TIMBER RESOURCE ANALYSIS

INSULAR NEWFOUNDLAND

2016 -2020

Government of Newfoundland and Labrador
Department of Fisheries, Forestry and Agrifoods
Forestry Services

Copies of this publication may be obtained free of charge from:

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1. INTRODUCTION

Section 6 of the Forestry Act requires the Minister to prepare a timber resource analysis for the province every five years and to submit the analysis to the Lieutenant-Governor in Council for approval. Since 1991, five separate analyses have been completed and the 2016 analysis is the sixth. Each analysis set the maximum amount of timber that can be sustainably harvested annually over that five year period and is commonly referred to as the Annual Allowable Cut (AAC). Section 9 of the Forestry Act requires the Minister to determine the AAC for each Forest Management District in the Province. Thus, the AAC's are considered the Province's measure of harvesting on a sustainable basis and under the Forestry Act, AAC's cannot be exceeded over the five year period.

The guiding principles for the analysis are:

- AAC's must be sustainable over a 160 year planning horizon (i.e. the forest must be able to provide the same volume of wood each year, every year for the next 160 years)
- minimize the level of uncertainty associated with calculating the AAC's , by accounting for:
    1. changes in the productive forest land base from the last analysis due to land alienations/restrictions for non- timber uses such as wildlife, tourism, agriculture and water resources;
    2. new forest management strategies, policies and objectives;
    3. disturbances or depletions to the forest growing stock due to harvesting, wildfire, wind storms, insects and disease
    4. better information on forest growth rates and the forest composition;
- incorporation of the latest technological advances in wood supply modeling that forecast the impacts of various harvesting scenarios on forest sustainability
- conformity must exist between the information and assumptions used in the analysis and actual management decision and actions taken on the ground (i.e. the analysis reflects operational reality);
    - incorporate broad range of diverse social, economic and ecological values, including non-timber values, like pine martin and caribou habitat, view landscapes, watersheds, protected areas, parks, cottage development areas, gravel pits, transmission lines that may impact the determination of a sustainable wood supply.
    - reflect economic reality by considering factors such as cost of road access, transportation and harvesting.
    - the AAC's be established for two timber types - softwoods and hardwoods

It is to be noted that a 2016 analysis was not conducted for Labrador, due to the fact that very little harvesting activities have taken place over the past five years and, consequently, little change has occurred in the Labrador forest. In addition, because of limited availability on the landscape, no hardwoods AAC has been set for Labrador. Therefore, Labrador's current softwood AAC of 307,500 m^3 remains unchanged.

2. TIMBER RESOURCE ANALYSIS INPUTS/CONSIDERATIONS/VALUES

This section provides information on the 2016 analysis and highlights the many inputs/considerations/values that have been taken into account.

2.1. DEFINING THE AAC LAND BASE

The Island's land base was broken out into three broad land base categories (Figure 1); productive forest (stands capable of producing <60 m^3/ha at maturity), non-productive forest (scrub types capable of producing >36 m^3) and non - forested areas (bogs, barrens, water, etc.). However, only the productive forest land base was considered in the analysis.

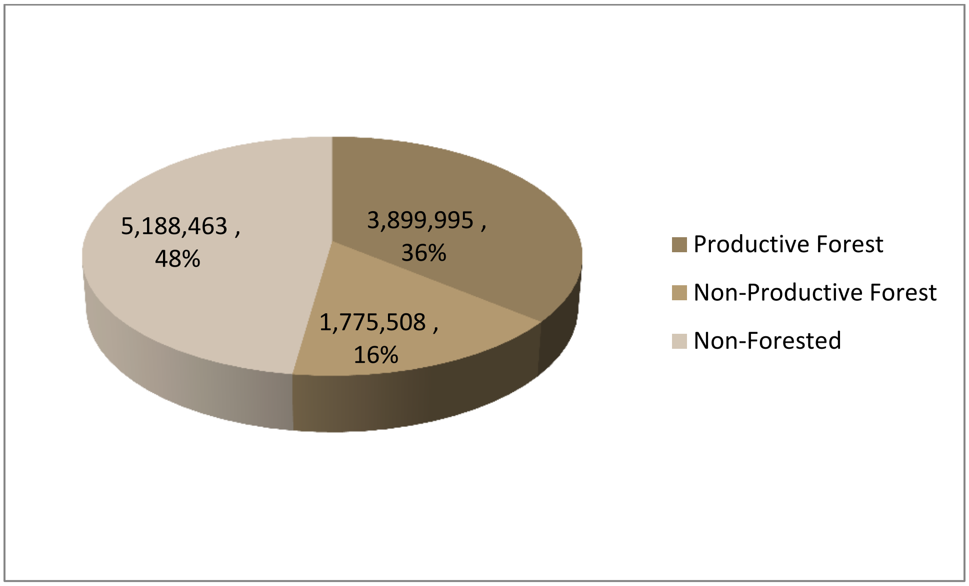


FIGURE 1: ISLAND LANDBASE BREAKOUT

In addition, the natural fragmentation of the island's forested landscape poses a challenge in the analysis , as the forest landscape is dotted by many ponds, bogs, rivers, streams and rock outcrops, resulting in relatively small, scattered pockets of timber; resulting in a highly diverse, fragmented landscape, where accessibility causes timber stands to vary greatly in their economic viability.

2.1.1. District Forest-Inventory Updates

Several key factors were taken into account; (i) since the entire island, as a whole, is only re-inventoried every 10 years, the inventory data across the Districts is of varying ages; (ii) not all of the productive forest is eligible for harvest due to social, physical, and legislative restrictions on the land base. Thus, District inventories had to be updated and brought into sync and the restrictions sub-divided into land classes. The following information is used to create an updated inventory.

2.1.1.1. New Photography

Each year, digital photography is acquired and interpreted to produce updated forest inventories for one or two Districts which are incorporated into the analysis.

2.1.1.2. Aging

Interpreted forest stand are assigned age classes in 20 year increments and for the analysis, were randomly assigned to 10 year classes within the 20 year increments. Discrete ages were assigned to stands where starting age is known through harvesting and disturbance records. Stands not harvested nor disturbed were aged to the time of the analysis (i.e. stands were aged forward to present day.)

2.1.1.3. Harvesting

Since the last analysis, an average of 8400 ha was harvested annually. The area harvested was incorporated the land base to ensure that all harvested stands are correctly represented.

2.1.1.4. Major Disturbances

Each District's inventory was updated to reflect forest changes resulting from any major disturbances, such as fire, wind disturbances and insect outbreaks.

