0	27,772
Northern Pressure Treated	0.03%	1.89%	43	263	405	327	91	0	0	0	0	0	1,129
Wahgoshig Resource Inc.	0.01%	7.27%	188	0	0	0	0	0	0	0	0	0	188
Midway Lumber Mills Limited	0.01%	0.05%	231	49	0	0	0	0	0	0	0	0	280
Taylor Sawmill	0.01%	100.00%	140	0	0	0	0	0	0	0	0	0	140
Domtar Inc.	44.25%	16.87%	149,806	160,757	121,673	122,436	119,210	139,313	129,119	78,881	70,964	101,506	1,193,666
EACOM Timber Corporation	34.21%	22.79%	11,600	92,423	152,719	55,406	77,972	133,678	147,648	95,714	83,158	137,270	987,587
Carlyle Forest Products Inc.	0.00%	0.56%	0	0	0	0	0	93	0	0	0	0	93
Columbia Forest Products Ltd.	0.02%	3.09%	487	26	52	0	0	0	0	0	0	0	565
Tembec	0.01%	0.21%	146	0	0	0	0	0	0	0	0	0	146
Goulard Lumber Limited	3.60%	18.98%	5,985	19,780	40,560	8,901	5,577	8,852	3,024	3,860	1,351	24,889	122,779
St. Marys Paper Corp.	0.06%	0.26%	1,476	0	0	0	0	0	0	0	0	0	1,476
Portelance Lumber Ltd.	0.30%	11.40%	2,224	374	163	154	131	828	952	379	0	2,787	7,991
Gervais Forest Products Ltd.	2.53%	63.03%	36,990	9,255	7,765	3,225	2,590	3,373	3,184	607	312	4,047	71,347
R.Fryer Forest Products Ltd.	0.66%	34.85%	8,117	3,849	1,329	5,325	0	0	0	0	0	0	18,620
H. & R. Chartrand Lumber Ltd.	4.78%	87.35%	17,981	7,229	26,563	9,659	4,601	10,591	13,606	11,888	17,148	22,730	141,995
Lahaie Lumber Ltd.	3.81%	72.21%	13,628	12,070	25,224	9,907	9,302	7,541	7,549	8,167	3,615	16,430	113,432
Herb Shaw & Sons Ltd.	0.00%	0.03%	0	0	0	0	91	0	0	0	0	0	91
Scierie Landrienne Inc.	0.28%	27.98%	0	0	3,242	0	0	0	0	0	0	0	3,242
Global LVL Inc.	0.65%	6.28%	0	0	0	0	0	0	916	456	2,765	3,411	7,548
Tembec Industries Inc.	0.12%	0.32%	0	0	0	17,240	0	0	0	0	0	0	17,240
Ontario	1.33%	1.61%	5,340	3,246	4,803	1,773	4,161	3,525	2,955	3,363	3,005	3,298	35,470
TOTAL	**100.0%**		**258,021**	**309,502**	**411,427**	**235,329**	**225,975**	**323,079**	**309,082**	**203,314**	**182,317**	**375,166**	**2,833,213**

Source: TREES Data Wharehouse - 2018-04-26

Note for Figure 2.2.2: Only the primary facility code is listed. Totals include volumes received at secondary facility codes under the same name at the same location (e.g./ 3609 includes volumes delivered to 3653); Depend. (Dependency) Ratio represents the total Volume received by a facility from the MU divided by the total volume received by the facility from Ontario Crown during the 10-yr period 2007-17 and is represented by a percentage. Data for 2017/18 not yet available.

Table FMP-15 provides a summary of currently committed wood supply to licensees.

The forest sector is recognized as being a part of the economy subject to seasonal variation as well as highly influenced by global periodic economic cycles. The number of pulp and paper manufacturers, strandboard manufacturers, and sawmills has reduced dramatically during the past twenty years. The most recent significant decline occurred around 2008 adding to the number of mills that closed permanently. This has radically changed wood flow demand in some parts of the province.

In recent years however, it appears that Ontario's forest industry is emerging from this extremely difficult period, largely driven by U.S. housing demand. Some mills have reopened, some under new ownership. Despite this improvement, demand for pulp grade roundwood products remains low. Current demand for Spruce-Pine-Fir (SPF) lumber is strong due to U.S. housing demand. With the expiry of the Canada-U.S. Softwood Lumber Agreement, the U.S. government has lodged countervailing duties against Canadian softwood lumber alleging injury to U.S. producers.

Additionally, the U.S. government has also been levied countervailing duties against Canadian super-calendered paper. Despite the countervailing duties against SPF, demand for SPF logs from the Sudbury Forest remains strong.

Domtar announced that for a number of forests, they will no longer accept conifer roundwood pulp. The reduced pulp capacity in Ontario and Quebec has resulted in an excess supply of sawmill wood chips. Sudbury forest roundwood pulp is still accepted by Espanola, however delivery is highly constrained.

Wood Supply Commitments

There are no current wood supply commitments applicable to the Sudbury Forest. The Minister has conditional offers extended to three facilities as a result of a recent Provincial Wood Supply Competitive Process (WSCP) (Figure 2.2.3).

Figure 2.2.3. Offers extended as a result of recent Provincial Wood Supply Competitive Process

Facility	Amount (m^3/year)	Species
1582735 Ontario Inc. (Wikwemikong)	3,000	Cedar
Gervais Forest Products Ltd. (Falconbridge)	16,000	White and Red Pine
Goulard Lumber Limited (Sturgeon Falls)	10,500	White and Red Pine

Wood from the Sudbury Forest is processed into pulp, paper, lumber, veneer, oriented strandboard, fuelwood, pallets, and other specialty products. The wood is delivered to over 15 mills in Ontario and in times of mill shut downs to some mills in Quebec. Figure 2.2.4 displays the mills receiving fibre from the forest, the number of employees (total of mill and woodlands) and a brief description of the products produced where information is available.

Domtar's pulp and paper mill in Espanola produces both hardwood and softwood pulp as well as over 200 grades of technical and specialty papers. It supports 552 local jobs – the largest employer in Espanola. The mill was the first in Canada to install ozone bleaching in the first stage of its kraft bleaching process. Lahaie Lumber and H & R Chartrand both produce primarily white pine and red pine cants and some rough lumber with small amounts of polar lumber. Lahaie has recently added a molding line and kiln to produce moldings for door and window casings, baseboards and paneling. Both Goulard Lumber and R. Fryer Forest Products produce planed and kiln dried white pine and red pine lumber products with R Fryer Forest Products also producing some hardwood lumber. The EACOM Timber Corp sawmill in Nairn produces a variety of grades, dimensions and lengths of lumber, including machine stress rated (MSR) and Premium Decking. All chips produced are shipped to the Domtar Inc. Espanola pulp mill. Sawdust and shavings are sold to reduce waste, and bark is used on site to reduce waste and produce energy.

Figure 2.2.4. Summary of Receiving Mills, their Location, Employees (where available), and Products.

Mill	Location	Number of Employees (Facility & Woodlands)	Product Type
Carlyle Forest Products Inc.	Espanola	n/a	Fuelwood
Domtar Inc.	Espanola	552	Pulp & Paper
EACOM Timber Corporation	Nairn Centre	131	Sawmill
EACOM Timber Corporation	Ostrom	n/a	Sawmill
Gervais Forest Products Ltd.	Falconbridge	n/a	Sawmill
Global LVL Inc.	Ville Marie	n/a	Laminated Beams
Goulard Lumber Limited	Sturgeon Falls	48	Sawmill
H. & R. Chartrand Lumber Ltd.	Noelville	24	Sawmill
Herb Shaw & Sons Ltd.	Pembroke	65	Planning Mill, Pole
Lahaie Lumber Ltd	Alban	n/a	Sawmill
Northern Pressure Treated Wood Ltd.	Dobie	21	Pole
Portelance Lumber Ltd.	Capreol	9	Sawmill
Rockshield Engineered Wood Products ULC	Cochrane	n/a	Plywood
Sturgeon Falls Brush & Contracting Limited	Sturgeon Falls	n/a	Fuelwood

Crown timber charges from harvested volumes are summarized in Figure 2.2.5.

Figure 2.2.5 Crown Timber Charges (2007/08-2016/17.

	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Actual Harvest Volume (m^3)	258,021	309,502	236,058	235,329	225,975	323,079	309,082	203,314	182,317	375,166
Total Stumpage	$458,270	$620,179	$416,233	$578,982	$551,178	$768,709	$808,425	$573,419	$574,262	$1,448,432
Payments to Forest Renewal Trust	$862,058	$1,377,893	$1,070,278	$878,639	$750,635	$1,101,273	$1,036,180	$736,103	$638,461	$1,659,078
Pa ments to the Forestry Futures Trust	$255,474	$398,865	$412,586	$204,415	$211,711	$398,332	$294,738	$212,053	$148,644	$291,001
Average Crown Timber Charges per m^3	$6.11	$7.74	$8.05	$7.06	$6.70	$7.02	$6.92	$7.48	$7.47	$9.06

Source: TREES Data Wharehouse - 2018-04-26

Note:

1/ Stumpage consists of minimum stumpage, residual value and administrative fees

2/ Forestry Futures consists of Forest Futures Trust, FRI charges and forest management fees (No Forest Management Fees are recorded in TREES for the MU during this period)

**Data for 2017/18 not yet available*

Figure 2.2.6. provides a summary of renewal payments from harvested wood volumes between 2007/08 to 2016/17, which is used to fund silvicultural activities ensuring the renewal of the forest through the Forest Renewal Trust (FRT) and Forestry Futures Trust (FFT). The FRT and FFT are general revenue funds.

Figure 2.2.6 Ten-year summary of actual harvest volume, value of stumpage, and the average stumpage paid through payments to the Forest Renewal Trust (FRT) and Forestry Futures Trust (FFT).

	Actual Harvest Volume (m^3)	**Total Stumpage**	**Payments to Forest Renewal Trust**	**Payments to the Forestry Futures Trust**	**Average Crown Timber Charges per m^3**
2007-08	258,021	$458,270	$862,058	$255,474	$6.11
2008-09	309,502	$620,179	$1,377,893	$398,865	$7.74
2009-10	236,058	$416,233	$1,070,278	$412,586	$8.05
2010-11	235,329	$578,982	$878,639	$204,415	$7.06
2011-12	225,975	$551,178	$750,635	$211,711	$6.70
2012-13	323,079	$768,709	$1,101,273	$398,332	$7.02
2013-14	309,082	$808,425	$1,036,180	$294,738	$6.92
2014-15	203,314	$573,419	$736,103	$212,053	$7.48
2015-16	182,317	$574,262	$638,461	$148,644	$7.47
2016-17	375,166	$1,448,432	$1,659,078	$291,001	$9.06

Source: TREES Data Warehouse (2017-03-27)

Note:
1/ Actual Volume includes undersized volume.
2/ Stumpage consists of minimum stumpage, residual value and administrative fees.
3/ Forestry Futures consists of Forest Futures Trust, FRI charges and forest management fees (No Forest Management Fees are recorded in TREES for the MU during this period).

Non-timber Forest Products

Various non-timber forest products are collected from the Sudbury Forest. The amount and value of the products are not known because there are no licenses or permits currently required for the harvest and collection of these forest resources.

Lycopodium, white pine and red pine cones and balsam fir boughs are collected and sold to make Christmas ornaments. Mushroom picking, and the collection of edible and medicinal plants are also prominent activities on many areas of the forest. The Sudbury area is well known for collection of blueberries, most of which are picked from Crown land.

Recreation and Tourism

The Sudbury Forest provides a plethora of opportunities for both casual and outdoor enthusiasts. Many people go unaccounted because they do not use the services of tourism establishments but chose to take self-guided canoe or hiking trips, wildlife viewing excursions, hunting and fishing trips or casual day trips. Even though numbers are not available these types of recreational opportunities count for a significant number of uses of the Forest.

Cottages and camps are also featured prominently on the Sudbury Forest, as described in Section 2.1.4.3 of this document. Several associations are in place for individual lakes and are actively involved in the FMP process.

There is a growing interest in self-propelled travel and in particular canoeing and kayaking. The Sudbury Forest contains a number of both recognized and unrecognized canoe routes on both large and small water systems. The following list is a list of most of these canoe routes:

- Sturgeon River
- Upper Wahnapitae River
- Lower Wahnapitae River
- Vermilion River
- Numerous loops & connections in the Chiniguchi Lake/Matagamasi/Maskinonge chain
- Solace Lake Chain
- Obabika River
- French River – upper, main channels, mouth of the river
- Murdock River
- Collin’s Inlet
- Pilgrim Creek
- Yorston River.

The Sudbury District also has recognized Ontario Federation of Snowmobile Clubs trail systems and a few cross-country skiing systems.

The tourism business on the Sudbury Forest is quite varied and extensive. Tourism experiences and opportunities range from the more well off sailing enthusiasts at Killarney to remote water access lodges catering to fishing enthusiasts, to a plethora of drive to resorts and lodges along the French River and on inland lakes providing services to fisherman, hunters and general outdoor enthusiasts, to remote fly in outpost camps, and a growing number of businesses offering semi remote to remote back country excursions. Many people come to the Sudbury Forest to enjoy and experience the fishing and hunting opportunities, boating excursions, canoeing and hiking adventures, and the unique landscape and terrain present on the forest.

Because of the varied nature of the tourism business on the Sudbury Forest and because of the differences in the boundaries of the Sudbury Forest compared to more traditional boundaries used for economic data collection it has been difficult to determine the socioeconomic contribution of the tourism business. An attempt has been made though in extrapolating data from other sources. From Statistics Canada Travel Survey of Residents of Canada and the International Travel Survey, 373,246 Canadians visited the Sudbury Regional Municipality and 589,833 Canadians visited the District of Sudbury in 2014.

Provincial Parks, Conservation Reserves and provincially significant wetlands

Provincial parks, conservation reserves and forest reserves incorporate Crown Land that is not available for forest management activities. Provincial parks and conservation reserves are designated and managed under the *Provincial Parks and Conservation Reserves Act (2006)*. Refer to Section 2.1.4.3 for a listing of Provincial Parks, Conservation Reserves and provincially significant wetlands.

During forest management planning, the area of provincial parks and conservation reserves within the boundaries of the Sudbury Forest are used in the contribution to wildlife habitat. Similarly, these areas contribute to meeting ‘Old Growth’ targets and preferred wildlife habitat levels, but are not included in the determination of the available harvest area, as they have been removed from the Sustainable Forest License area. Conducting forest management operations adjacent to protected areas requires consideration of the objective(s) and value(s) of the protected area, as well as potential tourism and recreational concerns. The purpose of Ontario’s protected areas is to protect a diversity of Ontario’s ecosystems, preserve Ontario’s natural and cultural heritage, and provide opportunities for compatible, ecologically sustainable recreation.

The management implication for forest operations occurring adjacent to protected areas is primarily to prevent the values within the protected area from being impacted by the operations. The forest management operations will follow the land use direction set out in the Crown Land Use Policy Atlas, protected areas management plans and/or existing agreements with Ontario Parks with respect to operating adjacent to, or in some cases crossing, a protected area. Individual protected areas may have operations prescriptions negotiated to maintain park values during and after operations. Refer to the values maps to find the administrative boundaries of the parks and protected areas within and adjacent to the Sudbury Forest.

In addition to the regulated parks and conservation reserves there are four Forest Reserves where forest management activities (including harvesting and road construction) are not permitted.

In addition to protected areas, eleven Enhanced Management Areas (EMAs) have been established within the Sudbury Forest. Enhanced Management Areas are established to provide more detailed land use direction in areas with special features or values. They continue to allow forest operations to occur; however, in some instances may require modifications to forest management practices (e.g., timing, location, method, access) to recognize other land use values.

Wetlands of various sizes and types are scattered throughout the Sudbury Forest. They are often associated with lakes, rivers and streams. Wetlands are some of the most biologically productive ecosystems on the Sudbury Forest. They provide critical habitat for many plant and wildlife species, including species at risk.

There are a number of Provincially Significant Wetlands on the Sudbury Forest (refer to Section 2.1.4.3 in this document). There are likely more Provincially Significant Wetlands on the management unit and further evaluation is required to identify these wetlands.

Hunting, Fishing and Trapping

With the varied terrain, forest cover and water systems, the Sudbury Forest offers exceptional variety in fishing and hunting opportunities. People can fish for cold water species like lake trout and speckled trout as well as traditional warm species like walleye (pickerel), bass (both largemouth and smallmouth), pike, perch and musky. Additionally, there are places to fish for the less sought-after species like whitefish and black crappie. As can be seen from the visitor numbers reported above this variety of fishing opportunities attracts a wide range of both local and non-local people to the Sudbury Forest to participate in these outdoor activities.

The Sudbury Forest contains populations of the three big game species plus numerous small game (ruffed grouse, spruce grouse, rabbit, and migratory waterfowl). These opportunities attract numerous visitors to the area plus support a healthy local interest as well.

The Ontario Ministry of Natural Resources and Forestry conducted an analysis of the socioeconomic contribution of big game hunting in Ontario by Forest Management Unit. The economic benefits of recreational hunting are difficult to quantify as it nearly impossible to determine which local transactions (e.g., hotels, supply stores, gas stations) are directly tied to hunting activities (OFAH letter, 2017). However, moose hunting is the most closely researched hunting activity by the MNRF, allowing for an economic analysis of moose hunting within the Sudbury Forest. Based on an average of 1,808 hunters annually, the total money spent on moose hunting within the WMUs that overlap the Sudbury Forest in a given year was estimated to be $4,277,749. While this figure only represents the expenditures for moose hunting, it is expected that there will be some overlap of expenditures (for both non-travel and certain trip related expenditures) for other game. Yet, due to the differences in equipment and supplies, and the fact that some individuals concentrate hunting efforts on other game, there will be additive expenditures by hunters for other species.

The direct expenditures on goods, services, and major purchases related to hunting of non-moose species, such as deer and bear, have not been surveyed. An estimate of the economic benefits of these species is unknown. However, deer are a popular species hunted in the Sudbury Forest. The number of antlerless deer tags is provided in Figure 2.2.7 below for five Wildlife Management Units (WMUs) overlapping the Sudbury Forest.

Figure 2.2.7. Total resident and non-resident deer hunters in the WMUs overlapping the Sudbury Forest, based on a 5-year average (2012-2016) from licensed hunter postcard surveys.

		Based on Percentage of WMU in Sudbury Forest		
WMU	**Percentage (%) in Sudbury Forest**	**Average of # Tags Allocated**	**Average of Projected # Hunters (3 WMU)**	**Average of Projected # Days (3 WMU)**
39	31%	47	292	2,030
40	5%	4	2	15
41	34%	136	500	3,331
42	59%	342	1,849	11,887
46	4%	43	92	556
Totals		**571**	**2,735**	**17,818**

An economic analysis of moose hunting on the Sudbury Forest is provided in Appendix 2 of Supplementary Documentation 6.1 (e).

Commercial Trapping

There are 81 trap lines on the Sudbury Forest. Forty-eight are Registered Trap Lines (SU) and 33 are Fur Management Units (FMU) surrounding the Greater City of Sudbury on large plots of mining land. These trap lines are registered to approximately 190 licensed trappers paying approximately $35 per trapper per trap line ($6,720) for this privilege. Private land trappers (16 trappers – license fees of $590) are also active on the forest targeting mostly beavers and some long-haired fur (i.e., red fox, wolves, coyotes, etc.).

The Sudbury Area Trappers Council has a long standing legally binding Nuisance Beaver Agreement with the City of Greater Sudbury. This agreement outlines roles and responsibilities of both parties in managing nuisance beaver issues in order to maintain safe roads and infrastructure within the city. The agreement is only in place during the regular closed season for beavers and involves 33 FMU found in the City of Greater Sudbury and Sudbury Forest. The City often pays a total of $30,000-40,000 for this program each year.

A season closure for hunting and trapping of wolves has been implemented in the following townships of the Sudbury Forest (Eden, Tilton, Secord, Burwash, Foster, Truman, Dieppe, Caen, Bevin, Halifax, Laura, Servos, Curtin, Rossevelt, Hansen, Goschen, Sale, Attlee, Waldie, Cox, Killarney, Carle, Kilpatrick, Struthers, Allen, and Humboldt).

Figure 2.2.8. Estimated value for fur bearers harvested 2016.

Species	2007 harvest	2016 harvest	Average Provincial Price as of 2016	Est. Value for 2016
Beaver	4301	3891	14.95	$58,170
Marten	832	871	74.54	$64,924
Fisher	423	481	65.47	$31,491
Lynx	35	30	90.17	$2,705

The 2016 year's fur harvest is worth a total value of $157,290 (Figure 2.2.8). Other furbearers were also harvested by the same trappers but the total dollar value is unknown at this time. These species would include black bear, otter, muskrat, raccoon, fox, wolf and coyote.

Upon authority of the Fish and Wildlife Conservation Act and in accordance with Ontario Regulation 666/98 a total of $8,562 was paid to the Crown for pelt royalties.

Commercial Bear Management Areas

Bear Management Areas were established in 1989 in Sudbury District enabling those operators with this privilege the opportunity to provide bear hunts to non-resident hunters. In 2016 there were a total of 31 active Bear Management Areas (BMAs) on the Sudbury Forest. License fees are calculated at the rate of $2.00 dollars per km square or $17,058 for the Sudbury Forest. A further license administrative fee charged to the operator ($35/licence) adds a further $1,100 dollars to the provincial coffer.

Between WMUs 39, 41 and 42 about 247 non-resident hunters harvested 152 bears in 2016. In addition, these three WMUs also had 2,585 resident bear hunters who harvested a total of 614 bears. By area, these WMUs fall 31%, 34% and 59% inside the Sudbury Forest, respectively, so the actual numbers within the Sudbury Forest would be less. The Sudbury Forest occupies 41% of the total area for these three WMUs and therefore it is possible that 314 bears were harvested from the Sudbury Forest in 2016.

Based on the 2016 bear hunt, resident hunters reported spending an average of $864/hunter and non-residents an average of $2,280/hunter in expenditures associated with their hunt that year. Nine-hundred fifty non-resident bear hunters generated $216,310 in 2016.

Bear hunting opportunities have increased with the expanded and extended spring bear hunt pilot by an additional five years, through to 2020. This season was created in all wildlife management units that currently had a fall bear hunt (ie. WMU 39, 40, 41, 42, 46, and 47) and was also opened to non-residents through the Bear Management Area Program. There were also a large number of resident bear hunters active in the Sudbury forest. Provincially, resident bear hunters are increasingly expressing serious concerns for a possible over harvest of animals and stressed bear populations. Figure 2.2.9 demonstrates the number of resident and non-resident hunters surveyed in the WMUs that overlap the Sudbury Forest.

Figure 2.2.9. Total resident and non-resident black bear hunters in the WMUs overlapping the Sudbury Forest based on a 10-year average (2006-2015) from licensed hunter postcard surveys.

		Based on Percentage of WMU in Sudbury Forest	
WMU	**Percentage (%) in Sudbury Forest**	**Resident Bear Hunters per WMU**	**Non-resident Bear Hunters per WMU**
39	31%	65.72	74.71
40	5%	12.5	13.65
41	34%	138.72	120.36
42	59%	215.35	153.4
46	4%	12.6	1.32
Totals		**445**	**363**

Commercial Baitfish Areas

A total of 60 baitfish licenses were active on the Sudbury Forest in 2017 (24 Commercial Bait Harvesters, 24 Bait Dealers, 8 Tourist Bait Dealers and 4 Tourist Dealers).

Total license revenues:

- Commercial Bait Harvester - $10,710
- Commercial Bait Dealers - $3,600
- Tourist Bait Dealers - $240
- Tourist Dealer - $240
- Total $14,790

All licensees harvest and deal about 103,760 dozen baitfish (total money generated approximately $518,815) and 19,900 dozen leeches (total money generated approximately $139,270).

The harvest, use and movement of bait are linked to the spread of diseases and invasive species and pose a significant threat to Ontario's fisheries and biodiversity. As a result, the MNRF has been reviewing its provincial policies related to baitfish and leeches. The Strategic Policy for Bait Management was developed and outlines new rules intended to maintain some flexibility for anglers and industry while minimizing the potential ecological risks.

The shared use of forest access roads is important to all commercial and recreational interests. The need for road access is an important foundation for FMP objectives for the development and maintenance of roads, and balanced with the importance of remote areas and road decommissioning.

Mining and Mineral Exploration, Aggregates and Hydro Generation

Mining and Mineral Exploration

Historically, Canadian nickel production has been dominated by the output from the Sudbury Basin. Presently, there are twelve operating nickel/copper/cobalt/platinum group element mines in the Forest and there are 3 advanced nickel-copper exploration projects underway.

There are three mines that have the project classification of industrial minerals, 4 of advanced minerals, and 9 as producing mines (Figure 2.2.10).

Figure 2.2.10. Sudbury Forest- Mineral Inventory (Industrial, Advanced Exploration and Producing Mines.

Project-Company Name	Project Classification	Commodity	Commodity Source
Allstone Quarry Products Inc	Industrial Minerals	Granite; building stone, landscaping stone, flagstone, cut stone	
Canadian Colour Rock Inc.	Industrial Minerals	Dolostone; flagstone, building stone, landscaping stone	
Taillefer Quarry	Industrial Minerals	Quartz, sandstone conglomerate; building stone, landscaping stone, monuments	
Victoria / KGHM	Advanced Exploration	13.6 million tonnes 2.6% Cu, 2.7% Ni, 8.3 g/t total precious metals	http://kghm.com/en/our-business/projects-under-development/victoria
Denison JV / Lonmin-Vale	Advanced Exploration	Nickel, Copper, Plantinum group elements, Gold	http://www.mndm.gov.on.ca/mines/data/google /rgp/files/html/MER_YearToDate_Sudbury_2015.html. 170406
Errington / Glencore	Advanced Exploration	5.8 million tonnes, zinc, copper, precious metals	https://www.northernontariobusiness.com/regional-news/sudbury/sudbury-basin-largely-unexplored-geologist-370712, Dan Farrow of the Ontario Geological Survey as in Northern Ontario Business article 'Sudbury Basin largely unexplored: geologist. 140915.
Vermillion	Advanced	2.5 million tonnes,	https://www.northernontariobusiness.com/regional-

Project-Company Name	Project Classification	Commodity	Commodity Source
/ Glencore	Exploration	zinc, copper, precious metals	news/sudbury/sudbury-basin-largely-unexplored-geologist-370712, Dan Farrow of the Ontario Geological Survey as in Northern Ontario Business article 'Sudbury Basin largely unexplored: geologist. 140915.
Nickel Rim South / Glencore	Producing Mine	24,127 tonnes nickel-in-concentrate; 48,150 tonnes copper-in-concentrate; 505 tonnes cobalt-in-concentrate;	http://www.glencore.ca/en/who-we-are/Pages/nickel.aspx, 170406
Fraser-Strathcona / Glencore	Producing Mine		
Copper Cliff North / Vale	Producing Mine	Nickel	http://www.geologyontario.mndmf.gov.on.ca/ gosportal/gos?command=mndmsearchdetails: amis&uuid=05621
Creighton / Vale	Producing Mine		
Garson / Vale	Producing Mine		
McCreedy East-Coleman / Vale	Producing Mine		
Stobie / Vale	Producing Mine		
Totten / Vale	Producing Mine		
Morrison (Levak) / KGHM	Producing Mine	High grade-copper, nickel, precious metals	http://kghm.com/en/our-business/mining-and-enrichment/morrison

Exploration continues to be a prominent activity on the management unit and relies heavily on the network of forest access roads.

Aggregates

There are 224 aggregate licences on private land and 160 aggregate permits on Crown Land issued in the Sudbury District for the extraction of sand, gravel, and quarry stone, with the majority being within the Sudbury Forest. A significant portion of the aggregate extracted is used as backfill in the mines to keep mined areas from caving in, with the majority of the rest being used in road construction and maintenance. In the Sudbury District total production in 2017 for all products was 6.2 million metric tonnes of this 2.5 million was produced from within the Greater City of Sudbury alone. The forest industry in the 2015-16 Annual Report reported a total of 13 pits identified as being active for the purpose of maintenance and construction of forest access roads. The forest industry is exempt from paying fees or royalties for aggregate extracted from category 14 pits. For all other aggregate permits and licenses the royalties in 2017 were $0.50 per tonne plus an additional $0.198 per tonne.

Hydro-electric Power Generation

There are seven waterpower generating facilities in the Sudbury Forest plus numerous other water control structures. All generating stations in the management unit hold waterpower lease agreements and the companies holding the agreements are in the process of working with MNR to develop 20-year water management plans. Figure 2.2.11 below lists the current facilities in the Sudbury Forest.

Figure 2.2.11. List of Generating Stations, Owner, and Location.

Generating Station	Owner	Location
Big Eddy Dam	Vale Inco	Spanish River at Lake Agnew
High Falls 1 & 2	Vale Inco	Spanish River at Lake Agnew
Wabagishik	Vale Inco	Vermilion River
Moose Rapids	Ontario Power Generation	Wahnapitae River
Stinson Generating Station	Ontario Power Generation	Wahnapitae River
Coniston Generating Station	Ontario Power Generation	Wahnapitae River
McVitie Generating Station	Ontario Power Generation	Wahnapitae River

2.3 First Nation and Métis Background Information Report

First Nation and Métis Background Information Reports (BIR) and Community Demographic Profiles may be made available at the discretion of individual communities. Refer also to Supplementary Documentation 6.1 (c) and (d).

Aboriginal values contain sensitive information and are updated and made available for planning purposes and annual work scheduling but are not shared publicly.

3.0 DEVELOPMENT OF THE LONG-TERM MANAGEMENT DIRECTION

3.1 Introduction

This section describes the long-term management direction (LTMD) and the development of the management strategy. The long-term management direction for the Sudbury Forest provides direction for road access, harvest, renewal, and tending activities required for a balanced achievement of management objectives. During the development of the LTMD, management objectives were developed and desirable levels and targets identified through analysis, which involved the use of the Strategic Forest Management Model (SFMM). The Ontario Landscape Tool (OLT) was also used to evaluate ecological and habitat indicators of forest composition and landscape pattern. A management strategy was developed based on the evaluation and assessments of objective achievement balanced over a 150-year planning horizon. The management strategy sets the level of harvest for the 10-year period of the forest management plan based on the results of the wood supply analysis and assessment of objective achievement. The wood supply analysis determines the available harvest area (AHA) for each forest unit on the Sudbury Forest.

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

- gathering background information
- identifying the current forest condition
- establishing a base model
- reviewing the desired forest and benefits
- developing management objectives
- proposing primary road corridors
- proposing and endorsing a long-term management strategy.

The LTMD must be consistent with forest legislation and policy and consider the direction in MNRF's forest management guides. The management strategy must also provide for an acceptable balance between social, economic and environmental considerations noted above and provide for the sustainability of the Crown forest.

3.2 Management Considerations

Management considerations are developed from an evaluation of changes to the forest condition (e.g., significant natural disturbance) or social, economic or environmental concerns that affect the development of the long-term management direction. Management considerations were identified by a review of past forest management plans, analysis of silvicultural results, independent forest audits (IFAs), and issues affecting the implementation of the current (2010-2020) FMP. Input from the Desired Forest and Benefits Meeting (Section 3.4 of this document) was also an important foundation to the management considerations. Other sources of information include new science and policy direction, the First Nation and Métis Background Information Reports and consultation with First Nation and Métis communities.

Species at risk (SAR) policy is relatively new and during Phase II of the 2010-2020 FMP updated direction was implemented. The Sudbury District MNRF maintains inventories and information for SAR on the Sudbury Forest which may be further updated during the 2020-2030 term. Known sites of occurrence of habitat are documented for flora, fish and wildlife that are listed as endangered, threatened or of special concern. Since this information is considered as sensitive it is not shown on the public FMP maps but is available to the planning team to ensure that known SAR habitat is adequately protected. The Stand and Site Guide provides forest management direction for forest-dwelling SAR and is updated periodically.

The planning has used the most current MNRF direction to develop updated area of concern (AOC) prescriptions and conditions on regular operations (CROs) for known SAR occurrences on the forest. New AOC prescriptions or CROs will be developed and amended to the FMP if new SAR habitat or species occurrences are identified during plan implementation that will potentially be impacted by planned forest operations.

The age structure of the forest, as described in Section 2.1.2 and Figure 2.1.3, is one of the most important considerations in the long-term management of the forest. The present and future harvest levels and habitat conditions are greatly influenced by current distribution of seral stages and has a profound effect on current and future wood supply.

The introduction of the new Landscape Guide direction also has significant management implications which are tied to the current condition of forest cover types and age classes. The previous 2010-2020 FMP, however, was influenced by the pending direction of the Landscape Guide, therefore there has been a fairly seamless transition in developing the 2020-2030 FMP.

Climate change is also an important consideration in the development of the proposed management strategy. Forest management inherently provides an important role in potential mitigation of climate change through the sequestration of carbon in the accumulation of biomass and wood products. The planning team’s approach to addressing climate change, however, was to focus on management activities, above and beyond regular forestry practices that will enhance the resiliency of the forest to a changing climate. Recommendations from the Forest Gene Conservation Association (FGCA) have been considered in the development of an objective to address climate change, as described in Section 36.

A significant portion of the Sudbury forest consists of fire-dependent ecosystems that evolved with periodic wildland fire as a renewal agent. In the absence of forest management, wildland fire is one of the primary forms of landscape disturbance, resulting in a mosaic of forest ages and composition. In a managed forest regime, planned harvest and renewal activities are used to emulate the pattern and frequency of wildland fires and resultant forest composition and structure. Wildland fire can be used as a tool, where safe and appropriate, to support land and resource management objectives (e.g., hazard reduction, forest renewal, habitat management). The recently approved Wildland Fire Management Strategy for Ontario and the concept of modified fire response areas were discussed at the September 27, 2018 planning team meeting. The planning team, through dialogue with Fire Science and Planning Specialists, examined the applicability of candidate areas (landscape or site-specific) for modified fire response on the management unit. For example, remote areas previously affected by insect outbreaks or blowdown that are not salvageable could be allowed to burn if safe to do so. Through these discussions, however, the planning team did not feel it was appropriate to identify modified fire response areas. Fire preparedness and prevention is discussed in Section 4.8 of this document.

3.3 Base Model

The analysis for the LTMD was completed using the Strategic Forest Management Model (SFMM) software. To create the model, the planning inventory was updated to account for stand conditions that would be expected in 2020 (i.e., stand age, and forecast depletions) to create the base model inventory (BMI) for input into SFMM. The resulting base model includes assumptions related to the land base (e.g., management zones and current forest condition), forest dynamics (forest succession, growth and yield), available silvicultural options, biological limits, and other model assumptions identified by the planning team that are documented in the Analysis Package. Section 3.0 of the Analysis Package, Supplementary Documentation 6.1 (b) provides the details of the development of the base model inventory and the base model.

3.3.1 Analysis of Silvicultural Activities

Past silvicultural activities were analyzed for the development of the 7-Year Annual Report and the trend analysis for the Independent Forest Audit in 2016. This involved a review of planned compared to actual renewal activities and expenditures, and their past performance (refer to next Section, 3.3.2).

Recommendations relating to renewal and tending activities that were implemented during the current 2010-2020 FMP were also reviewed with recommendations for implementation in the 2020-2030 FMP:

1) Improved timing and site selection for silvicultural treatment application;
2) Review the use of tools such as mechanical site preparation in jack pine renewal, to increase stocking on regenerating sites;
3) Prescribed natural regeneration where appropriate with emphasis on more targeted application of this treatment;
4) Continue to build upon post-renewal analysis to enhance future modeling endeavours on the management unit.

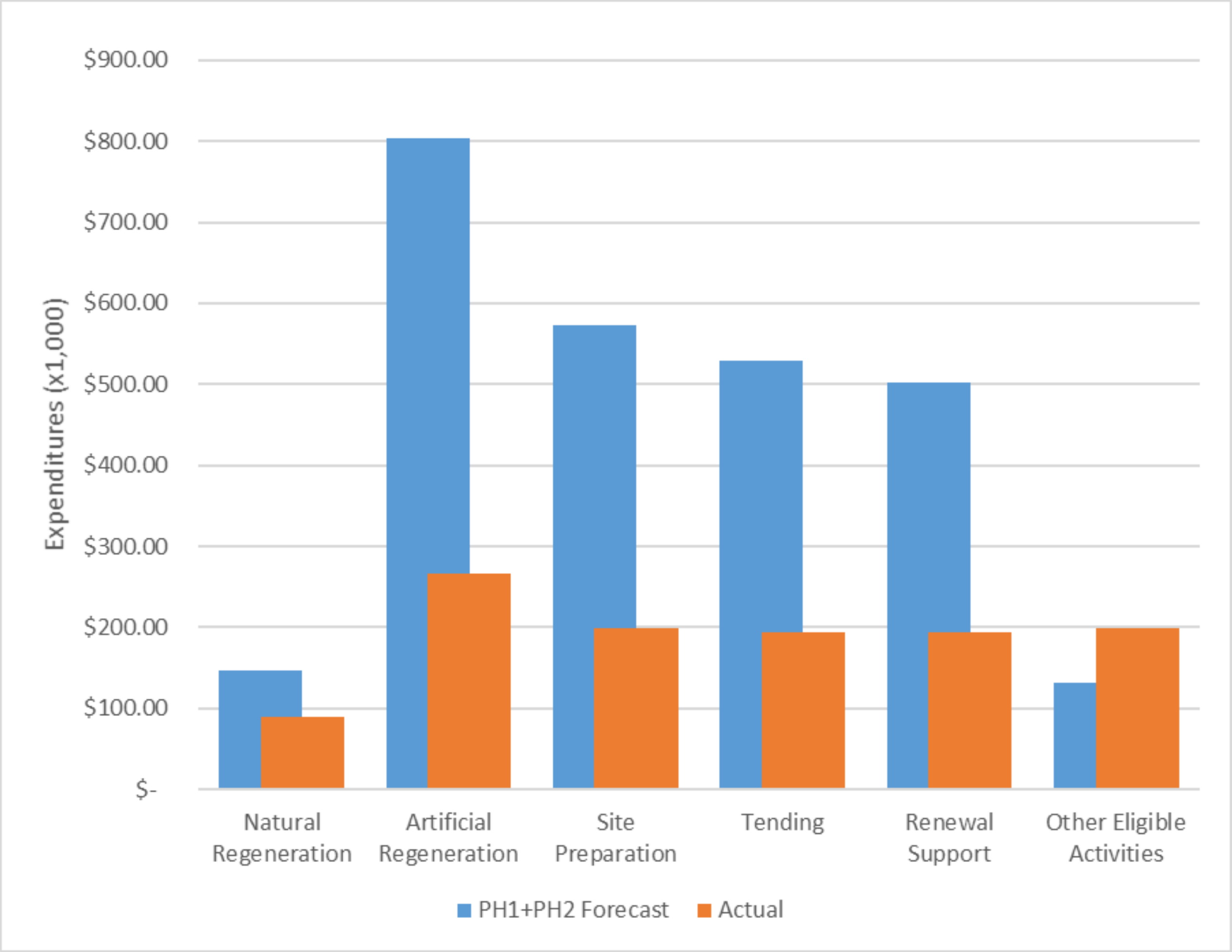
Implementation of mechanical site preparation has been successful over the duration of the 2010-2020 FMP. The amount of mechanical site preparation has increased significantly on the Sudbury Forest. Despite a harvest rate that is lower than planned, the amount of mechanical site preparation has more than doubled compared to the previous two FMPs.

Expenditures described in consecutive annual reports are keeping pace with harvest, as a percentage of forecast levels. Overall spending is at 37% of forecast, 42% if including “Other Eligible Activities”, compared to 36% of annual available harvest. “Other Eligible Activities” mainly include fixed costs such as salaries and vehicle use, which are relatively constant, regardless of harvest levels. Note there is a lag time between harvest and silviculture activities, so current spending generally reflects harvest in previous years, which have been at relatively low levels. Over the first 7 years of the 2010-2020 FMP, the total amount contributed in Renewal Fees was $7,281,875, and the amount contributed in Crown Dues, Forestry Futures Trust, and FRI fees ($7,462,665) was also just over $1 million per year.

Figure 3.3.1 illustrates the forecast and 7-year actual levels of expenditures for forest renewal from 2010 to 2016. The forecast levels are based on full utilization of the forest, i.e., the amount of area requiring site preparation, planting or natural regeneration, and tending assumes that all available areas are harvested. As noted above, harvest levels are well below the available levels, hence there is a corresponding drop in the levels of actual silvicultural work.

The treatment costs per ha were re-evaluated in year 7 for the development of the 2020-2030 FMP, and compared to costs that were planned and modelled for the 2010-2020 FMP. Overall, costs are very similar and have been adjusted for the 2020-2030 FMP base model. Some forest unit / intensity costs were increased slightly, while others decreased. For example, PWST Basic1 costs were adjusted down, while Inten1 costs increased. A full comparison can be made by reviewing the Analysis Package Section 3.1.2 of the 2010-2020 FMP and 3.4.3 of the 20202 FMP. Renewal rates are also reviewed annually and, if necessary, adjusted regularly and model inputs for the 2020-2030 FMP LTMD were based on the most recently adjusted rates.

Figure 3.3.1. Forecast and actual silviculture expenditures for the first 7 years of the 2010-2020 FMP.



Resultant yields for naturally regenerated stands are expected to align well with the non-density regulated "extensive" yield projections. A significant conclusion of the review of past silviculture is that natural regeneration (ingress) is very common, leading to a need for lower densities of planted trees and a relatively clumpy, random distribution of trees. As a result, non-density regulated yield models were used (i.e., "basic curves") for the Inten1 silvicultural treatments. Density regulated yields were applied in the model for Inten2 treatment combinations.

3.3.2 Analysis of Past Silvicultural Performance

Significant efforts were made in the first two years of the 2010-2020 FMP to reduce the backlog of area needing to be surveyed. Approximately 5,000 ha were surveyed per year in 2010 and 2011, with closer to 2,000 ha per year in subsequent years. Overall, the level of successfully regenerated area in the current 2010-2020 FMP is in line with recent harvest levels, and represents a significant increase over previous planning periods. This has provided a significant monitoring database for analysis, which will be expanded for future plans as well.

An evaluation of the monitoring database was used for the development of new, empirically-based post-harvest succession rules for the 2020-2030 FMP LTMD model, described in Table FMP-5. Post-harvest succession rates describe the predicted yield achievement of each forest unit and silviculture intensity combination (i.e., silviculture stratum) in clearcut and shelterwood systems. In previous plans, post-harvest succession, also referred to as post-renewal succession (PRS), relied heavily on professional opinion due to a limited supply of empirical data from free-to-grow (FTG) surveys or other sources. The PRS matrix in Table FMP-5 shows intentional regeneration to different forest units (including restoration to shelterwood forest units), as well as renewal success and failure; and was reviewed and revised by the Silviculture Task Team.

The SFMM model does not include successional changes for uneven-aged systems, therefore there are no successional pathways for the selection forest unit. Regardless, the selection forest unit is a climax forest community and tends to be very stable due to the predominance of shade-tolerant sugar maple; therefore, the succession of managed HDSEL stands is modeled as a static condition.

It is particularly important to ensure that the assumptions for post-harvest renewal are accurately reflected in the strategic model. The forecasted habitat conditions and wood supply are heavily dependent on the transitions from one forest unit to another after harvest. Some of the key observations, comparing the 2010 model assumptions and the trends from this analysis include:

- A much higher transition from BW to PO when managed extensively (30% predicted to 67% observed)
- Basic treatment intensity of MW1 to PWST resulted in a 90% achievement compared to 10% predicted
- MW1 treated intensively regenerated to PJSB 61% of the time, compared to 10% predicted, and less often to PJ (24% as compared to 70% predicted)
- PJSB treated extensively regenerated less often to MW1 than expected (31% rather than 60%) and more often to PO (35% compared to 10% predicted)
- Observed results were very close to predicted levels for PO extensive, PJSB and PJ intensive, SF basic and extensive.

Sample sizes for some forest unit and intensity combinations (strata) were smaller and therefore still required some professional judgement to predict outcomes.

Related to the post-harvest succession assumptions are the modelled inputs and results related to silvicultural intensity and restoration of red and white pine. During the implementation of the 2010-2020 FMP renewal efforts have been successful in meeting the overall objective for intensive management, however, the targeted levels by forest unit for restoration of red and white pine have been more challenging. The restoration of the PWUS or PR forest units is targeted at 70% of PWST harvested, 5% of MW1, 5% of MW2 and 5% of the BW harvest areas. Currently, the implementation of restoration on the landscape is at 23% of PWST harvested, 1% in white birch, 6% in MW1 and 22% in MW2 areas harvested. It is still early to be assessing this objective; however, the company is on track or exceeding expectations in mixedwoods, and is below targets in PWST and BW. The majority of BW areas that are planted are renewed to jack pine, and this is also a desirable result. Overall, there is a need to realign where restoration is done, and how much, i.e., the 2010 plan did not target PJSB, SF for restoration to white or red pine but some areas of these forest units are more suitable than some of the PWST areas, hence 4.7% of PJSB and 5.3% of SF, respectively, were planted to Pw/Pr. The forest units to target for restoration, and the levels for each were re-evaluated for the 2020-2030 FMP and updated in LTMD objective #6 (summarized in Table FMP-10).

Perhaps the most significant adjustments to model assumptions for the development of the 2020-2030 FMP was focused on white pine shelterwood harvests. The 2010 model was based on the assumption that all areas would be harvested with a seed-cut followed by 2 removal cuts, in accordance with MNRF direction at the time (i.e., PWUS 3-cut). In practice, however, the overwhelming majority of stands do not have sufficient stocking to support 3 commercial harvests. This was reviewed with the planning team and Silviculture Task Team to make recommendations for the development of the LTMD. The base model for the 2020-2030 FMP plan was subsequently adjusted to represent removal cuts as a single harvest following the seed-cut (i.e., PWUS 2-cut).

3.4 Desired Forest Benefits

The Desired Forest and Benefits meeting is the opportunity for the District Manager, Plan Author and the forest management planning team to hear from citizens, and gather information on their vision for the forest, in terms of the composition and the types of benefits to be derived from it. The input received during the meetings is used to inform the development of management objectives of the 2020 Sudbury Forest Management Plan.

The Ministry of Natural Resources and Forestry Sudbury District Manager hosted four (4) desired forest and benefits meetings for the Sudbury planning team, plan advisors, Local Citizens Committee (LCC), and First Nation and Metis communities. These desired forest and benefits meetings (DFBM) were held to inform participants of the background information and provide a forum to share their respective interests in the management of the Sudbury forest. The meetings generated a total of 187 comments; below is the breakdown of the source of the comments:

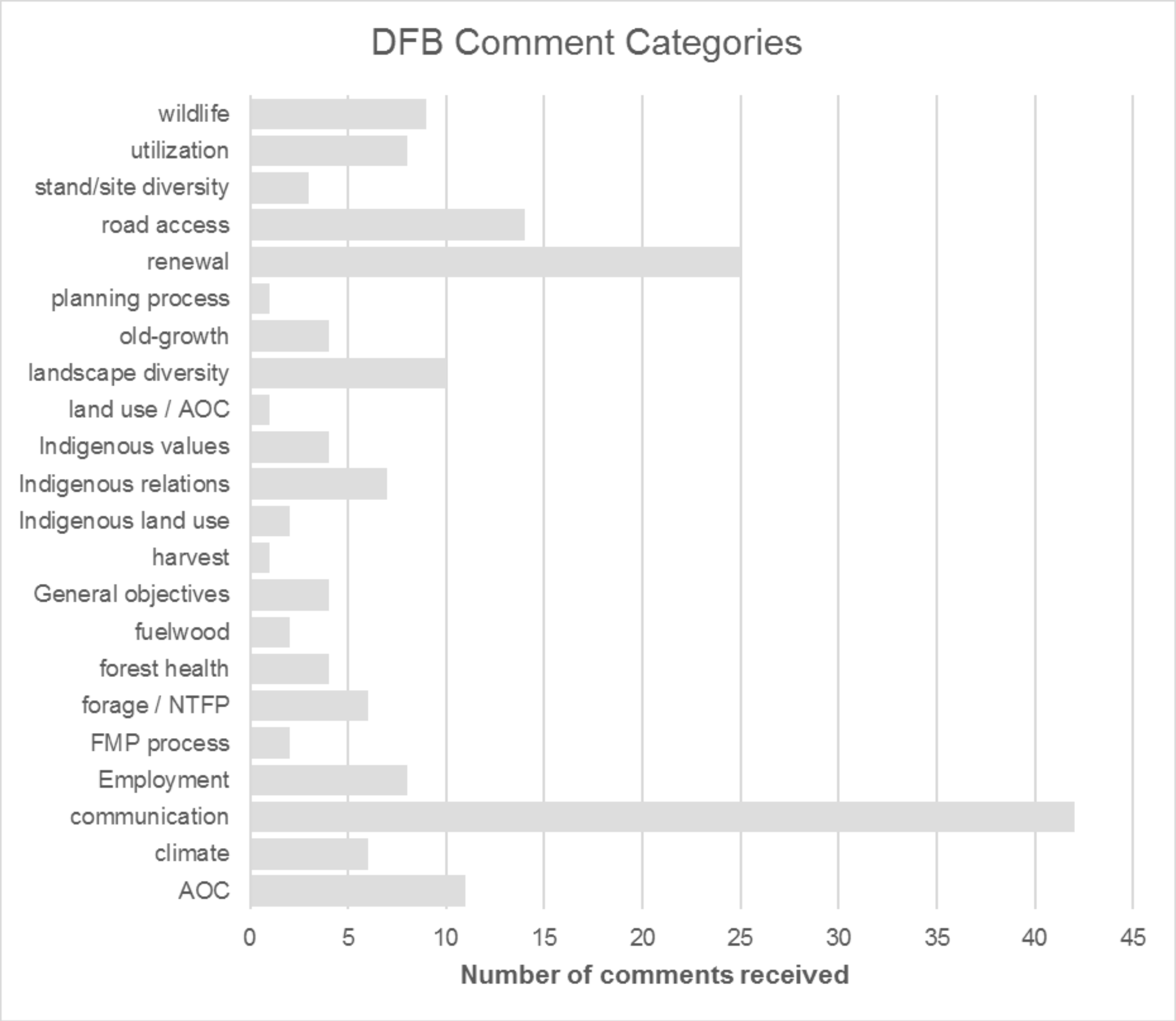
When	Participants	Number of Attendees	Number of Comments
April 11, 2018	Sudbury LCC	39	106
May 24, 2018	Atikameksheng Anishnawbek	13	22
May 28, 2018	Sagamok Anishnawbek	16	43
May 31, 2018	Wahnapitae First Nation	16 (plus 89 online)	16

Meeting participants were given an overview of the Sudbury Forest, and the 2010-2020 plan objectives to set the context for the meeting. At the LCC meeting the thirty-nine participants, divided in three groups, discussed and gave their opinions during each of three break-out sessions, focusing on Forest Cover and Diversity, Silviculture, and Social and Economic issues. The topics are the broad objective categories from the Crown Forest Sustainability Act and are described in section 1.2.5.1 of the Forest Management for Planning Manual for Ontario's Crown Forests (2017).

A total of 174 comments and recommendations were recorded and later grouped into similar topics and relevance to various sections of the plan. The comments were presented and discussed at meetings with the Sudbury Forest Management Planning Team and the Local Citizens Committee.

The majority of comments contribute directly to the development of the plan, in the setting of objectives and targets, developing access plans, area of concern prescriptions, conditions on regular operations, or Resource Stewardship Agreements. Figure 3.4.1 below illustrates the number of comments by category.

Figure 3.4.1. Sudbury Forest Desired Forest and Benefits Number of Comments by Category



The need for better or more communication seemed to be of top concern, with over 40 comments. Renewal and tending practices came second with 25 comments while road access, Areas of Concern and landscape diversity followed with each having around a dozen comments. A significant number of comments and suggestions were determined to be suitable for use in other parts of the plan and in processes other than forest management planning, such as the Crown Land Use Management, wildlife population management, designation of species at risk, private land management, internal processes, wood supply directives, and alternative energy programs.

Table FMP-10 of the Sudbury Forest 2020-2030 draft Long Term Management Direction describes thirty-six (36) plan objectives. The comments received at the desired forest and benefits meeting are incorporated within these objectives. The full table of unedited comments received from participants during the DFBMs is included in Supplementary Documentation 6.1 (k).

3.5 Strategic Management Zones

The Sudbury Forest is divided into 5 Strategic management zones (SMZ) to assess the spatial distribution of harvest and objective achievement. The zones are described as follows:

Zone Label	Name	Description
SMZ(1)	Zone1	Dispersed areas, fragmented access. Significant proportion of shallow soils (Eco-sites 008 to 028 are 45% of the area of the available forest within this zone), high proportion of birch and oak. Generally higher wood cost $/m^3.
SMZ(2)	Zone2	Dispersed areas, partly fragmented access. Some shallow soils (Eco-sites 008 to 028 are 26% of the available area), somewhat higher wood cost $/m^3.
SMZ(3)	Zone3	Northwest, mainly associated with Eco-region 4E (very small inclusion of 3E), west of the Wanapitei River, including the Spanish Arm. Most heavily dominated by boreal forest types and disturbance regimes.
SMZ(4)	Zone4	Southcentral, contiguous area of Eco-region 5E. Most representative of Great Lakes-St. Lawrence forest types and with a higher proportion of shelterwood silviculture conditions than zones 3 and 5.
SMZ(5)	Zone5	Northeast, mainly associated with Eco-region 4E (very small inclusion of 3E), east of the Wanapitei River.

SMZ(1) is by far the smallest zone, representing only 3% of the available forest area (Figure 3.5.2). It is however unique due to the dispersion among patent land, and relatively higher proportion of eco-sites with shallow soils. While this area is suitable for management it is generally more challenging to access and has a higher proportion of physical access considerations, i.e., steep areas or peninsulas.

SMZ(2) is also somewhat dispersed with relatively prominent eco-sites with shallow soils. The remaining zones are simply divided spatially to provide a balanced distribution of the land base. The north-south division is the Eco-Region 4E/5E boundary and it is divided east-west by the Wanapitei River.

The placement of zones in the strategic model allows for analysis of objectives spatially. This was done for old growth forest projections, and wood supply. Objective achievement for wood supply was assessed spatially as directed in the 2017 FMPM (Part B, Section 3.5) to quantify harvest area (and associated volume) over the first 40 years of the planning horizon. Analysis with and without spatial constraints shows sensitivity in the model to the spatial distribution of harvest area, but that a constraint can effectively control large fluctuations by zone for the first 4 terms.

Figure 3.5.1. Location of Strategic Management Zones.

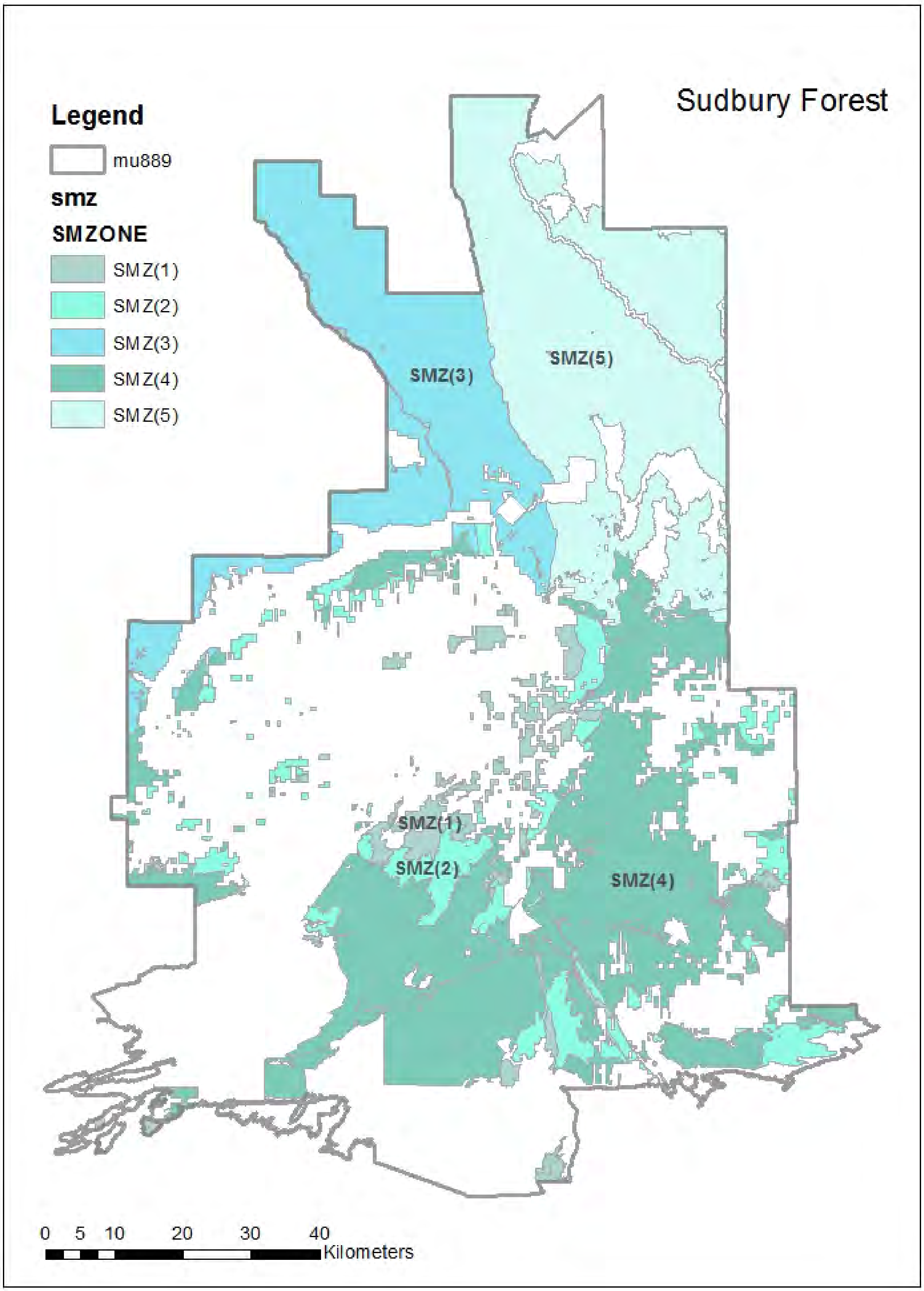
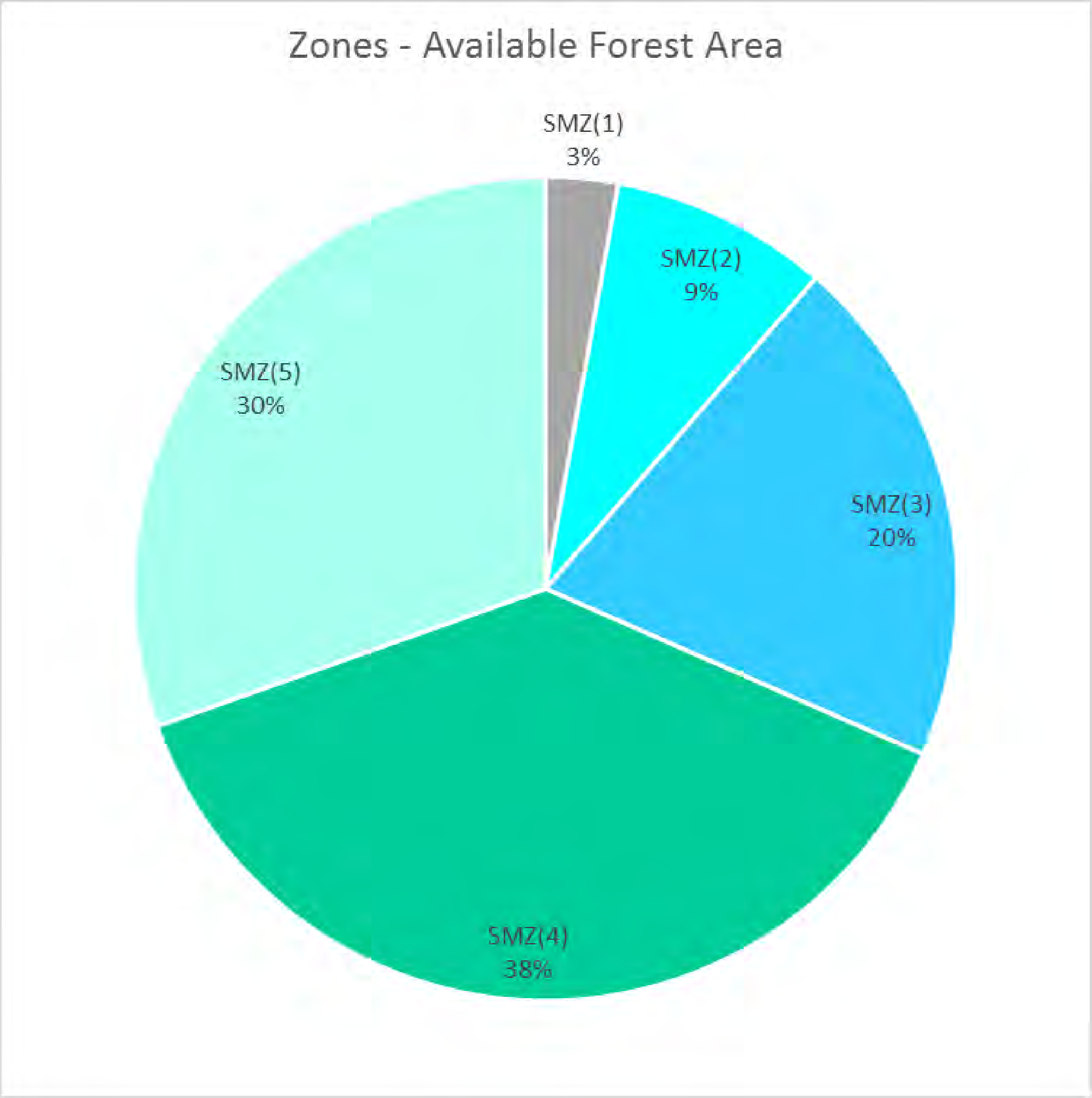

Sudbury Forest
Legend
mu889
smz
SMZONE
SMZ(1)
SMZ(2)
SMZ(3)
SMZ(4)
SMZ(5)
SMZ(3)
SMZ(5)
SMZ(1)
SMZ(2)
SMZ(4)
0 5 10 20 30 40
Kilometers

Figure 3.5.2. Area of each Strategic Management Zone.



3.6 Objectives and Indicators

The following objectives were developed from input from the Desired Forest and Benefits (DFB) meetings (refer to FMP Section 3.4), public consultation, and during meetings with the planning team and Local Citizens Committee. Objectives were also guided by MNRF sources of direction (including Figure A-3) from the Forest Management Planning Manual for Ontario's Crown Forests (MNRF 2017) 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), i.e., the Landscape Guide and the Stand and Site Guide, respectively.

Objectives are categorized as either quantitative, with specific measurable targets, or qualitative, which are evaluated by ensuring specific criteria are met, but are not defined by specific amounts or numbers.

The planning team's review of management objectives from the current (2010-2020) forest management plan resulted in carrying-over most of the objectives and indicators, with some additions and adjustments.

Several objectives have been assessed during the development of the long-term management direction and will be followed-up at later stages of plan production. The objectives and indicators that required measurement over medium- and long-term time scales were assessed using the Strategic Forest Management Model (SFMM), and balanced as part of the requirements of the management strategy. The Ontario Landscape Tool (OLT) was used to evaluate specific spatial and non-spatial indicators of landscape diversity at the start (2020) and end (2030) of the plan. The remaining objectives are assessed through the development of the FMP during Stage 3 and Stage 4 or during implementation of the FMP, in the Year 5 and 10 Annual Reports.

Some of the shorter-term objectives use compliance inspections as key indicators, to be measured as the percent of inspections in compliance. The desirable level for the percent of inspections would be 0% non-compliance for inspections related to all of the following objectives. These levels were chosen to ensure that there is no impact of forest activities on the values and other stakeholders on the Forest. However, it is unrealistic to expect that there would never be an incidence of non-compliance. The target (refer to FMP-10) has therefore been set according to a combination of the sensitivity and frequency of the value being protected. These indicators will be tracked and monitored through the annual report and will be assessed at years 5 and 10.

Quantitative Objectives

3.6.2 CFSA Category - Forest Diversity; natural landscape patterns

#1. Move toward a distribution of disturbances that more closely resembles the expected natural disturbance landscape pattern.

The texture of the mature and old forest and young forest patch size are coarse filter indicators used to characterize landscape pattern. Landscape pattern was assessed with three indicators:

A. Mature and old forest distribution (500 ha texture).

B. Mature and old forest distribution (5,000 ha texture).

Desirable levels are expressed as showing movement towards the hexagon histograms (SRNV mean) for the two assessment levels. Two assessment levels for this indicator are used, as described in the Landscape Guide, because it is possible that "the texture measurement at one level, as expressed in a proportional frequency histogram, is exactly the same between two landscapes even though the same texture measurement at a finer or coarser level is significantly different".

C. Young forest patch size.

Young forest is defined as being less than 36 years of age, as described in the Landscape Guide. Desirable levels were set based on showing movement towards the SRNV mean of patch size.

Texture of the mature and old, and young forest is measured at plan start year and the projected year 10 of the forest management plan as assessed at LTMD and each stage of operational planning.

Table FMP-10 provides the desirable levels (SRNV mean) for each indicator: Mature and old forest distribution (500 ha and 5,000 ha textures) for the following hexagon proportions are indicated: .01-.20, .21-.40, .41-.60, .61-.80, >.80.

Young forest patch size proportions by size class are as follows (the target is the desirable level):

Patch size (<36 years)	Plan Start	Target (SRNV mean)
1-100	0.616	0.788
101-250	0.236	0.121
251-500	0.073	0.045
501-1,000	0.059	0.021
1,001-2,500	0.014	0.009
2,501-5,000	0.003	0.006
5,001-10,000	0.000	0.006
10,001-20,000	0.000	0.003
>20,000	0.000	0.000

3.6.1 CFSA Category - Forest Diversity; structure and composition

#2. Move towards a more natural abundance of old growth habitat and increase the mean size and frequency of old forest patches.

Old-growth habitat by Landscape Guide Standard Forest Unit or grouping.

Old-growth habitat is defined in the Landscape Guide and OLT. Desirable levels were based on ensuring 100% of the SRNV was reached or maintained, or if the SRNV could not be reached then follow a trend towards the SRNV. Targets were then set during scoping analysis that ensured consistency with these trends and compatibility with other model constraints. The upper ranges were not imposed as hard constraints. Once the mature and old class targets are met, the proportion of old that contributes to each class may be higher than the proportion of mature. This is a desirable / acceptable result, i.e. there may be more old growth than the SRNV upper range.

This assessment was done during the development of the LTMD. The desirable level and target for each indicator is shown in Table FMP-10.

Indicators of patch size and frequency are also included, and are evaluated based on proposed harvest areas, starting at Stage 3 and updated for the draft and final plans.

The frequency of old forest stands by patch size and desirable level (target)
51-500 ha desired level (target): increase
501-1,000 ha desired level (target): increase
>1,000 ha desired level (target): increase

The mean area of old forest stands by patch size
51-500 ha desired level (target): increase
501-1,000 ha desired level (target): increase
>1,000 ha desired level (target): increase

This objective is also complimented by the FMP Old Growth Strategy, which was updated from the 2010-2020 FMP and is documented in Supplementary Documentation 6.1 (p). The Old Growth Strategy emphasises the long-term objectives for old growth, and actions that can be taken at the stand-level to enhance old growth conservation on the Sudbury Forest. It is important to note the distinction made between old growth habitat conditions and old forests. Old growth habitat can include managed forest conditions that meet the habitat criterial while the mapping of old forest areas exclude stands that have a record of management in the planning inventory. This is explained further in the Old Growth Strategy document.

#3. With consideration to the current landscape pattern and composition, ensure the long-term distribution of old growth develops across the Sudbury Forest in proportion to respective cover types.

Proportion of total old growth habitat by strategic management zone.

This objective was revised from the 2010-2020 FMP to utilize the strategic management zones developed for the Forest. The proportion of old growth in the various zones is expected to change over time due to the higher proportion of hemlock, white pine, and tolerant hardwoods in Zone 4 (Eco-region 5E), with a respective increase in old growth for these forest types where initial old growth levels are below the natural range. Zones 3 and 5 (Eco-region 4E) have more boreal characteristics and old growth quantities at plan start for early successional boreal species groups (e.g., white birch, poplar, jack pine, spruce-fir) are generally at or above the expected range of natural variation, therefore proportionally will contribute less over time as the more southern Great Lakes-St. Lawrence (GLSL) zones increase in old growth area.

The desirable levels and targets were developed from scoping runs in SFMM based on feasible solutions that achieve the balance of all objectives. The ranges for these indicators are largely influenced by natural and post-harvest succession rates and the targets set in Objective #2.

Strategic Zone	Plan Start	Desired Level (target)
Zone1	0.02	0.02 to 0.04
Zone2	0.07	0.04 to 0.08
Zone3	0.14	0.06 to 0.14
Zone4	0.42	0.42 to 0.60
Zone5	0.35	0.26 to 0.36

This indicator is assessed during the development of the LTMD.

#4. To maintain the area of forest cover types that would occur naturally on the Sudbury Forest, similar to the expected natural landscape dynamics, with consideration of the pre-settlement forest condition.

This objective was also carried over from the 2010-2020 FMP and is meant to ensure the selected management strategy provides for the development of forest cover types that more closely resemble the predicted range of natural variation. Desired levels are based on the comparative direction in moving towards SRNV levels of standard forest units in relation to conditions at the start of the FMP.

This indicator is assessed during the development of the LTMD. The desirable level and target for each indicator is shown in Table FMP-10.

#5. Provide Red and White Pine forest area not less than 1995 levels, consistent with the *Conservation Strategy for Old Growth Red and White Pine Forests Ecosystems in Ontario, 1996*.

Area of red and white pine forest (all ages).

The desirable level for red and white pine forest was based on maintaining area above the 1995 level to be consistent with the *Conservation Strategy for Old Growth Red and White Pine Forests Ecosystems in Ontario, 1996*. The SRNV was also used, and provided a much higher level to reach, therefore the target was based on reaching the SRNV. Scoping analysis showed that red and white area continually increased, and the SRNV could be reached in well under 100 years. The Landscape Guide milestone is to continually increase in the long-term, however, current projections suggest the SNRV can be reached and maintained within approximately 60 years.

This indicator is assessed during the development of the LTMD. The desired level for total area of red and white pine forest (all ages) on the Crown forest, defined in OLT, is 197,260 to 226,492 ha. The target is to not drop below the 1995 value and increase towards the SRNV.

#6. Restore to the PWUS or PR forest units a proportion of harvested area in the PWST, BW, MW1, MW2, SF, PJSB forest units.

In order to effectively meet objectives #4 and #5 there is a need to regenerate white and red pine on suitable sites where there was likely a higher component of white and red pine in the past. These are typically sites with coarse-textured soils, and where a mix of tree species is currently present. The PWST, BW, MW1, MW2, SF, PJSB forest units are the best candidates for restoration for these reasons. The level of restoration, as a proportion of the harvested area by forest unit, is targeted at the following levels based on past experience and SFMM output:

Forest Unit	Restoration level (%)
PWST	30
BW	5
MW1	5
MW2	2
SF	2
PJSB	10

The SFMM scoping runs determined these targeted levels to be appropriate for the achievement of all other FMP objectives and constraints, and are largely determined through the post-harvest succession probabilities and budget constraints on renewal costs for each stratum. The overall levels of intensive silviculture were also constrained to limit unwarranted application of intensive treatments.

This objective is assessed for the Year 5 management unit annual report and the management unit annual report for the final year of plan implementation.

#7. Move toward a distribution of seral stages that more closely resembles the expected natural variation.

This objective is developed from direction prescribed by the Forest Management Guide for Great Lakes-St. Lawrence Landscapes (the Landscape Guide). The Landscape Guide indicators quantify landscape structure, composition and pattern to provide desirable levels (milestones) to manage towards. Measurable targets are developed from the milestones based on the simulated range of natural variation (SRNV) for each indicator, i.e., the predicted natural level determined during the development of the Landscape Guide and Ontario Landscape Tool (OLT). The applicable geographic area for the Landscape Guide direction used in this objective (milestones from Table A4 for the Sudbury Forest of the Landscape Guide) is the Great Lakes-St. Lawrence (GLSL) North.

Specific indicators for this objective are based on the area (ha) of the following attributes:

A. Landscape Class as defined in the Landscape Guide:

i. Tolerant Hardwood (mature, old, two-stage),
ii. Intolerant Hardwood (mature and old),
iii. White Pine Mixedwood (mature, old, two-stage),
iv. Mixedwood (mature and old),
v. Mixed Pines (mature and old),
vi. Spruce-Fir-Cedar (mature and old).

Desired levels were set to align with the SRNV relative to the initial conditions: either movement upwards or downwards to the SRNV, then maintaining within the SRNV in accordance with milestones shown in Figure 3.7.16.

The targets for each of these indicators, shown in Table FMP-10 were developed and assessed during the development of the LTMD, as described in Section 4.3.1.2 of Supplementary Documentation 6.1 (b) Analysis Package. The indicators were also updated with the January 2019 version of OLT. Each of the indicators reached the prescribed milestones, however the white pine mixed class (PWMIX) presented a challenge and could not be reached with a straight linear approach. The PWMIX class followed an increasing, decreasing, then increasing trend and was constrained to ensure a minimum level of 78,500 ha was achieved at Term 6. This was discussed at length with the Planning Team and the Modelling and Analysis Task Team. The current age-class distribution of the PWUS and PWST forest units is such that there is very little recruitment of area into the mature ages, requiring a reduction in harvest area in Term 1 in order to maintain a reasonable progression towards the SRNV.

Young forest indicators are also included as directed by the Landscape Guide to ensure suitable levels of early-successional habitat are planned. These are measured as the pre-sapling and the combined pre-sapling, sapling and T-stage development stages (PSST). The pre-sapling development stage was constrained in the model to always remain within the SRNV. The combined PSST was not constrained in the model as this is not a requirement, which allows for a solution to obtained for the constrained objectives. Regardless, the PSST fluctuates within the SRNV of 65,484 to 141,092 ha, except in Term 3 where it very slightly exceeds the upper range by 250 ha.

3.6.3 CFSA Category - Forest Diversity; distribution and abundance of forest ecosystems

#8. Protect and maintain genetic diversity of rare tree species, and species at the northern end of their range on the Sudbury Forest (e.g., hemlock, yellow birch, black cherry, red oak, beech, white ash, burr oak, elm, red spruce, green ash, basswood).

This objective evolved from the 2010-2020 FMP to focus on ensuring forest management activities are in place and followed that contribute to the conservation of uncommon tree species. Because the FRI has a limited resolution to detect less common species (often occurring at concentration of less than 5% of a stand) the planning team felt the indicator for this objective should focus on compliance with a condition on regular operations (CRO) for the maintenance of rare species at the northern end of their ranges.

This objective is to be assessed during the development of the Year 5 and Year 10 Annual Reports. The desirable level and target are for 100% compliance with the CRO.

3.6.4 CFSA Category - Forest Diversity and Provision of Forest Cover; habitat for animal life

#10. Designate areas on the Sudbury Forest where habitat targets and road use strategies are developed to enhance moose populations.

The indicator for this objective is the development of moose emphasis areas (MEAs) dispersed across the forest in areas with moderate to high moose carrying capacity potential. MEAs must cover a minimum of 10-15% of the forest area, and each MEA must be at least 2,000 ha in size. In selecting candidate MEAs, preference was given to areas 10,000 ha in size or greater. Within MEAs, the forest is to be managed to create or maintain a forest composition most beneficial for moose and provide forest conditions that are similar to the conditions moose prefer and would encounter in a natural forest ecosystem.

The following criteria are set as measurable indicators, as directed by the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (2010). The desirable levels and targets are to maintain or move towards the following levels:

- Browse: 5-30% of each MEA
- Mature conifer: 15-35% of each MEA
- Hardwood / mixedwood: 20-55% of each MEA

Road use strategies in MEAs are also to be developed to mitigate 4x4 truck traffic to lessen potential hunting pressures. Other areas of the forest may also have road access strategies, as determined by CLUPA, and habitat management for moose. The desirable level of the road density indicator for this objective (km/km^2 of roads driveable by 4x4 truck) is to reduce by 5%, with a short-term target of no net increase.

Assessment of objective achievement for this indicator is during the development of the operational plan. Refer to Supplementary Documentation 6.1 (t) for details.

#13. Protect critical sites for forest-dwelling wildlife species at risk that are known to occur on the Sudbury Forest.

This objective stems from a FMPM (2017) requirement and is assessed for the year-5 management unit annual report and the management unit annual report for the final year of plan implementation. The indicators are 1) Provision of training for staff and contractors on the identification and protection of species at risk, and 2) Compliance with species at risk AOC prescriptions. The desirable level and target is for an annual spring training session for contractors and licensees, and 100% compliance.

This objective will be assessed for the year-5 management unit annual report and the management unit annual report for the final year of plan implementation.

#14. Promote early successional shoreline habitat for beaver, with preference to areas that are not adjacent to permanent roads and trails.

Forest management guidelines for the past several decades have focused on protection of riparian areas that precluded any planned disturbances along shorelines. This often resulted in unmanaged reserves along shorelines that resulted in a decrease in the amount of early successional habitats. Specifically, poplar and birch regeneration is discouraged in areas where natural fire and blow-down would allow for these species to regenerate. This is particularly important to sustain beaver populations. For this reason, the Stand and Site Guide provides direction to allow for some disturbances adjacent to water bodies under specific conditions to recreate a more natural balance of young and old forest, and conifer and hardwoods along shorelines for beaver habitat. Following this direction, an indicator was developed for the number of harvest blocks on which shoreline harvesting for beaver habitat is applied. This direction is to be implemented on a case-by-case basis in accordance with the Stand and Site Guide.

During the Desired Forest and Benefits meeting it was noted that encouraging beaver populations close to well-used roads and trails may conflict with other forest users, i.e., beavers may dam up culverts, resulting in wash-outs or flooding. As such, the direction is to focus on areas where permanent roads and trails will be less impacted.

This objective will be assessed for the year-5 management unit annual report and the management unit annual report for the final year of plan implementation. The desired level and target are to implement on a case-by-case basis in accordance with the Stand and Site Guide.

#19. Ensure land use direction is followed in CLUPA as well as adjacent to parks and conservation areas on the Sudbury Forest.

This objective is meant to ensure forest cover and access is managed in accordance with land use direction in the Crown Land Use Policy Atlas (CLUPA). The indicator is to monitor compliance with prescriptions for the protection of natural resource features, land uses or values dependent on forest cover (% of inspections in compliance); compliance with CLUPA direction / road use management strategies (RUMS) for access and road decommissioning (FOIP report on access). The desired level and target are for 100% compliance.

This objective will be assessed for the year-5 management unit annual report and the management unit annual report for the final year of plan implementation.

3.6.5 CFSA Category - Social and Economic; long-term harvest levels, community well-being

#21. Provide a sustainable, continuous and predictable wood supply that will meet, as closely as possible and for as long as possible, the current recognized industrial demand of the Sudbury Forest.

This objective is assessed with several indicators that include harvest area and volume targets:

A. Harvest flow policy.

Harvest flow policy is designed to regulate the fluctuation of harvest volume from term to term, or to establish an even-flow of volume through time. Moderate fluctuations are often needed on forests where there is a significant imbalance of age-classes, such as the Sudbury Forest.

Refer to Section 4.3.2.6 of the Supplementary Documentation, Analysis Package for a description of the model scoping that was done to evaluate the achievement and effects of varying harvest flow constraints. The following desired levels and targets were established:

Species Group	Desired Level	Target
Spruce-pine-fir (SPF)	10%	10%
Intolerant hardwoods (INT)	10%	10%
White and red pine (PWR)	10%	5%
Tolerant hardwoods (TOL)	10%	5%
Other conifer (OC)	10%	5%
All species groups (ALL)	10%	10%

This indicator is assessed during the development of the LTMD.

B. Available long-term projected total annual harvest area (AHA).

Harvest area (ha) is an important indicator of economic potential. Ideally there would be consistent (non-declining) harvest area from plan to plan, and term to term, therefore a 0% decrease was set as a desirable level. This was, however, determined to be infeasible while meeting other plan objectives (refer to Section 4.3.1.6 of the Supplementary Documentation 6.1 (b)), hence the targeted level was to ensure reductions in total AHA from term to term did not exceed 10%.

This indicator is assessed during the development of the LTMD.

C. Long-term projected available harvest area (AHA) by forest unit.

The desirable level is to maintain a forest unit mix, over time, in order to meet the projected available harvest volume (m^3) by species group. Desirable levels cannot be fixed, in order to allow the optimization of the selection of forest units from term to term. Desirable levels are to limit fluctuations from term to term by 20-30% (refer to Table FMP-10 for details). Accordingly, constraints were tested in the SFMM model to prevent changes in harvest area between 10-year periods. Limits less than 20% resulted in infeasible solutions.

This indicator is assessed during LTMD development.

D. Long-term projected available harvest volume by species group and product.

As with harvest area, harvest volume over time is an important indicator of sustainability. The current industrial demand (CID) developed for the 2020-2030 FMP is based on existing wood supply commitments and current mill business plans and was used to set desirable levels for the objective. The following volumes (1,000s m^3) by species group are the desired levels and targets established through scoping analysis (refer to Section 4.3.1 of the Supplementary Documentation 6.1 (b), Analysis Package):

Species Group	Desired Level	Target
Spruce-pine-fir (SPF)	230.5	230.5 in T1, 169 minimum
Intolerant hardwoods (INT)	150.2	150.2 in T1, 130 minimum
Tolerant hardwoods (TOL)	2.5	2.5 minimum
White and red pine (PWR)	86.9	86.9 minimum

Species Group	Desired Level	Target
Other conifer (OC)	3.0	3.0 minimum
All species groups (ALL)	473.1	473.1 minimum

Desired levels and targets for product groups are based on current demand.

Product Group	Desired Level	Target
Conifer pulp	93.0	93
Hardwood pulp/comp.	150.2	150.2
Conifer sawlogs	224.4	224.4
Hardwood sawlogs	5.0	5
Veneer	5.0	5
Poles	1.0	1
Total	478.6	478.6

This indicator is assessed during the development of the LTMD.

E. Actual harvest area, by forest unit (% of planned harvest area).

This indicator refers to the amount of harvest area that is actually harvested and reported in annual reports, which may differ from planned areas. Conditions on the ground may not match exactly what is described in the inventory, resulting in shifts in forest unit areas; and depressed market conditions may result in continued under-utilization. The target level for the actual harvest area by forest unit is for the depletions to be greater than 75% of the allocations for each FU. The desirable level for this indicator would be 100%, however, due to poor market conditions or poor wood quality, achieving 100% of the available harvest area may not be realistic.

This is to be assessed for the Year 5 management unit annual report and the management unit annual report for the final year of plan implementation.

F. Actual harvest volume, by species group (% of planned harvest volume).

The desirable level for this indicator is for the actual harvest volume to meet 100% of the planned volume for each species group. This level was chosen to meet CID requirements of the identified mills. In reality, there are a variety of possible operational and economic factors which prevent the 100% achievement. The target has, therefore, been set at the actual harvest volume being 75% of planned.

These targets are linked to the AHA indicator targets and will also be tracked through the annual reports and the results will be monitored and reported at years 5 and 10.

#35. Provide opportunities for personal fuelwood collection that are distributed in proximity to communities on the Sudbury Forest.

A desire to promote local fuelwood gathering opportunities was expressed during the Desired Forest and Benefits meeting and custom consultation meetings. This may involve personal fuelwood permits for unutilized material at landings, or standing fuelwood lots. These opportunities will be made available and encouraged. Monitoring will focus on the volume of wood acquired with Personal Use Fuelwood permits, and the number and area of fuelwood lots in use. Specific fuelwood areas are also allocated for opportunities for First Nation communities.

Assessment and reporting of this objective will be done for the Year 5 and Year 10 Annual Reports. The desired level and target is to maintain or increase from current levels.

3.6.6 CFSA Category - Social and Economic; Community well-being

#9. To recognize and incorporate non-timber forest products in the forest management plan.

This objective evolved from the main Desired Forest and Benefits meeting during Stage 1 of the FMP process, as well as during customized meetings at the request of specific First Nation and Métis communities. The focus of this objective is to ensure that collection of non-timber forest products such as medicinal plants, berries, mushrooms, and quality birch trees, is recognized as part of forest management. Compliance with AOC prescriptions for non-timber values is one of the primary mechanisms for this objective. Communications between users of non-timber forest products and forest foragers and the SFL and the MNRF regarding forest operations scheduling is also a key component. These indicators will be assessed during the development of the Year 5 and Year 10 Annual Reports.

Development of a map of appropriate areas of non-timber forest products and consider these areas in forest management planning was also raised as an important step, and is to be review and updated at the AWS stage with annual communications with users of non-timber forest products.

#15. Ensure there is a balance of road access to allow for effective and efficient forest operations, recreation, and remote areas on the landscape.

A. Density (km/km^2) of roads within the total land base (excluding core City of Sudbury area).

Road access to allocated harvest areas, silviculture treatment areas, and recreational areas is critical to the successful implementation of the FMP. Many users of the forest depend heavily on forest access roads for recreation, tourism (access within bear management areas, baitfish collection, camping, collection of non-timber forest products, etc.). An objective for the provision of a well-maintained road network is, therefore, a useful indicator of success. Road access is, however, contentious as pointed out during the DFB meeting, and a balance of motorized access and remote areas is needed, with the amount of road access currently being at the high-end of the spectrum. To reduce pressures on wildlife and remote areas, the desired level of road density is to decrease over time, i.e., as new roads are developed, older roads will become impassable through decommissioning, access controls, and becoming over-grown. This indicator is based on roads that are reasonably driveable by 4x4 trucks.

At the start of the FMP, densities are 0.37 km/km^2 for all roads and 0.27 km/km^2 excluding non-SFL roads, as determined at the LTMD stage. The desired level is to decrease the overall length of driveable road, hence there would a net loss in 4x4 driveable road density. The target is to remain less than 0.37 km/km^2 all roads and less than 0.27 km/km^2 excluding non-SFL roads.

B. Amount of remote area on the Sudbury Forest; accounting for access infrastructure including old logging roads.

This indicator is based on the amount of area that is beyond the reach of roads, utility lines, and railways. This was measured by buffering access structures with agreed-upon distances from the 2010-2020 FMP, with the addition of 'old logging roads':

- rail and hydro lines by 500 m
- primary Hwy, secondary Hwy and primary haul roads by 1,000 m
- municipal/local roads, secondary/branch roads by 500 m
- non-SFL roads, primary winter, secondary winter, and tertiary and old logging roads by 250 m.

The result is an area defined as remote of 496,036 ha. The desired level is for there to be an increase in remote area over time with the decommissioning and regrowth of roads that are no longer in use.

C. Amount of Crown land accessed by driveable SFL-responsible roads with consideration to access controls.

This indicator is similar to B, above, but essentially the reverse in that it measures area affected by 4x4 driveable roads with a pre-determined buffer distance. The intent is to quantify the area potentially impacted by roads that are built or used for the purposes of implementing the FMP. The desired level is to decrease the area that is reasonably driveable by 4x4 trucks over time.

These indicators are to be assessed for the Year-5 management unit annual report and the management unit annual report for the final year of plan implementation.

#20. Respect the presence of resource-based tourism as well as other commercial businesses on the Sudbury Forest.

Resource-based tourism is important to the economy and social well-being of the Sudbury area. Accordingly, a specific objective and indicator is to monitor compliance with prescriptions for the protection of resource-based tourism values (% of inspections in compliance). The desired level and target are for 100% compliance.

These indicators are to be assessed for the Year-5 management unit annual report and the management unit annual report for the final year of plan implementation.

#22. Protect cultural heritage values within the Sudbury Forest.

This objective is meant to ensure the protection cultural heritage values through the use of area of concern (AOC) prescriptions, e.g., portages, canoe routes, etc. The indicator is to monitor compliance with these prescriptions (summarized in Table FMP-11). The desired level and target are for 100% of inspections in compliance.

#23. Minimize the potential impact of forest operations on recreation areas that are identified on the values map

Similar to objective #22, the intent for this objective is compliance with AOC prescriptions for the protection of recreational values (% of inspections in compliance). The desired level and target are 100% compliance. The AOCs for the objective are specific to the following recreation and cottaging values:

AOC CODE	Description	Category
CL	Cottaging and Residential Lots on Lakes	Cottage
CRE	Canoe Routes (designated by MNRF or local First Nations) within Enhanced Management Areas	Recreation
CR	Canoe Routes (designated by MNRF or local First Nations) outside of Enhanced Management Areas	Recreation
LL	Cottaging values associated with Lonely Lake	Cottage
P	Portages as designated by MNRF	Recreation
XCT	Hiking, Cross Country Ski and Mountain Bike Trails (including Trans-Canada Trail) as recognized by the MNRF	Recreation
LA	Important viewscapes of Armstrong Lake	Cottage
TL	Cottaging values associated with Trout Lake	Cottage
DRL	Values associated with developed recreational and residential lakes	Cottage
AP	Access Points – MNRF-recognized public access point(s) to a lake or river	Recreation
TLU	Recreational values associated with parks and conservation reserves within the Temagami Land Use Area (Special Management Area - 49 and Integrated Management Area - 47).	Recreation
PNR	North Shore Road, Lake Panache	Cottage
DTL	Designated Tourism Lakes	Recreation
DC	Designated (by MNRF) Campsites	Recreation
PB	Park Boundary Buffer	Recreation

NV6 and NV9 AOCs protect trails and portages specifically identified by Aboriginal communities.

Objectives #22 and #23 are to be assessed for the Year-5 management unit annual report and the management unit annual report for the final year of plan implementation.

3.6.7 CFSA Category - Silviculture

#16. Conduct a range of intensities related to silvicultural activities on the Sudbury Forest.