2.1.1.5. Silviculturally Treated Stands

To accurately calculate the AAC volume, it was necessary to assign the silviculture treatment status to each stand (Figure 2), as the yield of treated stands will be higher than those of natural stands (Figure 3).Thus, the analysis reflects the 2,698 ha planted and 22,649 ha thinned) ,since the 2011-2015 analysis.

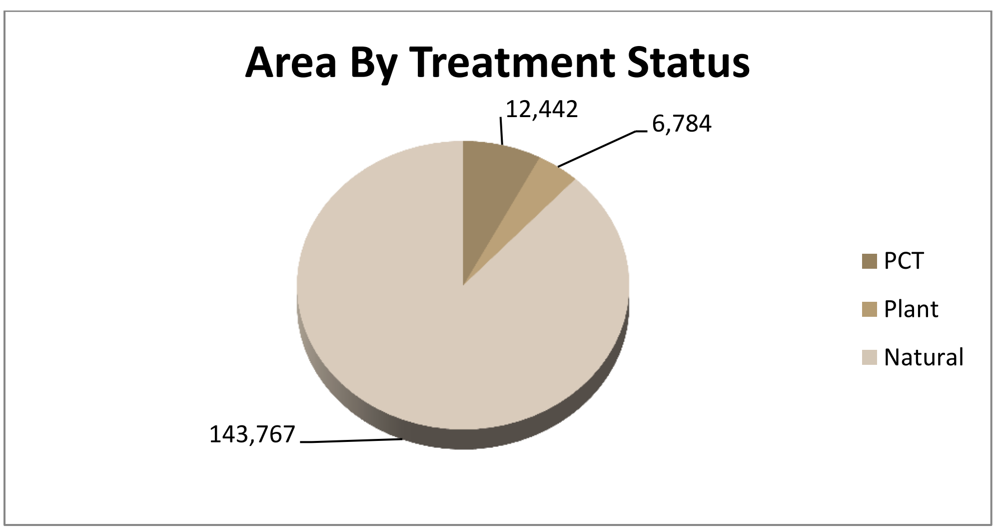


FIGURE 2: EXAMPLE OF THE TREATMENT STATUS OF THE PRODUCTIVE FOREST

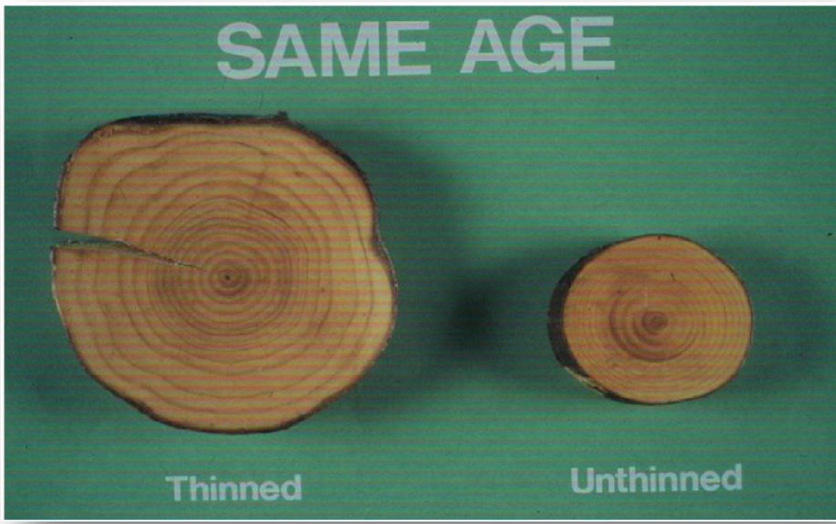


FIGURE 3: GROWTH RESPONSE TO THINNING

2.1.2. Land Class

It is noteworthy that while the Island's total productive forest land base is approximately 3.9 million ha, this land base has significantly reduced to a little over 2.2 million ha (58%) available for harvest , while the non-harvestable areas are 1.7 million hectares or 42% (Figure 4). This significant reduction is due to operational restrictions/alienations, non-timber values and regulatory alienations (see below). The 2.2 million ha has further restricted for other values (e.g., wildlife, endangered species, viewscapes, outfitting, municipal, cottages, water supplies, agriculture, and recreation).

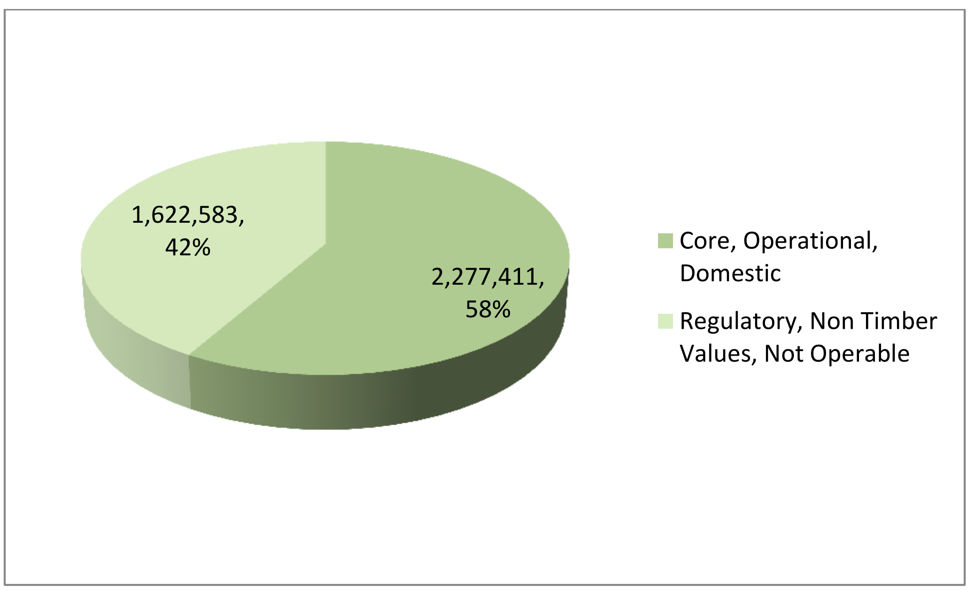


FIGURE 4: PRODUCTIVE FOREST BREAKOUT FOR THE ISLAND

2.1.2.1. Operationally Restricted

Stands in this land class are operationally challenging, due to restrictions such steep slopes, isolated stands, road distances which make harvesting these stands more expensive to harvest than those in the core land base . This designation was prevents the core AAC from being over harvested (i.e. this AAC that must actually be harvested on this land base.

2.1.2.2. Operationally Alienated

Stands in this land class are not considered harvestable, due to restrictions such extreme steep slopes or extreme isolation. Again, this designation prevents the core AAC from being overharvested.