The indicator for this objective is the percentage of the total harvest area of clearcut forest units managed with an intensive silviculture program. The desired level and target is based on an analysis of the current silviculture program, with 48% of harvested area of clearcut forest units (2010 to 2017) being managed intensively, and projections of objective achievement in SFMM. The combination of past experience and model projections for the selected management alternative suggest that 40% of the harvested area of clearcut forest units managed with intensive silviculture will allow for a balanced plan and achievement of objectives. As such, the desired level and target were set at 40%.

This objective will be assessed during the development of the Year 5 and Year 10 Annual Reports.

#17. Develop an integrated vegetation management program that includes evaluations and demonstrations of a range of treatment options including alternatives to herbicides.

The judicious, targeted use of herbicides is sometimes deemed to be necessary in certain situations to ensure objectives for renewal and habitat of conifer-dominated forests are met. Discussion at planning team meetings resulted in a decision to carry forward an objective specific to herbicide use from the 2010-2020 FMP. It was also decided that the objective should be revised to focus on ensuring herbicides continue to be used appropriately when required and that alternatives would continue to be evaluated and encouraged.

The area treated with alternatives, relative to harvest levels, is to be assessed as one of the indicators of this objective. The desirable level and target are to show an increase in area treated without herbicides for the purposes of controlling competing vegetation.

The establishment of a demonstration area of herbicide treatments and alternatives is another indicator that will be tracked during plan implementation. One trial was established in 2018 and the desired outcome is to establish two more sites by the end of the FMP (2030). These sites will contribute to a broader study undertaken by NRCAN.

The number of tours, meetings, and communications with concerned individuals or groups is also included as a indicator for this objective. Currently, 4 to 5 herbicide-related field tours occur per year, with generally 2 in-office meetings per year, and approximately 10 phone discussions. The intent is to maintain or increase this level of engagement, with up to 5 tours per year.

Assessment of this objective will be done for the Year-5 management unit annual report and the management unit annual report for the final year of plan implementation.

#18. Ensure silvicultural activities create the desired future forest condition or successful regeneration in the harvested areas on the Sudbury Forest.

This objective is measured by the percent of harvested land base that is regenerated (established), in relation to the harvested area by forest unit. The desired level is for 100% silviculture success, based on the premise that investment into any site would provide the anticipated result of a silviculture success all of the time. The target is lower, at 80%, to account for unanticipated shifts between forest units that may occur.

This objective will be assessed during the development of the Year 5 and Year 10 Annual Reports.

3.6.8 CFSA Category - Ecological Sustainability; healthy forest ecosystems

#11. Maintain the health of the Sudbury Forest under changing climate conditions.

Climate change is an important issue that garners a significant amount of public interest. The planning team’s approach to developing this objective, was to focus on management activities, above and beyond regular forestry practices that will enhance the resiliency of the forest to a changing climate.

One component of this objective is the mitigation of invasive species or natural insect and disease or abiotic disturbance (e.g., blow-down, fire) impacts through salvage and rehabilitation. This will be monitored on a case-by-case assessment of suitability for salvage and / or rehabilitation; and the percent (%) of salvaged area rehabilitated.

Invasive species pose a potential threat to the sustainability of forests that may be mitigated through awareness and prevention. Efforts to reduce the spread of invasive species may involve Canadian Food Inspection Agency (CFIA) quarantine zones in the event that new foreign pest are detected (CFIA holds the responsibility federally for quarantines of invasive pests). Awareness and prevention measures will be promoted during annual spring operations training, focusing on education with contractors, and equipment movement (reducing potential for spreading seeds). Compliance with CFIA quarantines for invasive species control or containment will be monitored.

Seed from collection areas recommended by the Forest Gene Conservation Association (FGCA) and Northeast Seed Management Associated (NESMA) will also be used in forest renewal programs. Traditional seed collection zones do not account for possible climate change scenarios; hence it is prudent to supplement seed sources from new climate-appropriate zones. The desired level for this program initially is to augment forest renewal with up to 10% of seed sourced from expanded zones further south.

This objective is to be assessed for the Year-5 management unit annual report and the management unit annual report for the final year of plan implementation.

#12. Prepare an analysis of carbon budgets associated with the selected management alternative and contrasting harvest scenarios.

Further to Objective #11, the planning team felt it was prudent to carry over the objective from the 2010-2020 FMP to quantify the Sudbury Forest’s contribution to the greenhouse gas (GHG) balance. The indicator for this objective requires an analysis of carbon budgets and associated GHG emissions for contrasting management scenarios using the methods described in Chen et al. (2018)[4]. For each scenario the new FORCARB-ON2 model was used to show carbon stocks in six pools: live trees, standing dead trees, down dead wood, forest floor, understorey, and soil.

Forests significantly affect the GHG concentration in the atmosphere, and the Intergovernmental Panel on Climate Change (IPCC) also recently revised its methods and guidelines for estimating GHG emissions by sources and removals resulting from land use, and forestry, and to consider harvested wood products (HWP) from forest management as an additional carbon pool. For this reason, the updated FORCARB-ON2 model was used to assess the mitigation potential of managed forests by integrating forest carbon estimates with life-cycle analysis (LCA) of HWP and wood substitution effects in reducing GHG emissions. The inclusion of HWP in the analysis is needed to account for sources of emissions that are offset by management activities. For example, many early-successional tree species have a relatively short live spans and begin to die off in less than 100 years. As these trees age, they become more susceptible to pests or fires, or simply die and decay over time, thus turning into carbon emitters if they were not harvested.

The analysis uses SFMM case files that simulate forest growth, natural succession, wild fire, harvesting, post-harvesting and post-fire forest succession, and the effects of other management activities. Forest development in SFMM is projected into the future on a 10-year time step. Fire disturbance is simulated based on forest unit-specific fire return intervals, with fires evenly burning all age classes in a forest unit in each 10-year period.

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[4] Chen, J. et al. 2018. Ontario’s managed forests and harvested wood products contribute to greenhouse gas mitigation from 2020 to 2100. For. Chron. 94(3): 269-282.

Total ecosystem forest carbon stock is the sum of the above-listed six pools. All stocks are expressed in million tonnes of carbon. The output also contains carbon stocks in harvested wood products (HWP) and associated greenhouse gas (GHG) emissions. Carbon stocks in HWP are broken down by HWP in use and HWP “retired” in landfills. Emissions are divided into manufacturing emissions (that include upstream emissions from harvest equipment, transportation, etc.) and methane emissions from landfill; methane emissions are estimated separately because of its high global warming potential (GWP). As with forest ecosystem stocks, stocks in HWP and emission are expressed in million tonnes of carbon (emissions are back-converted to units of dry mass for comparison with other stocks).

This indicator is evaluated during the development of the LTMD.

#24. Minimize the amount of productive forest land negatively impacted by site damage and loss of forest productivity.

The protection of forest soils and sensitive sites is an important aspect of sustainable forest management. Accordingly, standards and best practices are developed for careful logging practices and are monitored regularly. This objective is evaluated by the number of forest operations inspections with non-compliance, by activity and remedy type, as a result of forest management activities causing site damage and loss of forest productivity. The desired level and target are 100% compliance.

#25. Protect water quality and fish habitat within watercourses and water bodies affected by forest management.

As with objective #24, the intent for this objective is compliance with management practices that prevent, minimize or mitigate site damage to riparian areas of concern (% of inspections in compliance). The desired level and target are 100% compliance.

#26. Maintain the area of Crown Productive Forest available for timber production and habitat at the highest possible level and minimize conversion of Crown forest area to non-forest land.

This objective is intended to ensure losses of Crown productive forest are minimized. At the start of the FMP, 583,330 ha Crown productive forest is available. The desirable level is to maintain 100% of current Crown productive forest, however small annual losses can be expected for long-term access roads and landings. The target is to ensure <1% of Crown productive forest is lost to roads and landings by plan end.

Objectives #24, #25 and #26 are evaluated for the Year 5 and Year 10 Annual Reports.

#36. Maintain or increase the level of compliance on the Sudbury Forest.

This is a general objective to ensure that the level of compliance and inspections provides an appropriate degree of accountability during plan implementation. Compliance in forest operations inspections is monitored regularly (% of inspections in non-compliance by category) and will continue to be reported at LCC meetings and in annual reports. The desired level and target are for 100% compliance.

Assessment of this objective will be summarized for the Year 5 and 10 Annual Reports.

Qualitative Objectives

3.6.9 CFSA Category - Social and Economic; involvement in forest management planning

The involvement of Indigenous communities is critical to developing successful outcomes in the planning process. The next three objectives were 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, the Indigenous Working Group, community meetings, development of the Indigenous Values Information Report, and development of AOCs for the protection of indigenous values.

#27. First Nations and Métis Communities are involved in forest management both during the development of the FMP and also with its implementation.

#28. First Nations and Métis Communities will benefit economically through partnerships, employment opportunities and new business relationships.

#29. First Nations and Métis Communities will continue to benefit from forest management through educational and social opportunities.

These objectives focus on the provision of opportunities for direct involvement in the FMP, and community benefits flowing from the management of the forest. Documentation of meetings and workshops and participation levels will be used to monitor the effectiveness of the objective. Evidence of contracts / agreements and economic figures to support objective will also be recorded. Reporting on these objectives will occur during the development of the Year 5 and Year 10 Annual Reports.

#30. To encourage support of the Local Citizens Committee in the development of the FMP for the Sudbury Forest

Local citizens committee (LCC) involvement is a key component to the development of the long-term management direction on the Forest, and recognition of this and other levels of participation is important to the planning team. The LCC's self-evaluation of its effectiveness in plan development and support for FMP objectives will be recorded as part of the FMP. The LCC also participates during the development of proposed operations (Stage 3), therefore this objective will be evaluated at the Draft FMP stage.

#31. To encourage support of the Local Citizens Committee in monitoring the implementation of the FMP on the Sudbury Forest.

The LCC is encouraged to be involved in the implementation and monitoring of the FMP, including scheduled audits. Annual Report presentations, AWS presentations will continue to be done each year. Review and support for minor and major Plan amendments will also be documented to evaluate progress of the FMP objectives.

During the DFBM it was apparent that more communication and understanding of forest management activities was needed. For this reason, two new objectives were developed:

#32. To use effective communication tools for the dissemination, gathering, and exchange of information relataed to forest management activities. Records of communication in addition to legislation commitments (trappers, cottage groups etc.); and the use of website, signs, posting and media notices that are accessible locally and remotely will be implemented.

#33. Create a greater awareness of ongoing forestry activities on Crown Land. Signs to demonstrate water crossing removal on forest access roads, signs for decommissioning road networks, and signs that highlight the history of operations and silviculture in particular blocks (e.g., FFT signs for areas planted) will be used more regularly.

3.7 Long-Term Management Direction

The long-term management direction (LTMD) represents a balance in the achievement of management objectives, based on model analysis of what the forested land base is capable of achieving under a variety of constraints (e.g., age structure and composition, habitat requirements, and budget limitations). These outputs are summarized in the tables:

a) FMP-2: Describes the forest units for the 2020-2030 FMP
b) FMP-6: Describes the forest condition for the Crown productive forest by forest unit and age class
c) FMP-7: Describes habitat for selected wildlife species (replaced by the use of Landscape Guide Indicators with the associated milestones shown in Figure 3.7.16)
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.

The LTMD provides the high-level, strategic direction to guide management activities, based on an analysis of the current forest condition and projections over a 150-year planning horizon. The analysis identifies the levels of road access, harvest, and renewal activities that are required to meet the desired objectives. The development and review of the preliminary LTMD is the second step in a five-step, public consultation process for the plan. Subsequent steps include review of operational aspects of forest management planning including refined harvest allocations, areas selected for silviculture, branch road planning, and the protection of specific values on the forest.

Objectives related to forest cover and biodiversity were confirmed and updated according to new policy direction in the Landscape Guide and Stand and Site Guide. The objective for disturbance pattern was changed significantly with the evolution from the Natural Disturbance Pattern Emulation Guide to the new Landscape Guide, although the intent and results are similar, i.e., to move towards the predicted range of natural variation (SRNV) for young, mature and old forest landscape pattern or texture.

In accordance with the FMPM (2009, 2017), scoping analysis is an iterative process of modeling scenarios to provide insight into what the forest is capable of producing in order to develop realistic and feasible desirable levels for objective indicators. Scoping investigations will consider implications on wood supply, forest conditions, habitat, and other non-timber resources for the short-term, medium-term, and long-term.

The following investigations were considered in 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); and
b) An investigation and assessment of the ability of the forest to continue to supply forest benefit levels associated with the current forest management plan.

A summary of each of the scoping investigations and significant conclusions or results is provided including:

i. changes and/or additions that are made to base model inputs and assumptions;
ii. results and conclusions that provide rationale for specific management objectives, indicators and desired levels.

The *'Greatest value of timber harvested over entire planning horizon'* objective function in SFMM was used for all tests / runs. This function optimizes value based on volume and price of products for each species group.

Management objectives are represented in the analysis as described by the indicators and targets summarized in Table FMP-10. These represent the desired forest structure and composition as determined by the Landscape Guide in relation to the simulated ranges of natural variation (SRNV). The application of direction presented in Table 2 of the Landscape Guide was followed in the analysis of objective achievement, with indicators represented in the habitat matrix as described in the Section 3.3.4 of Supplementary Documentation 6.1.(b) Analysis Package. Old-growth targets were developed for individual Standard Forest Units to provide a higher level of resolution than with groupings, and for a direct link to SRNV values provided in OLT.

The Landscape Guide Appendix 1, Table A4 provided general milestones for objective achievement for coarse-filter indicators.

Wood supply was represented in the analysis of objective achievement as a percent of the targets during each planning term. Initial scoping runs represented volume targets as non-binding constraints to determine general trends and potential for wood supply. Binding targets were then used to ensure minimum levels could be met during the lowest terms where age classes were most limiting.

The achievement of objectives was interpreted from the model results based on the ability to meet the targets specified in Table FMP-10. Objective achievement for wood supply was also assessed spatially, in part to phase in direction from the 2017 FMPM (Part B, Section 3.5), and to provide assurance that harvest area is not disproportionately allocated across spatial zones over the first 40 years of the planning horizon. Analysis with and without spatial constraints shows sensitivity in the model to the spatial distribution of harvest area, but that a constraint can effectively control large fluctuations by zone for the first 4 terms (refer to Supplementary Documentation 6.1 (b) Analysis Package, Section 3.5 for a description of zones).

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 long-term management direction follows trends that are consistent with previous management plans, without any major changes or fluctuations in habitat or wood supply. Planned harvest volumes gradually decline for several terms, as predicted previously, then recover once the age-class imbalance is overcome.

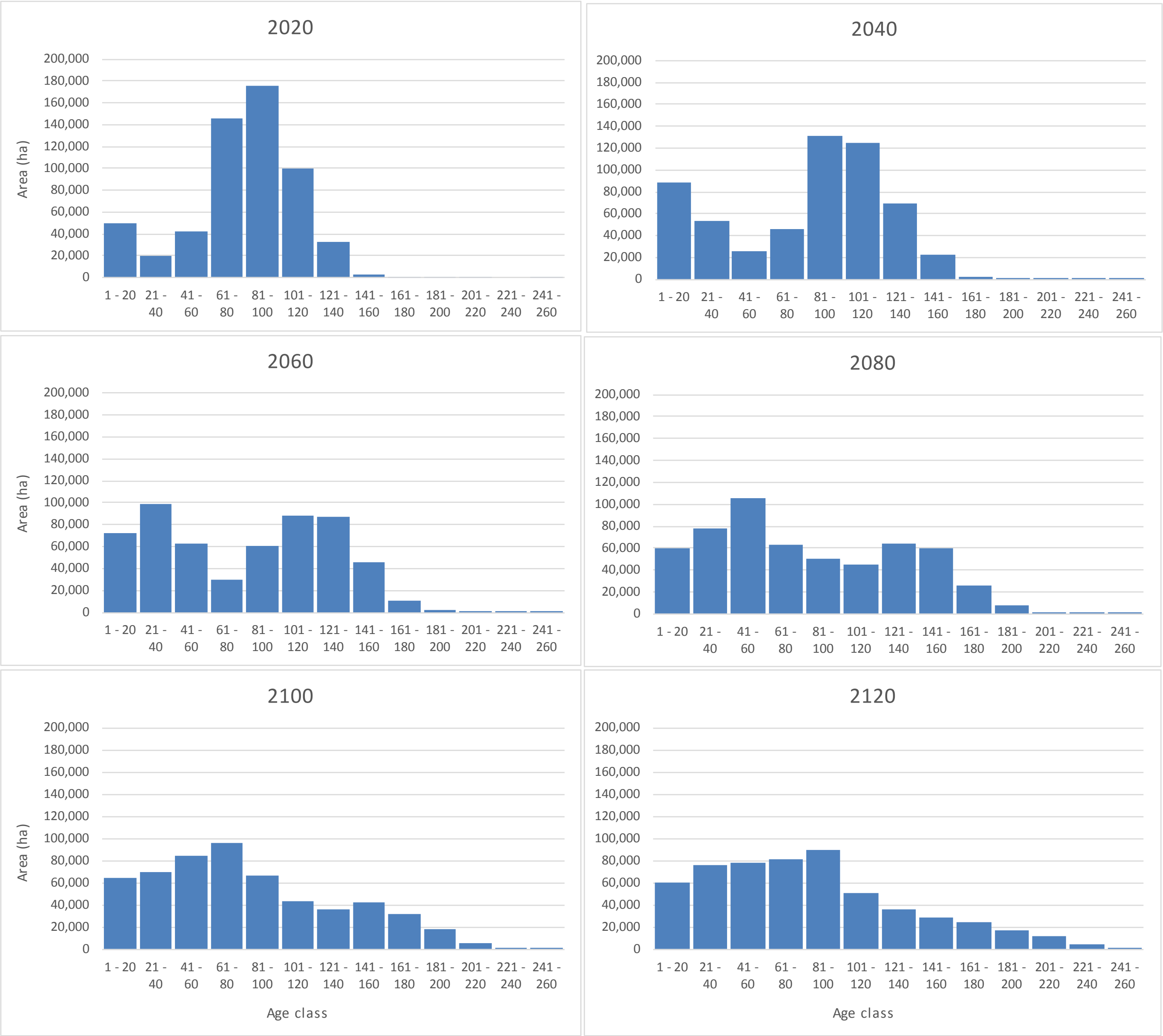
The development of the base model, objectives, and long-term management direction are described in sections 3.0, 4.0 and 6.0 of the Supplementary Documentation 6.1 (b) Analysis Package. The final mode run selected for the LTMD is PMA80, with the associated SFMM file 889_01_11_v19F_PMA80.data.

Forest Condition of the Crown Productive Forest

Table FMP-6 summarizes projections from SFMM of the area of productive Crown forest by forest unit and age class, represented in 20-year intervals. There is a 1.5% reduction in total productive forest area, from 581,432 ha to 572,428 ha over the 100-year timespan due to estimated losses from roads and landings.

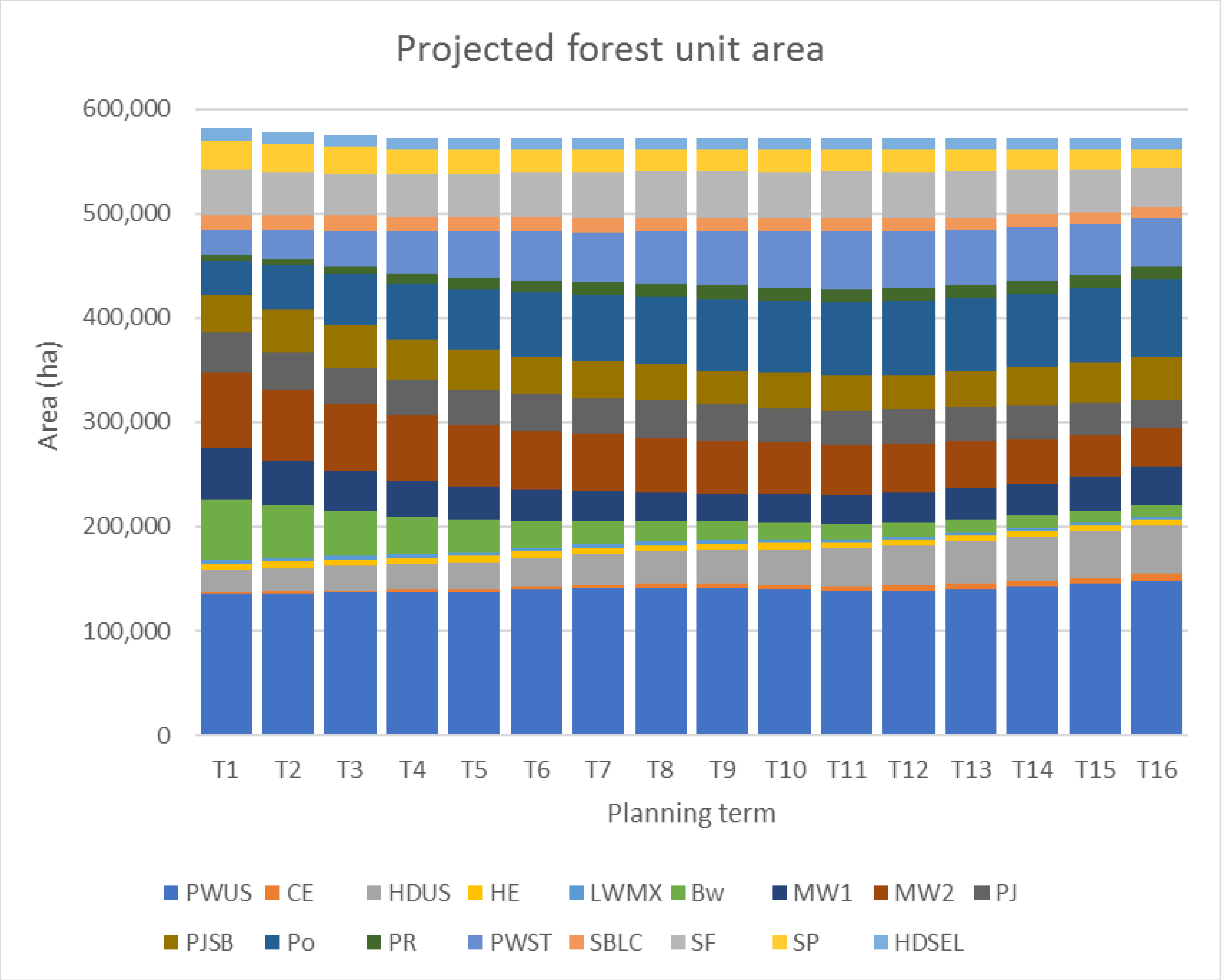
Changes in the projected age-class distributions, resulting from disturbance, renewal, and natural aging over time, are shown in Figure 3.7.1. Initially the majority of the forest area falls within mature, operable age classes which is favourable in the short-term for meeting wood supply and biodiversity objectives, but problematic in the long-term. For some forest units there is also a lower than desired level of old growth in the short term, e.g., PWUS, PR, HE, HDUS.

Figure 3.7.1. The total Crown productive forest area by age class projected by SFMM over 100 years.



Projections over the medium- and long-term show age classes becoming more evenly distributed, with increasing amounts of old growth. The recruitment of area into older ages occurs as harvest levels are constrained to meet this objective. Harvest levels for some forest units are also constrained by the limited availability of immature forest in 2020, resulting in reduced harvest availability in future terms (Figure 3.7.2). The mixedwood and BW forest unit harvest areas decline over the entire projection while the PWST, PJ, PO, and SF forest units decline then increase in later terms. The PWUS forest unit is tightly constrained in the first term to meet the objective indicator for mature and old forest but harvest area is relatively stable over time.

Figure 3.7.2. The total Crown productive forest area by forest unit projected by SFMM over 100 years.



Volume Supply and Demand

The overall projected harvest volume for the LTMD follows a similar pattern to previous plans. The initial age-class structure of the forest largely influences the gradual drop followed by an increase in volume over time. The projected level of available harvest volume (Table FMP-9) is portrayed graphically in Figure 3.7.7 FMP along with:

(a) projections from the previous FMPs;
(b) historic wood utilization; and
(c) Ontario Forest Accord Advisory Board (OFAAB) benchmark harvest levels, as identified in the Provincial Wood Supply Strategy.

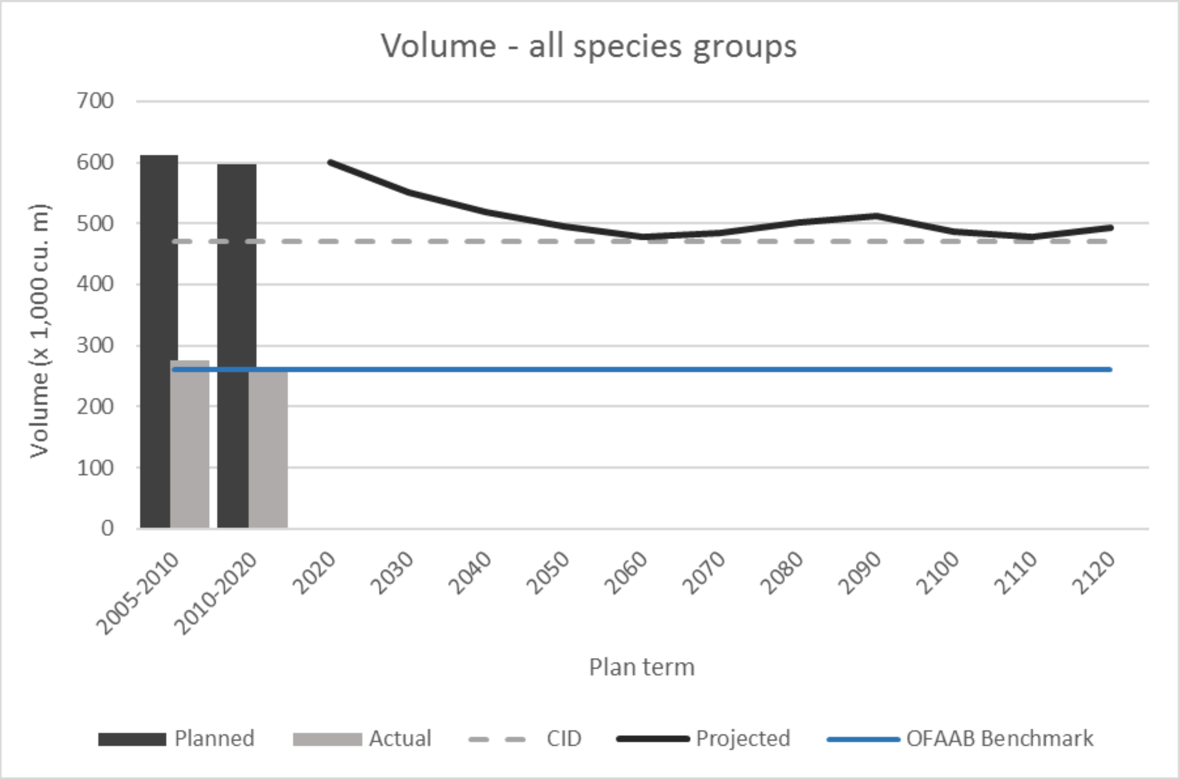
The current industrial demand (CID) is also shown in Figure 3.7.3. The CID is based on wood supply commitments and expected facility demands for the 2020-2030 FMP. The CID levels are based on potential utilization rather than historical averages, thus are typically higher than OFAAB benchmark levels.

Projections for total wood supply (all species groups) remain at or above the CID for all forecasted terms. The Intolerant Hardwood (poplar and birch) and Spruce-Pine-Fir (SPF) species groups dip below the CID for multiple terms before following an increasing trend. Again, this trend is similar to projections from previous plans and is unavoidable due to the age-class structure of these forest types. The SPF species group declines to levels of just over 170,000 m^3/year that are comparable to the average utilization for the 2010-2020 FMP, with peak levels over the past five years of close to 215,000 m^3/year.

Also included in the total volume is the Other Conifer (OC) species group. The OC species group mainly consists of hemlock, cedar, and tamarack (larch). These species are shown in higher abundance than in previous plans and continue to exceed recognized levels of market demand.

Volume projections also identify product types over time (Table FMP-9 and Figure 3.7.4). These projections show the proportions of products are quite stable over the entire projection period. The proportion of sawlogs increases slightly in the second term and then stabilizes. A small increase in utility poles, mainly from thinning planted red pine, also occurs in the short- and medium-terms. Consequently, there is an expected gain in proportional value from the forest.

Figure 3.7.3. Harvest volume for species groups by 10-year terms.



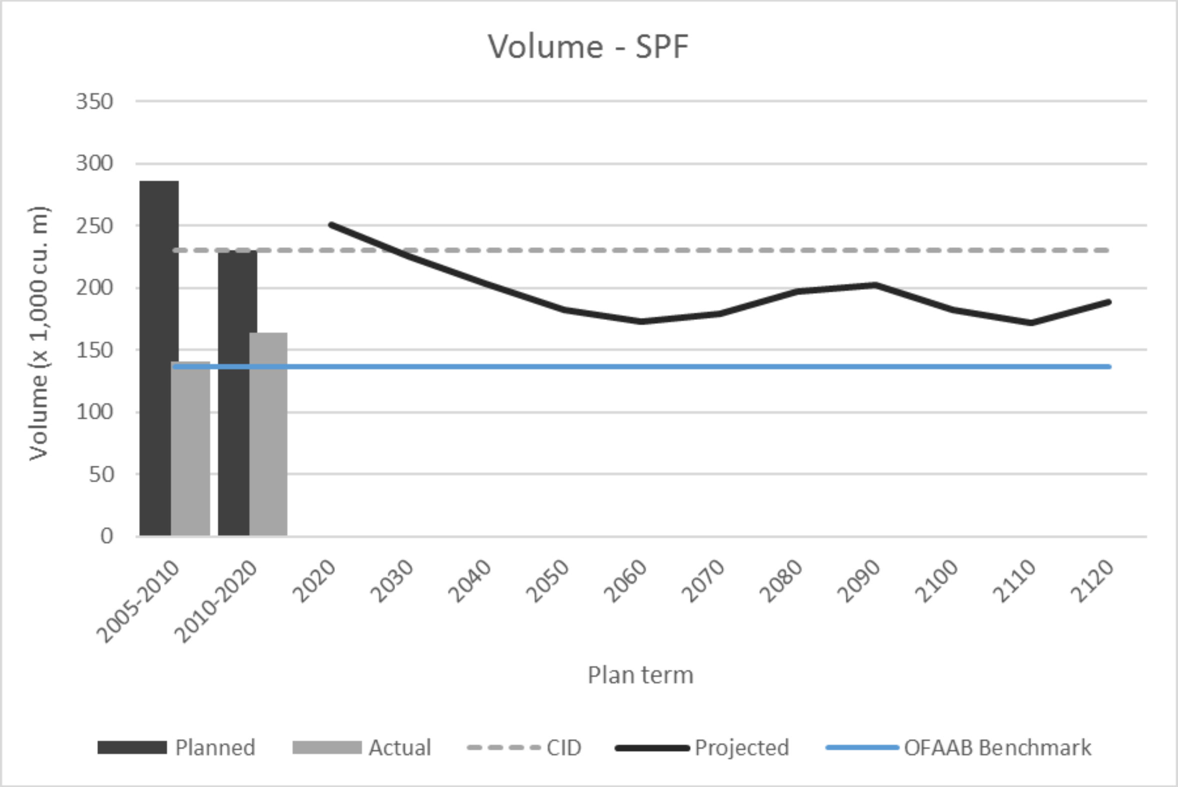
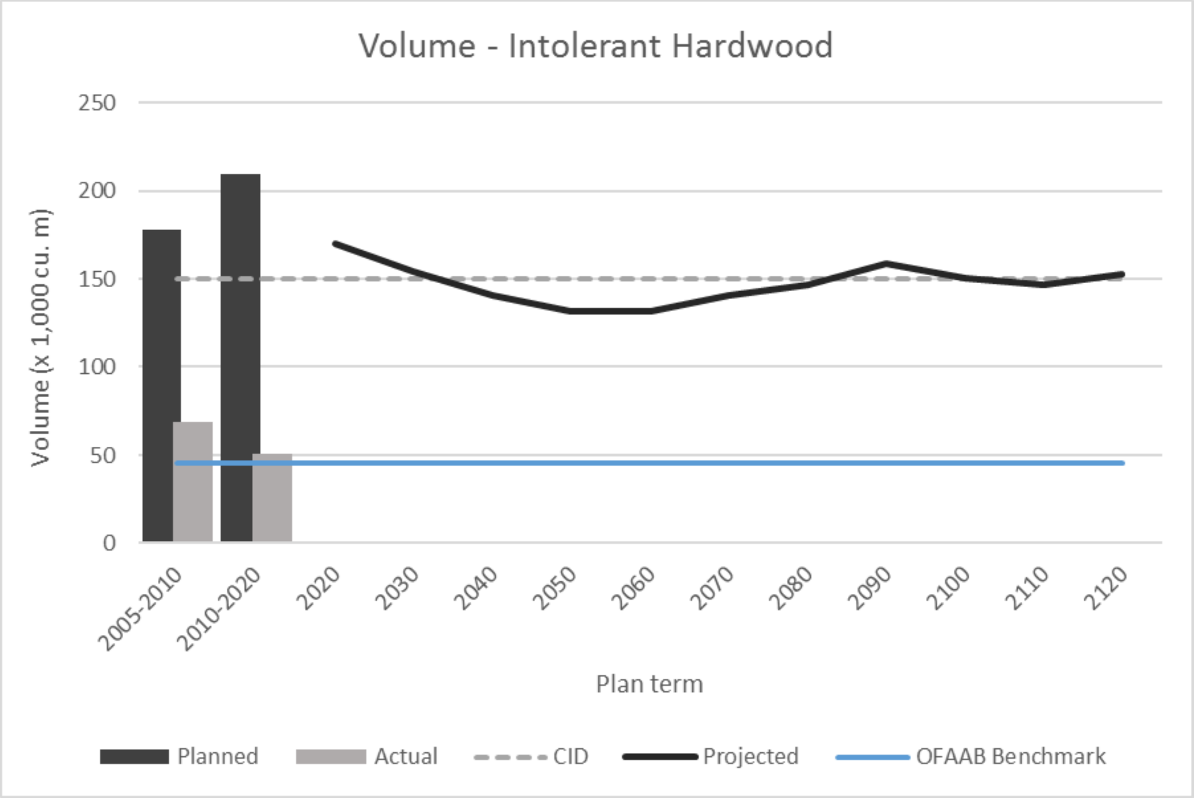


Figure 3.7.3. (continued)



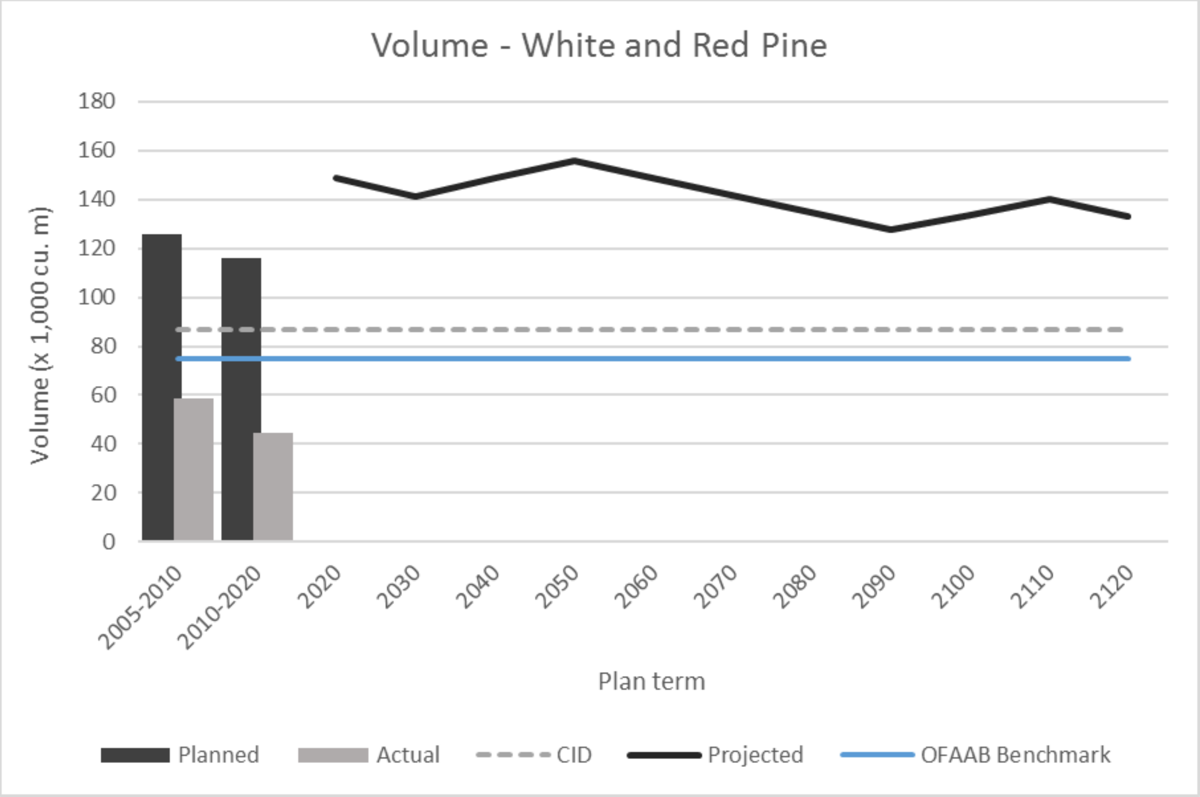
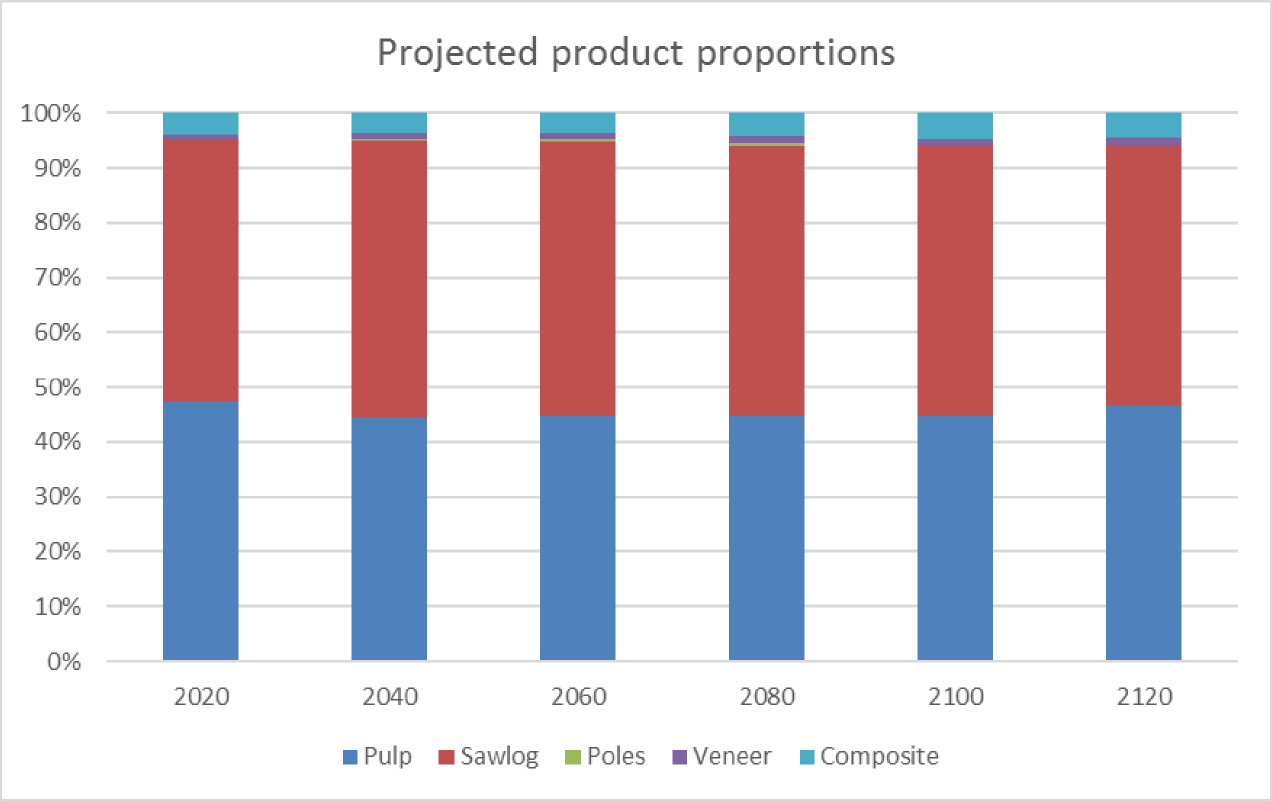


Figure 3.7.4. Projections of product groups for the proposed management strategy.



Documentation of the development and decisions made for the strategic model are described in Sections 3.0 and 4.0 of the Supplementary Documentation 6.1 (b) Analysis Package.

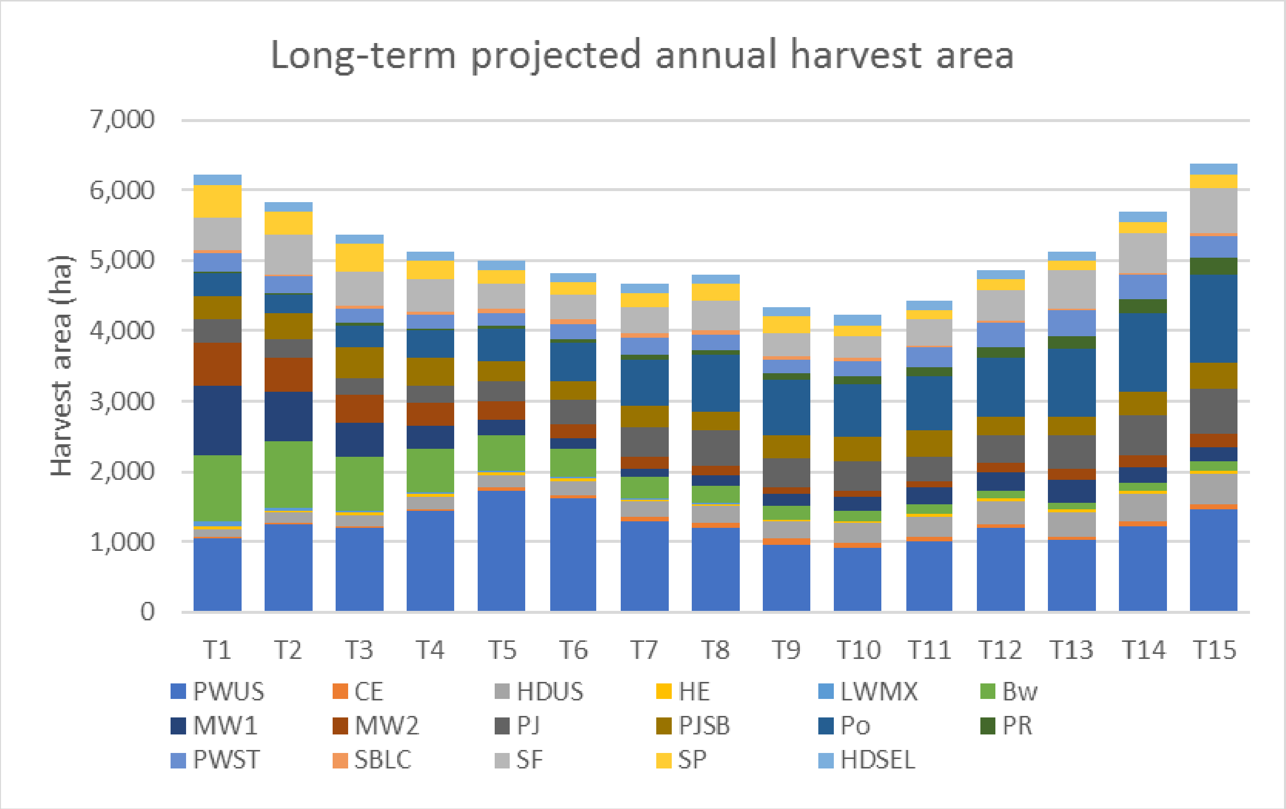
3.7.1 Available Harvest Area

Table FMP-8 summarizes the estimated available harvest area (i.e., for a ten-year period) by twenty-year projections for the LTMD. Some forest units show a greater degree of stability over time (Figure 3.7.5), as influenced by the current age structure. Hardwood selection (HDSEL) of course has the most stable harvest area which is defined by the cutting cycle and is not constrained by mature and old targets the way the even-aged shelterwood areas are.

There is a general consistency in harvest area trends between the planned harvest area for the 2010-2020 FMP, the second 10-year model term of available harvest for the 2010-2020 FMP (projected for the 2020-2030 period), and the available harvest for the first term of the 2020-2030 FMP (Figure 3.7.6). Some specific differences in projections are, however, apparent.

Harvest for the BW forest unit was projected to decrease slightly in the second term of the 2010 LTMD (during 2020-2030) while the 2020 LTMD shows a slight increase in BW harvest area over the 2010 plan. The 2020 LTMD also shows significantly higher harvest areas for MW1 and MW2.

Figure 3.7.5. Projected Annual Available Harvest Area (AHA) by forest unit.