2.1.2.3. Non-Timber Values

To accommodate social issues and other non-timber values, stands have been removed from the harvestable land base to accommodate things such as aesthetics, parks, wilderness corridors, Tourism values, water supply areas, etc…

2.1.2.4. Regulatory Alienation

Areas have been removed from the analysis, as they are restricted from harvest due to legislation or agreements on pending legislation. Two of the most significant removals are protected areas and no cut buffers.

2.1.2.4.1. Protected Areas

All established and proposed protected areas/parks/reserves/wildlife areas have been removed from the AAC land base; including the Natural System Areas (Figure 5). This removal equates to 628,000 hectares of productive forest or 16% of the total productive forest land base on the Island.

FIGURE 5: GAMBO POND CANDIDATE PROTECTED AREA

2.1.2.4.2. No-Cut Buffers

Under provincial guidelines, all water bodies greater than one meter in width have been given a 20-meter, uncut treed buffer (Figure 6). In addition, buffers greater than 20 m have been established to protect values such as public water supplies, salmon rivers, cabin development areas, wildlife habitat and outfitting camps. These buffers account for 478,000 hectares or 12% of the productive forest land base and not are available for timber harvesting and are not included in the analysis.

FIGURE 6: TREED NO-CUT WATERCOURSE BUFFER

2.1.2.5. Core Harvestable Land Base

Through incorporating the above regulatory alienations, operational /restrictions and non- timber values, the productive forest has been netted down to what is available for harvest (i.e. the Core land base). Each stand type was described in detail to properly represent it in the modelling environment. The major characteristics to represent a stand are listed below and were used to calculate the yields associated with a forested stand.

2.1.2.5.1. Species Composition

Species composition (Figure 7) is important for calculating accurate and sustainable AAC's. Major differences in stand yields, operability limits, and life spans occur, depending on the dominant species. This information must be accurate to ensure realistic future forest state modeling. Also, when considering habitat modelling, stand types are most important for planning for non- timber values, especially wildlife.

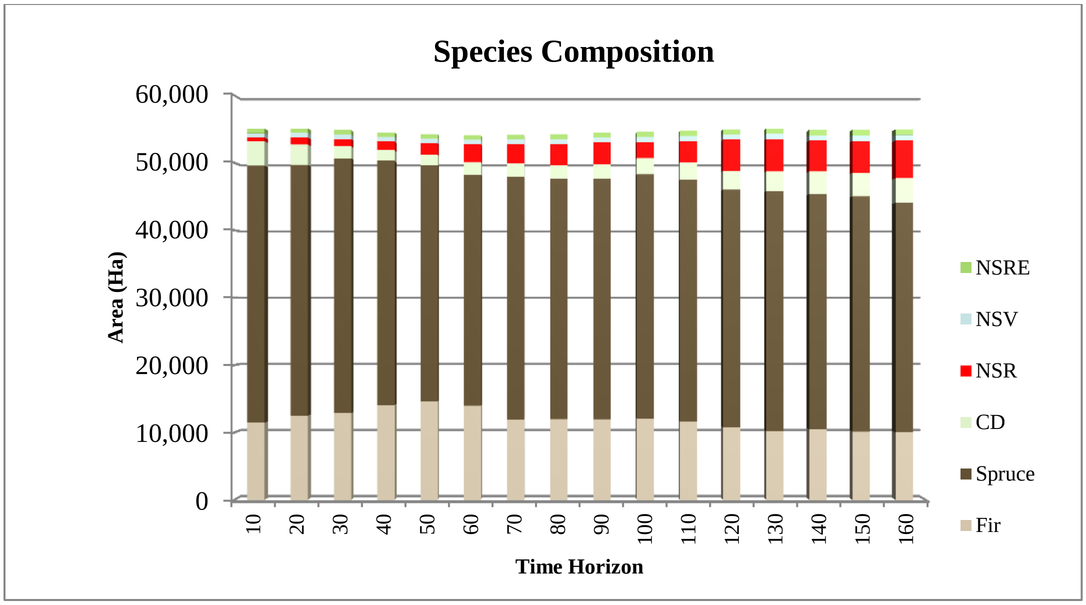


FIGURE 7: EXAMPLE OF PRODUCTIVE FOREST SPECIES COMPOSITION IN A TYPICAL FMD

2.1.2.5.2. Age Class Structure

A typical Forest Management District (FMD) contains unbalanced age class structure; i.e. where older forests (over 80 years) and younger regenerating forests (less than 40 years) are in more abundance than intermediate-aged forests (40-60 years) (Figure 8). As a result of this unbalanced, most FMDs will experience a period when there will be a reduced amount of harvestable forest available.

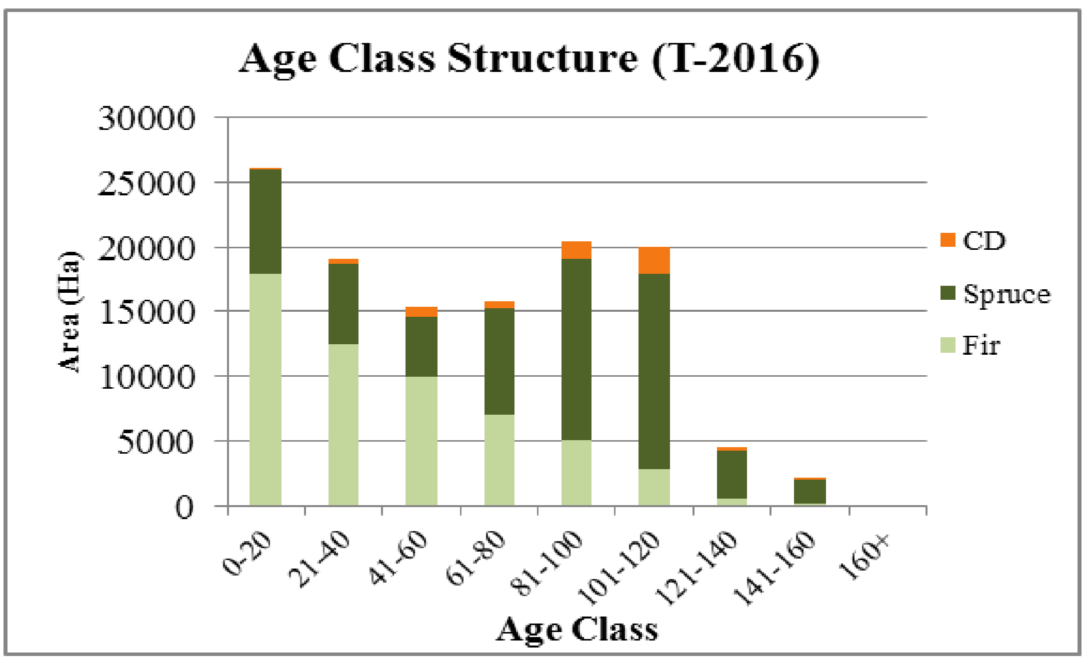


FIGURE 8: EXAMPLE OF AGE CLASS STRUCTURE IN A TYPICAL WESTERN NEWFOUNDLAND DISTRICT

Strategies have been adopted to help offset the intermediate forest age class gap, including (i) a forest protection program to keep mature and over- mature stands alive as long as possible; (ii) setting of harvesting schedules that limit the harvest of intermediate age class timber; (iii) silviculture thinning programs that accelerate the growth of trees in younger, regenerating forests so that they become harvestable earlier; and (iv) an aggressive reforestation program ensures that all harvested sites are adequately reforested, either naturally and through tree planting. While these actions do not directly reduce the intermediate forest age class gap, it helps to ensure a long term wood supply that is both sustainable and of high quality

2.1.2.5.3. Site Class

Site class represents the productivity of a site for the dominant species at a given age (Figure 9). Good site types have higher volumes than medium and poor sites at a given age for a particular species. The island, as a whole has predominately medium site types which in natural stands reach their peak volumes around age 70 to 80 year. It is also important to note that planting and PCT strategies allow for stands to reach their peak volumes at lower rotation ages.

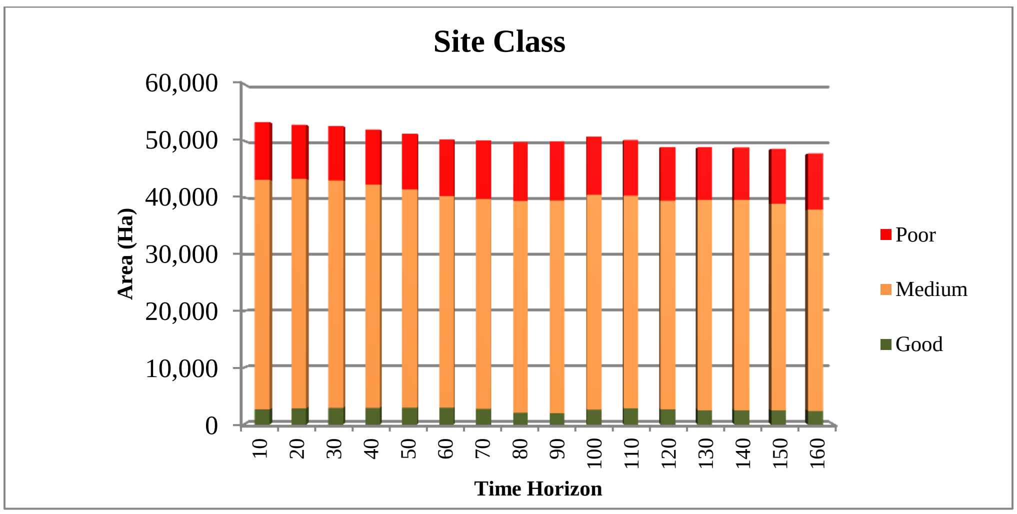


FIGURE 9: SITE CLASS FOR A TYPICAL FOREST MANAGEMENT DISTRICT

2.2. GROWTH FORECASTING

A key element in the analysis is the understanding of how forests renew themselves after disturbance and grow/develop over time to determine the merchantable or harvestable timber the forest should contain at any given point in time. This understanding is obtained through the use of "yield curves" and "regeneration assumptions".

2.2.1. Yield Curve

A yield curve (Figure 10) describes the pattern of timber volume accumulation and loss over time for a particular stand type. The validity of the analysis is largely determined by the accuracy of yield curve forecasts, and a significant amount of resources has gone into developing and updating accurate yield curves.

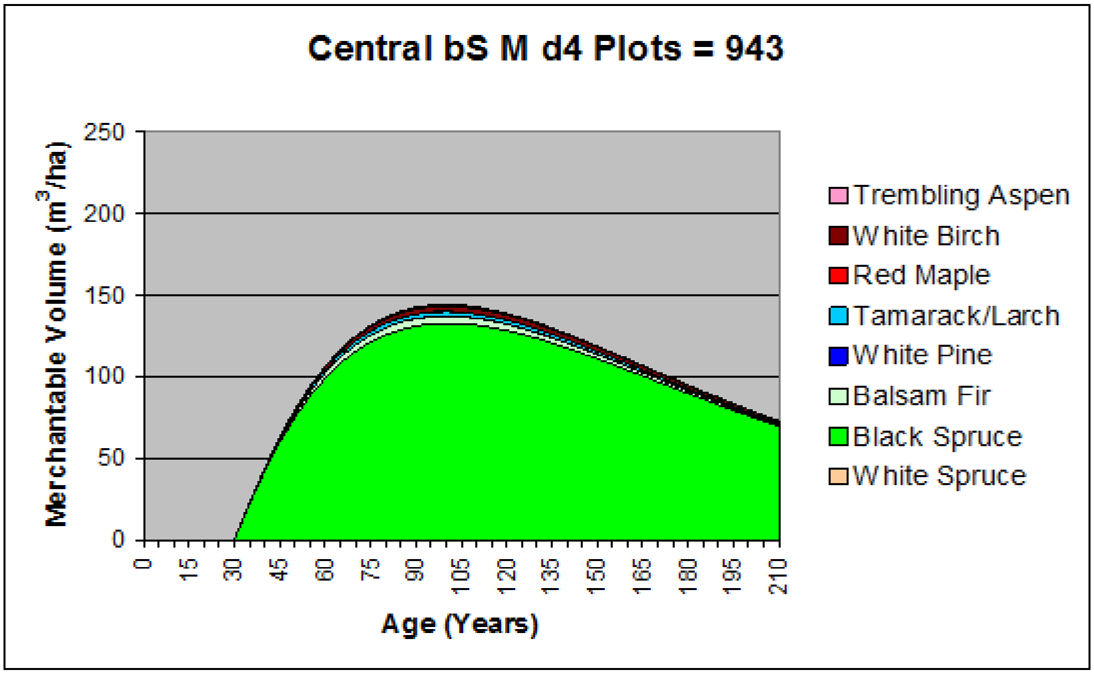


FIGURE 10: YIELD CURVE USED TO PREDICT VOLUME HARVESTED FROMA STAND

2.2.2. Regeneration Assumption

Regeneration assumptions describe the expected regeneration pattern of a forest (Table 1), after it has been disturbed by harvesting, insects, fire, etc. For each forest stratum (i.e., species, site quality, forest cover combination) assumptions are assigned on a District basis to reflect how a disturbed site is expected to regenerate. To improve the ability to predict regeneration patterns, the Forest Service has conducted extensive island-wide surveys of disturbed forest sites. The data from these plots, along with expert field opinion of Crown and industry foresters are used to develop regeneration assumptions. Sites which are not expected to regenerate naturally are targeted for planting.