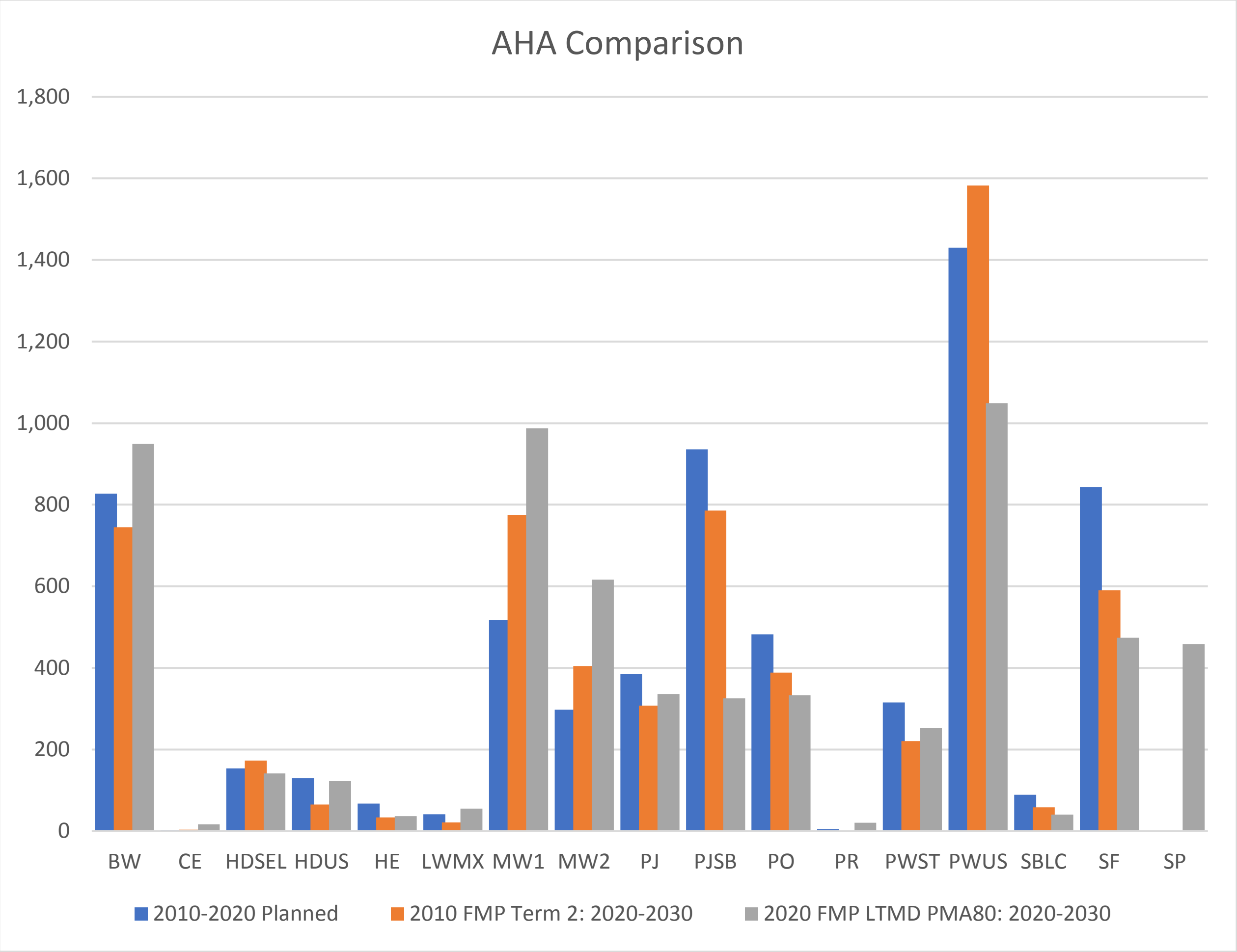
The PO forest unit shows a decline in harvest area that is slightly greater than what was projected in the 2010 LTMD solution. The SF forest unit shows a larger decline, although this trend was also projected in the 2010 LTMD.

A significant difference in harvest area is projected for the PWUS forest unit. The 2010 LTMD indicated an increase in harvest area while the 2020 LTMD shows a significant decrease. This is the result of a combination of a few factors, but most notably the change in modelling between a 3-cut shelterwood in the 2010 plan to a 2-cut shelterwood in the 2020 plan. The resultant volume at each of the two harvests are, however, expected to be higher than the volumes spread across three harvests. In other words, all else being equal, the volume is greater per cut in the 2-cut system than the volume per cut in the 3-cut system (total volume would be roughly equal but divided over 2 versus 3 harvests). In practice, however, a high-volume stand could still be harvested in 3 cuts, and this is encouraged where feasible. The application of the Landscape Guide direction also had an effect due to the requirement to retain mature and old forest at increasing levels, hence reducing the available area for harvest in the short-term.

Another significant difference is the splitting of the PJSB forest unit of the 2010 FMP into the PJSB and SP forest units for the 2020 FMP. While this meant using separate yields and succession paths for the new SP forest unit, the end result was not significant in overall harvest area. The combined harvest area for the 2020 LTMD for the 2020-2030 period is almost identical to the projection for the same 10-year period shown in the 2010 LTMD (i.e., the difference was 784 ha in the 2020 LTMD and 786 ha in the 2010 LTMD).

The remaining forest units showed relatively little difference between the projections from the 2010 LTMD and 2020 LTMD for the period spanning 2020-2030.

Figure 3.7.6. Comparisons of projected Annual Available Harvest Area (AHA) by forest unit for the LTMD of the 2010 and 2020 plans.



Overall, aside from the increases in BW, MW1 and MW2 harvest areas, and decreases in PWUS and SF harvest areas there are no significant changes from what was expected based on the previous plan.

The spatial distribution of harvest is described by the five strategic management zones (SMZ) as indicated in Section 3.5 of this document. The distribution of harvest for the first 4 FMP terms, or 40 years is portrayed on the composite scale map MU889_2020_FMP_MAP_DistHarv_00 of Supplementary Documentation 6.1 (u) for the selected LTMD.

Results and implications of the spatial assessment of harvest area is summarized in Section3.7.4 of this document.

3.7.2 Selection of Areas for Harvest

During the development of the FMP the proposed harvest areas and selection criteria are presented to the public for review and input. The preferred harvest areas portrayed for the LTMD include eligible areas for allocations for the 10-year period of the plan (2020-2030).

Preferred areas for harvest were identified by the following criteria:

a) eligibility of forest stands (land tenure / availability, and forest unit and age criteria),
b) past management history,
c) spatial arrangement and distribution (i.e., proximity to existing or proposed road infrastructure), and
d) management considerations, such as steep terrain, or rock.

The preferred harvest areas identified were used for the preliminary spatial assessment of texture indicators. Harvest areas identified as optional have also been portrayed on the maps. The optional 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 unsuitable.

Criteria for eligibility for harvest include:

1. Areas are reasonably accessible by existing road or with the development of new road within the 10-year period,
2. Are selected from the available forest land base (excludes islands, non-productive area, non-Crown managed, protection forest),
3. Areas meet the age criteria (table below),
4. Silviculture history: past shelterwood regeneration cuts are a priority, areas meet the required timing since previous entry for selection and shelterwood silviculture systems,
5. Confirmation from field work (identified in the Planning Composite Inventory) and / or imagery,
6. Spatially balanced – refer to Strategic Management Zones in base model,
7. Balanced by forest unit area relative to the AHA,
8. Balanced by licensee share with consideration to traditional operating areas,
9. Planned harvest areas do not exceed available harvest area by forest unit.

The following age ranges were applied for preference of stand selection:

Forest Unit	**Preferred Min. Age**	**Suitable Min. Age**	**Max. Age**	**Additional Criteria**
BW	75	65	119	
CE	80	70	139	
HDSEL	80	70	139	or YRDEP <= 1990
HDUS	80	70	139	Include SEEDCUT and FIRSTCUT regardless of age
HE	80	80	154	Include SEEDCUT and FIRSTCUT regardless of age
LWMX	80	70	119	Include SEEDCUT and FIRSTCUT regardless of age
MW1	75	65	119	
MW2	75	65	119	
PJ	70	65	119	

Forest Unit	Preferred Min. Age	Suitable Min. Age	Max. Age	Additional Criteria
PJSB	70	65	119	
PO	70	65	119	
PR	80	70	139	Include THINCOM regardless of age
PWST	80	70	139	
PWUS	80	70	139	Include SEEDCUT and FIRSTCUT regardless of age
SBLC	100	100	139	
SF	75	65	119	
SP	70	65	119	

The selection criteria for harvest area are reflected in the strategic model along with additional landscape-level objectives or constraints. These are based on the requirements for the retention of old growth and mature forest conditions and projections of future availability and volume demands. The strategic model also selects harvest area based on the time at which succession to another forest unit will occur, and the where the area resides along the yield curve. As such, age is an important criterion in the model selection of area for harvest.

The Landscape Guide and the Stand and Site Guide provide direction on spatial patterns for disturbance and mature and old forest patches. Selected harvest areas contribute to these spatial textures by the creation of young forest patches either alone or in combination with pre-existing patches, i.e., if within a threshold separation distance multiple patches may combine to create a single larger patch. The guideline direction is to create a mosaic of young and mature and old forest patches consisting of many small sizes to increasingly fewer larger sizes. Some very large patches are part of the ecological balance and are created over successive plans. The distribution of patches is evaluated with the OLT and adjusted where necessary to meet desired configurations.

The distribution of new, larger patches is focused in part in the northwest portion of the forest (Zone 3). This area is dominated by even-aged boreal clearcut forest units that largely originated from wildfires. The forest inventory shows fire depletion from 1941 in particular dominates the majority of the Spanish Arm area. The resulting uniformity of ages and contiguous pattern is suitable for inclusion of patches that can be created within a 10-year time span. These large disturbances patches from the past, that are now even-aged forests in the eligible age range make this zone conducive for the development of patches meeting the Landscape Guide criteria, i.e., inclusion of patches larger than 2,500 ha. Conversely, if this area included significant areas of white pine (shelterwood) or tolerant hardwoods then it would be less conducive to clearcut patches.

Section 4.9 of this document describes how the planned harvest areas compare to the projections in the LTMD in terms of management zones, and age class and stage of management.

Section 3.7.3 this document provides further description of how the areas selected for harvest contribute to the achievement of targets and objectives for landscape pattern.

3.7.3 Assessment of Objective Achievement

Many of the FMP objectives are assessed at the LTMD stage, and described here, while other objectives are assessed at later stages of plan development or implementation. Results from the assessment of objective achievement are summarized in Table FMP-10.

Landscape Patterns

The purpose of Objective #1 is t move toward a distribution of disturbances that more closely resembles the expected natural disturbance landscape pattern.

A preliminary spatial assessment was conducted using the Ontario Landscape Tool (OLT) for the spatial objective and associated indicators (desirable and target levels) that are affected by the location and distribution of the planned harvest areas. The indicators used to measure the spatial objective assessment are:

- Mature and old forest at 500 and 5,000 hectares scales;
- Young forest patch size (<36 years).

The size, shape, and proximity of homogeneous forest types that make up the landscape mosaic can influence the availability of contiguous habitat conditions and the amount and distribution of 'edge' habitat.

Mature and Old Texture

Assessment is for the FMP start (year 2020) and end (short-term, 2030). Results from the LTMD and proposed operations (Stages 2 and 3, respectively) are presented in Section 5.2 of the Supplementary Documentation 6.1 (b), Analysis Package. Results for planned operations are presented here.

***Figure 3.7.7a*. Mature and old texture, 500 ha hexagons.**

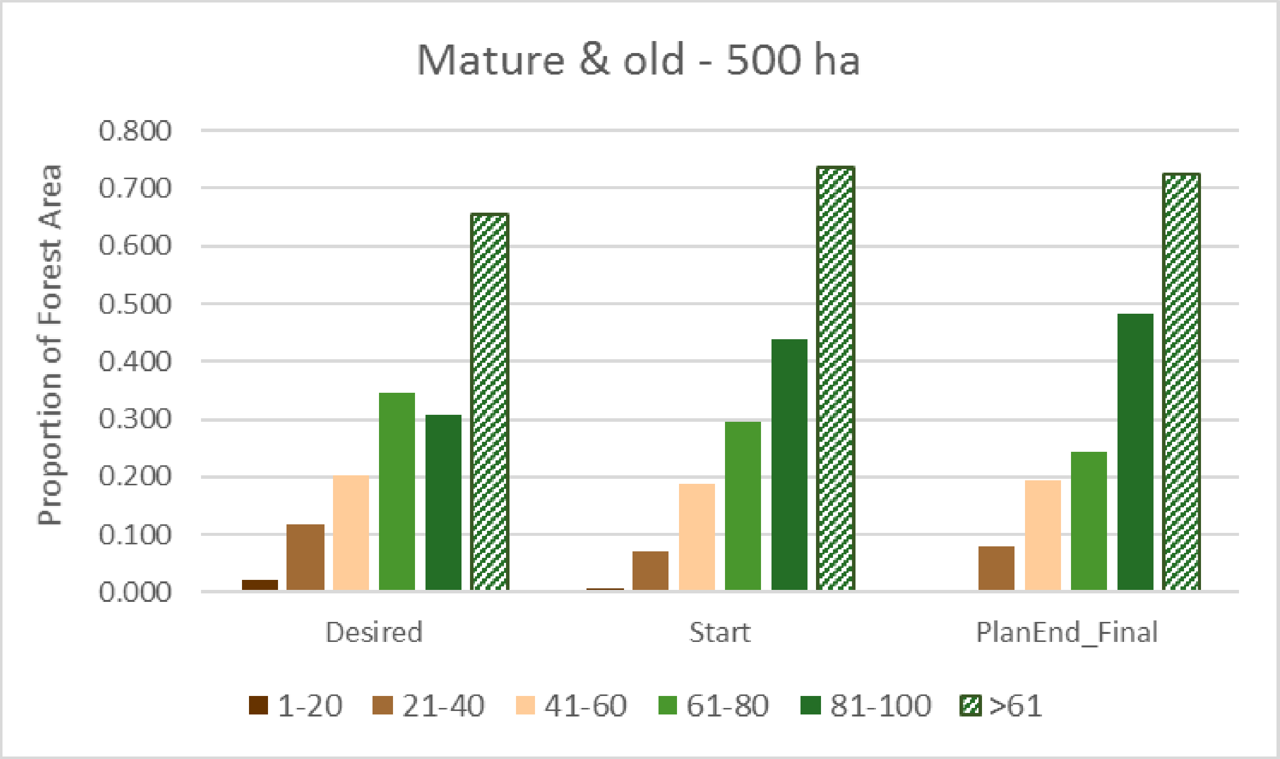
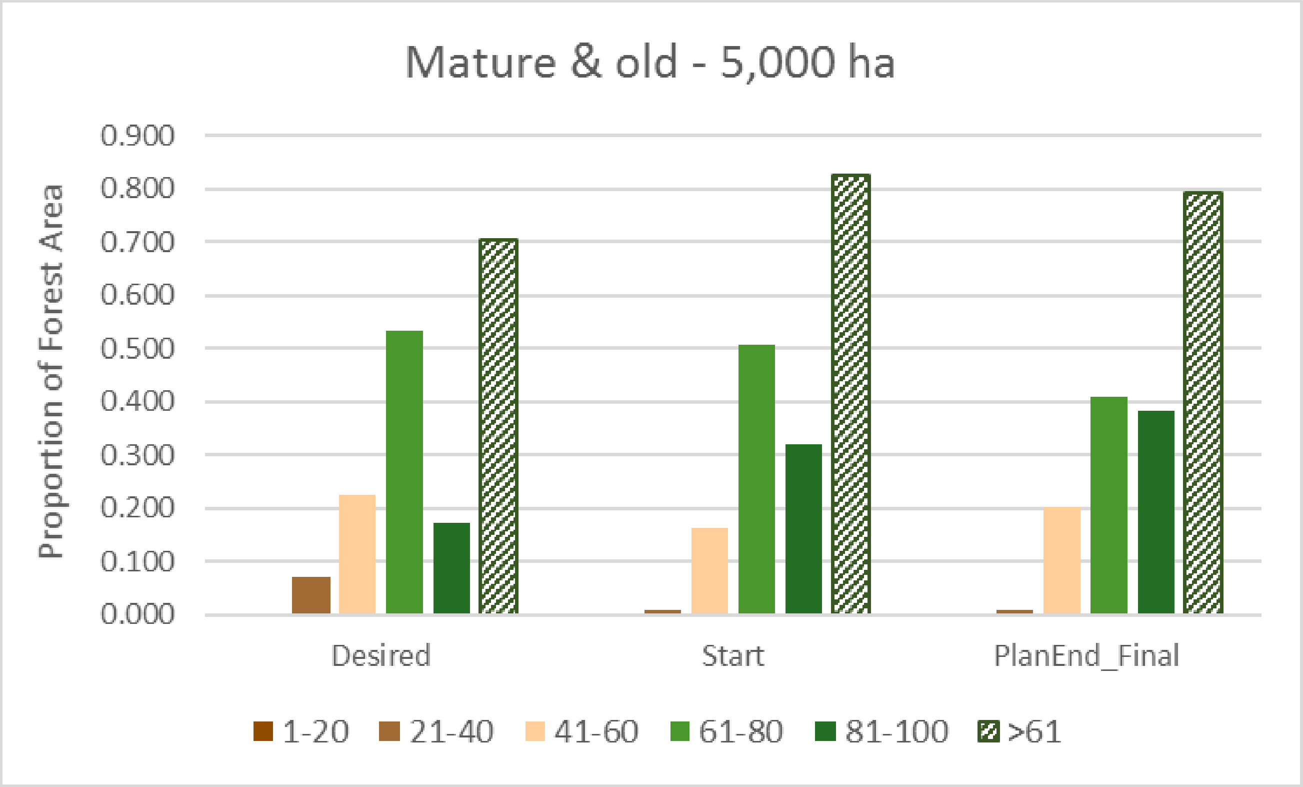


Figure 3.7.7b. Mature and old texture, 5,000 ha hexagons.



500 ha Scale

Plan-end values are closer to the desired level (mean) than plan-start levels except in the .01-.20, .61-.80 and >.80 concentratioons which are slightly further from the mean for proposed operations, i.e., achieved a lower level of 61-80% concentration than the mean and higher level (too much) mature and old forest at the highest concentration level. Combined, the areas in the >0.61 categories move closer to the combined mean (Figure 3.7.7a).

5,000 ha Scale

Assessment is for the FMP start (year 2020) and end (short-term, 2030). Plan-end values are the same or closer to the desired level (mean) than plan-start levels except in the .61-.80 and >.80 concentrations which are slightly further from the mean for proposed operations, i.e., lower level of 61-80% concentration than the mean and higher level (too much) mature and old forest at the highest concentration level. Combined, the areas in the >0.61 categories move closer to the combined mean (Figure 3.7.7b).

At both scales, the amount of high concentrations of mature and old forest (>.81) is largely influence by parks and protected areas, e.g., Killarney and French River Provincial Parks. Accordingly, the extent to which this indicator can be affected is limited, i.e., the high concentrations of mature and old forest cannot be influenced by harvesting.

The spatial patterns for mature and old forest are shown in Figures 3.7.8 and 3.7.9 at the 500 ha and 5,000 ha scales, respectively.

Figure 3.7.8. **Spatial distribution of the proportion of Mature and Old forest texture at the 500 ha scale at the end of the 10-year planning period (2030).**

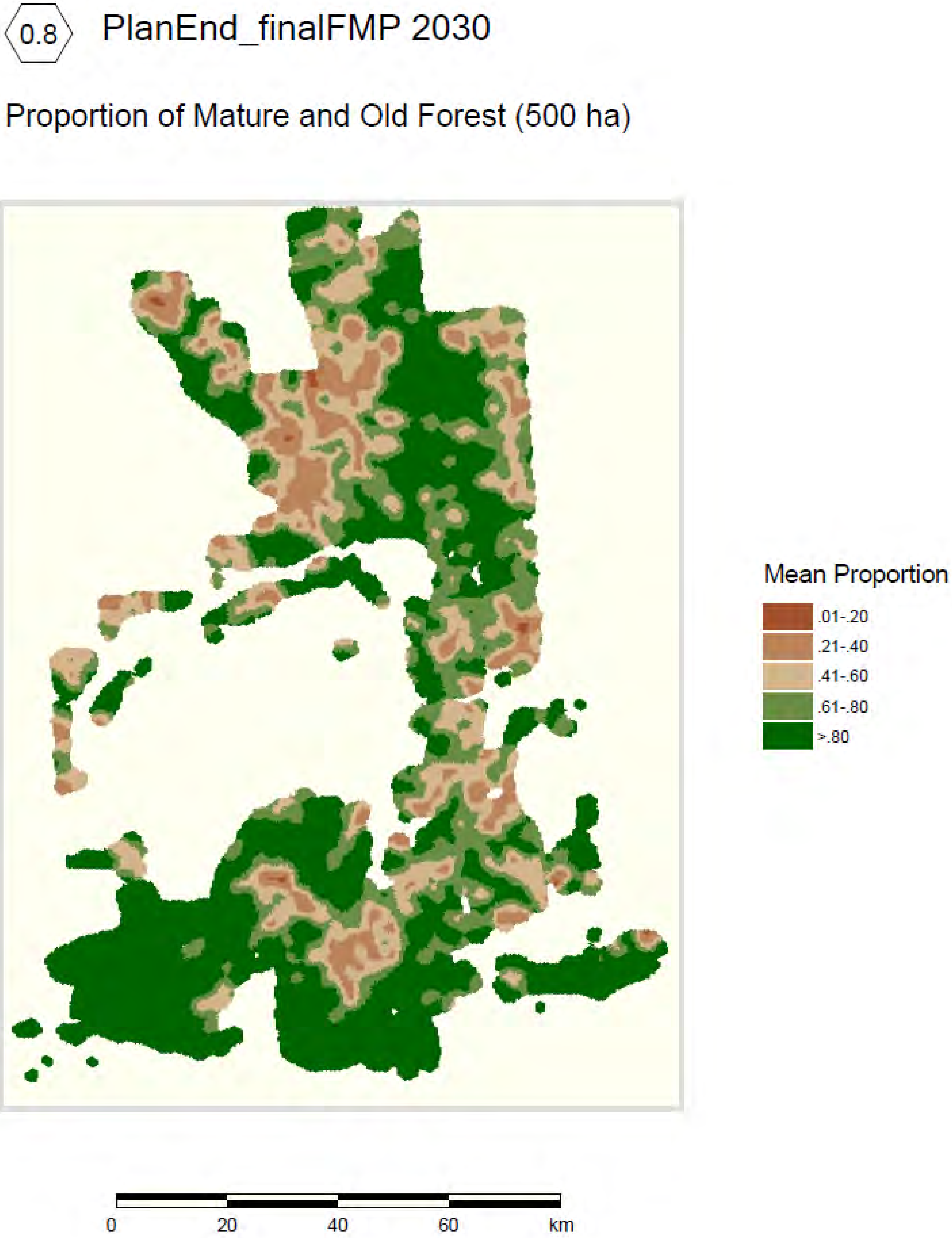
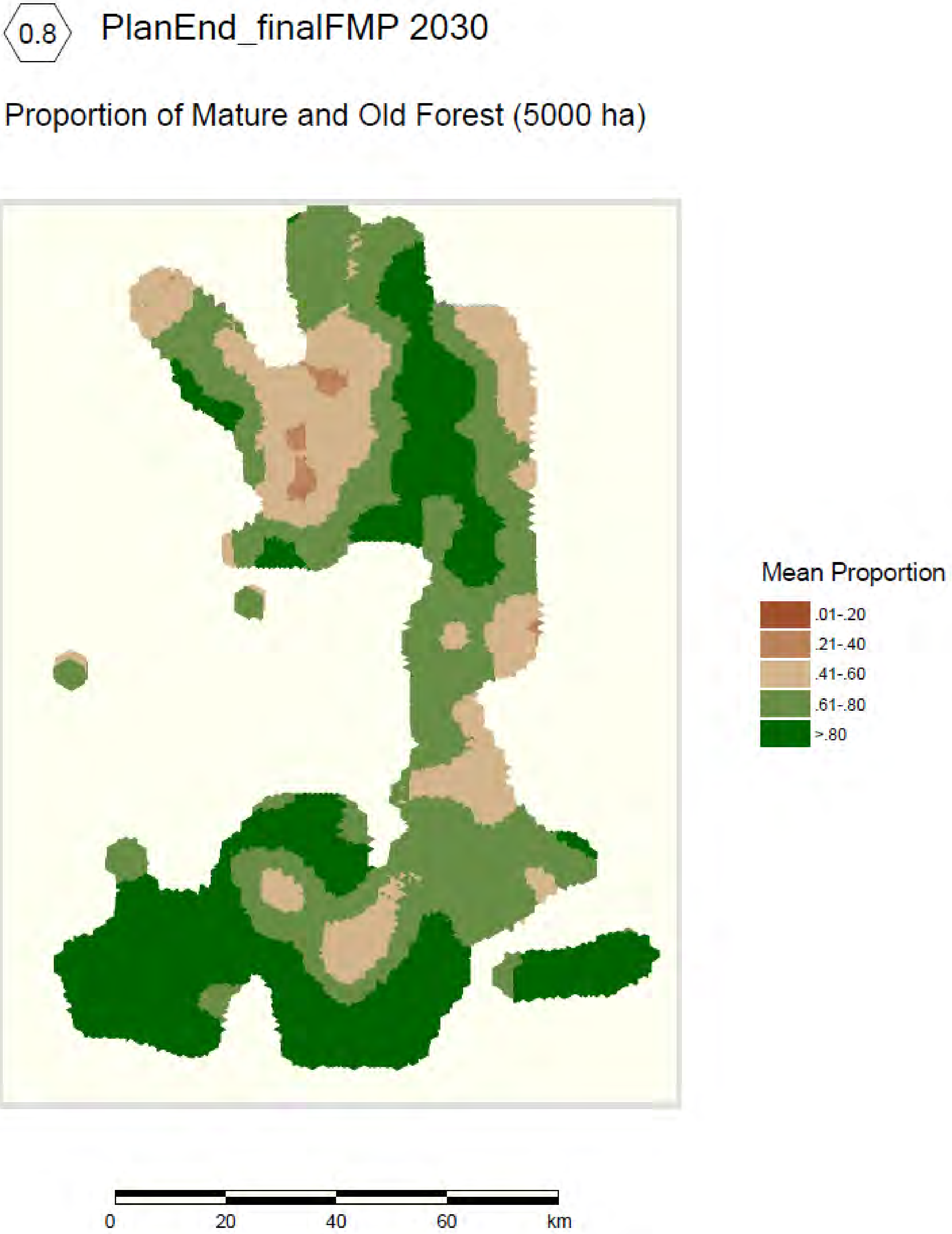

0.8
PlanEnd_finalFMP 2030
Proportion of Mature and Old Forest (500 ha)
Mean Proportion
.01-.20
.21-.40
.41-.60
.61-.80
>.80
0
20
40
60
km

Figure 3.7.9. **Spatial distribution of the proportion of Mature and Old forest texture at the 5,000 ha scale at the end of the 10-year planning period (2030).**


0.8
PlanEnd_finalFMP 2030
Proportion of Mature and Old Forest (5000 ha)
Mean Proportion
.01-.20
.21-.40
.41-.60
.61-.80
>.80
0
20
40
60
km

Results from the OLT analysis indicate there is not enough disturbance in 10-year FMP to meet all indicators. The available level of harvest is insufficient to create all of the disturbances to reduce the high-concentration areas of mature and old forest texture, and subsequent increase in in areas with low concentrations of mature and old forest at both scales.

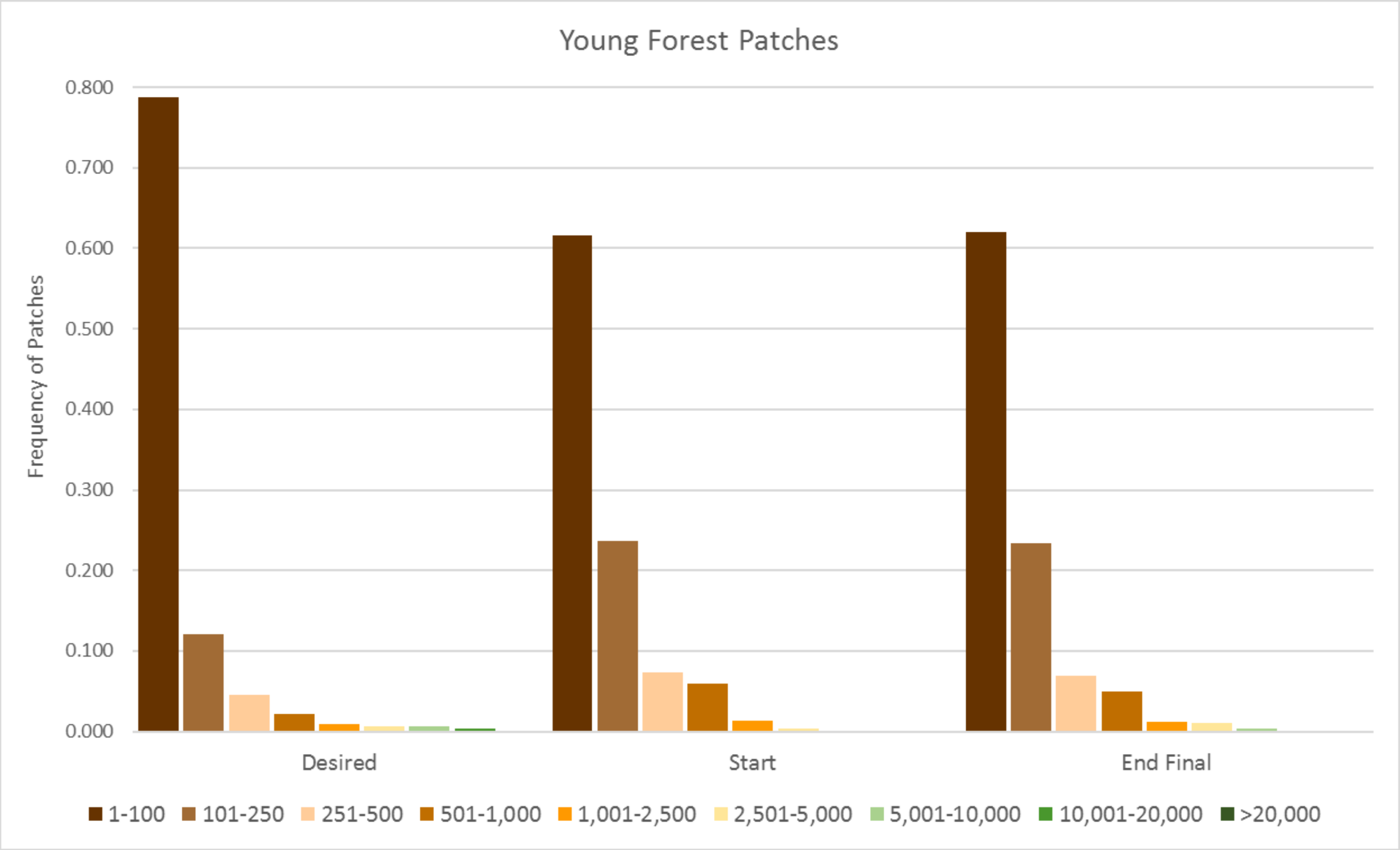
Young Forest Patches

Patches of young forest are geographically dispersed across the entire management unit, and result from both natural disturbance (mainly fire) and harvest. Harvest areas contribute to these spatial textures by the creation of young forest patches either alone or in combination with older patches. Beyond a threshold separation distance multiple patches are counted separately while if they are closer they may combine to create a single larger patch. The guideline direction is to create a mosaic of young and mature and old forest patches consisting of many small sizes to increasingly fewer larger sizes. Some very large patches are part of the ecological balance and are created over successive plans. Figure 3.7.10 shows the desired frequency of patch sizes in relation to plan starting conditions and plan end conditions, assuming all of the allocated area is fully utilized.

Assessment is for the FMP start (year 2020) and FMP end (short-term, 2030). All plan-end values are the same or closer to the desired level (mean) than plan-start levels except in the 101-250 and 2,500-5000 ha size classes. The 2,500-5,000 ha indicator moved in the correct direction but slightly too far:

Patch size (ha)	**Desired**	**Start**	**End Final**	**Desired Direction**	**Assessment**
1-100	0.788	0.616	0.616	Increase	No change
101-250	0.121	0.236	0.237	Decrease	Target almost met
251-500	0.045	0.073	0.070	Decrease	Target met
501-1,000	0.021	0.059	0.049	Decrease	Target met
1,001-2,500	0.009	0.014	0.014	Decrease	No change
2,501-5,000	0.006	0.003	0.011	Increase	Target direction met, slightly too far
5,001-10,000	0.006	0.000	0.003	Increase	Target met
10,001-20,000	0.003	0.000	0.000	Increase	No change
>20,000	0.000	0.000	0.000	None	Target met

Figure 3.7.10. Young forest patch size frequency.



The spatial arrangement of young forest patches at plan start and plan end are shown in Figures 3.7.11 and 3.7.12, respectively.

Overall, the spatial distribution of disturbances closely resembles the desired pattern. The spatial indicators are also all very close to the SRNV median values, representing a pattern that emulates a natural landscape mosaic. With a limited harvest area in each successive FMP the movement towards the natural pattern is gradual and cannot realistically be achieved in a single 10-year term. This may be exacerbated with a low level of harvest utilization, meaning it will take longer to meet the desired disturbance pattern.

Figure 3.7.11. Spatial distribution of young forest patches at plan start (2020).

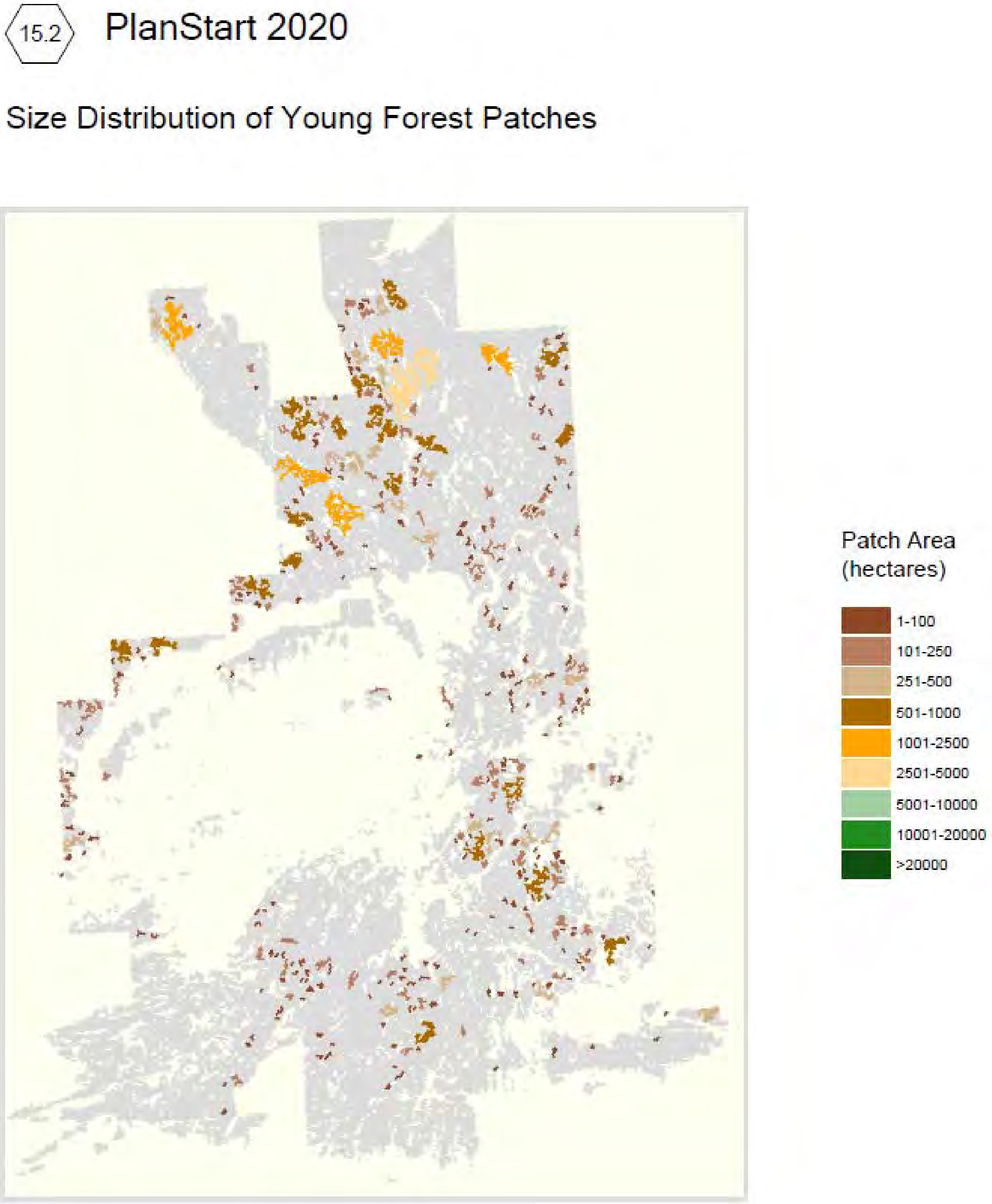
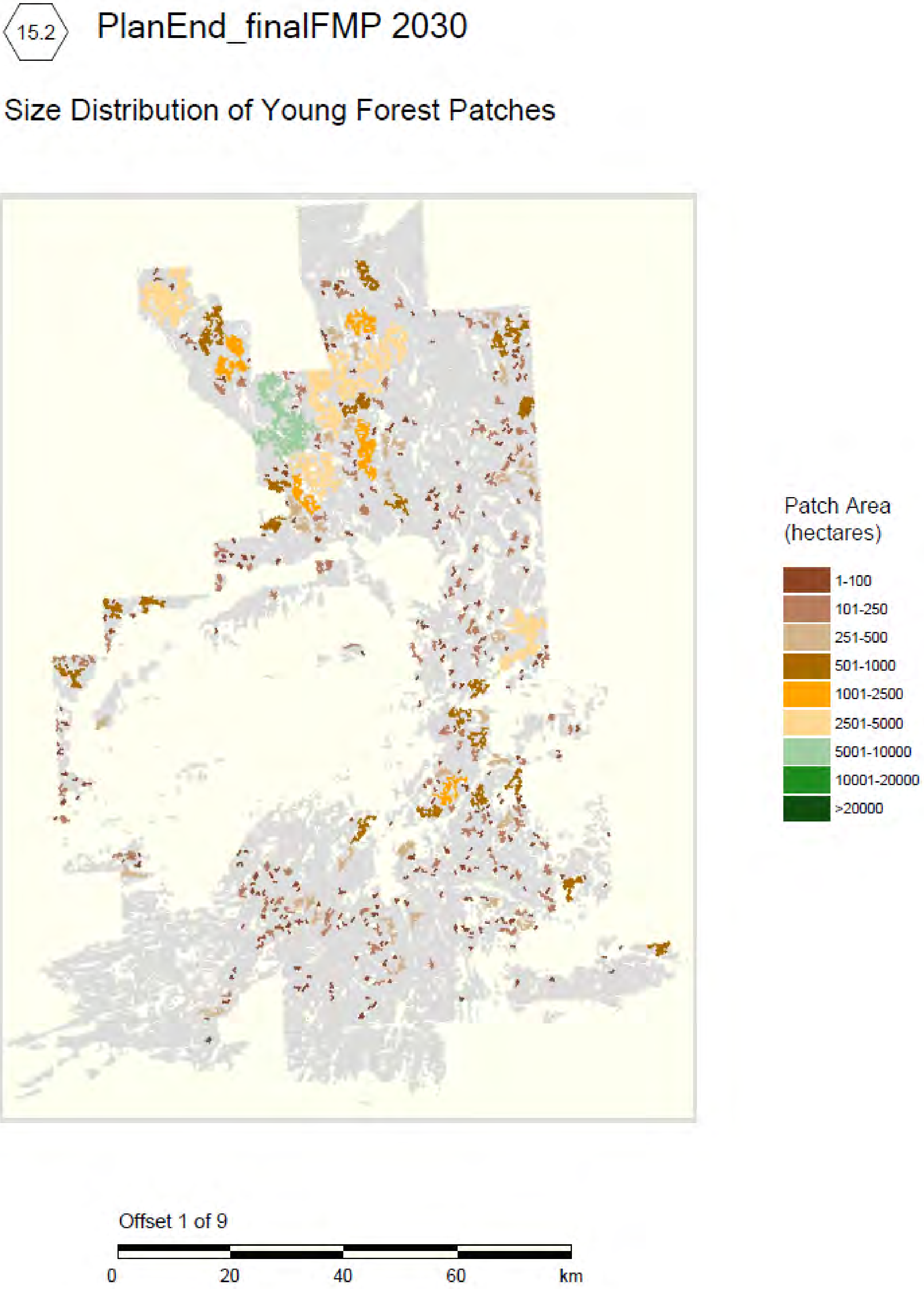

15.2
PlanStart 2020
Size Distribution of Young Forest Patches
Patch Area (hectares)
1-100
101-250
251-500
501-1000
1001-2500
2501-5000
5001-10000
10001-20000
>20000

Figure 3.7.12. Spatial distribution of young forest patches at plan end (2030).


15.2
PlanEnd_finalFMP 2030
Size Distribution of Young Forest Patches
Patch Area (hectares)
1-100
101-250
251-500
501-1000
1001-2500
2501-5000
5001-10000
10001-20000
>20000
Offset 1 of 9
0
20
40
60
km

Old Growth Habitat and Old Forest

Objectives #2 and #3 focus on the amount and spatial distribution old growth habitat and the size and frequency of old forest patches.

The forest inventory shows a significant amount of variation in the amount of old growth forest habitat on the landscape at the start of the FMP. Old growth is described using the Landscape Guide definitions and SRNVs for each of the Standard Forest Units (SFUs). This provides a higher level of resolution and control in the model than Plan Forest Units (PLANFU), which are aggregations of SFU, e.g., mixedwoods. Desired levels for old growth were then based on individual or groupings of SFU.

The approach for the proposed management strategy was to maintain old growth levels where they occur above SRNV levels, and increase levels where they are below SRNVs. For some SFUs, starting levels described in the inventory are very low relative to SRNVs and therefore do not reach the SRNV within the planning period. In part this is a function of uneven-aged forests, which may be very old in terms of the time since a stand-replacing disturbance, being described by the average age of dominant and co-dominant trees, e.g., cedar, hemlock, and tolerant hardwood forest that are uneven-aged have stand ages lower than the old growth age of onset even though there is no evidence of disturbance.

The level of achievement of old growth over time is showin in Figure 3.7.13 in relation to SRNV(s). Desired levels (targets) were met or show continual movement towards each indicator over the projection period. Old growth levels remain above the target for SF and mixedwoods combined.

Between the start and end of the FMP there is an increase in the abundance and size of old forest patches. The number of patches of old forest increases in each size class. The relative proportions of larger size classes increase while the proportion of 0-50 ha patches decreases. The three largest size classes increase in average size while the smallest size class decreased in average size. Overall, the average patch size increases from plan start to plan end (this assumes all of the forecast and available harvest area is fully harvested):

	Plan Start (2020)			**Plan End (2030)**		
Patch size	**Average area (ha)**	**Count**	**Proportion**	**Average area (ha)**	**Count**	**Proportion**
0-50 ha	11.0	2048	0.918	9.8	3,728	0.903
51-500 ha	102.9	177	0.079	109.1	390	0.094
501-1,000 ha	700.1	3	0.001	670.2	6	0.001
>1,000 ha	1282.6	2	0.001	2,025.1	4	0.001
All	20.3	2230	1.000	22.1	4,128	1.000

Figure 3.7.13. Projected areas of old growth forest.