TABLE 1: REGENERATION MATRIX FOR A BF MEDIUM DENSITY 2 STAND POST HARVEST

Target Species	Target Site	Target Density	Percentage Regenerated
bF	M	D2	60
bFoS	M	D2	10
bFoH	M	D3	15
HS	M	D4	3
wB	M	D5	2
NSR	M	N/A	10

2.3. Forest Management Strategies

Once the current state of the forest condition was determined and the forest database was updated and growth patterns refined, the next step in the analysis was developing strategies to effectively manage the forest – where the key objective was to maximize sustainable AAC's over the long term (160 years); yet ensuring that other forest values such as caribou habitat, protected areas, agriculture areas, aesthetics, etc. were taken into consideration. In developing the management strategies, the goal was to reduce timber losses and enhance sustainability and compliment/support the Province's 10 year (2014 – 2024) Sustainable Forest Management Strategy. Factors considered when developing the management strategies include:

2.3.1. Operability Limits

Operability limits describe the period when a forest is eligible for harvesting. Typically, a stand first becomes operable when it contains enough "merchantable" volume to warrant harvesting (i.e. be commercially viable (i.e. stands contain enough "merchantable" volume to warrant harvesting)). As stands grow older and become decadent, the merchantable volume reduces to the point where insufficient volume remains to warrant harvesting (i.e. they cease to be economically viable). Stands that have been silviculturally treated become operable at an earlier age than natural or untreated stand.

2.3.2. Harvest Flow Constraint

Government requires harvesting to take place at a consistent, but sustainable level, over the planning horizon to prevent significant fluctuations in harvest levels from year to year which creates stability in the forest industry. To reflect such consistency, even flow harvest constraints have been incorporated into the model.

2.3.3. Silviculture

Silviculture is the science of growing forest trees and stands. It is fundamental to a sustainable wood supply. In Newfoundland and Labrador, there are two main facets to the silviculture program. Forest establishment encompasses those activities associated with creating a new forest. The principal activity is tree planting which is used to create forest plantations. Forest improvement includes those activities that are used to manage an existing juvenile forest to grow more volume, improve stem form, enhance fibre quality or achieve some other management objective (Figure 11). The principal activity is pre-commercial thinning which is used to remove surplus stems from a young forest so that the remaining trees grow larger and faster, and can be harvested at an earlier age.

In recent years reforestation has emerged as the more important of the two streams of silviculture activity. Tree planting represents a great investment that will benefit future generations (Figure 12). Most seedlings being planted today are genetically improved and will grow much taller and more quickly than regular, unimproved seedlings. This means that forest plantations established today will achieve up to 20% more volume at maturity than unimproved plantations. Ongoing tree improvement work will ensure that future plantations will produce even greater volumes.

Over the past five years (2011-15), an average of 4,530 hectares has been planted annually versus 540 ha of pre-commercial thinning per annum. In the upcoming five years, it is expected that planting levels will remain stable even while the PCT area continues to decline.

FIGURE 11: GENETICALLY IMPROVED TREE SEED ORCHARD FOR BLACK SPRUCE

FIGURE 12: FOUR YEAR OLD SPRUCE PLANTATION IN WESTERN NEWFOUNDLAND

2.3.4. Analysis Planning Horizon

Government is committed to long-term forest sustainability. To ensure that actions and strategies applied today will not negatively impact the long-term sustainability of future forests, the analysis is forecasted ahead for 160 years, which represents two 80 year rotations.

2.3.5. Operable Growing Stock Allowance

To further ensure the sustainability of AAC's, an "operable growing stock allowance" has been imposed - where in any given harvest period, no more than half of the harvestable timber available in the Core land base on a Tenure/District basis may be harvested (Figure 13). To account for modelling assumptions this allowance ensures a buffer between the level of harvesting and what has been predicted to be the maximum amount of harvestable timber on the landscape.

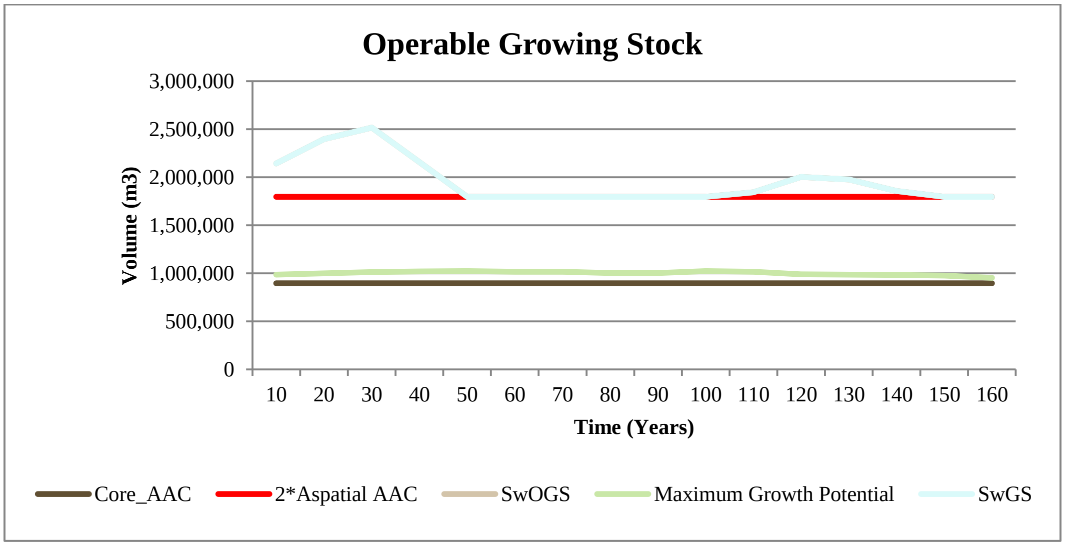


FIGURE 13: GROWING STOCK FOR THE 160 YEAR PLANNING HORIZON

2.3.6. Old Forest Targets

To ensure the presence of old growth forests on the landscape, a modeling restraint was put in place that requires (at all times through the 160 year planning horizon) , a minimum of 15% of the productive forest in each District to be 80 years of age or older (Figure 14).

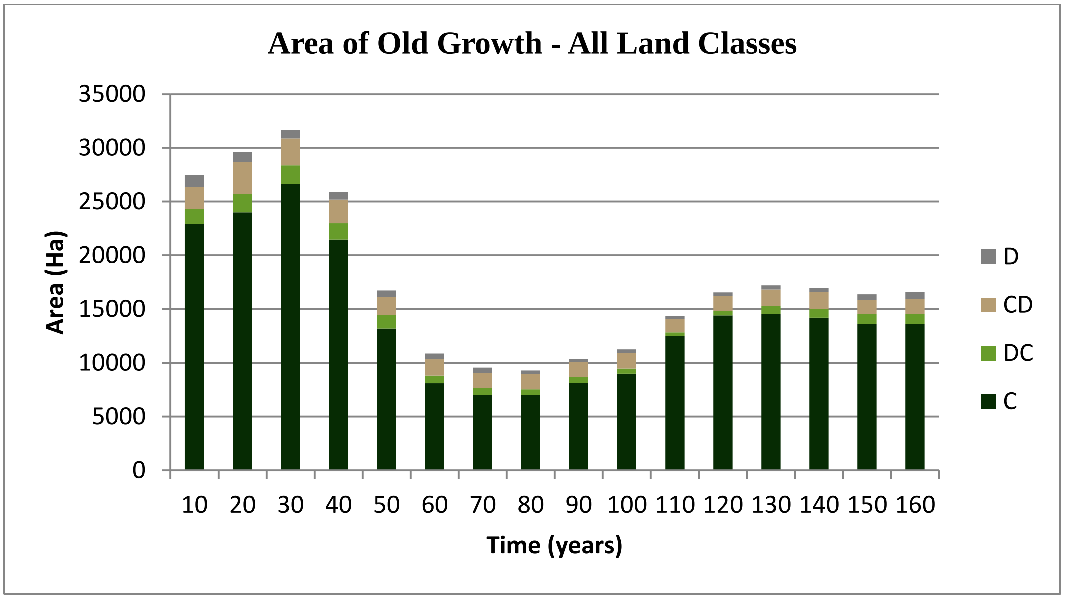


FIGURE 14: OLD GROWTH FOREST BY SPECIES COMPOSITION

2.3.7. Caribou

To meet the requirements stated in the Provinces' 10 Sustainable Forest Management year strategy, a constraint was incorporated which prohibited any industrial harvest in Core Caribou areas for the first 10 years of the planning horizon (Appendix 1).

2.3.8. Large Intact Landscapes

To meet the requirement in the Provinces' 10 Sustainable Forest Management year strategy, a constraint was incorporated which prohibited any industrial harvest in Large Intact Landscape areas for the first 10 years of the planning horizon (Appendix 2).

3. The Analysis

The analysis incorporated the land base and management strategies described above to run computer simulations which grow the forest through time and report on the amounts of harvest achievable; while satisfying any constraints applied. Inputs were varied or adjusted for cause and effect (i.e. sensitivity analysis) to allow managers to choose which management strategies and at what levels will be appropriate for the final District AAC calculations.

3.1. Model Construction and Validation

3.1.1. Forest Modeling Software

The analysis involved using specially designed computer models to forecast the impacts of various harvesting scenarios on forest sustainability of a selected land base (e.g. a Forest Management District). The modeling software used in all the analysis to date, including the 2016 analysis, is referred to as

"Woodstock & Stanley". This commercial wood supply software package is the software of choice throughout Canada and can be applied to any forest planning situation to build long-term scenarios for the sustainable management of wood supply, taking into account a variety of information, including the amount of forest land base available for timber management, the current forest structure (i.e. tree age, tree species, tree height, tree taper, stand density), forest health(i.e. fire, insects, disease, wind, floods), forest growth rates and management strategies. Woodstock also takes into account non-timber values/uses such as habitat requirements for pine marten and caribou, biodiversity, watershed management, viewscape, recreation, tourism and other forest values. The Woodstock software created unique models for each District to generated "pictures" of how today's forest will develop under different management scenarios.

The Stanley software is used to develop 20 year harvest schedule for each District and automatically generates maps showing where timber is to be harvested in the future. This provides the managers with an initial schedule that was tailored to their management objectives though manual scheduling/adjustments.

Thus, the analysis, not only determines how much wood can be sustainably harvested, it schedules where to harvest to maintain sustainability. The following elements were considered:

3.2. Scenario Generation

Managers often vary the model inputs to ultimately choose a final solution - this is known as scenario generation. By using the AAC land base and adjusting the model inputs (i.e. silviculture levels or operability limits), the model generated "pictures" of how today's forest will develop under the different management scenarios. In some cases, 10 to 20 scenarios were be generated for each FMD, before selecting the best scenario where all management objectives were satisfied to finalize the framework for management for the next five years. The final solutions generated gross sustainable harvest levels or AAC's which were then reduced to net AAC's.

3.3. Netting Down Gross Harvest Levels

The gross AAC's were adjusted downward to reflect the loss of available timber supplies, as identified below;

3.3.1. Harvest Scheduling

The use of harvest schedules fosters the long-term sustainability of the AAC's by mimicking current harvest practices and accounting for actual on-the-ground conditions that may delay or restrict the future harvesting of stands. Woodstock & Stanley alone cannot account for all the operational restrictions within a forest management District. By utilizing a manual process, along with the simulation modelling, the actual ground conditions that restrict harvesting are accounted for when defining a spatial harvest schedule. In essence, the manager evaluates the computer generate schedule and modifies the scheduling on a stand by stand basis to determine what will be harvested. The 2016 analysis generated a 20 year harvest schedule, with a 10 year harvest periods. The various harvest schedules validated through the modeling software to evaluate their sustainability and determine if non-timber objectives are achieved. In most cases, the harvest scheduling went through several iterations before an acceptable harvest schedule was realized. The Woodstock model reports a harvest level that is optimal (all stands harvested at exactly the right point in time) and identifies deviations in scheduling that occur through spatial blocking. This invariably results in an AAC reduction, known as the spatial blocking adjustment, and depending on the FMD, varied from a 1% reduction to as much as a 58% reduction. For the island as a whole, the average blocking adjustment was 11%.

3.3.2. Inventory Analysis

Adjustments have to be applied to account for volume reductions that are likely to occur due to natural disturbances and timber harvesting, including fire, insects and disease, and projected versus actual yields. GIS mapping analysis of insect-infested areas (Figure 15) that have been salvaged or harvested, was used to estimate the mean annual amount of productive timber lost to insect mortality each year. While the insect adjustment varies from District to District, the average for the 2016 analysis is less than 1%. Historical wildfire statistics are used to estimate the mean annual loss of productive timber to wildfire (Figure 16), by FMD. While the fire adjustment varies from District to District, the average for the 2016 analysis is less than 1%.