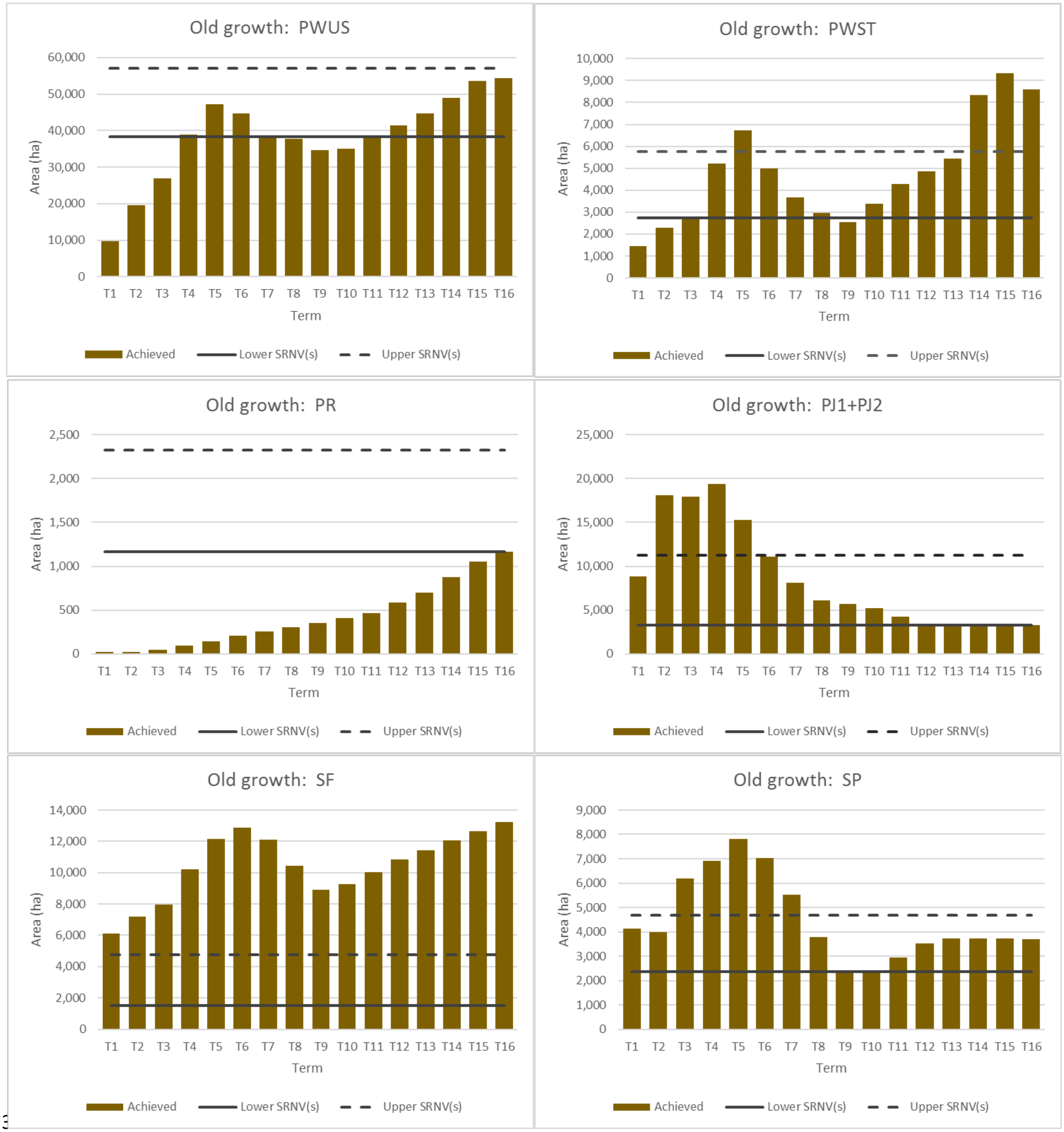


Figure 3.7.13. (continued).

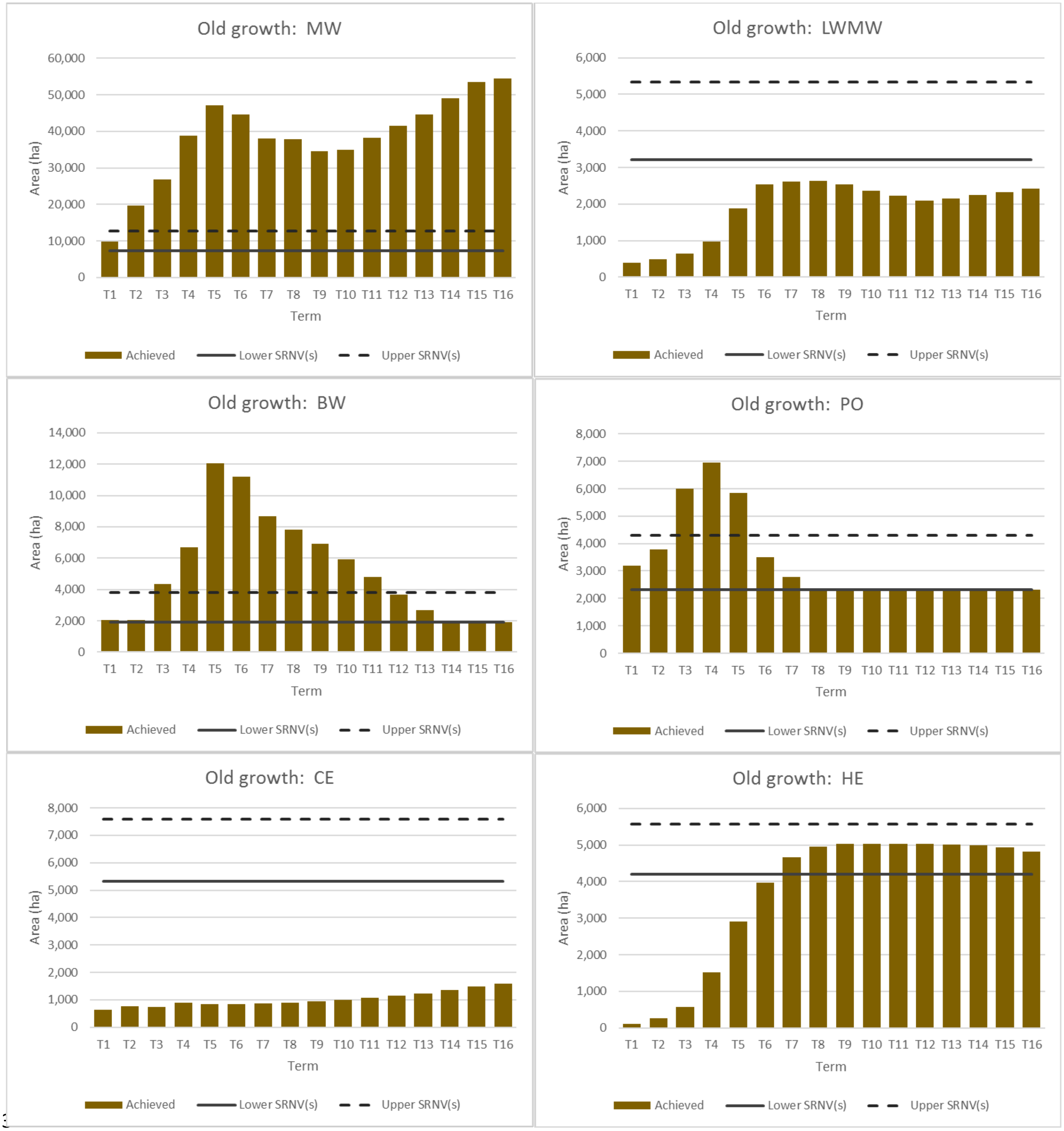
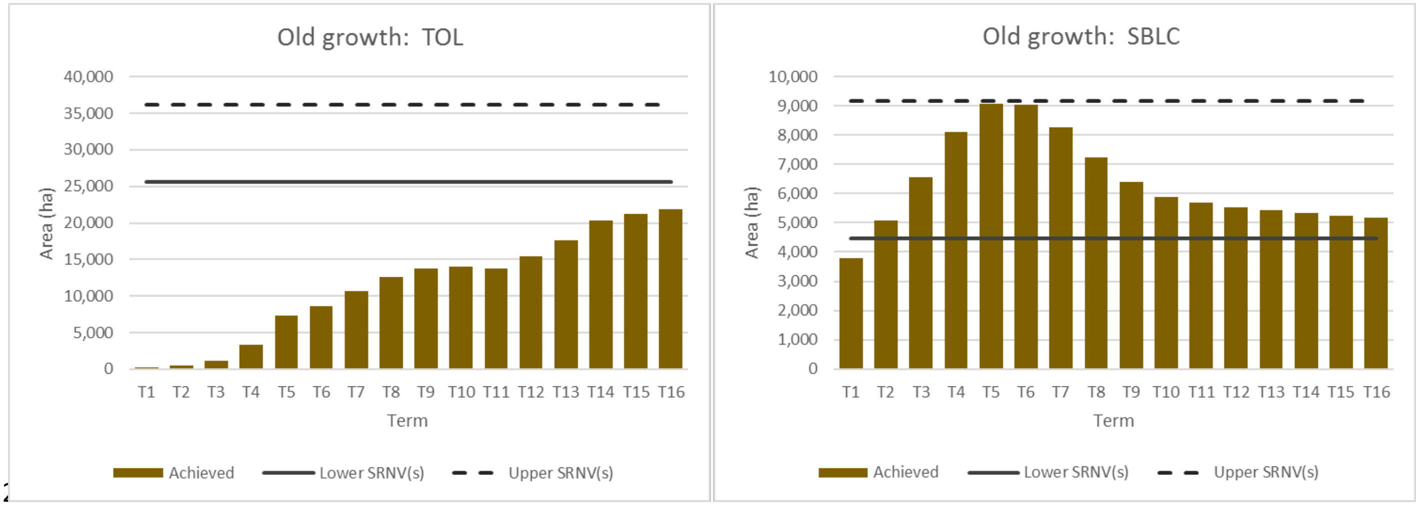


Figure 3.7.13. (continued).



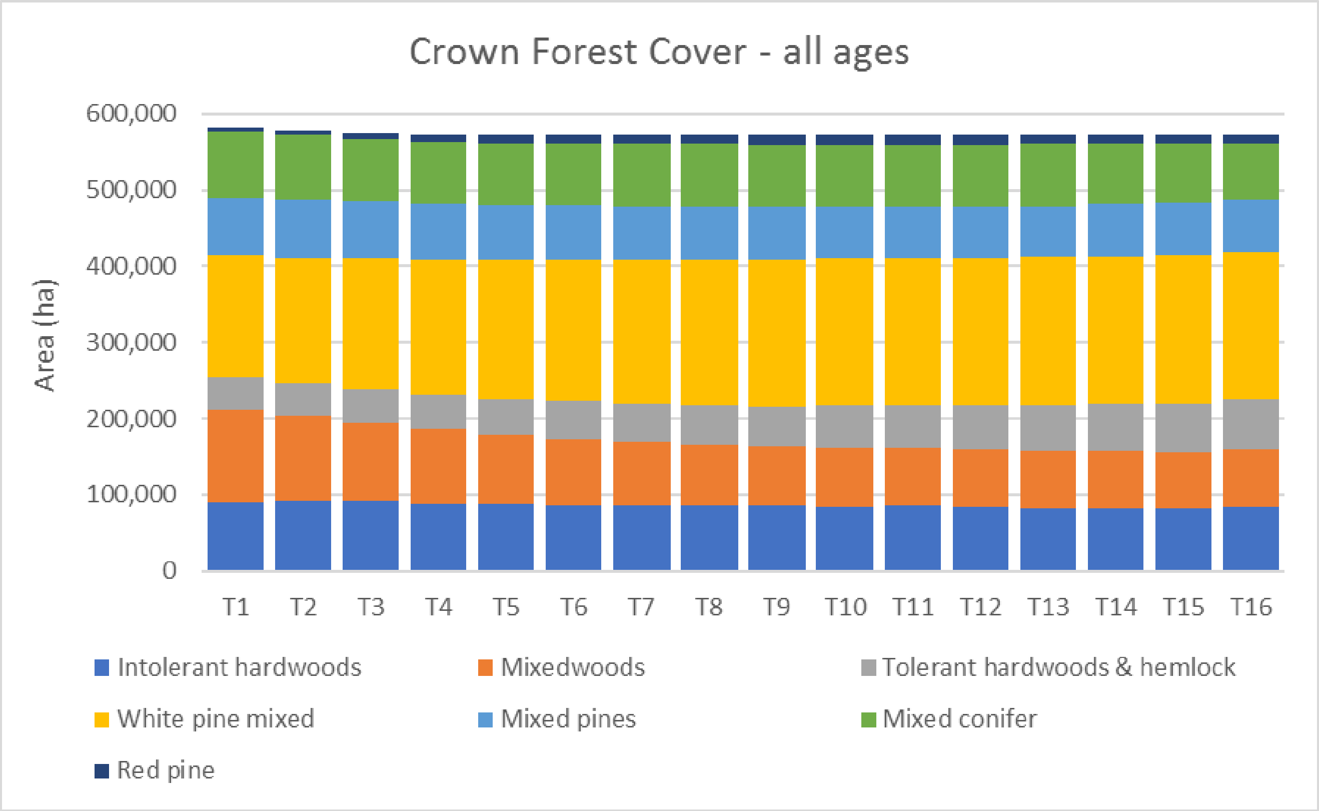
The proportion of old growth remains relatively stable in Zones 1 and 2, increases in Zone 4, and decreases in Zones 3 and 5. This trend is to be expected due to the higher proportion of hemlock, white pine, and tolerant hardwoods in Zone 4 (Eco-region 5E), and the respective increase in old growth for these forest types where initial old growth levels are below the natural range. Zones 3 and 5 (Eco-region 4E) have more boreal characteristics and old growth quantities at plan start are generally at or above the expected range of natural variation.

Forest Cover and Habitat

Objective #4 is to maintain the area of forest cover types that would occur naturally on the Sudbury Forest, similar to the expected natural landscape dynamics, with consideration of the pre-settlement forest condition. This objective was also carried over from the 2010-2020 FMP and is meant to ensure the selected management strategy provides for the development of forest cover types that more closely resemble the natural variation. Desired levels are based on the comparative direction in moving towards SRNV levels of standard forest units in relation to conditions at the start of the FMP. Results show similar trends to 2010, but not completely comparable as the 2010-2020 FMP PJSB forest unit has been divided into two separate forest units. Table FMP-10 provides results for each grouping and Figure 3.7.14 shows the trends over time for consolidated groups for a simpler visual representation.

Objective #10 is achieved through the implementation of Moose Emphasis Areas (MEAs). The targeted level of productive forest designated as MEAs was met at 14%. Browse levels are met for all areas except #2 where browse will be slightly higher than desired if all allocations are utilized, and #8 where browse levels remain low for the 2020-2030 term. Mature conifer levels are generally on the high end of targets, and in some cases exceed the target. This provides for ample opportunity for future allocations within each of the MEAs. Hardwood mixedwood levels are below targets for areas #3, 4, 5 for the 2020-2030 term and levels are within the targeted range for all other areas. Hardwood mixedwood components tend to be low where mature conifer levels are high, and these levels will fluctuate over time.

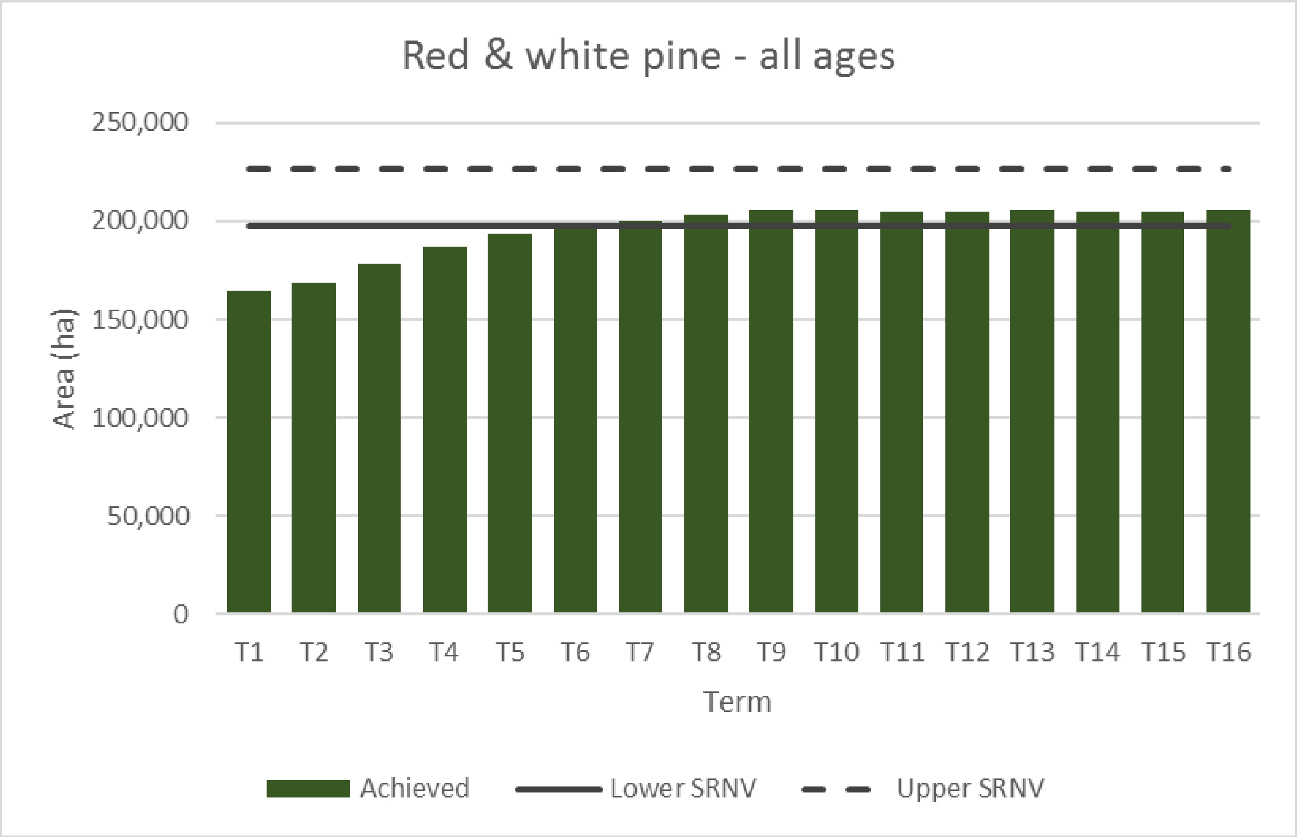
Figure 3.7.14. Area of forest cover types for all Crown forest over the entire projection period.



Red and White Pine Forest

The level for all ages of red and white pine forest was based on maintaining area above the 1995 level to be consistent with the Conservation Strategy for Old Growth Red and White Pine Forests Ecosystems in Ontario, 1996, and the predicted SRNV. The SRNV results in a much higher level to reach, therefore the target was based on moving towards the SRNV. Scoping analysis showed that red and white area readily approaches reaches the SRNV and is maintained or may even exceed the SRNV depending on silviculture inputs. For the selected management strategy, the SRNV (desired level) is reached by Term 6 and maintained (Figure 3.7.15).

Figure 3.7.15. Projected areas for red and white pine forest.



Landscape Classes

Objective #7 refers to the area of forest in each Landscape Class over time. Landscape Classes provide coarse-filter direction for biodiversity indicators, as prescribed by the milestones in the Landscape Guide Table A4, and updated based on new analysis completed in 2018 (Figure 3.7.16).

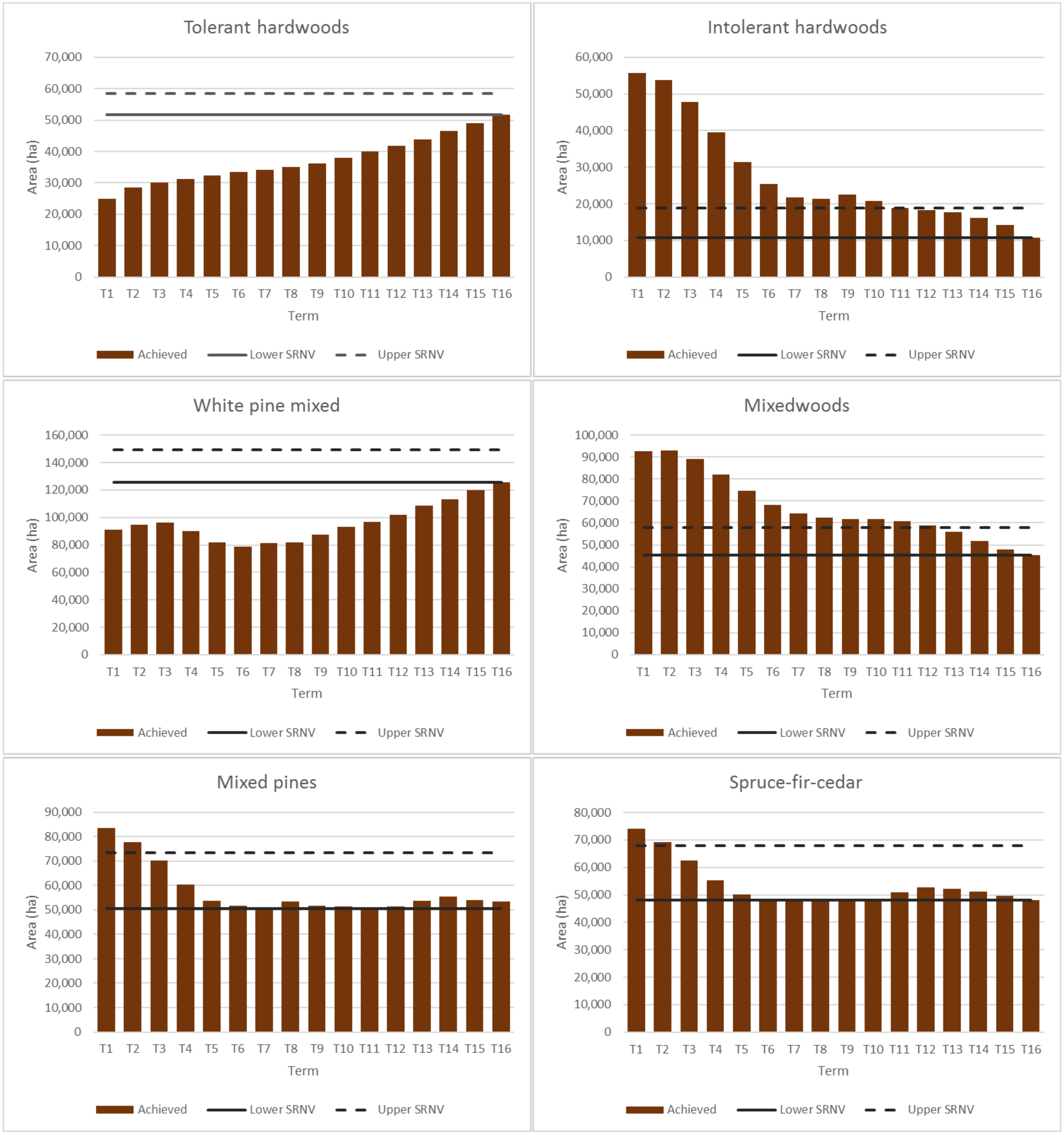
The area of mature and old Landscape Classes for the proposed management strategy are portrayed in Figure 3.7.17 for each 10-year term of the model projections. Projected levels are also shown in relation to the SRNV for each class. All of the six classes reach the desired SRNV milestones, and are maintained within the desired ranges for those classes that reach the desired levels before the end of the projection.

Figure 3.7.16. Landscape Guide Region GLSL North – Sudbury Forest milestones (update to Landscape Guide Table A4).

Landscape Guide Indicator	**Version**	**Change in direction**	**Directional statement**	**Milestones**		
				Short (10 yr)	**Medium (20 yr)**	**Long (100 yr)**
Tolerant hardwood	2010 Landscape Guide		Increase towards the SRNV	Increase	Increase	Increase
	2020 FMP	*no*	*Increase towards the SRNV*	*Increase*	*Increase*	*Increase*
Intolerant hardwood	2010 Landscape Guide		Decrease and maintain within the SRNV	Decrease	Decrease	Maintain
	2020 FMP	*no*	*Decrease and maintain within the SRNV*	*Decrease*	*Decrease*	*Maintain*
White pine mixedwood	2010 Landscape Guide		Increase towards the SRNV	Increase	Increase	Increase
	2020 FMP	*no*	*Increase towards the SRNV*	*Increase*	*Increase*	*Increase*
Mixedwood	2010 Landscape Guide		Decrease towards the SRNV	Decrease	Decrease	Decrease
	2020 FMP	*yes*	*Decrease and maintain within the SRNV*	*Decrease*	*Decrease*	*Maintain*
Mixed pines	2010 Landscape Guide		Increase and maintain within SRNV	Increase	Increase	Maintain
	2020 FMP	*yes*	*Decrease and maintain within the SRNV*	*Decrease*	*Decrease*	*Maintain*
Spruce-fir-cedar	2010 Landscape Guide		Increase towards the SRNV	Increase	Increase	Increase
	2020 FMP	*yes*	*Decrease and maintain within the SRNV*	*Decrease*	*Decrease*	*Maintain*
Old growth by forest unit or appropriate grouping	2010 Landscape Guide		Move towards and/or maintain within the SRNV	Move towards and/or maintain as applicable	Move towards and/or maintain as applicable	Move towards and/or maintain as applicable
	2020 FMP	*no*	*Move towards and/or maintain within the SRNV*	*Move towards and/or maintain as applicable*	*Move towards and/or maintain as applicable*	*Move towards and/or maintain as applicable*
Red and white pine - all ages	2010 Landscape Guide		Increase towards the SRNV	Increase	Increase	Increase
	2020 FMP	*yes*	*Increase and maintain within SRNV*	*Increase*	*Increase*	*Maintain*

.

Figure 3.7.17. Projected Landscape Class areas.



The Landscape Classes represent broad wildlife habitat categories, hence are a replacement for the more specific habitats previously shown in Table FMP-7. The current policy direction is to assess habitat through the use of Landscape Guide classes with the associated milestones that provide direction for achievement through time.

Changes in the areas of these Landscape Classes is a function of disturbance and succession, and are influenced very heavily by the current forest composition. Harvest and renewal activities have a limited effect over the course of a single planning term, however, over the entire 150-year planning horizon these management activities influence the forest condition in the medium- and long-term. In combination, the influence of the current condition, natural succession, harvest and renewal strongly affect the future forest condition.

The area of mature and old Intolerant hardwoods is represented by poplar and white birch forest units. The initial forest condition shows a significant over-abundance of this class which is the result of a large portion of the forest originating 80 to 100 years ago. Subsequent disturbance levels have been relatively low, though natural succession will likely contribute to increasing levels of species transitions. Following the proposed management strategy, the Intolerant hardwood class is predicted to reach the SRNV in 100 years and can be maintained within the SRNV for the remainder of the planning horizon. Similarly, the area of mature and old Mixedwood class also starts well above the SRNV and following the proposed strategy will reach the SRNV by Term 12.

Mature and old jack pine and red pine mixed forests (Mixed Pines) and Spruce-fir-cedar are slightly above the SRNV at the start of the planning horizon and are maintained within desired levels from the third term onwards.

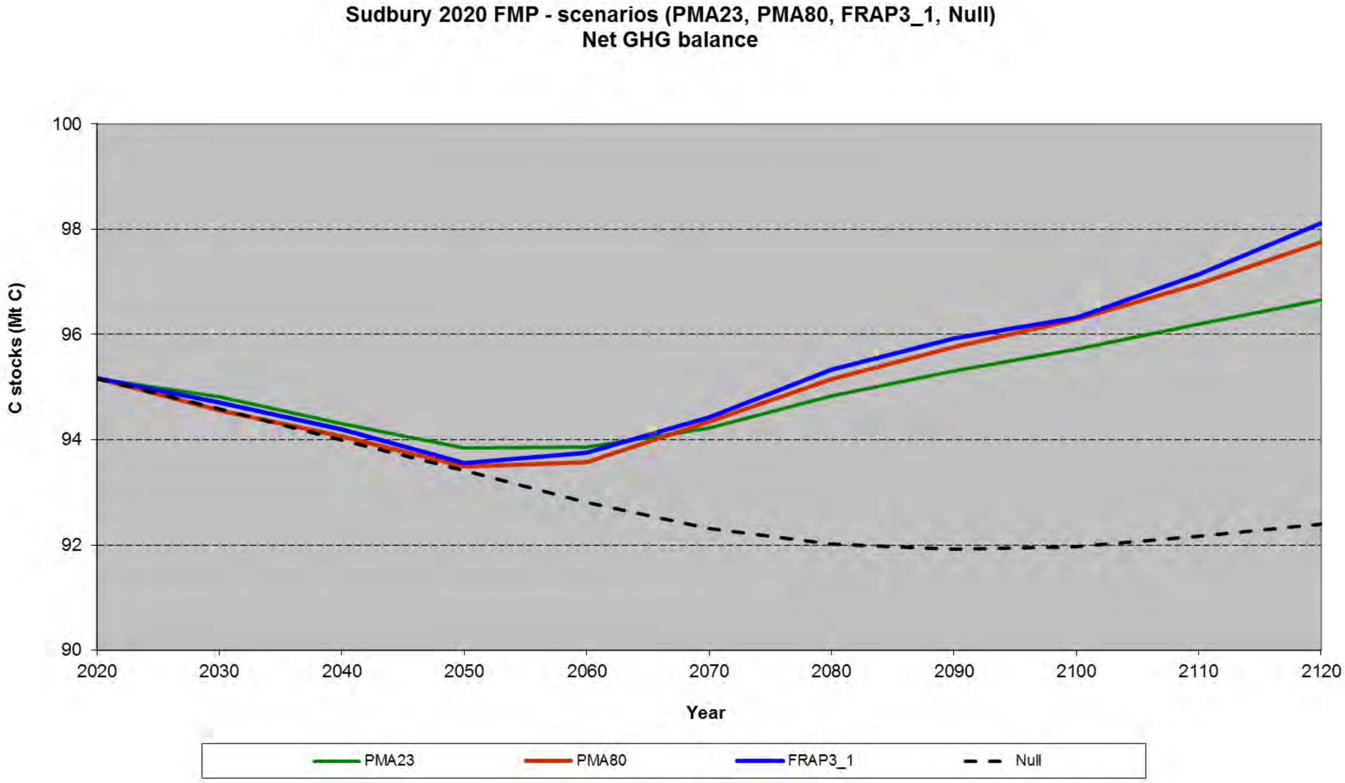
Both the mature and old Tolerant Hardwood and White Pine Mixedwood classes follow the milestone trends, with increasing levels over the planning horizon, except there is a non-linear progression for the White Pine Mixedwood class. This was review by the Modelling and Analysis Task Team and determined to be appropriate given the initial age structure of the PWUS and PWST forest units, and limitations in future recruitment of immature forest into mature age classes.

Forest Carbon

Objective #12 is carried over from the 2010-2020 FMP to quantify the projected carbon stocks for different management alternatives. Although a specific target for carbon stocks was not set, the selected management strategy is one that should provide favourable net carbon storage over time.

Four SFMM cases were analysed with the Carbon Budget Measurement Model (OFRI FORCARB-ON2 Analysis). For each scenario the FORCARB-ON2 output shows carbon stocks in six pools: live trees, standing dead trees, down dead wood, forest floor, understorey, and soil (Figure 3.7.18). Total ecosystem forest carbon stock is the sum of the above-listed six pools. All stocks are expressed in million tonnes of carbon. The output also contains carbon stocks in harvested wood products (HWP) and associated greenhouse gas (GHG) emissions. Carbon stocks in HWP are broken down by HWP in use and HWP “retired” in landfills. Emissions are divided into manufacturing emissions (that include upstream emissions from harvest equipment, transportation, etc.) and methane emissions from landfill; methane emissions are estimated separately because of its high global warming potential (GWP). As with forest ecosystem stocks, stocks in HWP and emission are expressed in million tonnes of carbon (emissions are back-converted to units of dry mass for comparison with other stocks).

Figure 3.7.18. Summary of forest carbon stocks in four different model scenarios.



Wood Supply

Objective #21 is to provide a sustainable, continuous and predictable wood supply that will meet, as closely as possible and for as long as possible, the current recognized industrial demand of the Sudbury Forest. This objective is assessed with several indicators that include harvest area and volume targets:

A. Harvest flow policy.

Harvest flow policy is designed to regulate the fluctuation of harvest volume from term to term, or to establish an even-flow of volume through time. Moderate fluctuations are often needed on forests where there is a significant imbalance of age-classes, such as the Sudbury Forest.

Refer to Section 4.3.1.6 of the Supplementary Documentation 6.1 (b), Analysis Package for a description of the model scoping that was done to evaluate the achievement and effects of varying harvest flow constraints. The following desired levels and targets were established and assessed at LTMD:

Species Group	Desired Level	Target	T1 to T2	T2 to T3	T11 to T12
Spruce-pine-fir (SPF)	10%	10%	-10%	-10%	10%
Intolerant hardwoods (INT)	10%	10%	-9%	-9%	4%
White and red pine (PWR)	10%	5%	-5%	5%	-5%
Tolerant hardwoods (TOL)	10%	5%	-5%	-5%	-5%
Other conifer (OC)	10%	5%	-5%	-5%	-5%
All species groups (ALL)	10%	10%	-8%	-6%	3%

B. Available long-term projected total annual harvest area (AHA).

Harvest area (ha) is an important indicator of economic potential. Ideally there would be consistent (non-declining) harvest area from plan to plan, and term to term, therefore a 0% decrease was set as a desirable level. This was, however, determined to be infeasible while meeting other plan objectives (refer to Section 4.3.1.6 of the Supplementary Documentation 6.1 (b)), hence the targeted level was to ensure reductions in total AHA from term to term did not exceed 10%. This target was met as flow constraints in SFMM esnure total harvest area is within 10% of each previous term. Each individual forest unit was set to a maximum fluctuation level of 20-30% and this was achieved.

C. Long-term projected available harvest area (AHA) by forest unit.

The desirable level is to maintain a forest unit mix, over time, in order to meet the projected available harvest volume (m^3) by species group. Desirable levels cannot be fixed, in order to allow the optimization of the selection of forest units from term to term. Desirable levels are to limit fluctuations from term to term by 20-30% (refer to Table FMP-10 for details). Accordingly, constraints were tested in the SFMM model to prevent changes in harvest area between 10-year periods. Limits less than 20% resulted in infeasible solutions. Refer to Table FMP-10 for results.

D. Long-term projected available harvest volume by species group and product.

As with harvest area, harvest volume over time is an important indicator of sustainability. The current industrial demand (CID) developed for the 2020-2030 FMP is based on existing wood supply commitments and current mill business plans and was used to set desirable levels for the objective. The following volumes (1,000s m^3) by species group are the desired levels and targets established through scoping analysis (refer to Section 4.3.1 of the Supplementary Documentation 6.1 (b), Analysis Package). Results for achievement of these indicators are shown in detail in Table FMP-10.

Objective indicators for actual harvest area and volume are tracked through the annual reports and the results will be monitored and reported at years 5 and 10.

The collective assessment of objective achievement is summarized in Section 5.1 of this document.

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 landscape objectives.

Analysis with and without spatial constraints shows sensitivity in the model to the spatial distribution of harvest area, but that a constraint can effectively control large fluctuations by zone for the first four (4) terms (refer to Section 3.5 of this document and Section 3.5 of the Supplementary Documentation 6.1 (b) Analysis Package for a description of zones).

A 20% harvest flow constraint was applied to each zone to prevent excessive spatial fluctuations in harvest, and to limit how much activity can occur in a given portion of the forest.

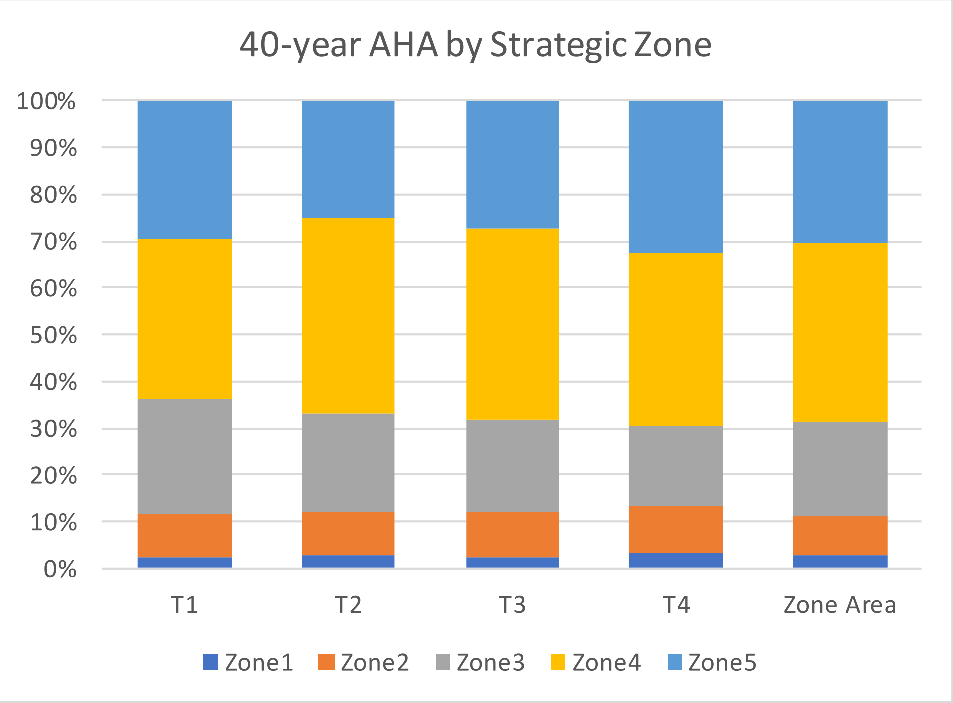
The first two zones are relatively small and represent a low overall contribution to wood supply. These two zones are partly intermingled with patent land and have a variety of access challenges. Over time, access will need to be developed if the levels of harvest projected in the model are to be achieved.

The remaining three zones make up the majority of the land base and wood supply. Over time there are also shifts in the proportion that each zone contributes to the projected harvest levels. Zone 3 encompasses the northwest section of the Forest, including the Spanish Arm. This area contributes almost one quarter of the projected harvest area in Term 1, then decreases to just over 17% (Figure 3.7.19). Road access to this zone is fairly well developed, although continued construction of the Spanish Arm Road system is required to achieve the projected harvest level. Special access considerations are to be implemented in this area to mitigate impacts to established resource-based tourism values and trout lakes in the area.

The south and central portions of the Forest are covered by Zone 4 where white pine and hardwood forest types dominate. This zone is also generally well roaded however the development of the Secord Forest Access Road system is important to the long-term utilization of this area. This area also has significant camp and cottaging values and associated challenges with timing of operations and use of public road systems. Projected harvest levels for Zone 4 are shown to increase to just over 40% in Term 2 then decrease by Term 4 to levels similar to Term 1.

Figure 3.7.19. Projected spatial harvest area over the first four planning periods (40 years).

Term	Zone1	Zone2	Zone3	Zone4	Zone5	Total
T1	2.3%	9.1%	24.8%	34.3%	29.5%	100.0%
T2	2.8%	9.2%	21.1%	41.6%	25.2%	100.0%
T3	2.6%	9.5%	19.5%	41.1%	27.3%	100.0%
T4	3.2%	10.1%	17.4%	36.5%	32.8%	100.0%
Zone Area	2.8%	8.6%	20.2%	37.9%	30.5%	100.0%



The central and northeast portion of the forest is covered by Zone 5. Projections of harvest area for Zone 5 are shown to fluctuate and eventually increase by Term 4. In order to achieve this projected harvest area there is a need for further development of road access, including areas to the east of the Sturgeon River. Road access to a portion of this area is challenged due to remote values and many access strategies have been proposed. The approved access is via the Turner Road system. Measured development of access and harvest opportunities is required in this area due to objectives for remoteness in the northeast portion of the zone in the Yorston River / Selkirk Creek (E353r) Enhanced Management Area.

Overall, the implications of the spatial harvest projections highlight the need for a balance of harvest areas across the forest, and an avoidance of any particular zones being over-utilized or by-passed. This provides for long-term economic stability (balancing further, more costly wood with more readily accessible wood in each 10-year term), and the ability to meet ecological landscape-level diversity objectives. Achieving this of course depends on the development and maintenance of road access, and working with timing restrictions across the available land base.

3.7.5 Social and Economic Assessment

The Forest Management Planning Manual (2017) states that a social and economic assessment of the proposed management strategy will be prepared identifying the impacts of implementing the management strategy. The assessment examines how the quantity of timber supplied to wood-processing facilities, and the silvicultural investment requirements for the proposed management strategy may affect the communities identified in the Social and Economic Description. Refer to Section 2.2 of this document and Supplementary Documentation 6.1 (e) for details on the Social and Economic Description.

There are two options for assessing the socioeconomic impacts. These include either a quantitative or a qualitative assessment. The quantitative assessment and analysis are completed using the provincially approved Socioeconomic Impact Model (SEIM). The qualitative assessment and analysis use information from both the proposed management strategies and social and economic descriptions from the 2010-2020 and 2020-2030 FMPs. The Sudbury Forest planning team considered both types of assessments and decided to use a qualitative method as there is relatively little change in harvest volume between FMPs (i.e., <10%).

The following assessment will examine the impacts of the proposed management strategy related to three areas of interest: timber volume, silviculture expenditures, and non-timber values.

Timber Volume

Annual projected harvest volumes between the 2010-2020 Sudbury FMP and the 2020-2030 Sudbury Forest management strategy are compared; as well as direct employment and employment income related to the average annual projected harvest volume for the two plans.

The assessment of timber volumes is based on a comparison of projected harvest volumes from the 2010-2020 Sudbury Forest FMP to the proposed management strategy for the 2020-2030 FMP and any related impacts on direct employment levels and employment income.

In any given year there are from 15 to 20 communities that receive wood fibre from the Sudbury Forest or provide employment to the forest industry. In addition, there are Indigenous communities within or adjacent to the Sudbury Forest and whose interests and traditional uses may be affected by forest management activities.

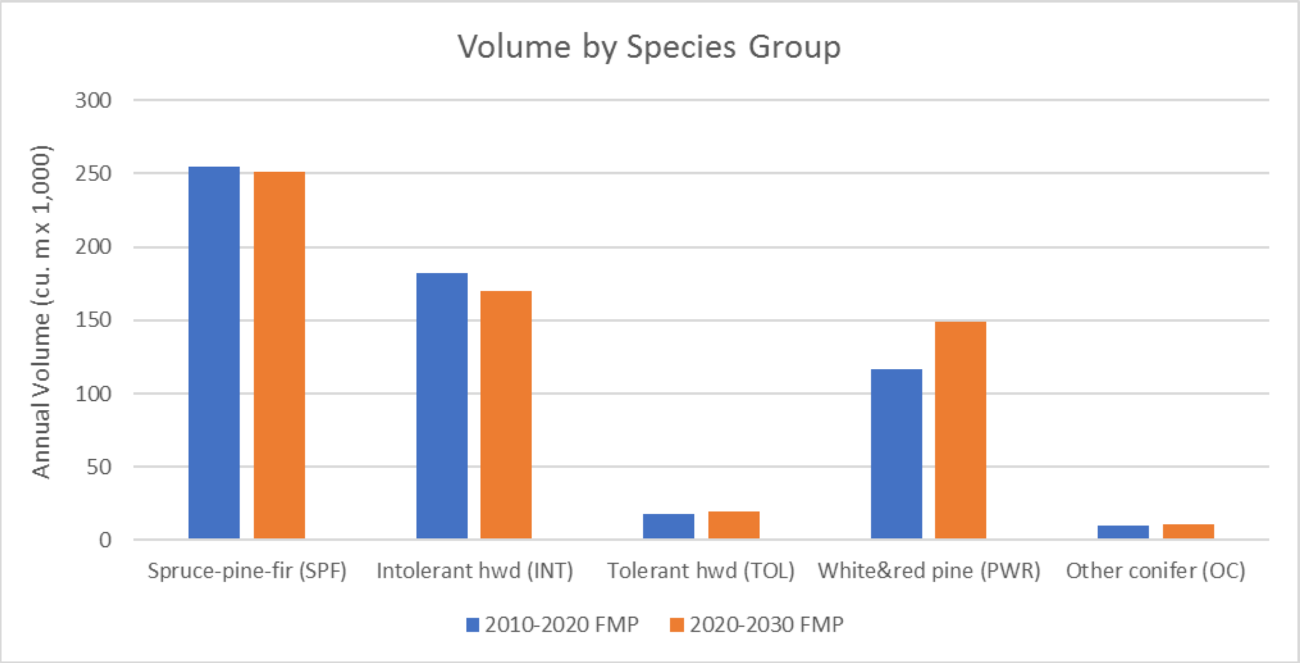
Communities receiving wood fibre from the Forest (> 1%) or having employment related to the forest industry are: Espanola, Nairn and Hyman, Alban, Noelville, Monetville, Sturgeon Falls, Englehart, Falconbridge, Ostrum, Capreol, Sault Ste. Marie and Kirkland Lake.

Figure 3.7.20 displays the annual volume available from each forest unit provided by the proposed management strategy compared to what was provided in the 2010-2020 FMP. For most forest units there is a slight increase in volume between the two plans. Not all forest units are directly comparable, however, as there has been a change in forest units between the two plans. The PJSB forest unit in the 2010-2020 FMP included area that is identified as a unique SP forest unit in the 2020-2030 FMP. This change in forest units explains the large difference in the PJSB volumes.

Other significant differences in volumes are related to corresponding changes in available harvest area for each forest unit, e.g., The SF and PWUS forest unit harvest areas have declined significantly, while the mixedwood and BW harvest areas have increased. Smaller forest units such as HE, CE, and PR are sensitive to changes as the harvest areas are very small, therefore show large proportional changes even though the actual volume changes are minor.

Figure 3.7.20: Comparison of Projected Annual Harvest Volumes by Forest Unit (top) and Species Group (bottom) Between the 2010-2020 Sudbury FMP and the 2020-2030 Sudbury FMP.