The largest deduction applied to the AAC accounted for in the difference between the projected yields generated from the Provincial Forest Inventory and the actual volumes harvested. The differences can be attributed physical volume losses that can be seen during operations, including merchantable timber that is lost during the harvesting process, high stumps, dropped pieces, big tops, rot, etc. Other losses can be attributed to the global nature of the inventory which when applied across several hundred thousand hectares (i.e. on a District basis) is accurate, but when applied on stand basis can over or underestimate the volume. This adjustment averaged 17% across all Districts.

FIGURE 15: INSECT DAMANGE IN PRODUCTIVE FOREST

FIGURE 16: WILDFIRE IN PRODUCTIVE FOREST

The consolidated Inventory adjustments varied from 9 to 28 % from District to District, while the average adjustment in 2016 analysis was approximately 18%.

4. RESULTS

The 2016 analysis utilized the best available data and used the most advanced modeling and analytical techniques.

The softwood and hardwood AAC's for the Island for 2016 to 2020 are set out below (Tables 2 & 3). Individual District softwood AAC's for the Island and Labrador are outlined in Appendix 3 and hardwood in Appendix 4. The individual district boundaries for the Island and Labrador can be found in Appendixes 5 & 6.

TABLE 2: ISLAND SOFTWOOD AAC: 2016 - 2020

Tenure	Island Softwood AAC - 2016 to 2020			
	Core (m^3)	Operational (m^3)	Domestic (m^3)	Total (m^3)
Crown	1,014,808	196,985	407,754	1,619,547
CBPPL	775,332	61,677	0	837,009
Total	1,790,140	258,662	407,754	2,456,556

TABLE 3: ISLAND HARDWOOD AAC: 2016 - 2020

Tenure	Island Hardwood AAC - 2016 to 2020			
	Core (m^3)	Operational (m^3)	Domestic (m^3)	Total (m^3)
Crown	34,500	4,036	9,114	47,649
CBPPL	21,039	82	NA	21,121
Total	57,666	4,484	9,114	68,770

The Core AAC decreased by 6% and the Operational softwood AAC decreased by 37%. These decreases reflect the designation of a new Domestic softwood AAC category. On a tenure basis, the overall Crown softwood AAC increased by 11%, while Corner Brook Pulp and Paper Limited (CBPPL)'s softwood AAC declined by 1%. Overall, the Island softwood AAC's (Table 4), increased by 6 %, compared to the 2011/15 AAC

Generally, the overall Crown softwood AAC increase was due to (i) the designation of a Domestic softwood AAC land class, which had fewer deductions for operational scheduling; (ii) updated forest inventory which captured more harvestable forest on the Crown land base. CBBPL's decrease, being such a small percentage, cannot be attributed to any one factor. Most of the analysis inputs such as inventories; yield curves, spatial schedules, and operability have all changed since the last analysis.

TABLE 4: COMPARISON OF SOFTWOOD AAC'S FROM 2011-2015 TO 2016-2020

Tenure	Island Softwood AAC - 2011 to 2015 vs 2016 - 2020											
	Core (m^3)			Operational (m^3)			Domestic (m^3)			Total (m^3)		
	2011	2016	% Change	2011	2016	% Change	2011	2016	% Change	2011	2016	% Change
Crown	1,166,100	1,014,808	-13%	298,700	196,985	-34%	-	407,754	NA	1,464,800	1,619,547	11%
CBPPL	730,800	775,332	6%	113,700	61,677	-46%	-	-	NA	844,500	837,009	-1%
Total	1,896,900	1,790,140	-6%	412,400	258,662	-37%	-	407,754	NA	2,309,300	2,456,556	6%

In comparison to the 2011/15 analysis (Table 5), the Island 2016/20 hardwood AAC's increased by 28% - with a 30% increase in the Crown hardwood AAC and a 24% increase in CBPPL's hardwood AAC.

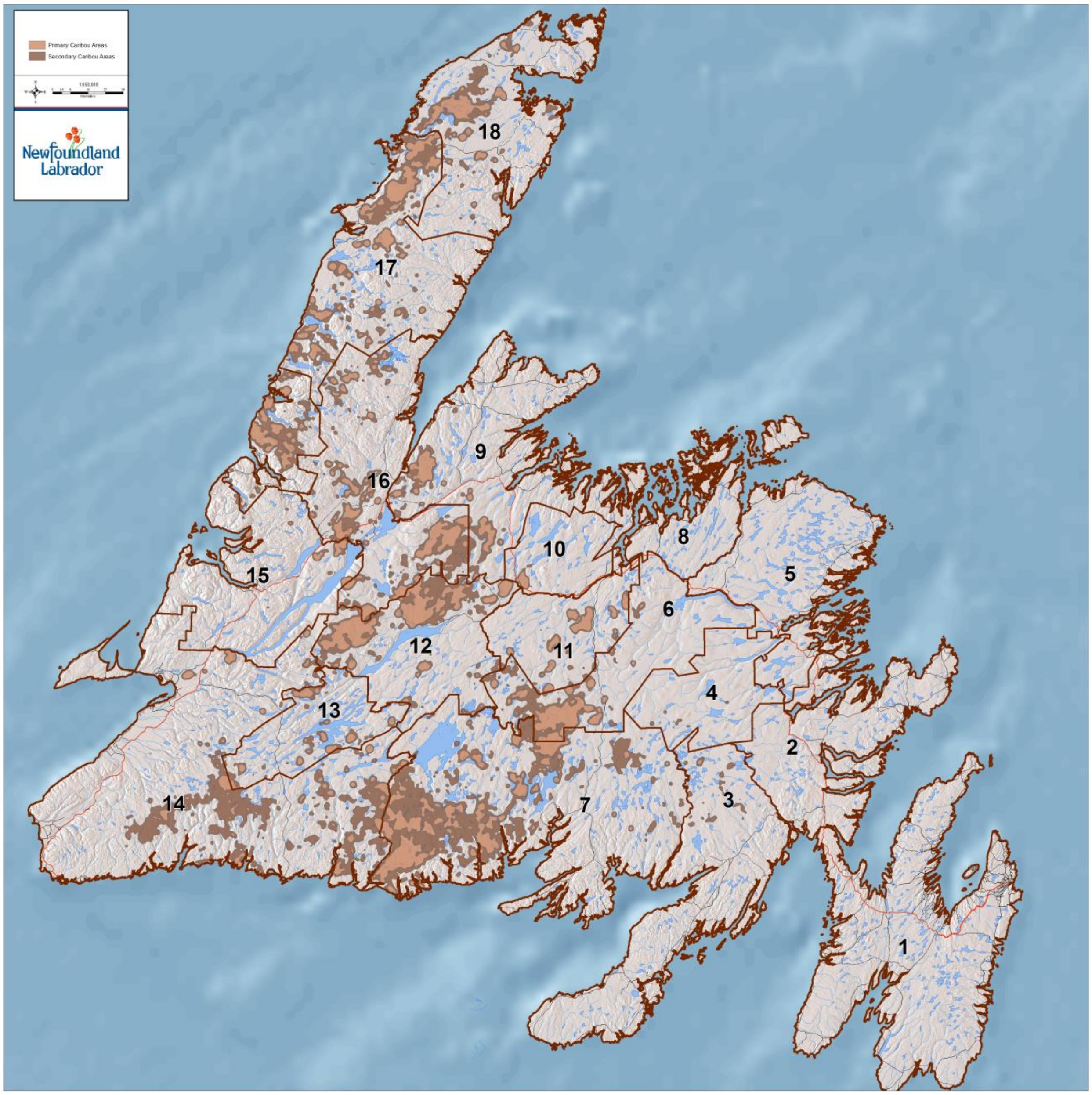
TABLE 5: COMPARISION OF HARDWOOD AAC'S FROM 2011-2015 TO 2016-2020