Forest Unit	2010-2020 FMP	2020-2030 FMP	Difference	% Change
BW	62,116	74,870	12,754	21%
MW1	49,599	83,311	33,712	68%
MW2	30,239	38,502	8,263	27%
PJ	50,160	44,129	-6,031	-12%
PJSB	82,208	36,113	-46,095	-56%
PO	51,413	44,249	-7,164	-14%
PR	6,413	21,688	15,275	238%
PWST	35,300	36,325	1,025	3%
SBLC	9,632	4,185	-5,447	-57%
SF	76,696	53,026	-23,670	-31%
CE	25	692	667	2668%
HDUS	6,064	4,109	-1,955	-32%
HE	4,981	2,153	-2,828	-57%
LWMX	1,231	1,326	95	8%
PWUS	109,106	97,333	-11,773	-11%
HDSEL	4,836	4,333	-503	-10%
SP	0	53,430	53,430	
Total	580,019	599,733	19,714	3%



Species group volumes are also compared between the two FMPs. The SPF volume decreases by 1.4%, while the intolerant hardwoods (poplar and birch) decrease by 6.7%. In contrast, the red and white pine group and tolerant hardwood volumes increase by almost 28% and 11%, respectively (Figure 3.7.20, bottom). Note that while the area of the white pine shelterwood forest unit has increased in the new inventory, some of the white pine volume also occurs in mixed species forest units (e.g., MW1, SF) and utilization in these mixed conditions has typically been low. It is also important to note that, while SPF volumes are very similar between the two plans, the volume projected in the PJ forest unit is lower in the 2020-2030 FMP. The similarity in volume is largely due to the amount of jack pine in the MW1 forest unit in the 2020-2030 FMP, and the combined volume in the PJSB + SP forest units. Once again, the availability of the jack pine in the MW1 forest unit is subject to how effectively that forest unit is utilized.

Figure 3.7.21: Estimate of Mill Employment and Employment Revenue for the Sudbury Forest.

	2010-2020 FMP	**2020-2030 FMP**	**Difference**	**% Change**
Planned annual harvest volume (m^3)	580,019	599,733	19,714	3%
Average estimated annual forestry employment per 1,000m^3 harvested	0.816	0.603	-0.213	-26%
Total estimated annual forestry employment	502	995	493	98%
Estimated average annual income in forest industry, based on all communities dependent on the Sudbury Forest	38,687	41,351	2,664	7%
Total estimated employment income generated from the Sudbury Forest	19,424,743	41,143,748	21,719,005	112%

The data in Figures 3.7.20 and 3.7.21 indicate that the difference between the 2010-2020 and 2020-2030 plans is not significant at only 3%. As well, to date the volume levels made available by the proposed management strategy have not been fully utilized with an average total volume of approximately 283,000 m^3 from the 2007-2008 to the 2016-2017 operating years. Implementation of the LTMD should not result in a decrease in the short-term employment levels or employment income for communities dependent on wood from the forest. The LTMD provides for higher levels of harvest than what has been historically utilized, as with previous plans, and improved utilization of previously under-utilized forest units can potentially increase employment and income levels significantly.

The marginal increase in total volume is also reflected in an increase in estimated direct employment and direct employment income generated from the volumes. Direct employment includes mill workers and businesses offering employment in the woodlands sector such as tree marking, tree planting, logging, and stand tending. Indirect employment in business areas providing equipment, food services, housing, etc. also benefit from a stable forestry sector supported by the LTMD.

The LTMD does indicate that the long-term volume for the SPF species groups is declining slightly until Term 6 after which volumes increase again. All other species groups follow similar trends or are exhibiting slight fluctuations in volumes over the long-term. The volume trends do suggest that employment growth may be limited in the long term, however, available volume is projected to remain well above current utilization levels. The long-term trend of declining volumes may limit new forest industry development as currently available un-utilized volumes become less available in the future, although there is significant growth opportunity with the projected available wood supply.

Silviculture Expenditures

Annual projected renewal program expenditures between the 2010-2020 Sudbury FMP and the forecast program expenditures for the 2020-2030 Sudbury FMP are compared using the results from the strategic models.

The projected annual silviculture expenditures for the 2010-2020 FMP and the 2020-2030 FMP are $2,517,717.00 and $2,729,880.00, respectively. This amounts to a difference of 8.4%. The increase is a function of different renewal rates, and varying levels of silvicultural effort. The overall impact on employment from changes in projected silviculture expenditures is low and could result in significant employment growth if harvest utilization is to increase. Actual annual expenditures due to harvesting less-than-planned levels in the 2010-2020 FMP have ranged from $1.05 million to $1.3 million with an average of $1.19 million over the last eight years. If future harvest levels approach the projected levels and silviculture expenditures follow as required then an increase over current actual levels of silviculture employment could be expected.

Non-Timber Values

The impacts that forest management activities may have on other forest-based industries is evaluated, as well as how potentially negative impacts are to be mitigated.

Non-timber uses and users of the Sudbury Forest are wide ranging and make use of every corner of the forest. They include both remote and non-remote tourism operators, anglers, hunters, canoeists, hikers, wildlife and bird watchers, all-terrain vehicle (ATV) enthusiasts, aggregate industry, mining industry, power generation, berry pickers and other food gatherers, trappers, BMA operators, and baitfish harvesters. Of all the forest management activities that are carried out on Crown Land, motorized forest access probably has the highest, both positive and negative, impact on other uses of the forest.

It is anticipated that there will be five contentious issues encountered and discussed during the development 2020-2030 FMP for the Sudbury Forest. Two of these issues are similar and involve changes to timing restrictions applied to forest operations in areas of concern (AOCs) to mitigate impact to other social values. These timing restrictions have been applied to developed cottaging lakes and canoe routes in enhanced management areas to mitigate the noise resulting from forestry operations on recreational activities. The forest industry is proposing to reduce the length of the timing restrictions as a means of offsetting losses in non-winter operating areas due to other values on the Forest.

A third issue has arisen with the implementation of the Stand and Site Guide in the creation of Moose Emphasis Areas (MEAs) and the location and extent of MEAs across the Forest. Within MEAs forest access roads will need to be managed and decommissioned to mitigate increased hunting pressure from road access. There are some members of the public who object to the perceived loss of road access while others are in agreement, and there are concerns from the forest industry because of the potential increased cost in road decommissioning.

In planning for allocations for the next ten years it has been necessary to allocate groups of stands which will require to the use of municipal and local roads board roads to access them and haul the wood to receiving mills. Many people living adjacent to or using these public roads have objected to the potential use by logging trucks because of perceived safety and maintenance concerns.

The other significant issue concerns the construction and confirmation of the approved Turner Road into Enhanced Management Area 353r (or Special Management Area 49 in the Temagami Land Use Plan). Road access and harvesting in this area is an issue that continues to be unresolved despite current land use direction.

Figure 3.7.22 provides a summary of issues related to different economic sectors and potential socioeconomic impacts.

Figure 3.7.22: Impacts of Forest Management Activities on Non-timber Uses/Users of the Forest.

Sector	Activity	Potential Impacts
Recreation & Tourism	**Commercial Tourism**	➢ Road access is the forest management activity with potentially the largest impact on commercial tourist operators. For those types of tourism businesses that depend on access for their business forest access development and maintenance can be beneficial by providing for continued access to either their establishments or to surrounding recreation areas or for inclusion of new services or activities. Increased access can, however, also lead to overharvesting of wildlife. ➢ For those tourism businesses that depend on a sense of remoteness or wilderness experience increased and maintained access can have a negative affect. Uncontrolled access in areas of these types of businesses can lessen the quality of the experience for fly-in customers and for customers of back country outfitters. ➢ These issues are minimized or mitigated through controlled public motorized access and implementing current land use policy direction in the Crown Land Use Policy Atlas. Other mitigation techniques include building branch and operational roads to a lower standard to facilitate natural abandonment, physical abandonment of operational and branch roads where no longer needed or where continued use would negatively impact remote tourism activities, and motorized access restrictions where permitted through land use policy direction. These conflicts and issues are addressed through planning and consultation. ➢ Harvesting activities can disturb the natural sounds or silence

Sector	Activity	Potential Impacts
		and aesthetics of an area and this may affect the business of tourism operators. Viewscape management, timing restrictions for operations, and area of concern prescriptions with reserves and/or modified management zones are proposed for mitigation. These impacts are considered during the Resource Stewardship Agreements (RSAs), AOC planning, and public consultation processes.
Recreation & Tourism	**Hunting**	➢ Forest access roads are, at times, positively accepted by hunting enthusiasts because increased access equates to increased hunting opportunities. Public motorized access restrictions and physical abandonment of roads are often negatively perceived by hunters because they restrict hunting opportunities while other hunting enthusiasts disapprove of increased access because of subsequent increased hunting pressure. These issues are considered through the road planning and public consultation processes. ➢ The protection, maintenance and regeneration of habitat through forest management activities helps to promote the sustainability of key game species like moose, deer, bear, and ruffed grouse. Habitat levels are planned in accordance with the range of natural variation for specific cover types in accordance with provincial guidelines.
	Fishing	➢ Forest access roads are a potential concern for fishing enthusiasts where access to waterbodies is limited, while many anglers rely heavily on access roads to enjoy the sport. Road access is addressed through the road planning, application of the Crown Land Use Policy direction and public consultation processes, and specific AOC prescriptions are developed for self-sustaining trout lakes with varying levels of existing road access. ➢ Area of concern prescriptions, conditions on operations, and regulated road and water crossings minimize environmental impacts on fisheries and riparian areas.
	Cottaging	➢ In established cottaging areas the use of forest access roads has possible negative effects on creating additional access to the area, potential for increased vandalism and theft, noise, dust and traffic. Access strategies around cottage areas are dealt with through application of the Crown Land Use Policy direction, area of concern prescriptions, operational planning and public consultation processes. ➢ Forest management activities can potentially affect aesthetic values and create noise in proximity to cottages or camps. Through consultation with the public and cottage or camp

Sector	Activity	Potential Impacts
		associations, and the development of AOC prescriptions that may include reserves and/or modified management zones, and operational planning, these negative impacts are mitigated or minimized.
Recreation & Tourism	**Eco-tourism**	➢ Some tourism providers may benefit from increased access as it could provide for additional opportunities to access new routes or activities for clients, however, where tourism operators cater to back-country enthusiasts, increased access can have a negative effect. ➢ Harvesting activities can disturb the natural sounds or silence and aesthetics of an area or may diminish an eco-tourism feature; this may affect the business of tourism operators. ➢ Mitigating measures can include viewscape management, restrictions on the timing of operations, and AOC prescriptions that may include reserves and/or modified management zones developed during the RSA and public consultation processes.
Mining, Aggregate and Power Generation	**Mining**	➢ 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. ➢ The potential removal of mining survey lines and disturbance to claim posts by forest harvesting activities is mitigated through compliance with license and annual work schedule (AWS) conditions, and through annual notification of AWS activities to claim holders.
	Aggregates	➢ Forest management activities, primarily through access creation and maintenance, can potentially create additional access to aggregates and may lead to additional discovery of resources.
	Power generation	➢ Access for hydro generation activities may be provided or maintained through forest management. In specific situations, harvesting operations may be coordinated with the construction of wind turbines where cleared land is needed.
Other	**Traplines**	➢ Forest access roads may result in increased or refurbished access which can assist trappers in accessing traplines. Road access may, however, disturb wildlife or draw in other forest users that could hinder trapping activities. Forest harvesting and silviculture can also potentially damage trails or marten boxes. Forest management activities in trapline areas is managed through the application of Crown Land Use policy

Sector	Activity	Potential Impacts
		direction, direct consultation with trappers, public information sessions, and operational / AWS planning. ➢ Registered trap cabins are protected with area of concern prescriptions. ➢ Forest management activities alter wildlife habitat spatially and over time in accordance the with the range of natural variation, e.g., the creation of early successional forest for beaver habitat, or the harvest of mature marten habitat and regeneration of young forest. Habitat management through forestry activities is governed by the application of the Landscape and Stand and Site Guides.
	Baitfish operators	➢ Road development and maintenance for forest management can provide motorized access for baitfish operators. ➢ Impacts of harvest operations close to shorelines or riparian areas are mitigated through AOC prescriptions and conditions on operations.
	Bear Management Areas (BMAs)	➢ Road access provides BMA operators with access to baiting sites and hunting opportunities. ➢ Forest management activities may affect planned hunts due to noise or disturbance. Consultation, strategic and operational planning, and AWS notification processes are used to mitigate these impacts.

For a summary of AOC prescriptions and conditions on operations that mitigate impacts on non-timber uses and users of the forest refer to Table FMP-11 and Supplementary Documentation 6.1 (q).

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. Impacts may affect social, economic or environmental values, alone or in combination. This assessment of risks was completed during Stage 2 LTMD planning and is updated in Section 5.2 of this document.

4.0 PLANNED OPERATIONS

4.1 Introduction

Section 4.0 describes the planned operations for the 10-year forest management plan. The text in the following sub-sections details the prescriptions for operations, harvest areas and volumes, renewal and tending operations, roads planning, expenditures related to operations, monitoring and assessment of operations, and finally compares the proposed operations to the LTMD. Maps of the areas selected for operations, Supplementary Documentation 6.1 (u), and FMP tables 11 to 20 provide more specific details.

4.2 Prescriptions for Operations

4.2.1 Operational Prescriptions and Conditions for Areas of Concern

An area of concern is defined as a "geographic area established for an identified value that may be affected by forest management activities" (FMPM 2017). In order to prevent, minimize or mitigate any potential adverse effects of forest management activities to these values, detailed area of concern (AOC) prescriptions are developed. Specific areas identified as areas of concern contain operational prescriptions that may vary from those identified for normal operations. AOC planning is done on all areas, including those contained within harvest blocks, operational road boundaries and aggregate extraction areas.

The prescription includes a description of the area of concern (the specific value(s) to be protected), the operational prescription for road access, harvest, renewal and tending activities and a monitoring program if required. All of this information is presented in Table FMP-11 Operational Prescriptions for Areas of Concern and Conditions on Roads, Landings, and forestry Aggregate Pits (formerly Table FMP-10).

Non-timber values (herein referred to as a "values") to be protected on the Sudbury Forest are identified and shown on a series of values maps. These maps are based on data stored and maintained by the MNRF in Land Information Ontario (LIO). Values data are updated periodically throughout the year to include newly discovered values and to correct any existing inaccurate information.

The values and associated AOC prescriptions are summarized in Table FMP-11 and are mapped on 1:15,840 scale harvest operations maps. The basic elements of an AOC are made up of a reserve, and up to 3 modified management zones (MMZ1, MMZ2 and MMZ3). A reserve area is considered crown productive forest in which forest management activities are not permitted in order to protect a certain value on the landscape. Certain prescriptions may allow a controlled crossing of these reserve areas, provided the proper adherence applicable policy and legislation related to the value under protection. Modified management zones are usually at greater distance from the value than the reserve area and dictate a modified approach to implementing normal forest management activities. For example, a modification to the level of harvest, timing on operations or conditions on road construction are just three of the types of modifications to forest management activities that could be present in these zones.

When sites contain several values in close proximity and mapped modified management zones overlap (e.g., a nest location, other feature and a fisheries value) the most restrictive modified management zone is mapped and applied. Often timing and road restrictions are incorporated into the mapping of modified management zones, and therefore the need to indicate a mapped timing or road restriction is redundant. Timing and road restrictions are mapped independently, with a unique symbol, when no modified management zone exist with a corresponding distance.

The planning team, with input from the LCC, developed AOC prescriptions using direction from the Crown Land Use Policy Atlas (CLUPA), approved implementation manuals, on-site information, consultation with First Nation and Métis communities, resource-based tourism operators and public consultation. Prescriptions for AOCs that cover values specifically identified by First Nation and Métis communities are labelled as Aboriginal Values and mapped as Non-disclosed Values NV1 to NV9 (sensitive values, however, are not shown on public FMP maps).

More detailed information regarding management options, analysis of options, and the selection of the preferred option for each AOC that was updated by the planning team, and not governed by MNRF guidelines or direction, is located in the AOC Supplementary Documentation 6.1 (j). No new AOCs were developed that are not covered by existing guidelines or MNRF direction.

No exceptions to provincial guidelines are proposed for prescriptions for AOCs in Table FMP-11.

4.2.1.1 Operational Prescriptions and Conditions for Areas of Concern Information Products

The information product associated with operational prescriptions and conditions for areas of concern will identify:

a) the area of concern identifier; and
b) the area of concern type.

The areas of concern information products include:

- MU889_20AOC01.E00 – AOC composite
- MU889_20AOC02.E00 – AOC road restrictions (that differ from other modified management zones)
- MU889_20AOC03.E00 – AOC timing restrictions (that differ from other modified management zones)
- MU889_2020_FMP_MAP_Index_00 – Index Map
- MU889_2020_FMP_MAP_Ops 4505130 to 5605100 – Operation Maps.

For identified bridging areas (Part A, Section 1.3.4.1), the operational prescriptions and conditions for areas of concern follow the direction in the 2020-2030 FMP documented in FMP-11 and are portrayed accordingly on maps.

4.2.2 Prescriptions for Harvest, Renewal and Tending Areas

4.2.2.1 Silvicultural Ground Rules

Silviculture Ground Rules (SGRs) document all possible silvicultural treatments that can be used to maintain or regenerate a specific forest unit, through harvest, renewal and tending actions, into the desired future forest unit. The SGRs identify a unique set of treatments (Harvest, Site Preparation, Regeneration, Tending) documented as the “Most Common Treatment Package”. The remaining possible treatments are documented as “Acceptable Alternative Treatments”. Table FMP-4 contains 49 SGRs for the Sudbury Forest. The prescriptions for harvest, renewal and tending presented in FMP-4 will serve as the prescriptions for operations, including depleted areas that are salvaged, for the 10-year period of the FMP.

The SGRs reflect the silvicultural options in the base model (Section 3.3 of this document). The renewal standards associated with each SGR are associated with the developmental information and renewal costs in the model. Likewise, the associated species compositions, average stocking, and site class assumptions associated with each yield/intensity curve (i.e., stratum) are consistent with model assumptions.

The development of the SGRs was also influenced by the analysis of silvicultural activities and past performance (Sections 3.3.1 and 3.3.2 of this document). Considerable experience has been gained during the implementation of past plans, providing important insight into treatment costs, effectiveness and outcomes. This is important information that provided a foundation for the model assumptions for post-renewal succession (Table FMP-5) and the prescribed treatment packages shown in Table FMP-4.

The SRGs that will most commonly be used to regenerate each stratum are as follows:

BW-BW-E
MW1-MW1-E
MW2-PO-E
PJ-PJ-I
PJSB-MW1-E
PO-PO-E
PR-PR-I
PWST-PWUS-I
SBLC-SBLC-E
SF-PJ-I
CEUS-CEUS
HDUS-HDUS
HEUS-HEUS
LWMXUS-LWMXUS
PWUS-PWUS-2CUT
HDSEL-HDSEL
SP-SP-I

The most common treatment packages listed in Table FMP-4 for each SGR will be the most likely treatment.

The information presented here represents the best estimate of proposed operations at the time of FMP preparation, and will not limit the selection of any acceptable alternative silvicultural treatments in the SGRs at the time of implementation of operations.

The elements of SGRs as documented in Table FMP-4 ultimately must be transferred to on-the-ground operations. The document titled Prescriptions for Harvest, Renewal and Tending, and Conditions on Regular Operations located in Supplementary Documentation 6.1 (q) provides more specific direction that is to be followed to facilitate the Forest Operations Prescription process. Of course, the SGRs are one of the very important components of the process.

The use of prescribed burning is an alternative site preparation that may be of interest in specific, controlled situations. There are currently, however, no areas identified for this treatment. Areas identified for prescribed burning would need to be identified in the proposed Annual Work Schedule and are subject to approval by the MNRF.

The aerial application of herbicides is an important treatment option in many SGRs to ensure adequate regeneration of specific species and habitat conditions. Where the renewal objective is for pines, spruces, and sometimes other conifers or mixed species, aerial herbicide applications may be prescribed if competition levels from other vegetation is deemed to be significant enough to inhibit renewal success.

Areas identified for aerial chemical tending or site preparation will be identified annually in the proposed Annual Work Schedule, and are subject to approval by the MNRF. In addition, Ministry of the Environment, Conservation and Parks approvals are required prior to the aerial application of any registered herbicide on the Forest. All products used in the FMP must be approved and registered by Health Canada's Pest Management Regulatory Agency (PMRA) under the authority of the federal *Pest Control Products Act*.

The information products for harvest, renewal and tending operations will serve as the stand list.

No exceptions to the guides or silvicultural trial areas are planned in this forest management plan.

4.2.2.2 Conditions on Regular Operations

Based primarily upon the *Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales*, conditions on regular harvest, renewal and tending operations conducted as per the SGRs, have been developed to maintain or protect features that are not addressed by operational prescriptions for areas of concern (e.g. wildlife trees, residual forest, deer wintering, cultural heritage, land use direction), or to implement specific operational standards or guidelines (e.g. site disturbance, residual tree damage). These conditions apply to all of the Sudbury Forest and apply to all harvest, renewal and tending operations. In addition, conditions on roads, landings and aggregate pits have been included for those areas where there are conditions on regular operations. Selected best management practices associated with the conditions on regular operations are also included. Refer to supplementary documentation section 6.1. (q) Prescriptions for Harvest, Renewal and Tending, and Conditions on Regular Operations.

There are no conditions on operations that apply only to a specific management zone on the Sudbury Forest.

4.3 Harvest Operations

4.3.1 Harvest Areas

The planned harvest areas for the 10-year term of 2020-2030 are based on the available harvest determined by the LTMD. Planned areas for harvest were identified by the criteria explained in Section 3.7.2 to ensure that harvest selections are feasible and support the management objectives for landscape-level biodiversity.

The planned harvest area for the 10-year period of the forest management plan is shown in Table FMP-12 by forest unit, age-class and stage of management. The total projected available harvest area plus the mid-rotation tending figure from SFMM (commercial thinning of red pine plantations, PRCT) and the total harvest area for the ten-year period is shown in Figure 4.3.1. The areas shown exclude areas within AOC reserves, thus represent total area available for harvest.

Figure 4.3.1. Summary of the available harvest area by forest unit and the associated planned allocation and volume.

Forest Unit	LTMD Available Area (ha)	Allocated Area (ha)	Planned Volume (m3) Hardwood	Planned Volume (m3) Softwood	Planned Volume (m3) Total
BW	9,487	9,487	499,770	222,702	722,473
CE	165	165	374	6,252	6,626
HDSEL	1,416	1,416	34,348	11,696	46,044
HDUS	1,232	1,232	34,273	14,206	48,479
HE	367	367	6,921	15,808	22,729
LWMX	556	555	12,652	8,471	21,123
MW1	9,873	9,873	344,232	609,059	953,290
MW2	6,166	6,166	237,858	240,364	478,222
PJ	3,361	3,361	24,071	399,177	423,247
PJSB	3,253	3,253	48,561	332,262	380,823
PO	3,328	3,328	311,169	95,985	407,154
PR	209	209	3,459	28,055	31,514
PWST	2,525	2,525	86,411	210,589	297,000
PWUS	10,487	10,486	213,332	770,329	983,661
SBLC	405	405	1,625	28,545	30,170
SF	4,742	4,742	66,235	389,269	455,504
SP	4,582	4,582	75,735	403,048	478,784
Total	**62,154**	**62,153**	**2,001,027**	**3,785,815**	**5,786,842**
PRCT	1650	1,542	15,379	65,579	80,959
Grand Total	**63,804**	**63,695**	**2,016,407**	**3,851,394**	**5,867,801**

The planning of harvest operations is a complicated process of locating feasible harvest areas to meet an available harvest area (AHA) from a non-spatial model (SFMM). The SFMM model, however, includes spatial constraints to accommodate the strategic management zones and a strategic distribution of the harvest. Harvest area is reported and mapped for the first 40 years as required, and can also be tracked spatially over the entire 150-year projection period.

The management strategy prescribes the ‘optimum’ age-class and stage-of-management distribution of the allocation based on non-spatially explicit inputs and constraints. The model is only able to solve the problem as it is framed within its technical capabilities. SFMM has limited capabilities when it comes to considering the numerous spatial constraints that are constrained to broad strategic zones developed for the forest.

Spatial constraints that drive allocation decisions not considered by the model include:

i. economic considerations (e.g. proximity of stands to existing roads and other eligible stands),

ii. administrative considerations (e.g. traditional operating areas), and
iii. policy considerations (e.g., Landscape Guide and Stand and Site Guide).

Areas selected for harvest operations are chosen to be consistent with the management strategy and then tested for compliance with spatially constraining policies using the Ontario Landscape Tool (OLT) and the Evaluate Forest Residual Tool (EFRT). If the proposed allocations do not pass the tests, the harvest areas are adjusted and re-tested. An allocation adjustment may solve one issue but inadvertently create another. The spatial assessment is described in Section 3.7.4 of this document.

The EFRT was run on the planned harvest to determine if and where any additional residual patches would be required on the forest. Biologically, the Sudbury Forest is very diverse as it is located in the Great Lakes St. Lawrence Forest Region which is a transitional forest between the hardwood-dominated region to the south and the Boreal Forest Region to the north. The Sudbury Forest has a wide range of silvicultural treatments coupled with a significant history of disturbances (logging and wildfire) which has created a diverse spatial forest condition.

When the EFRT tool was run on the planned allocations the results indicated that the current harvest pattern on the landscape did not require additional residual planning to meet spatial and temporal requirements of the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales, (Stand and Site Guide or SSG), at the 500 ha scale, with two exceptions. An isolated patch of Crown forest was selected for harvest that is surrounded by patent land in Graham Township (Block 20-148). It would be infeasible to retain 25 ha of mapped residual on this allocation and still have a viable harvest block which in total includes only 35 ha of forest. The failure is the result of the tool measuring only Crown land, not because of a large disturbance patch. This was discussed at the August 1, 2019 planning team meeting and agreed that the allocation could be left as is with the application of the Condition on Regular Operations for retaining 0.5/50 ha residual forest. The second area is Block 20-059 where the EFRT detected a fail zone due to an adjacent harvest from 1990, however, this is an inaccuracy with past harvest and renewal data and imagery and inventory interpretation confirms the area is residual forest. Accordingly, there are no mapped residual patches for planned clearcuts.

These results for residual forest are similar to previous plans and were expected for the Sudbury forest as the diversity within each block with regards to AOC planning and silviculture systems tend to favour a harvest pattern that is conducive to the intent of residual planning guidelines.

Consideration to the failures identified in the 0.5/50 have been made in the plan in the conditions on regular operations in Section 3.15 of Supplementary Documentation 6.1 (q). The condition states that "Implementation of the harvest plan will ensure that any point within a new clearcut harvest area will have at least 0.5 ha of residual within a 50 ha circle (or hexagon) about that point."

VFM has created operational planning maps to be used when prescriptions are developed for each block, to ensure that either remaining unharvested patches, or new planned patches will meet the intent of the stands and site guidelines. These Coarse Filter Pattern Emulation Maps (1:15,840 scale) and analysis account for forecast depletions from the 2010-2020 FMP and full utilization of the planned 2020-2030 harvest. The following blocks have been identified as requiring one or more residual patch in accordance with the EFRT 0.5/50 analysis:

20-001
20-002
20-003
20-005
20-006
20-007
20-009
20-010
20-011
20-012
20-013
20-015
20-016
20-017
20-018
20-019
20-020
20-023
20-027
20-028
20-038
20-040
20-041
20-044
20-045
20-046
20-054
20-055
20-059
20-060
20-062
20-066
20-067
20-071
20-072
20-074
20-079
20-082
20-087
20-089
20-102
20-118
20-124
20-125
20-125
20-126
20-129
20-133
20-134
20-147
20-148
20-153
20-155
20-165
20-167
20-170
20-172
20-177

The EFRT results are described in Section 5.3 of the Supplementary Documentation 6.1 (b) Analysis Package.

The planning of harvest operations is also supported by the FMP Old Growth Strategy, which was updated from the 2010-2020 FMP and is documented in Supplementary Documentation 6.1 (p). The Old Growth Strategy emphasises the long-term objectives for old growth, and actions that can be taken at the stand-level to enhance old growth conservation on the Sudbury Forest. During the allocation process, specific stands were deferred from harvest to conserve old growth features as part of this strategy.

Mapped allocations portray regular harvest, contingency harvests, and Bridging Areas (on-going operations from the 2010 FMP). Locations where fuelwood can be obtained will be identified in each annual work schedule.

The harvest area distribution among licensee groupings is also shown in Table FMP-14. The percentage of harvest area allocated to each licensee group is as follows:

(i) Shareholders – 85%
(ii) Independents – 1%
(iii) First Nations Shareholders – 14%

The approval of this FMP is not an agreement to make harvest areas available to a particular licensee or licensee group.

4.3.2 Completion of On-going Harvest Operations from Previous Plan

An opportunity is provided in the 2017 FMPM to bridge a portion of area from the current (2010-2020) FMP that is scheduled for harvest in the final year of the plan and that may not be completed by March 31, 2020. These areas are described as Bridging Areas. Bridging Areas are limited to three months of harvest area (i.e., 25% of an annual available area) and can only be scheduled in the first year of the new FMP, i.e., harvest of bridging area cannot extend beyond March 31, 2021. In total, 1,657 ha is available for bridging based on an available harvest in the 2010-2020 FMP-15 of 66,263 ha (25% of 6,626 ha annually is 1,657 ha). Figure 4.3.2 summarizes the planned bridging area by forest unit.

Figure 4.3.2 The area of bridging harvests by forest unit.

Forest Unit	**Allocated Area (ha)**	**Planned Volume (m3)**		
		Hardwood	**Softwood**	**Total**
BW	192	9,953	4,726	14,679
HDUS	26	789	326	1,115
MW1	156	6,056	10,200	16,255
MW2	229	6,538	9,791	16,329
PJ	25	46	3,110	3,156
PJSB	84	1,345	9,884	11,230
PO	88	7,649	2,957	10,606
PWST	1	3	25	28
PWUS	570	5,795	53,187	58,982
SBLC	31	192	2,295	2,487
SF	182	3,191	14,183	17,374
SP	50	1096	5246	6342
Total	1,633	42,653	115,930	158,583

Bridging areas do not contribute to the achievement of the 2020-2030 FMP harvest area, therefore the first annual report will summarize this area separately.

The following blocks are identified for bridging in the first year of the FMP:

Block number	**Area (ha)**
20-145	220
20-149	78
20-155	109
20-156	100
20-164	146
20-166	37
20-168	23
20-174	56
20-175	47
20-176	85
20-177	347
20-178	227
20-179	23
20-181	136

4.3.3 Harvest Volume

The planned net merchantable harvest volume for the 10-year period is 5,867,801 m^3; 2,016,407 m^3 is hardwood and 3,851,394 m^3 is softwood (conifer). These volumes include regular planned harvest allocation including commercial thinning volumes. This information is provided in greater detail in Table FMP-13. Volumes listed under "other conifer" consist of only larch (tamarack).

The available volume projected in the forest management model consisted of 1,892,202 m^3 of hardwood representing a 6.5% variance lower than planned levels. The 4,105,531 m^3 of conifer volume represents an 5.9% variance higher than planned levels. Overall, the planned volume estimate is very close to the available modelled volume (2.2% lower), rounded off at 5,997,734 m^3. The planned volume is averaged at approximately 92 m^3/ha, which is comparable to volumes for previous plans and annual reports.

When comparing the available to the forecast, the variance can be explained by a number of different factors. The first is related to the way the model generates an average condition by forest unit. It applies a similar volume recovery to each hectare harvested, depending on its forest unit classification and age. The methodology used to calculate the planned volume involves individual estimates on a stand by stand basis, using the stand level volume generator in the Modelling and Inventory Support Tool (MIST). Stocking, site class, age, and species composition are considered on an individual basis rather than an average condition.

Another cause of variation is the more accurate accounting of volumes left unharvested in modified AOC zones. Volumes in modified zones in the planned allocations were netted down according to mapped AOC areas, whereas these estimates were more coarsely estimated in the strategic model. The consideration of operationally modified harvests in a portion of the allocation slightly reduces the expected yield for some stands, and this is accounted for in the planned volumes at an individual stand level.

Overall the variance experienced is not significant, and planned volumes satisfy wood supply commitments in the same manner as the strategic analysis. Further discussion on utilization is presented in Section 4.3.4, below.

Planned harvest volumes have been summarized by species and licensee grouping in Table FMP-14. There is no surplus area identified in the FMP, however Table FMP-14 does indicate surplus volume associated with uncommitted supply.

4.3.4 Wood Utilization

Table FMP-14, located in section 8.0, details the net merchantable wood that is utilized and unutilized (surplus) by licensee grouping in this Plan and Table FMP-15, also located in section 8.0, details the wood utilization by mill for the Plan. Table FMP-15 identifies surplus volumes in:

- pulp material species of white pine, red pine, cedar, other conifer, hemlock, and white birch.
- sawlog material species of white pine, cedar, other conifer, hemlock and poplar.

While these volumes appear available, they have been identified as mixed with other marketable and non-marketable fibre, and must be investigated on a block by block basis at the ground level to determine operational feasibility for harvest.

Projected unutilized harvest volumes remain available for utilization to support industrial proposals.

There are no specific commitments identified over and above the shareholder requirements on the Sudbury forest. The outcome shown in FMP-15 was produced by first fulfilling the shareholder requirements, consideration for the recently awarded wood supply competitive process offers (now supply agreements) and then expected open market purchases. The “Commitment Types” shown in Table FMP 15 have changed since the last Plan was approved in 2010, with the biggest changes being the inclusion of the mills supply agreements offered a wood supply from the 2010 wood supply competition and the dropping of mills no longer in operation. The “Sudbury Forest Available Wood Report” was reviewed to assist in the development of FMP-15.

If the underutilization of the available harvest area continues on the Forest, objectives related to economic outlooks, social elements and forest diversity aspects of the forest may not move towards targets at the rate predicted in the LTMD of the 2020 FMP. The effects of underutilization on plan objectives has been analyzed and reviewed by the planning team. The potential effects of underutilization of the available harvest volume are discussed in the analysis package of this FMP, as well as on an annual basis in annual reports.

Direction for harvest utilization during periods of greatly reduced market conditions is provided by the MNRF, Northeast Region in Supplementary Documentation 6.1 (s), Northeast Region Operations Guide for Marketability Issues (2013). This direction was considered in the development of direction for utilization in the Modified Utilization Strategy, Section 3.28 in Supplementary Documentation 6.1 (q) Prescriptions for Harvest, Renewal and Tending, and Conditions on Regular Operations. Block-specific direction associated with this strategy will be provided in the applicable Forest Operations Prescriptions. Implementation of the Modified Utilization Strategy will be confirmed with each Annual Work Schedule, if necessary due to market conditions.

The approval of this FMP is not an agreement to make areas or volume available for harvest to a particular licensee, or an agreement to supply wood to a particular mill, but rather an identification of the wood available for market, and the demand associated with the Forest.

4.3.5 Salvage

Currently there are no plans to undertake any salvage operations during the 2020-2030 plan period. However, if a natural disturbance event occurs on the Forest that warrants a salvage harvest operation an amendment may be made to the FMP. FMP-14 will be updated to include the additional natural depleted area and estimated volume by species.

4.3.6 Contingency Area and Volume

Unforeseen circumstances such as blowdown, wildfire, insect damage or disease may cause some of the planned harvest area to become unavailable for harvest during the ten-year period of the FMP. In order to accommodate such circumstances contingency areas for harvest have been identified. The contingency area is intended as replacement area for lost harvest opportunities. Contingency areas may be later proposed as regular allocation harvest areas in the following FMP. The contingency areas are identified and portrayed on the operations maps of the Plan.

Contingency areas were selected spatially across the Forest to support opportunities for all the licensees. In general, contingency areas were located near existing roads or adjacent to proposed allocations to allow for operational feasibility.

Table FMP-16 records the amount of contingency area by forest unit and age class with associated conifer and hardwood volumes. The total contingency harvest volume equals 1,201,990 m^3 which is comprised of both conifer (softwood) and hardwood volumes of 819,847 m^3 and 382,143 m^3 respectively.

There are 12,475 ha of contingency area identified in the plan, including 26 ha of red pine commercial thinning. This total contingency area represents approximately two years (19.6%) of the available harvest area. In general, on a forest unit basis the intent was also to identify two years worth of contingency, however the amount varies based on the anticipated risk to harvest operations based on challenges in road access, timing restrictions or seasonal access constraints, marketability, or potential natural disturbances. For these reasons there are somewhat higher proportions of contingency in some areas of the forest.

Contingency area is included in the harvest information products.

4.3.7 Harvest Area Information Products

Harvest area information products define the spatial or map information included in the plan. Information products associated with all the harvest areas identify and portray:

- The harvest block identifier
- The silvicultural system
- The harvest category (regular, bridging, second pass, salvage or contingency)
- The operational prescriptions for areas of concern (AOC)
- The silvicultural ground rule (SGR)
- If applicable, stand level residual requirements

The harvest area information products include:

- MU889_20PHR00.E00 – Planned Harvest
- MU889_20FDP00.E00 – Forecast Depletions
- MU889_20PCI00.E00 – Planning Composite Inventory (PCI)
- MU889_20AOC01.E00 – AOC composite
- MU889_20AOC02.E00 – AOC road restrictions (that differ from other modified management zones)
- MU889_20AOC03.E00 – AOC timing restrictions (that differ from other modified management zones)
- MU889_2020_FMP_MAP_Index_00 – Index Map
- MU889_2020_FMP_MAP_Ops 4505130 to 5605100 – Operation Maps.

It is important to note that harvest area portrayed in the MU889_20PHR00.E00 – Planned Harvest layer does not account for AOC reserves. Reserve areas must be removed to calculate actual available harvest areas (AOCTYPE = R in the AOC layer).

4.4 Renewal and Tending Operations

4.4.1 Renewal and Tending Areas

The analysis of past silvicultural activities and performance, described in Sections 3.3.1 and 3.3.2 of this document provided the foundation for the planned renewal and tending operations. The projected and planned levels of renewal and tending operations associated with harvesting and natural disturbances are summarized by treatment in Table FMP-17. The treatments in the table are consistent with the expected implementation rate of each acceptable alternative silvicultural treatment in the silvicultural ground rules in Table FMP-4. The planned levels of renewal and tending (Table FMP-17) and associated expenditures (Table FMP-19) are required to achieve the objectives described in the FMP.

All possible areas that may be eligible for renewal and tending operations for the 10-year term are shown on the summary and composite map for renewal, tending and tree improvement. The areas shown on the maps includes:

- 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; and
- all areas which may require pre-commercial thinning

From Table FMP-17, the planned regeneration treatments include:

- natural regeneration in clearcut, shelterwood, and selection silviculture systems for a total 37,730 ha.

Planned site preparation treatments include:

- mechanical treatments for 18,400 ha
- aerial chemical treatments for 8,440 ha
- ground chemical treatments for 5,170 ha

Planned tending treatments include:

- manual tending treatments for 3,050 ha
- aerial chemical treatments for 37,910 ha.

The planned treatments in Table FMP-17 were used to develop the requirement for seed and planting stock (Renewal Support, Section 4.4.2 of this document) and, in association with costs for each treatment, to develop the planned expenditures table (Table FMP-19). These renewal and tending levels reflect full utilization of the planned harvest area. Less than full utilization will result in lower actual implementation rates than planned, but appropriate treatments will be applied according to the area of each forest unit depleted.

Information products associated with all areas scheduled for renewal, tending, and protection are submitted with the annual work schedule (AWS).

No silvicultural trial areas are being planned at this stage in the FMP.

4.4.2 Renewal Support

Renewal support includes estimates of the number of trees required for planting and number of seeds required for aerial seeding in each Seed Zone for the duration of the Plan, as well the amount of cones that would be required to be collected to meet those estimates.

The tree seedling requirement was calculated according to the planned rate of implementation of SGRs that include planting for each Forest Unit. Assuming harvest and renewal of the full 10-year allocation, 39 million trees would be required (Figure 4.4.1). This is somewhat higher than the LTMD estimate of 32.7 million seedlings due to the inclusion of outstanding area to be planted from the 2010-2020 FMP. Species planned be grown in order of abundance is jack pine (44.4%), white pine (23.9%), black spruce (14.4%), red pine (10.7%), and white spruce (6.6%).

Figure 4.4.1. Nursery Stock Requirements for Tree Planting for the 2020 – 2030 period.

Species	Seed Zone	Stock Type	Number of Trees Required ('000s)
White Pine	25	Container	933.7
White Pine	26	Container	2,801.1
White Pine	27	Container	5,602.2
Red Pine	25	Container	1,252.4
Red Pine	26	Container	1,669.9
Red Pine	27	Container	1,252.4
Jack Pine	25	Container	12,156.7
Jack Pine	26	Container	5,210.0
Jack Pine	27	Container	0
Black Spruce	25	Container	3,943.7
Black Spruce	26	Container	1,690.2
Black Spruce	27	Container	0
White Spruce	25	Container	769.4
White Spruce	26	Container	1,025.9
White Spruce	27	Container	769.4
Total			**39,044.2**

The 340 ha of PJ depletion area planned for aerial seeding requires 13.6 million seed applied at 40,000 seed/ha (Figure 4.4.2)

Figure 4.4.2. Seed Requirements for Aerial Seeding for the 2020 – 2030 period.

Species	Seed Zone	Number of Seeds Required ('000s)
Jack Pine	25	9,520
Jack Pine	26	4,080
Total		**13,600**

Cones will be collected from natural stands in the three seed zones on the Sudbury Forest (Zones 25, 26, and 27). Draft provincial guidelines in development at the time of FMP production recommend sourcing seeds from areas south of the planned renewal areas in anticipation of a warming climate. Working with the Forest Gene Conservation Association, VFM will consider enhancing approximately 10 percent of the seed inventory from additional recommended climate-appropriate zones. It is anticipated that the Sudbury Forest may become an important source of tree seed for SFLs further north.

In Figure 4.4.3, the Number of Cones Required is based on the tree and seed needs listed in 4.4.1 and 4.4.2. An oversow factor of 2.2 seeds/tree was used across the board for all species. The seed target was converted to hectolitre-equivalents of cones using Ontario Tree Seed Plant and VFM historical seed yields. VFM has a robust seed inventory. Although 967 hL of cones is projected to be consumed in the 10-year plan, only 396 hL will need to be picked to meet the target inventory. Jack pine and white pine have the greatest shortfall at 210 and 96 hL respectively.

Figure 4.4.3. Forecasted Seed Collection for the 2020 – 2030 period.

Species	Seed Zone	Source of Seed Collection	Number of Cones Required (hL)	Shortfall from 2019 Inventory (hL)
White Pine	25	Bulk Stand	45	35
White Pine	26	Bulk Stand	136	0
White Pine	27	Bulk Stand	273	96
Red Pine	25	Bulk Stand	17	0
Red Pine	26	Bulk Stand	23	0
Red Pine	27	Bulk Stand	17	0
Jack Pine	25	Bulk Stand	336	210
Jack Pine	26	Bulk Stand	104	50
Jack Pine	27	Bulk Stand	0	0
Black Spruce	25	Bulk Stand	2	0
Black Spruce	26	Bulk Stand	1	1
Black Spruce	27	Bulk Stand	0	0
White Spruce	25	Bulk Stand	4	4
White Spruce	26	Bulk Stand	5	0
White Spruce	27	Bulk Stand	4	0
Total			**967**	**396**

4.5 Roads

4.5.1 Primary and Branch Roads

The following is a summary of primary and branch road construction planned for the 2020-2030 FMP.

Supplementary Documentation 6.1 (i) contains the environmental analysis of the alternative corridors for each new road corridor, the rationale for the selected corridor and associated use management strategy, and the rationale for each new branch road corridor and associated use management strategy. Supplementary Documentation 6.1 (i) also identifies primary and branch roads that will have access restriction and/or road transfer implemented during the 10-year period.

Table FMP-18 identifies each primary and branch road planned for construction. Table FMP-18 also lists all the existing primary and branch roads proposed for use during the FMP.

Primary and branch road corridors are identified on the operations maps described in Supplementary Documentation Section 6.1 (u). As per the 2017 FMPM, planned primary and branch roads are portrayed as 1 km wide corridors within which the road will be located and constructed. Road construction may take place anywhere within the approved corridors with consideration to AOCs and any unavailable areas inside the corridors, e.g. AOCs with road restrictions and direction from the CLUPA.

Forestry aggregate pits and landing areas for road right-of-way wood may also be developed within the corridors. All road construction in these proposed corridors will follow the conditions laid out in Supplementary Documentation Section 6.1 (q) of this plan, including where the road or landing does not intersect an area of concern.

All roads, sections of roads and networks transferred to the MNRF will be in a decommissioned state, unless otherwise defined in Table FMP-18 and the Road Use Management Strategy. A protocol for transferring road responsibility is found in Supplementary Documentation 6.1 (w).

As per MNRF Transfer of Forestry Roads Responsibility, a transfer plan will be created for each road network being transferred to the MNRF.

Primary Roads:

Primary roads provide principal access for the Forest and are constructed, maintained, and used as part of the main road system. The planned primary road corridors will access harvest areas and allow for access to conduct silviculture treatments for the next 10 years. The roads are intended to provide long term access to future harvest areas for the next 20 to 30 years. Figure 4.5.1 provides a summary of planned primary road corridors.

The long-term strategy for harvest and renewal of the forest must consider the entire available land base, and the development of road access needs to compliment the spatial distribution of planned and future allocations. Each of the strategic management zones for the forest require long-term access, hence the need for continued primary road development, particularly within the Spanish Arm area and within the area east of the Sturgeon River. Planned road development is undertaken in the FMP to ensure there is an economic balance of roads and harvest areas that are well distributed, thus avoiding areas of the forest that would otherwise accumulate as disproportionately large amounts of higher-cost allocations in the future.

Figure 4.5.1. Summary of Planned Primary Road Corridors.

Road Name	Access Control
Bowell Road (Hutton Road)	sign
Clary Road	none
Dieppe-Truman Road	none
Eighteen Mile Island Road	gate & sign
Fire Lake Bypass Road	none
Goulard's Road	none
Kilpatrick Road	none
Knight Creek Road	none
Levack-Harty Road	sign
McCarthy Road	gate & sign
McLeod Road	none
Ministic North Road	gate & sign
Secord Forest Access Road	gate & sign
Spanish Arm Road	water crossing & sign
Turner Road	gate & sign
Tyson Road	gate & sign
White Oak Road	gate & sign

Note that Bowell Road is planned for longer-term access; any construction would likely be towards the end of the FMP, and there is a possibility of construction being deferred to the next FMP.

There are no proposed primary roads being transferred to the Crown.

Branch Roads:

Branch roads are roads that fork off an existing or new primary or other 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 (Figure 4.5.2).

Figure 4.5.2. Summary of Planned Branch Road Corridors.

Road Name	Access Control
Barnet Road	*
Bevin Creek Road	*
Canoe Lake Road	MEA-berm*
Carafel Road	sign & berm
Chartrand Road	MEA-berm
Creelman Road	sign & water crossing
Den Road	*
Frog Creek Road	*
Kilpatrick Branch Road	MEA-berm
Lampman Branch Road	*
Laura-Line Road	none
Limit Road	*
Little Beaver Road	none
Lynx Road	none
Mowat Road	none
North Channel Road	*
Pine Lake Road	none
Power Line Road	*
Saccharum Road	MEA-berm
Simon Road	none
Skead Road	MEA-water crossing
South Channel Road	*
Spruce Road	none
Stobie-Marconi East Road	none
Telfer Road	MEA-water crossing
Tower Road	MEA-water crossing
Turner Branch Road	*
Vermilion Road	*

Road Name	Access Control
Waldie Road	none
Wassi Road	MEA-berm
Wolf Creek Road	MEA-berm

** Access is controlled indirectly by the originating primary road, not on the branch road itself (refer to Table FMP-18 and Supplementary Documentation 6.1 (i) for details).*

None of the new branch roads or sections of new branch roads are proposed to be transferred to the Crown.

4.5.2 Operational Roads

Operational roads are contained within a defined operational road boundary and provide short term access for harvest, renewal and tending operations. An operational road boundary is the perimeter of the planned harvest area plus the area from an existing road or planned road corridor to the harvest area within which an operational road is planned to be constructed. New operational roads planned for construction in this plan period must be within an operational road boundary.

Operational roads are normally not maintained after they are no longer required for forest management purposes, and are often decommissioned in accordance with land use direction or direction for moose emphasis areas (MEAs).

Each operational road boundary, within which an operational road will be constructed, and the associated use management strategy for the road(s) is recorded in Table FMP-18. All road construction in these proposed operational road boundaries will follow the conditions laid out in Supplementary Documentation 6.1 (q) of this plan.

Documentation of the use management strategy for each operational road or networks of operational roads is included in Supplementary Documentation 6.1 (i). Where the use management strategy restricts public access, the rationale for the restriction is also provided in this supplementary documentation.

4.5.3 Area of Concern Crossings - Primary and Branch Roads

In order to access the approved harvest allocations, many primary and branch roads need to cross through areas of concern (AOCs) due to terrain conditions or when no other reasonable alternative exists for the location. In general, to minimize the impact on the AOC the intent is to cross within the modified portion of the AOC and not the reserve portion, wherever possible or feasible.

Road construction and landings through an area of concern must adhere to direction in the Operational Prescriptions for Areas of Concern found in Table FMP-11. Area of concern conditions must be followed within the road corridors. The areas of concern prescriptions and the conditions on construction for each individual AOC and road (or landing if applicable) are located in FMP-11. Supplementary Documentation 6.1 (j) summarizes the planning of operational prescriptions and conditions for areas of concern for AOCs that were updated by the planning team and not covered by existing guidelines or MNRF direction.

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. When possible, this will be completed a year ahead of time. Public comments on the primary and branch road AOCs are included in the supplementary documentation of the plan section 6.1 (j).

4.5.4 Area of Concern Crossings - Operational Roads

In order to access the approved harvest allocations, many operational roads need to cross through areas of concern (AOCs) due to terrain conditions or when no other reasonable alternative exists for the location. In general, to minimize the impact on the value the intent is to cross within the modified portion of the AOC and not the reserve portion, wherever possible or feasible.

Road construction and landings through an area of concern must adhere to the direction in the Operational Prescriptions for Areas of Concern found in Table FMP-11. Area of concern conditions must be followed within the Operational Road Boundaries (ORBs). The areas of concern prescriptions and the conditions on construction for each individual AOC and road (or landing if applicable) are located in FMP-11.

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. When possible, this will be completed a year ahead of time. Public comments specific to operational road AOCs are included in the Supplementary Documentation of the plan section 6.1 (j).

4.5.5 Existing Roads

Table FMP-18 lists the existing primary and branch roads, as well as the operational road networks. This table also identifies whether the road is the SFL's responsibility or another agency. The responsibility was assigned to either the forest industry or the MNRF. Responsibility includes the monitoring of road conditions, and addressing potential or existing personal and environmental hazards on the roads. This can include the closing of roads where hazards exist. When the forest industry is responsible for a road, ongoing monitoring, maintenance and emergency repair work will be prioritized to meet safety, environmental and industry operational needs. It should be noted that emergency repairs to roads and water crossings might not be restored in a timely manner if they are damaged or destroyed by unplanned events, such as a major storm. Also, there is no obligation, on the part of the Crown or the forest industry, to undertake maintenance or repair work on behalf of other users. These users may not have the resources to replace failed infrastructure and access to businesses or properties could be disrupted at any time.

There are no mandatory safety standards with respect to road maintenance, however, the responsible party should correct, when resources to do so are available, any identifiable or known hazardous conditions that could be encountered unexpectedly and have the potential for serious consequences (e.g. washouts or obstructions).

Users of all Crown forest access road networks on the Sudbury Forest will use roads at their own risk.

The existing operational road networks identified in this table as being the responsibility of the forest industry are those roads constructed by the forest industry in 2005/2006 or later. The 2005/2006 starting point was selected because MNRF began a program of signing Memorandums of Understanding with the forest industry for water crossings in 2005/2006.

Responsibilities for roads will be detailed by VFM in Overlapping Licence Agreements (OLAs) with each individual licensee. VFM will not enter into OLAs with licensees that do not want to take on or accept the responsibilities identified in this Plan.

The associated road use management strategies can be found in Supplementary Documentation Section 6.1 (i).

The transfer of road responsibilities between the forest industry and the MNRF will be in accordance with the use management strategy for that particular road/road network. Generally, roads no longer required by the industry for periods of five years or more will be considered by the forest industry for transfer. A protocol for transferring road responsibility is found in Supplementary Documentation 6.1 (w). As per MNRF Transfer of Forestry Roads Responsibility, a transfer plan will be created for each road network being transferred to the MNRF.

Conditions on Existing Roads and Landings

If an existing road or landing intersects an area of concern, the appropriate conditions will be applied as described in Table FMP-11. If there are any additional conditions on roads or landings based on other land use direction, from previous FMP commitments or developed by the planning team these conditions will also be documented in FMP-11.

If an existing road and or landing is planned to be used for forest management purposes during the period of the forest management plan, and where the road or landing does not intersect an area of concern for a value, existing roads and landings will also follow the conditions in Supplementary Documentation 6.1 (q).

4.5.5.1 Road Information Products

For each existing road or road network that is the responsibility of the sustainable forest licensee and other existing roads that will be used for forest management purposes and which are shared responsibility, information products associated with road construction, maintenance, monitoring, access controls and decommissioning identify:

a) the corridors for primary roads (20 years);
b) the corridors for primary and branch roads planned for construction (10 years);
c) the operational road boundaries (10 years);
d) the areas of concern within the corridors for primary and branch roads, operational road boundaries, and the areas of concern that intersect existing roads;
e) the roads that will be maintained;
f) the roads and associated water crossings that will be monitored;
g) the segments of roads that currently have access controls and the segments of roads where new access controls are scheduled, and the type of access control activities; and
h) the segments of roads that will be decommissioned, and the type of decommissioning activities.

Information products associated with all areas scheduled for road construction, maintenance, monitoring, access controls and decommissioning portray:

a) the corridors for primary roads (20 years)
b) the corridors for primary and branch roads (10 years);
c) the operational road boundaries (10 years);

d) the areas of concern within the corridors for primary and branch roads, operational road boundaries, and the areas of concern that intersect existing roads;
e) the segments of roads that currently have access controls and the segments of roads where new access controls are scheduled; and
f) the segments of roads that will be decommissioned.

The road information products include:

- MU889_20ORB00.E00 – Operational Road Boundaries
- MU889_20ERU00.E00 – Existing Road Use Management Strategies
- MU889_20PRC00.E00 – Planned Road Corridors
- MU889_20AOC01.E00 – AOC composite
- MU889_20AOC02.E00 – AOC road restrictions (that differ from other modified management zones)
- MU889_20AOC03.E00 – AOC timing restrictions (that differ from other modified management zones)
- MU889_20_FMP_MAP_Index_00 – Index Map
- MU889_20_FMP_MAP_Ops 4505130 to 5605100 – Operation Maps.

4.5.6 Road Water Crossings

The review and approval of the construction and decommissioning of water crossings will be in accordance with 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). For each new primary and branch road water crossing to be constructed, the location, crossing structure and conditions on construction will be finalized in the applicable AWS (as per FMPM Part D, Section 3.2.5) in accordance with 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 Section 6.1 (q). In addition to the applicable construction conditions, all applicable water crossing standards will be documented in Table AWS-1 under the *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, or where an operational management zone related to fisheries has identified a need for MNRF review and approval, a MNRF review is required.

As per the Protocol, Operational Management Zones for fisheries have been established in the Sudbury Forest and are portrayed on the MU889_2020_FMP_MAP_OMZ: Operational Management Zones for Fisheries map of Supplementary Documentation 6.1 (u). Water crossings within the operational management zones require review and approval by the MNRF and DFO (if necessary) and a water crossing standard cannot be applied.

The purpose for the Operational Management Zones is to protect specific fisheries habitat associated with brook trout (and lake trout in the Timmins District area of the management unit). Brook trout are known to have an affinity for and in many cases rely on small tributary streams for spawning and rearing of early life stages. Water crossings on these streams may not be appropriate, depending on the nature of the stream in question and the location of the crossing relative to site specific habitat features. MNRF review of all crossings is required within the Operational Management Zones. The Operational Management Zone map may be updated periodically by the MNRF Sudbury District as improved data becomes available, and included with each Annual Work Schedule.

The water crossing standards represent additional measures to the specific conditions on the construction, use, and decommissioning of water crossings in Table FMP-11 as per the water crossing standards and guidelines in the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales and MNRF's Crown Land Bridge Manual.

4.5.7 Forestry Aggregate Pits

Forestry Aggregate Pits (previously Category 14) are exempt from the requirement for an aggregate permit under the *Aggregate Resources Act (ARA)* as per the Exemption Criteria identified below.

Exemption Criteria (2017 FMPM Section A 1.3.6.6)

By regulations under the Aggregate Resources Act, a person engaged in forest operations on Crown land is exempt from subsection 34(1) of that Act, as amended from time to time (i.e., the requirement for an aggregate permit to operate a pit), if the following criteria are satisfied:

a) a FMP for the management unit has been approved;
b) the aggregate is required for a forest access road in a management unit;
c) aggregate is extracted:
    i. no closer than 1.5 metres above the established groundwater table; or
    ii. closer than 1.5 metres above the established groundwater table if:
        - the proposed site is remote or isolated; and
        - the excavation limit of the site is not within:
            - 500 metres of a cold-water stream;
            - 1000 metres of a water well, whether dug or drilled; and
            - 5000 metres of a receptor (e.g., residences or facilities where people sleep {nursing homes, hospitals, trailer parks, camping grounds}; schools; day-care centres).
(d) aggregate extraction will be completed within 10 years from the commencement of the pit; and
(e) the pit is established within:
    i. an approved new primary or branch road corridor in the FMP and the AWS;
    ii. an approved harvest area in the FMP and in the AWS;
    iii. an approved operational road boundary in the FMP and in the AWS; or
    iv. an approved aggregate extraction area in the FMP and in the AWS located within 500 metres of an existing forest access road.

Aggregate pits that satisfy these criteria are hereafter referred to as "forestry aggregate pits" (FAP).

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 Sudbury Forest, and as a result forestry aggregate pits are sometimes needed for periods of time that exceed 10 years.

Forestry Aggregate Pits must remain within the road corridor or operational road boundary that was identified in the AWS at the time the site was established. Refer to Supplementary Documentation 6.1 (q) Prescriptions for Harvest, Renewal and Tending, and Conditions on Regular Operations, Section 3.25 for operational standards for Forestry Aggregate Pits.

There are no planned aggregate extraction areas outside of operational road boundaries identified for the term of the 2020-2030 forest management plan.

Conditions on Forestry Aggregate Pits

If a forestry aggregate pit intersects an area of concern, FMP-11 identifies if there are any conditions on operations. Aggregate material must not be removed from an area of concern or within 15 metres of the boundary of an area of concern, except in accordance with the conditions described in FMP-11.

If a forestry aggregate pit is planned to be used for forest management purposes during the period of the forest management plan and it does not intersect an area of concern, any conditions on operations are documented in supplemental documentation Section 6.1 (q) Prescriptions for Harvest, Renewal and Tending, and Conditions on Regular Operations.

4.5.7.1 Aggregate Extraction Areas Information Products

Information products associated with aggregate extraction areas identify (if included in the FMP):

a) the aggregate extraction area identifier; and
b) the areas of concern.

Information products associated with aggregate extraction areas will portray:

a) the aggregate extraction area identifier; and
b) the areas of concern.

The aggregate extraction area information products include (this layer is not submitted as there are no new areas planned outside of operational road boundaries):

- MU889_20PAG00.E00 – Aggregate Extraction Areas
- – Operation Maps.

4.6 Expenditures

Table FMP-19 summarizes the projected expenditures for renewal and maintenance operations, and renewal support for the Sudbury Forest for the 10-year planning term. Average annual silviculture expenditure for full harvest utilization is $2.86 million

The forecast of silviculture expenditures was derived using the planned level of treatments documented in Table FMP-17 and the associated renewal support forecasts documented in Section 4.4.2. Actual expenditures will depend on how much of each planned forest unit is harvested, and the associated costs required to meet commitments of renewing those forest units.

VFM and the Shareholders review the renewal rates annually. The review is done to ensure that the current rates for each trees species is consistent with renewal expenditures required to maintain them. Justification for any adjustments are reviewed with the MNRF.

4.7 Monitoring and Assessment

4.7.1 Forest Operations Inspections

4.7.1.1 VFM Compliance Plan

The Sudbury Forest 10-year strategic compliance plan has been developed in accordance with the requirements of the Forest Compliance Handbook (2014), and MNRF’s Forest Compliance Strategy (2007).

The compliance program also considers Recommendation #4 of the 2016 Independent Forest Audit to continue to work cooperatively with MNRF to strengthen the compliance program.

In general, the compliance plan describes where the Company will detail the methods, intensity and frequency of forest operation prescriptions, particular circumstances for which inspections will be conducted, and the submission of inspection reports to the MNRF. The compliance plan provides further information and detail for unique situations, past, present and anticipated compliance problems, compliance goals, objectives strategies and expected results, corrective actions, inspection techniques, and roles and responsibilities. The compliance plan is located in supplemental documentation section 6.1(r). A more detailed compliance plan, which is consistent with the 10-year strategic compliance plan, is developed annually and included as part of the annual work schedule.

The Forest Operations Information Program (FOIP), which is a MNRF web-based program, will be used to document inspections, compliance issues and, if required, to track whether remedial actions have been completed.

4.7.1.2 MNRF Compliance

The MNRF forest compliance plans are part of the Sudbury District Annual Compliance Operations Plans. The Timmins District also undertakes compliance on the forest as needed. The forest compliance plans are prepared in accordance with the Ontario Forest Compliance Handbook. From the analysis, evaluation and approval of the annual Sudbury Forest compliance components and operational activities, and from the review of past operations, MNRF Sudbury District plan for the allocation of staff and resources to ensure compliance obligations are met.

An integral part of district compliance plans is the application of MNRF's risk analysis and management strategies related to its compliance monitoring of forest operations, as described in the Ontario Forest Compliance Handbook. The focus for forest compliance planning is achieving the best risk management decision in the planning and allocation of forest compliance monitoring resources, given all other mitigating measures in place, so that an appropriate balance is struck among: minimizing the likelihood of non-compliant occurrences; minimizing the probability of the failure of monitoring systems to detect a non-compliance; and minimizing the amount of or adequately mitigating any loss or damage resulting from a non-compliance.

All compliance inspections are completed by MNRF certified compliance inspectors.

The Forest Operations Information Program (FOIP), a MNRF web-based program, is used to document inspection results, including in compliance operations, operational issues, corrective actions taken, and remedies to address issues.

The Sudbury Forest Local Citizens Committee is provided, at each meeting, updates on forest operations, including compliance issues. Semi-yearly field trips often include looking at active and completed forest management projects and include discussions on forest compliance. Part of the presentation of the Annual Reports to the LCC includes the summary of forest compliance. In addition, LCC members are invited to participate in the Independent Forest Audits and Forest Stewardship Council certification audits.

4.7.2 Exceptions

The FMPM requires a monitoring program be prepared for any operational prescriptions contained in a FMP for AOCs or SGRs that are exceptions or that differ from specific direction provided in a forest management guide. The exceptions monitoring program describes methods that will be used to monitor the effectiveness of the operational prescription.

None of the operational prescriptions planned or SGRs for implementation under this FMP are exceptions to the approved forest management guides, therefore an exceptions monitoring program is not required.

4.7.3 Assessment of Regeneration

4.7.3.1. Establishment Surveys

In clearcut forest units, Establishment Surveys serve a very similar role as Free-to-Grow (FTG) surveys had in the past: to describe the characteristics of a renewing stand (species composition, site occupancy, height) to determine if the renewal standards have been met for the expected forest unit after all expected renewal and tending treatments are complete. As such, Establishment Surveys confirm the resultant silviculture stratum as represented by a forest unit and associated yield trajectory. In cases where the expected treatments did not produce suitable results, Establishment Surveys also provide an opportunity to implement additional silviculture treatments if necessary. Timing of the surveys done by the SFL will follow the ‘Establishment Year’ for each silvicultural stratum stated in FMP-4. MNRF will validate the SFL establishment results within one year of data submission. MNRF validation will be based on ground-based field surveys using an MNRF-approved method (e.g. SOiSTARS).

The LCC is welcome to request a presentation on Establishment Survey procedures and review results summaries. Field visits to give a visual picture to the survey results may be arranged.

Establishment Surveys are aerial ocular assessments done from a helicopter for all clearcut forest units except PWST and PR. For naturally regenerated sites, this survey typically occurs 7 years following harvest. For artificially regenerated areas, the survey more typically occurs 10 years after harvest or after the final expected tending treatment. Principles adapted from *White, R.G. 2016. Aerial ocular assessments of forest regeneration in northwestern Ontario: A case study. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Science and Research Technical Report TR-14. 23 p.* will be followed.

In shelterwood forest units (as well as PWST and PR), Establishment Surveys serve the same purpose as Interim Renewal Status Surveys (IRSS) have in the past: to describe the characteristics of the renewal layer stand (species composition, site occupancy, height) to determine if the stand is on track to develop into the target forest unit. These surveys are ground-based using the SO-iSTARS survey methodology, and are performed about 10 years following the Seed Cut after the final expected tending, but prior to the Final Removal. In all cases the multi-radius plot approach is employed where the centre 4 m^2 plot is assess for occupancy. That plot may be occupied by a stem of minimum height in the 4 m^2 plot or by taller stems in the 8 m^2 plot or even taller stems in the 16 m^2 plot. The electronic tally platform used is referred to as the Regeneration Establishment Assessment Program (REAP).

As per the Forest Operations and Silviculture Manual Establishment Surveys use parameters representing the number and distribution of trees. VFM uses site occupancy to provide these parameters in all Establishment Surveys, rather than stem density. No stems are counted – in each assessment plot, the presence of each species is noted and a determination of which species dominates the plot (if any) is performed and recorded. Site Occupancy can be expressed as a percent – i.e. 40 percent of assessed plots are occupied a certain assessed species. Or Site Occupancy can be expressed as an Index representing a minimum number of well-spaced stems per hectare by multiplying the occupancy percentage by the mathematically possible fully-stocked condition based on assessment plot size. In all cases, VFM uses a 4 m^2 assessment plot size, so the fully stocked standard is 10,000 / 4 = 2500. A renewal area with Site Occupancy Percent of 40 has a Site Occupancy Index of 0.4 x 2500 = 1000. The term Site Occupancy Percent replaces the term 'stocking' for renewal surveys.

It should also be noted that the MNRF provincial policy for standards of observations were not finalized in time for inclusion in the 2020-2030 FMP and, therefore, some adjustments through an amendment may be needed once the new direction is approved.

Refer to Supplementary Documentation 6.1 (h) for a tabular summary of monitoring activities and assessment methodologies for aerial ocular and REAP surveys.

Table FMP-20 summarizes the area (hectares) harvested in previous FMP periods that is projected to require Establishment Surveys completed in the 2020-2030 FMP period. For three FMP periods where depletion data is available: 2000 - 2004, 2005 - 2009, and 2010 – 2017, the total depletion area by SGR is listed along with the amount of that area that has not yet been assessed (i.e., in need of an Establishment Survey). All stands harvested prior to this planning period will be assessed against the regeneration standards from equivalent SGRs developed for the 2020-2030 Sudbury FMP.

A total of 23,046 ha of assessment need was identified as follows: 2000 – 2004 period 2,375 ha of 13,556 ha (17.5% of depletion); 2005 – 2009 period 3,521 ha of 12,516 ha (28.1% of depletion); 2017 – 2020 period 17,150 ha of 18,880 (90.8% of depletion).

The results of the surveys are reported annually and summarized in year 5 and year 10 in Table AR-14 of the Annual Report. The results are also used to update the Forest Resource Inventory with the actual stand description before production of the next forest management plan. Although the target future forest condition is not always achieved (post renewal succession expectations are documented in the Silvicultural Ground Rules - FMP-7) it is highly unusual for an area to not be adequately stocked to a standard that meets the definition of another forest unit. If no standard is met at the time of Establishment Survey, a determination is made if a future re-survey is required to give more time for the site to fill in, or if active renewal intervention is required.

The level of implementation of treatments is listed for each forest unit in Supplementary Documentation 6.1 (q), Prescriptions for Harvest, Renewal and Tending, and Conditions on Regular Operations, Section 1.4.

4.7.3.2 Operational Monitoring

The silvicultural treatments described in the SGRs include harvest and logging method, site preparation, regeneration, and tending. As these treatments are being implemented on the ground, a variety of quality control or performance measures are being implemented. These are described in detail in the Forest Renewal Monitoring Protocol, Supplementary Documentation 6.1 (h).

Separate protocols are used for 1) Clearcut Forest Units, 2) Conifer Shelterwood Forest Units, and 3) Hardwood Forest Units.

The clearcut forest unit monitoring protocols are further detailed by Extensive, Basic, and Intensive management intensity. Monitoring activities start with harvest compliance items such as utilization (required removal of merchantable timber), damage to residuals, and rutting. Natural regeneration areas prescribed to include a conifer component are followed up for the presence of germinants and need for tending. Where artificial regeneration is implemented, activities of site preparation, tree planting, and tending contractors are supervised and evaluated. Efficacy of herbicide treatment is evaluated after green-up the following season.

Conifer shelterwood forest unit and tolerant hardwood forest unit monitoring protocols start with tree marking and continue through harvest, site preparation, tree planting and tending.

4.7.4 Roads and Water Crossings

The monitoring program for all roads that are the industry's responsibility will include a physical inspection of bridges on an annual basis. Culverts will be inspected every three years (or sooner if there has been a major weather event). Roads will be monitored for proper crowning, ditching, sight lines and other safety and environmental concerns. The monitoring program will be conducted and documented by VFM on behalf of all of the licensees.

MNRF will continue to implement focused monitoring and compliance efforts on water crossing construction and decommissioning projects as per this FMP and associated AWSs, the requirements of the MNRF Forest Compliance Handbook, and the Ministry of Natural Resources and Forestry/Fisheries and Oceans Canada Protocol for the Review and Approval of Forestry Water Crossings.

4.7.5 Species at Risk

This section applies only when the FMP is proposed to be designated as a Section 18 Overall Benefit Instrument under the *Endangered Species Act*. The FMP is not designated as an ESA Section 18 Overall Benefit Instrument; therefore, this section does not apply.

4.8 Fire Prevention and Preparedness

All forest operations on the Sudbury Forest will be carried out with careful consideration to the prevention of forest fires. It is recognized that accidental fires can have a larger impact on annual operations or timber sustainability than many harvest or silvicultural operations. Operators must also be prepared to safely take on initial actions to prevent fire spread, should a fire occur. In addition, operators must be aware of other prevention measures in the Forest Fires Prevention Act and associated regulations.

Under the authority of the Forest Management Planning Manual and the Crown Forest Sustainability Act, conditions are placed on forest operations through the Annual Work Schedule to provide for fire prevention and preparedness.

4.8.1 Licensee/Contractor - MNRF Fire Contact

The principal contact person(s) for each operation is identified in the Annual Fire Plan. This table identifies each Licensee and the contractor that will be involved in harvesting and silvicultural operations during the period of this AWS. It will be the responsibility of VFM, as the prime licensee, to ensure that any new contractors or Overlapping Licensees are added to this table (and the other tables in this fire plan) and forwarded on to the local MNRF Fire Management Supervisor, prior to the start of operations.

Digital files containing composite maps showing areas where all harvesting, road construction/ maintenance and silvicultural activities will be occurring during the year can be found in the geo-spatial data layers of each annual work schedule. In addition to this information, a table showing where operations will be during the year and when VFM will be conducting inspections can be found in the annual compliance plan, which is also part of the AWS submission.

4.8.2 Fire Prevention

During periods of high fire danger, forest operations will be restricted or suspended according to the guidelines developed by the forest industry and the MNRF called "Modifying Industrial Operations Protocol (2011)". This Protocol was developed to prevent forest fires during high hazard periods by prescribing when, and under what circumstances, operations would be subject to; Short Shift, Restricted Shift, Shutdown, or specific Prevention measures. Forest workers will utilize the MNRF's Forest Users Information phone line or website to find out the fire danger level for their areas and to determine what modifications to make to their operations.

The Modifying Industrial Operations Protocol will also provide an incentive for forest operators to become trained and capable with respect to fire suppression, which allows them to operate under slightly higher fire danger conditions.

Trained & Capable status will be maintained by meeting each of the following criteria:

Prevention: Implementation of an effective prevention program for the type of operation, as outlined in the Fire Prevention and Preparedness Plans.

Suppression: Minimum resource and equipment availability as identified in the Modifying Industrial Operations Protocol (Modifying Industrial Operations Protocol Section 1.2 Fire Suppression Equipment).

Communication: The ability to communicate and report fires immediately and to receive or obtain updated information on the fire danger.

Immediately means – two-way radio or telephone capabilities from the site to the company or MNRF office.

Training: A minimum of 25% of all staff involved in forest operations on a particular site must be trained to the MNRF SP-102 standard.

Licensees and their contractors will implement refresher training on a regular basis to ensure that their staff are proficient with the material covered within the SP-102 course at the start of the fire season (usually when operations start back up from the spring break-up). The Modifying Industrial Operations Protocol is also covered during VFM spring training sessions for Licensees and contractors as required.

A fire preparedness inspection will be completed for all operations by Licensees and contractors prior to the start of operations. Industry FOIP reports will be prepared by VFM after operations start. The FOIP reports will describe compliance or any incidents of non-compliance with the requirements.

A minimum of one inspection will be completed on 50% of the active forest harvest operations during periods of high fire danger and Industry FOIP reports will be submitted.

A fire preparedness inspection will also be conducted by VFM Staff for all renewal operations (tree plants, slash pile burning etc.) prior to start up. Silvicultural contractors will not be allowed to start until all requirements have been met.

All industry FOIP reports regarding fire compliance will include details outlining location, type and condition of the fire equipment.

All operations will be classified into one of 4 levels of operational risk which are Low, (L) Moderate (M) High (H) or Very High (VH). Local MNRF Fire Management personnel may be called to assist in determining the degree of risk presented by the forest operations and assist in determining the level of fire prevention and suppression preparedness required for the forest operation.

One of the keys to any successful fire prevention program is good communications. When resources are available, the spring compliance meeting will provide a start to familiarizing Company and MNRF fire staff with each other and to review how operations will be modified if the fire danger increases.

VFM will work with forest workers to promote fire prevention awareness to other forest users during periods of high fire danger. Company field staff are encouraged to discuss fire prevention with campers, berry pickers, fishermen etc. as they are encountered in the bush. Operations will be encouraged to post signs indicating the fire danger hazard levels on their operations. The company will participate when possible in public notices through different media related to fire bans.

Monitoring of activities during the fire season will focus on checking that the required fire suppression equipment is in place and ready to be used. Operators will check their required fire equipment daily prior to starting work. Attention will also be made to the storage of flammable fuels and the parking of equipment on mineral soil. Each operation should be visited once a month during the fire season.

The overall success of a fire management program depends on quick response as soon as fire is discovered. Forest workers will be made aware of their responsibilities to prevent fires, to start initial suppression and to report fires to the MNRF Aviation Forest Fires and Emergency Services (AFFES) Headquarters.

Fire reporting to the MNRF will occur in a number of ways. A number of licensees have their own internal radio communication system that allows operators to report fires to their office and then the report is phoned into the MNRF. Many contractors and individuals also have cellular phones and can directly report fires to the MNRF. All methods of two-way communication for anyone involved in operations must be immediate.

During periods of high fire danger, particularly in periods of modified operations, patrols by contractors and company supervision will be made of the job site after operations have shut down for the day. The level of inspections/patrols will be geared to the requirements for the situation, but all inspections/patrols will continue for at least one hour after work ceases at all locations.

If a fire is discovered, Company and/or forest workers will take immediate action to start suppression and to report the fire to the MNRF. The Company and forest workers agree to keep track of the labour and equipment used until the MNRF takes over. The minimum required information to be reported to the MNRF includes: a) discovery time of the fire, b) expected cause of the fire if known, c) location of the fire, d) size of the fire, e) access to control the fire, f) fuel types and g) other values in the area.

The annual fire plan will contain detailed operating procedures around normal operations and escalated fire operations. It will outline:

- Company, contractor and MNRF contact information
- Fire suppression equipment required
- Licensee fire training records
- Company and contractor equipment available for fire suppression activities
- Fuel keys and definitions related to modification levels to guide operations

- Standard operating procedures and good management practices related to fire prevention on the management unit.

4.9 Comparison of Proposed Operations to the Long-Term Management Direction

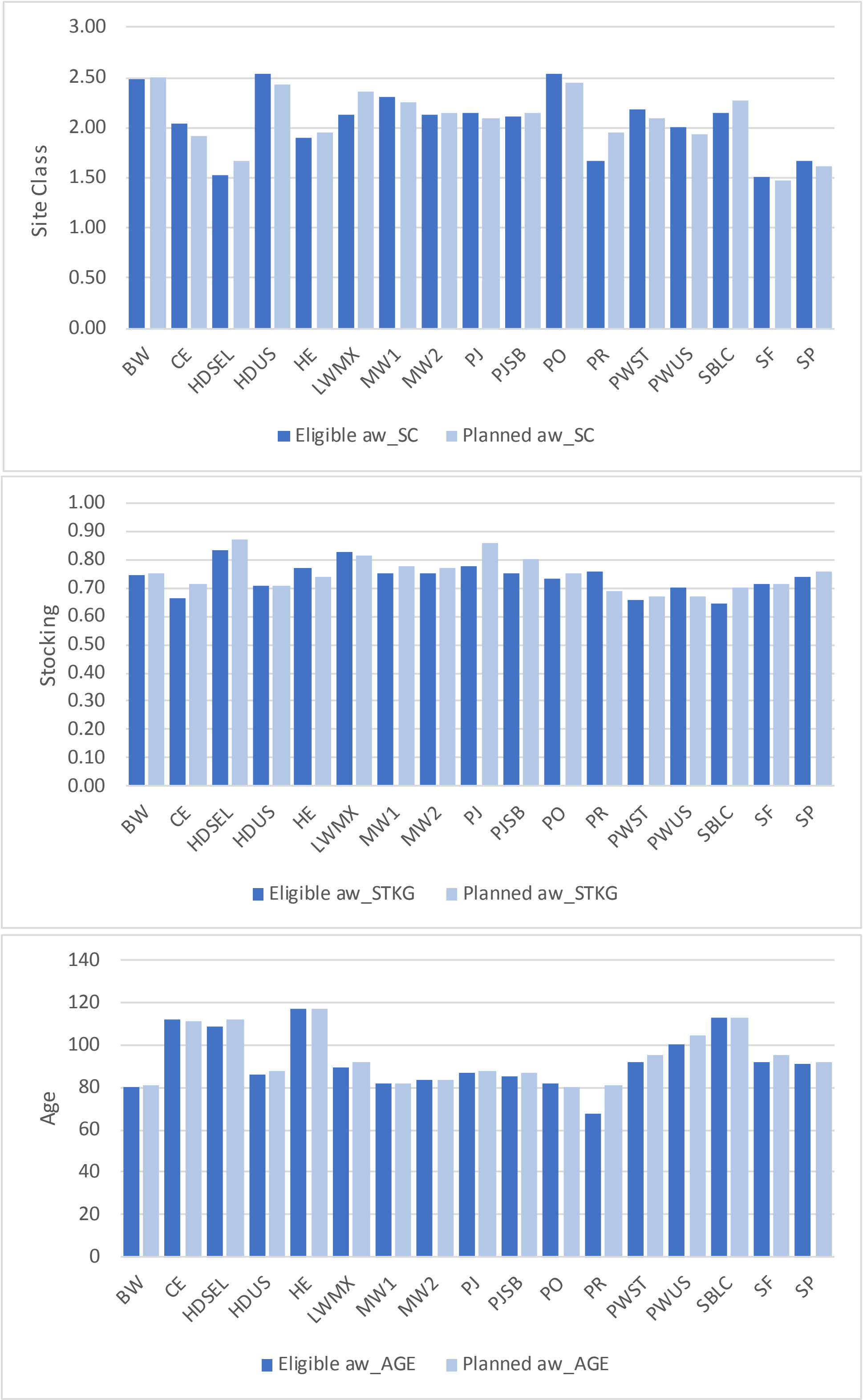
This section provides an assessment of the expected effects of planned types and levels of harvest, renewal and tending operations, and the spatial distribution of harvest areas on the progress towards meeting the objectives in the LTMD. Planned harvest areas are compared to the LTMD in two formats: the actual stand conditions from the allocated inventory stands relative to all eligible areas and the strategic model (Section 4.9.1), and the long-term modelled allocations (A-1.3.9 SFMM run) to the strategic (LTMD) model (Section 4.9.2).

4.9.1 Eligible versus selected harvest areas

It is important to ensure that the areas selected for planned harvest allocations are comparable to the eligible areas across the land base. This provides assurance that the better stands are not being preferentially allocated, leaving disproportionately poorer stands for future plans. For instance, the level of productivity (estimated by Site Class) is similar for each forest unit between the average eligible areas and what has been allocated (Figure 4.9.1). In the case of Site Class, a higher number represents a less productive site. Site Class of planned harvest areas are within 10%, with the exception of the PR forest unit which has an average Site Class difference of 16% and LWMX is 11% different; and in both cases the site quality of allocated areas is poorer than what is eligible overall. Likewise, Stocking values (a measure of occupancy of stands by merchantable trees) for allocations are all within 10% of eligible areas.

Average ages between the eligible and planned harvest areas are also very similar. The PR forest unit is the only case where the area-weighted average age differs by more than 4%. This is due to there being more younger area available for harvest (including stands available for commercial thinning) than what is allocated for regular harvest, excluding commercial thinning, in the 2020-2030 FMP.

Figure 4.9.1. Comparison of area-weighted average stand attributes by forest unit between all eligible stands and planned harvest areas.



1 **Figure 4.9.2. Area-weighted species composition by forest unit for all planned harvest areas.**

	BW	CE	HDSEL	HDUS	HE	LWMX	MW1	MW2
AB	0.00	0.04	0.02	0.00	0.01	0.48	0.00	0.01
AW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BD	0.00	0.00	0.02	0.01	0.01	0.00	0.00	0.00
BE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BF	0.03	0.05	0.01	0.03	0.02	0.01	0.02	0.07
BW	0.39	0.02	0.04	0.18	0.05	0.05	0.23	0.23
BY	0.01	0.01	0.11	0.04	0.09	0.04	0.00	0.02
CB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CE	0.00	0.54	0.00	0.01	0.03	0.06	0.00	0.04
HE	0.00	0.00	0.05	0.01	0.47	0.03	0.00	0.00
IW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LA	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
MH	0.01	0.00	0.52	0.06	0.06	0.00	0.00	0.04
MR	0.12	0.00	0.13	0.08	0.13	0.11	0.06	0.12
OB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OR	0.03	0.00	0.01	0.34	0.02	0.00	0.01	0.02
OW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PJ	0.05	0.00	0.00	0.02	0.00	0.00	0.26	0.02
PB	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
PO	0.22	0.01	0.01	0.07	0.00	0.05	0.20	0.15
PR	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.00
PW	0.03	0.02	0.02	0.07	0.04	0.00	0.05	0.06
SB	0.05	0.11	0.00	0.02	0.04	0.08	0.11	0.12
SR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SW	0.05	0.17	0.04	0.06	0.03	0.05	0.04	0.11
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

2

1 **Figure 4.9.2, continued**

	PJ	PJSB	PO	PR	PWST	PWUS	SBLC	SF	SP
AB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BF	0.00	0.01	0.01	0.01	0.05	0.02	0.07	0.12	0.04
BW	0.07	0.12	0.15	0.12	0.18	0.09	0.03	0.13	0.13
BY	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00
CB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CE	0.00	0.00	0.00	0.00	0.00	0.01	0.08	0.04	0.01
HE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LA	0.00	0.01	0.00	0.00	0.00	0.00	0.14	0.01	0.01
MH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	0.00	0.00	0.05	0.00	0.06	0.04	0.01	0.02	0.01
OB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OR	0.00	0.00	0.01	0.00	0.01	0.02	0.00	0.00	0.00
OW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PJ	0.77	0.54	0.08	0.01	0.03	0.02	0.01	0.04	0.21
PB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PO	0.03	0.08	0.59	0.06	0.14	0.07	0.01	0.03	0.06
PR	0.00	0.01	0.01	0.75	0.09	0.14	0.00	0.01	0.01
PW	0.00	0.02	0.03	0.01	0.25	0.46	0.02	0.12	0.06
SB	0.11	0.18	0.03	0.04	0.12	0.05	0.61	0.34	0.42
SR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SW	0.00	0.01	0.04	0.01	0.05	0.06	0.03	0.12	0.04
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

2

3

Figure 4.9.3. Area-weighted species composition by forest unit for all eligible areas.

	BW	CE	HDSEL	HDUS	HE	LWMX	MW1	MW2
AB	0.00	0.03	0.02	0.00	0.00	0.45	0.00	0.01
AW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BD	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
BE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BF	0.03	0.04	0.01	0.03	0.01	0.02	0.03	0.08
BW	0.39	0.05	0.04	0.20	0.05	0.07	0.23	0.23
BY	0.00	0.01	0.10	0.03	0.04	0.03	0.00	0.01
CB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CE	0.01	0.51	0.02	0.01	0.03	0.06	0.00	0.04
HE	0.00	0.00	0.06	0.01	0.53	0.01	0.00	0.00
IW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LA	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00
MH	0.01	0.00	0.45	0.05	0.05	0.00	0.00	0.04
MR	0.12	0.01	0.17	0.09	0.09	0.11	0.07	0.13
OB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OR	0.04	0.00	0.01	0.34	0.02	0.00	0.01	0.02
OW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PJ	0.05	0.01	0.00	0.02	0.00	0.00	0.23	0.01
PB	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
PO	0.22	0.01	0.01	0.07	0.01	0.08	0.19	0.13
PR	0.01	0.01	0.00	0.02	0.01	0.00	0.02	0.01
PW	0.03	0.02	0.02	0.06	0.09	0.02	0.07	0.05
SB	0.05	0.17	0.01	0.02	0.02	0.07	0.10	0.11
SR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SW	0.05	0.09	0.04	0.04	0.03	0.06	0.04	0.11
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure 4.9.3, continued

	PJ	PJSB	PO	PR	PWST	PWUS	SBLC	SF	SP
AB	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
AW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BF	0.00	0.01	0.02	0.01	0.05	0.02	0.04	0.15	0.04
BW	0.08	0.14	0.15	0.05	0.18	0.11	0.04	0.13	0.13
BY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CE	0.00	0.00	0.00	0.00	0.01	0.01	0.09	0.05	0.01
HE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LA	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.01	0.01
MH	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
MR	0.01	0.01	0.05	0.00	0.08	0.05	0.00	0.02	0.01
OB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OR	0.00	0.01	0.01	0.01	0.02	0.02	0.00	0.00	0.00
OW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PJ	0.76	0.54	0.06	0.05	0.03	0.04	0.01	0.04	0.21
PB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PO	0.03	0.06	0.59	0.07	0.13	0.08	0.00	0.03	0.06
PR	0.01	0.02	0.01	0.77	0.12	0.11	0.00	0.01	0.02
PW	0.01	0.02	0.02	0.02	0.22	0.42	0.03	0.11	0.06
SB	0.09	0.16	0.03	0.02	0.10	0.06	0.60	0.32	0.40
SR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SW	0.01	0.02	0.04	0.01	0.05	0.06	0.02	0.13	0.04
Total	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00

Species composition was also compared between all of the eligible areas for harvest versus the areas selected for actual allocations. This information is presented in Figures 4.9.2 and 4.9.3 for each forest unit. For example, the area-weighted average content of jack pine (Pj) in the PJ forest unit is 0.76, or 76%, for all eligible areas and 0.77, or 77%, in the selected allocations. Of the 25 species in 17 forest units (425 combinations), only six allocated species values varied by more than a proportion of 0.05 from the average of eligible areas. These values are shaded in Figure 4.9.2, e.g., the proportion of hard maple (Mh) in the HDSEL forest unit is 0.52 in planned allocations and 0.45 in all eligible areas for a difference of 0.07. The larger variations also occurred in the smaller or more variable forest units, i.e., CE, HDSEL, HE, and PR.

The slight differences in Site Class, Stocking, and species composition between eligible and selected stands are not expected to impact sustainability.

For a description of the species abbreviations used in Figures 4.9.2 and 4.9.3 refer to Supplementary Documentation 6.1 (v).

A comparison of harvest areas by age class between the LTMD and A-1.3.9 models is presented with additional detail in Supplementary Documentation 6.1 (b), Section 7.0.

4.9.2 Strategic versus planned operations

Upon completion of the proposed management strategy, with consideration for the balance of numerous management objectives, the projection of harvest area by forest unit, age-class and silviculture intensity was identified on the landscape as planned allocations. A preliminary comparison of the operational planned allocations against the strategic direction was performed. Results were summarized as part of the long-term management direction, as well as the proposed operations phases of the plan.

Following consultation with the public, proposed harvest areas were revised and another verification run was executed and the results were re-evaluated based on 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 long-term management direction, and any impact on short, medium and long-term objective achievement. The modelling process for comparing the strategic LTMD solution to the planned operations is described in the Supplementary Documentation 6.1 (b), Section 7.0. This provides additional information on how the two models differ due to complexities of forecast depletions and the representation of PWUS stages of management.

The variations between available and planned harvest areas are largely seen as age-class substitutions, i.e., there are some planned harvest areas that are either younger or older than the areas selected in the SFMM LTMD model. The level of substitution of ages varies by forest unit, although there is generally a wider distribution of ages selected in the allocated stands than in the strategic model. As an optimization model where value is the key variable, SFMM is selecting areas with the highest volume and financial return before volume is lost to succession or mortality. Also, as a non-spatial model, SFMM selects harvest area irrespective of proximity to roads or block size. Logically, actual stands that are realistically feasible to allocate have a wider range in composition, volume and ages (Figure 4.9.4).

Overall, there is less age-class substitution than in previous plans. There is, however, a significant amount of substitution, particularly in the MW2, PJSB, PO, SF, and SP forest units. This is mainly because it is unrealistic to select harvest areas from such a narrow range of ages as shown in the model. Doing so would result in more roads, longer hauling, excessive floating of equipment and moving operations to small isolated areas (i.e., high cost); and this would also not be consistent with landscape diversity indicators for young forest patch sizes and mature and old texture. The selection of harvest areas must account for a range of disturbance patch sizes, including some large patches, and contiguous areas of mature and old forest. The SFMM model is non-spatial, therefore does not account for these considerations of block size, proximity, or spatial decisions.

Traditional operating areas are also considered in the planned allocations and not in the SFMM model. The balancing of harvest area among the traditional areas of licensees is another factor that results in some level of age substitution.

Figure 4.9.4. Comparison of harvest area by forest unit and age-class determined in SFMM vs. the planned harvest areas.

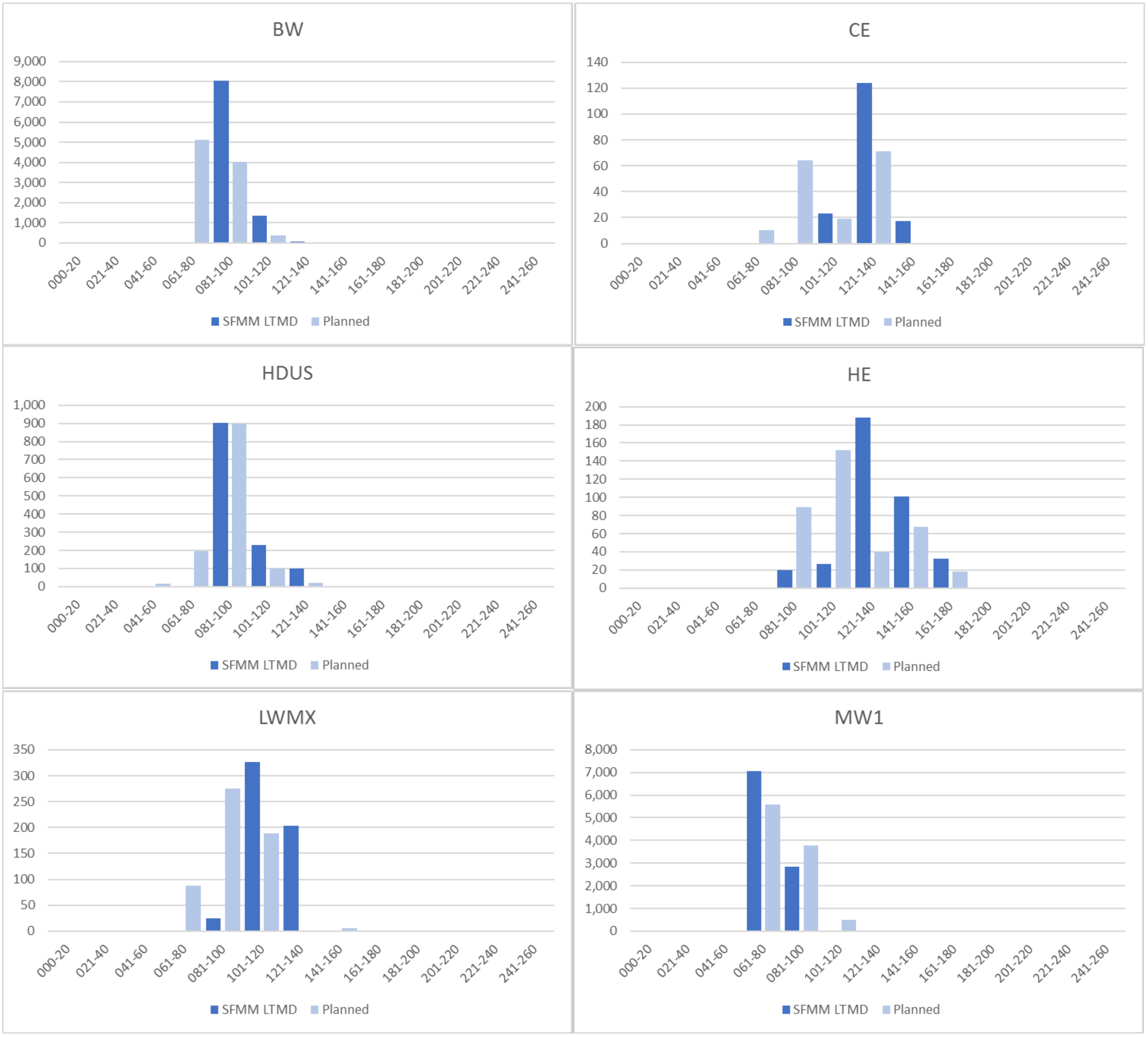


Figure 4.9.4., continued

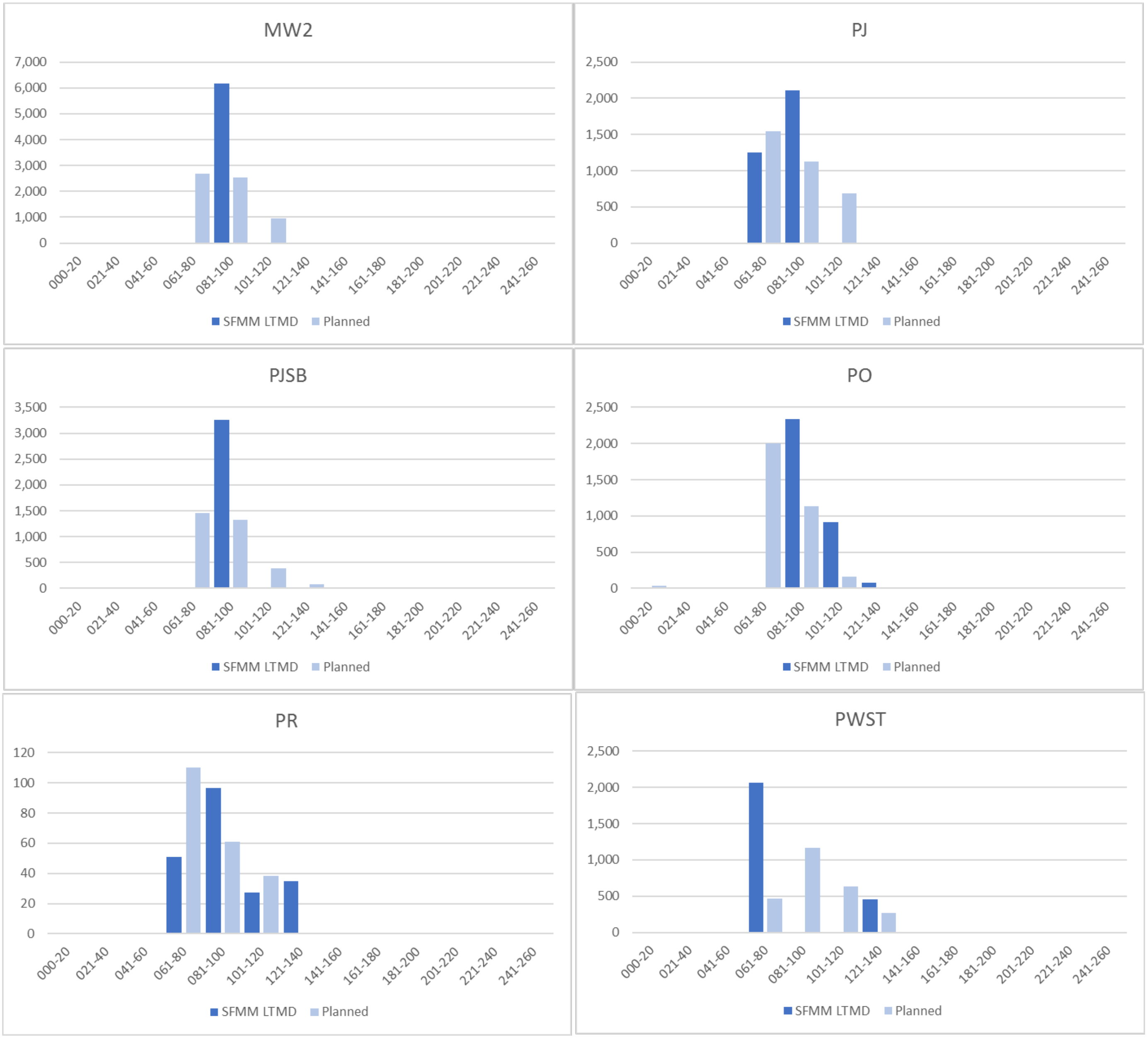
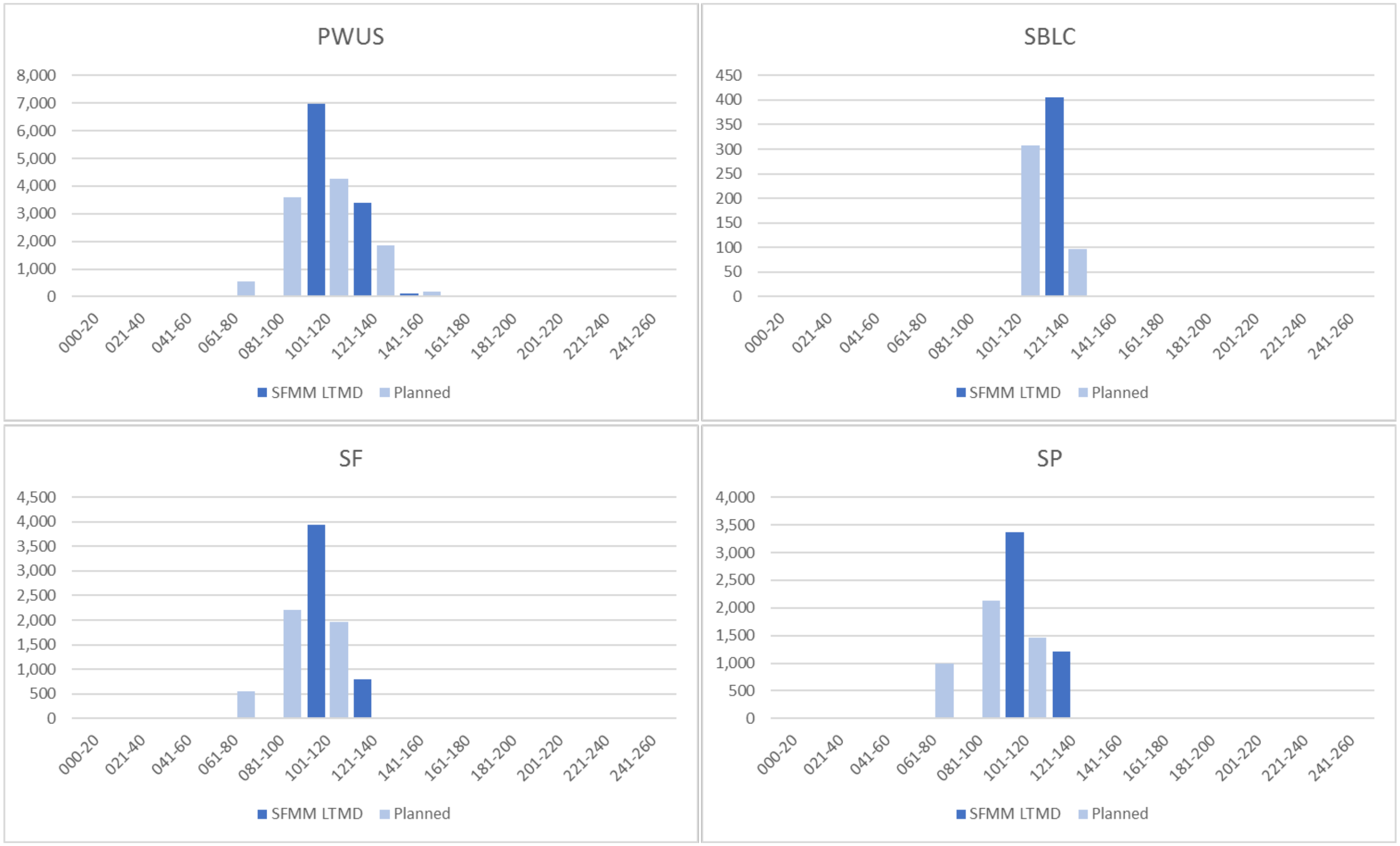


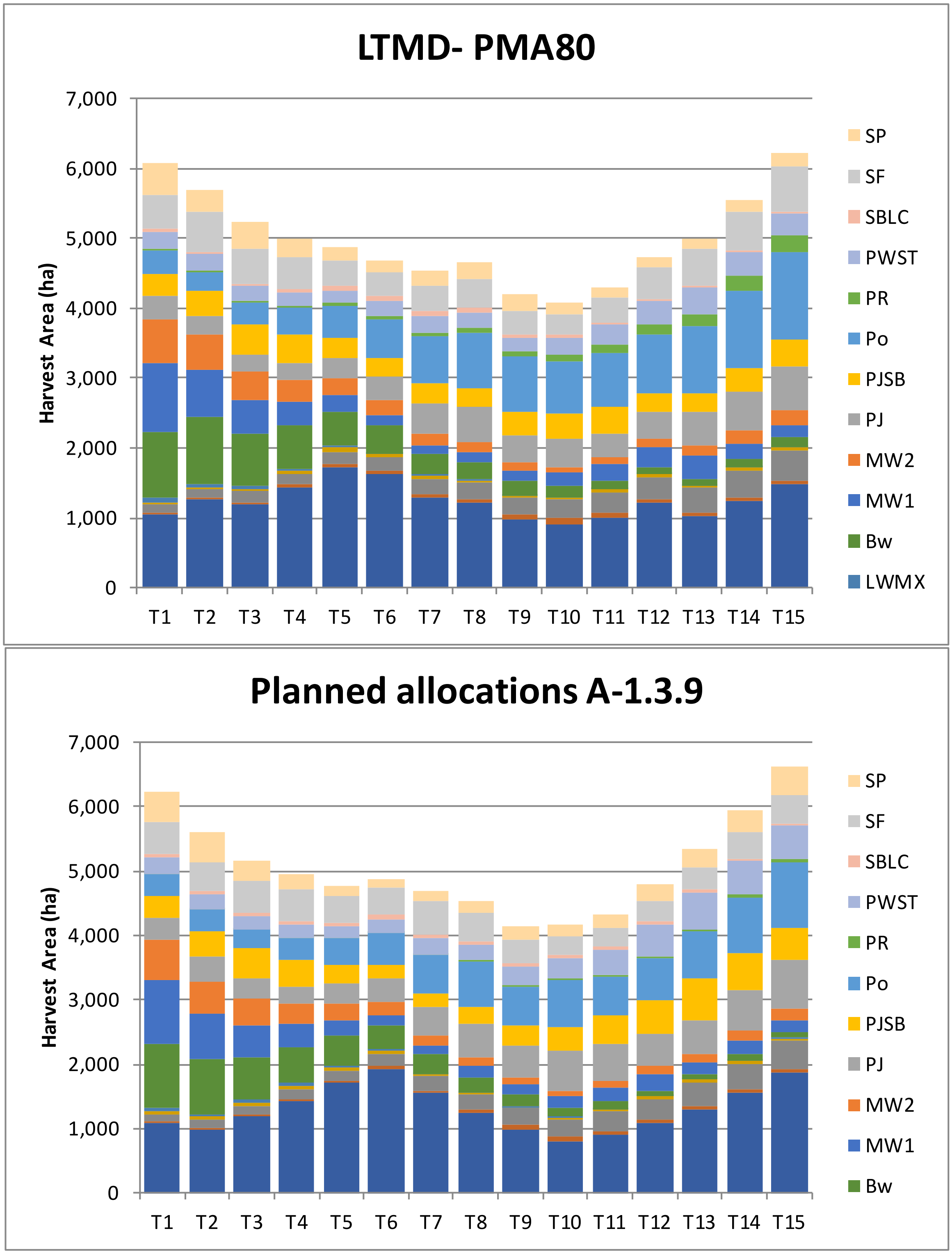
Figure 4.9.4., continued



The distribution of harvest area also must account for proximity to socially defined areas of interest. During the consultation process the desire to have mature and old forest close to communities and roads was clearly identified, not just at the far corners of the land base. Accordingly, there are areas of mature forest that is optimal for harvest that is deferred across all portions of the land base, including areas that are close to roads and communities.

Long-term projections of harvest area are somewhat sensitive to the areas selected in the first term of the model. Overall, there is a very similar pattern of harvest area over time between the LTMD solution and the A-1.3.9 run (Figure 4.9.5). Notable trends in both cases show the PWUS harvest area increases until Term 6, followed by a gradual decrease and then fluctuations that are comparable to the Term 1 level. The BW MW1 and MW2 harvest areas all decline consistently over the entire projection. The conifer dominated clearcut forest units (PJ, PJSB, SF, SP) tend to fluctuate downwards then increase towards the end of the projection period.

Figure 4.9.5. Comparison of annual available harvest area between the management strategy (LTMD PMA80) and planned operations (A-1.3.9) SFMM model runs.



As described in Section 3.7.4 of this document, zones were developed for the forest to spatially identify and set goals for the amount of area harvested over time. The spatial distribution of harvest area in the LTMD is compared to the planned allocation in each zone for the 2020-2030 term. A spatial comparison by zone has also been done for the first 4 terms of the planning horizon, or 40 years, of the model projections (Figure 4.9.6). Sections 3.5 and 3.7.4 of this document provide further discussion on the spatial zones, which are also portrayed on harvest distribution maps MU889_2020_FMP_MAP_DistHarv_00.

The first two zones are quite small and contribute a limited amount of harvest area and volume overall. These two zones are partly intermingled with patent land and have a variety of access challenges. The amount of area allocated in Zones 1 and 2 is lower than in the LTMD solution. This does not impact the achievement of objectives, although it does reflect a level of under-utilization in these two zones relative to what is available. This under-utilization is largely due to challenges with access associated with private land and physical features such as rail lines, water bodies, and highways. Longer-term development of access is needed to be able to better utilize the available harvest area, both in terms of road and water crossing infrastructure as well as landowner agreements.

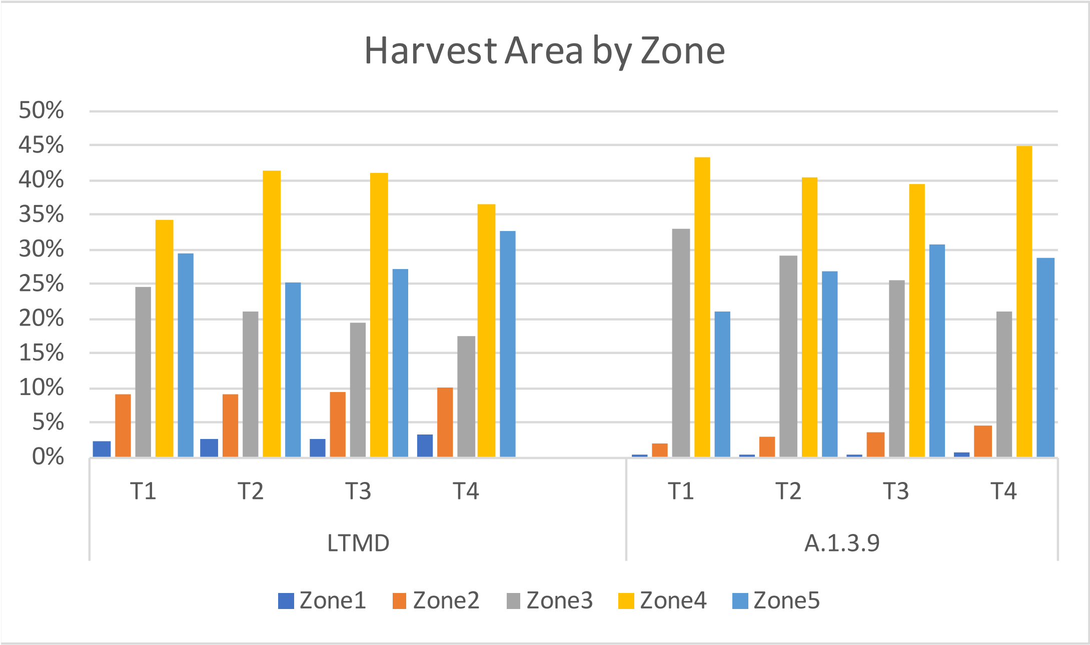
The majority of the land base and wood supply comes from the remaining three zones. Over time, the LTMD projections show shifts in the proportion that each zone contributes to the projected harvest levels. Zone 3 encompasses the northwest section of the Forest, including the Spanish Arm. This area contributes almost one quarter of the projected harvest area in Term 1, then decreases to just over 17% (Figure 4.9.6). Road access to this zone is fairly well developed, although continued construction of the Spanish Arm Road system is required to achieve the projected harvest level. A very large wildfire affected the majority of the Spanish Arm in 1941, resulting in a large, contiguous area that is highly uniform in age. The natural disturbance pattern, and dominance of boreal forest conditions (as opposed to GLSL shelterwood) also provides rationale for the selection of some larger harvest blocks in this zone to meet young forest patch distribution targets.

The south and central portions of the Forest are covered by Zone 4 where white pine and hardwood forest types dominate. This zone is also generally well roaded however the development of the Secord Forest Access Road system is important to the long-term utilization of this area. This area also has significant camp and cottaging values and associated challenges with timing of operations and use of public road systems. Projected harvest levels for Zone 4 are shown to increase to just over 40% in Term 2 then decrease by Term 4 to levels similar to Term 1. The level of allocations in Zone 4 is higher than shown in the LTMD solution largely to compensate for the infeasibility of accessing some of the areas in Zones 1 and 2 in the short term. As discussed previously, balancing out the distribution of harvest between Zones 1, 2 and 4 will require concerted effort to improve access in Zones 1 and 2.

There is also less area allocated in Zone 5 than in the LTMD solution. A significant portion of Zone 5 consists of EMA E353r where special considerations are required to maintain remoteness. The planned access to this area is along the Turner Road corridor. Development of this road has been slow due to lengthy consultation processes, and high costs of construction. As such, relatively fewer allocations are planned for the 2020-2030 FMP in this area. If a previously proposed access route across the Sturgeon River was permitted then the planned allocation could be accelerated here to more closely resemble the LTMD solution in the 2020-2030 and subsequent terms. Instead, proportionally more area is allocated in Zone 3 where there are comparable forest units and age classes.

Figure 4.9.6. Comparison of available harvest proportion by zone between the management strategy (LTMD PMA80) and planned operations (A-1.3.9) SFMM model runs.

Model	Term	Zone1	Zone2	Zone3	Zone4	Zone5	Total
LTMD	T1	2.3%	9.1%	24.8%	34.3%	29.5%	100.0%
	T2	2.8%	9.2%	21.1%	41.6%	25.2%	100.0%
	T3	2.6%	9.5%	19.5%	41.1%	27.3%	100.0%
	T4	3.2%	10.1%	17.4%	36.5%	32.8%	100.0%
A.1.3.9	T1	0.3%	2.2%	32.9%	43.5%	21.2%	100.0%
	T2	0.4%	2.9%	29.3%	40.6%	26.9%	100.0%
	T3	0.5%	3.7%	25.4%	39.4%	30.9%	100.0%
	T4	0.6%	4.6%	21.2%	44.8%	28.7%	100.0%
Zone Area	Zone Area	2.8%	8.6%	20.2%	37.9%	30.5%	100.0%



Despite the initial differences in proportions of harvest areas there are similar trends over time between the strategic and A-1.3.9 models. Both models show increasing harvest proportions in Zones 1, 2, 4 and 5, with decreases in Zone 3 over the first four terms.

Volume projections were also compared between the management strategy and proposed harvest areas. Table FMP-13 shows the LTMD strategic volume for the 10-year plan term in comparison to the sum of the planned (mapped) stand-level volumes (refer also to Section 4.3.3 of this document).

Strategic volumes are also compared between the LTMD and A-1.3.9 models. There are minor differences in the available (Term 1) and projected volumes, due to the slightly different starting conditions, however the trends over time are very similar (Figures 4.9.8). This is to be expected given that the same constraints and objectives were applied in both scenarios. Overall there are slightly lower volumes in the planned areas than the strategic areas selected by the model. The goal of the strategic model is to optimize volume and value; therefore, it selects the best possible harvest areas. In reality, the areas feasible for harvest in the 10-year planning period are not as optimal due to constraints around access and competing objectives. In either case, volume targets are met as both runs were based on binding targets.

Figure 4.9.7. Comparison of available harvest volume by species group between the management strategy (LTMD PMA80) and planned operations (A-1.3.9) SFMM model runs for the 10-year term 2020-2030.

	Volume (1,000s m^3/yr)			
Species Group	**Desired Level**	**LTMD T1**	**A-1.3.9 T1**	**A-1.3.9 - LTMD**
Spruce-pine-fir (SPF)	230.5	251.1	257.6	6.6
Intolerant hwd (INT)	150.2	169.7	164.4	-5.3
Tolerant hwd (TOL)	2.5	19.5	17.7	-1.8
White&red pine (PWR)	86.9	148.9	123.6	-25.3
Other conifer (OC)	3.0	10.6	10.6	0.1
Total	473.1	599.8	574.0	-25.7

Surplus (unutilized) volumes associated with the planned harvest are shown in Table FMP-14 and Table FMP-15. The effects of unutilized harvest volume on the achievement of the LTMD may result in a lower level of achievement of some objective indicators, e.g., spatial patterns and seral stages. Economic opportunities may also not be fully realized with a lower than projected harvest. These are detailed further in Sections 4.3.4 and 5.2 of this document.

Figure 4.9.8. Comparison of projected harvest volume by species group between the management strategy (LTMD PMA80) and planned operations (A-1.3.9) SFMM model runs.

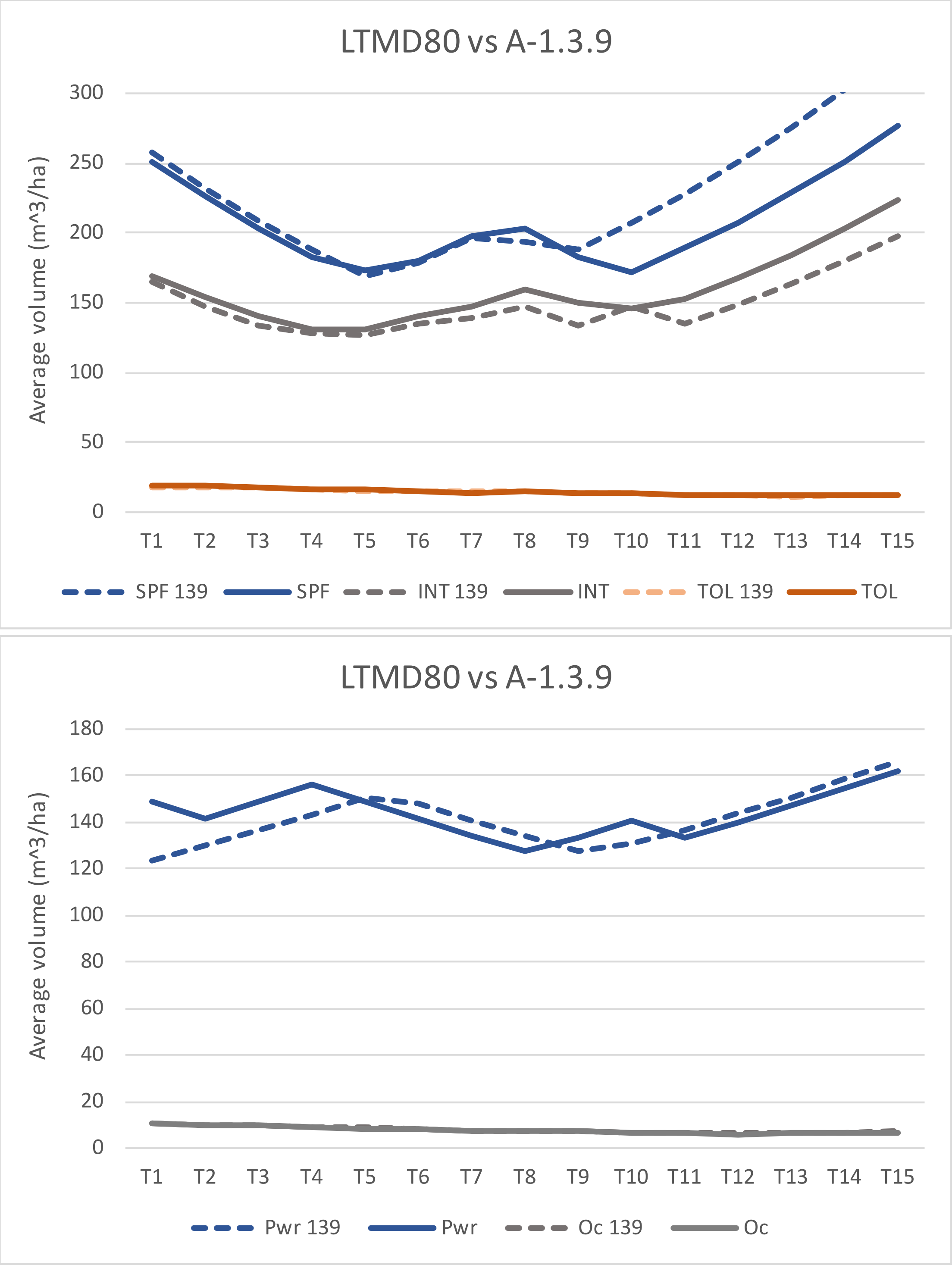
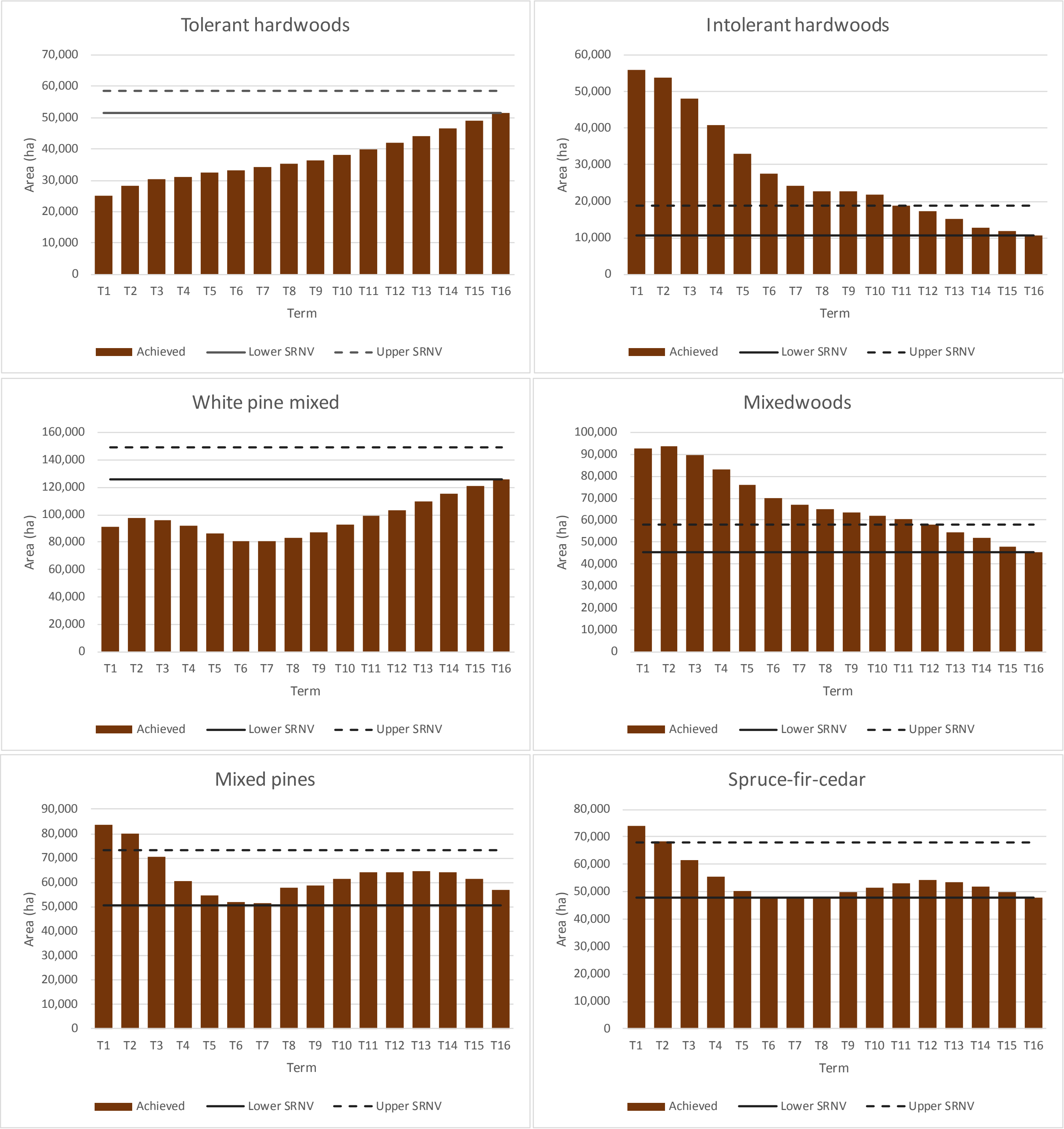


Figure 4.9.9. Landscape Guide Classes for the planned operations (A-1.3.9) SFMM model run.



The ecological targets were also compared between the LTMD and planned allocation model (the A-1.3.9 run). Given that the same set of long-term constraints and objectives were applied, the results are intuitively comparable. Each of the Landscape Guide Classes for mature and old forest, total old-growth, and red and white pine follow the same trends over time (Figure 4.9.9 as compared to Figure 3.7.17 for the LTMD). Tabular results are shown in Supplementary Documentation 6.1 (b), Section 7.0.

Renewal and tending limits were also applied with the same constraints between the LTMD and proposed operations (A-1.3.9) model runs, resulting in comparable treatment levels. Planned expenditures for forest renewal are set at $28,592,170.00 , as shown in Table FMP-19. The stumpage revenue and expenditures in the LTMD model are determined to be $27,298,838.48 for the 10-year term of the plan. These values are not directly comparable, however, as the planned expenditures include outstanding renewal from the 2010-2020 FMP.

5.0 DETERMINATION OF SUSTAINABILITY

The 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. The following is a summary of the elements assessed for the determination of sustainability with regards to plant and animal life, water, soil and air quality, and social and economic values including recreational values and heritage values.

5.1 Assessment of Objective Achievement

The assessment of objective achievement is based on balancing multiple, often conflicting, objectives. The 36 objectives and more than 1,200 indicators of sustainability developed for the Sudbury 2020-2030 FMP address the following CFSA categories:

- Forest diversity – natural landscape pattern and distribution; forest structure, composition and abundance;
- Forest diversity and provision of forest cover – habitat for animal life;
- Social and economic – community well-being; healthy forest ecosystems; long-term harvest levels;
- Ecological sustainability – healthy forest ecosystems; and,
- Silviculture.

Details on the assessment of objective achievement are documented in Table FMP-10 and Section 3.6 of the plan text. The assessment is based on the extent to which the desirable levels and targets are satisfied during the 10-year plan period and over the long-term forecast for those indicators that span multiple 10-year terms. Some objectives cannot be assessed during the production of the plan and are assessed during plan implementation and reported in Annual Reports. Table FMP-10 provides a summary of the timing of assessment for each indicator.

The indicators of sustainability assessed during development of the plan were within the desirable levels or are showing movement towards acceptable levels established to balance the achievement of multiple objectives, e.g., wood supply and biodiversity objectives. Section 3.7.3 of this document describes the achievement of objectives associated with the strategic direction (LTMD). An additional model run (comparison of proposed operations to the LTMD SFMM run or A-1.3.9 run) was also done to evaluate the planned operations to the long-term management strategy. The model results and analysis show that the planned operations meet the intent of the LTMD (Section 4.9 of this document).

Overall, the spatial distribution of planned harvest disturbances closely resembles the desired pattern. The spatial indicators are also all very close to the SRNV median values, representing a pattern that emulates a natural landscape mosaic. Section 3.7.3, Landscape Patterns provides an assessment of spatial indicators.

Implementation of the planned operations provide significant economic and social benefits to the local area and province as a whole. The employment levels, revenues, and recreational and cultural benefits are expected to be comparable to the past FMP as there are no significant changes in planned operations. Review of the harvest volumes and silviculture expenditures from the planned operations compared to the LTMD (Section 4.9) show slight differences but overall are consistent with the LTMD. Hence, the conclusion from the qualitative social and economic analysis of the LTMD would still apply for the planned operations.

The social and economic impacts of implementing the planned operations are described further in Section 3.7.5.

Tourism, recreation, and cottaging values are also considered during the development of the FMP. Increased or improved road access will benefit those values that depend on accessibility while potential negative impacts to values that rely on remoteness are mitigated to the extent possible with specific direction through the implementation of AOC prescriptions, conditions on operations, and resource stewardship agreements (RSAs). Stakeholder involvement and communication during plan implementation will also occur at the Annual Work Schedule stage. This will allow further consideration for values and users to be incorporated in the FMP to minimize potential negative impacts from forest operations.

5.2 Risk Assessment

Risks that some plan objectives may not be fully achieved during the implementation of the FMP are acknowledged, which can impact the future forest condition and desired benefits. Impacts may affect social, economic or environmental values, alone or in combination. Forest management planning relies on a precautionary approach in dealing with uncertainty, and follows an adaptive management process to mitigate against risks. This is a foundation of the environmental values considered in the development of the FMP, as described in the Supplementary Documentation 6.1 (o), Statement of Environmental Values.

A primary source of risk is a potential continuation of uncertain market conditions for wood fibre. During the current and previous planning cycles the level of utilization has been quite low, especially for some forest types and species groups, e.g., pulpwood. This is largely reflective of market conditions and high costs associated with accessing some parts of the forest where volumes are also low.

Local and global markets, economies, and international trade also affect the implementation of the FMP. Market conditions and demand for forest products fluctuate over a ten-year period and can 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 2020-2030 period. A consequence of continued low harvest levels 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 the expectations associated with full utilization of the available harvest.

As part of the scoping that was done during the development of the LTMD the past and current under-utilization of the forest was analysed and documented in the Analysis Package (Supplementary Documentation 6.1 (b) Section 4.3.1.4. This involved setting the SFMM model to allocate future harvest levels to equal the past averages for the full 150-year projection period. This was done with two approaches of 'historic wood utilization': 1) based on forest unit harvest areas and 2) based on species group volume utilization. The forest unit average harvest area is an accurate representation of what has been harvested and reported over the past eight years which is just under 40% of the available harvest. Future projections of this utilization level then provide insight into the effects of continued low harvest levels on long-term FMP objectives.

A low-level of forest disturbance through harvesting can be favorable to objectives that rely on mature and old forest, however is unfavorable to objectives that rely on the creation of young forest and early successional forest types and species such as jack pine, poplar, and white birch. This can also lead to increases in late successional forest types and balsam fir. An increase in balsam fir, which is a less marketable species, would be unfavourable as it could further contribute to the low utilization potential of the forest. Reduced harvest levels may also pose a risk to achieving the ideal mix of habitat for moose. Harvesting that stimulates the production of deciduous saplings, which is a significant source of browse, is important to the successful maintenance and enhancement of Moose Emphasis Areas (MEAs). The projected plan-end habitat and carrying capacity for moose within the MEAs is based on the assumption that all allocated areas will be harvested. In the event that some areas are left uncut, browse stimulation in these areas will be reduced. Scoping analysis of the historic, low utilization levels of just under 40% of the available harvest shows significant impacts on forest diversity and cover indicators due to the low harvest levels in BW, MW1, MW2, SFC. The result is a much higher amount of mature and old forest, remaining above the SRNV for the Mixedwood, Intolerant Hardwood, and Spruce-Fir-Cedar landscape classes. Coinciding with this is an underachievement in young forest conditions. Pre-sapling projections are as low as 48% of the LTMD solution in Term 4, but levels never fall below the SRNV. While this means that browse production would be less than a fully utilized LTMD level it is not expected to impact sustainability since levels stay well above the expected natural condition.

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. Fewer or smaller patches may be favourable for the smaller patch size classes while unfavourable for the larger classes that are currently at a lower frequency than the desired natural pattern, i.e., patches larger than 2,500 ha. Harvest levels also affect the assessment of texture of mature and old forest. Low harvests will contribute to a continued build-up of higher concentration areas of mature and old forest (refer to Section 3.7.3, Landscape Patterns).

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 at times 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 company business planning and new initiatives with the Ministry of Training, Colleges and Universities and industry partners.

Over the course of the ten-year plan there may also be changes at a political or regulatory level that affect the implementation of the FMP. Changes to policy requirements (i.e., species at risk or land tenure) may result in lower utilization of otherwise operational harvest areas. Regulations that govern the protection of species and habitats are dynamic, and may further reduce the level of flexibility needed to accommodate other access constraints and weather conditions. This is an issue that has occurred with the implementation of the 2010-2020 FMP and additional changes could impact the 2020-2030 FMP.

Climate change also poses a potential threat to the health and condition of the forest, and 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. This may constrain the availability or feasibility of accessing some winter harvest areas. The use of winter roads is mandated in specific areas of the forest by land use direction (CLUPA) or sensitive sites (wet, fine textured or organic soils). Annual work schedules may, therefore, need to be revised periodically to accommodate changing weather conditions. The adaptive management process of monitoring and subsequent planning.is an important aspect of addressing climate change.

The incidence of wildfires has been relatively low on the Sudbury Forest since the 1970s, although there have been periodic fluctuations. The incidence of fire under natural (without fire suppression) and managed conditions is estimated and accounted for in strategic modelling and the LTMD, including peak fire seasons in 1977, 1988, and 2018 (refer to the Analysis Package, Supplementary Documentation 6.1 (b) Section 3.4.8). Climate change, however, may result in 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 (refer to Section 4.8.2) and adaptive management. 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 against the accumulation of higher fuel loads with the dispersion of young forest and hardwood (e.g., poplar) to create a landscape pattern that emulates and is more resilient to fire.

The overall risks to successfully implementing the FMP are mitigated with a well-balanced strategy and adaptive management process. A mid-term evaluation of the FMP progress is required 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.

5.3 Conclusion

The collective assessment of the management objectives and associated indictors, including spatial assessments, has concluded that, on balance, the 2020-2030 Forest Management Plan objectives are being met and progress is being made towards the desired forest conditions and benefits. The social and economic assessment indicates that current levels of social or economic benefits are projected to be maintained or increased for the 2020-2030 term.

The LTMD and planned operations were developed by the planning team with consideration to plant and animal life, water, soil and air quality, and social and economic values including recreational values and cultural heritage values. The assessment of objective achievement, social and economic assessment, risk assessment, and the long-term management direction (LTMD) have all demonstrated that the 2020-2030 FMP for the Sudbury Forest provides for the sustainability of the Crown forest.

6.0 DOCUMENTATION

6.1 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) The social and economic description and demographic profiles
- (f) The monitoring programs for exceptions
- (g) The monitoring programs for species at risk
- (h) The monitoring program for success of silvicultural activities
- (i) Documentation of the planning of roads, and roads in areas of concern
- (j) Documentation of the planning of operational prescriptions and conditions for areas of concern
- (k) A summary of public consultation in the preparation of the plan
- (l) The LCC report
- (m) The final list of required alterations and list of major changes from the draft to final FMP
- (n) The planning team's terms of reference
- (o) Statement of Environmental Values (SEV)
- (p) Old Growth Strategy
- (q) Prescriptions for Harvest, Renewal and Tending, and Conditions on Regular Operations
- (r) Compliance Plan
- (s) MNRF NER Utilization Strategy
- (t) Documentation of Moose Emphasis Areas
- (u) A Series of Maps
- (v) Common Acronyms and Tree Species Codes used in Forest Management Planning
- (w) Implementation Bulletin: Transferring Forestry Road Responsibility

Refer to the separate file MU889_2020_FMP_TXT_SuppDoc.

6.2 Other Documentation

A copy of the Report on Protection of Identified Aboriginal Values is held at the Sudbury MNRF District Office.

Public correspondence (with redacted personal information) related to the development of the FMP is also retained at the Sudbury District MNRF office.

7.0 FOREST MANAGEMENT PLAN SUMMARY

A FMP summary is prepared to facilitate public review of the draft 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 will also be available.

Refer to the separate files MU889_2020_FMP_TXT_Sum and MU889_2020_FMP_TXT_SumFR.

8.0 Forest Management Plan Tables

FMP tables have been submitted as a separate file (MU889_2020_FMP_TBL_Tables) in the electronic version of this FMP.

List of Tables

FMP-1: Management Unit Area Summary

FMP-2: Description of Forest Units

FMP-3: Summary of Managed Crown Productive Forest by Forest Unit

FMP-4: Silvicultural Ground Rules

FMP-5: Post-harvest Renewal Transition Rules

FMP-6: Projected Forest Condition for the Crown Productive Forest

FMP-7: Projected Habitat for Selected Wildlife Species

FMP-8: Projected Available Harvest Area by Forest Unit

FMP-9: Projected Available Harvest Volume by Species Group and Broad Size or Product Group

FMP-10: Assessment of Objective Achievement

FMP-11: Operational Prescriptions for Areas of Concern and Conditions on Roads, Landings, and Forestry Aggregate Pits

FMP-12: Planned Harvest Area

FMP-13: Planned Harvest Volume by Species

FMP-14: Planned Harvest Volume and Wood Utilization

FMP-15: Projected Wood Utilization by Mill

FMP-16: Contingency Harvest Area and Volume

FMP-17: Planned Renewal and Tending Operations

FMP-18: Road Construction and Use Management

FMP-19: Planned Expenditures

FMP-20: Planned Assessment of Establishment