Tenure	Island Hardwood AAC - 2011 to 2015 vs 2016 - 2020											
	Core (m^3)			Operational (m^3)			Domestic (m^3)			Total (m^3)		
	2011	2016	% Change	2011	2016	% Change	2011	2016	% Change	2011	2016	% Change
Crown	28,600	34,500	21%	8,000	4,036	-50%	-	9,114	NA	36,600	47,650	30%
CBPPL	14,000	21,039	50%	3,100	82	-97%	-	-	NA	17,100	21,121	24%
Total	42,600	55,539	30%	11,100	4,118	-63%	-	9,114	NA	53,700	68,771	28%

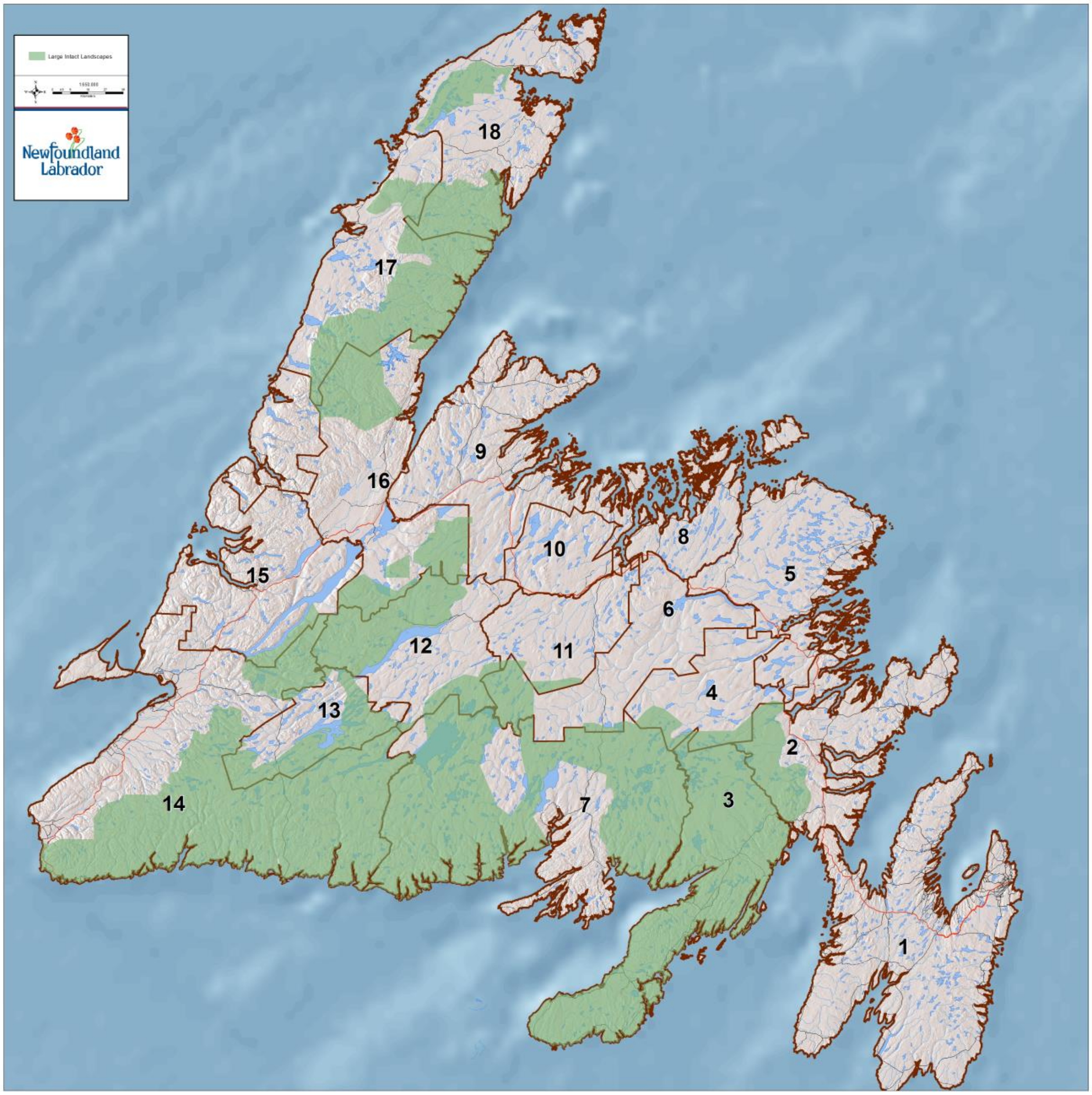
The increases reflect an emphasis being placed on higher operability limits, as more hardwood stands are harvested for fuel wood which allows for higher harvest levels in a wider variety of stand types. Hardwoods represent a relatively minor component of the Island forest and changes in modelling assumptions can have big impacts on AAC levels.

APPENDIXES

APPENDIX 1: CARIBOU AREAS FOR THE ISLAND OF NEWFOUNDLAND.



APPENDIX 2: LARGE INTACT LANDSCAPES FOR THE ISLAND OF NEWFOUNDLAND.



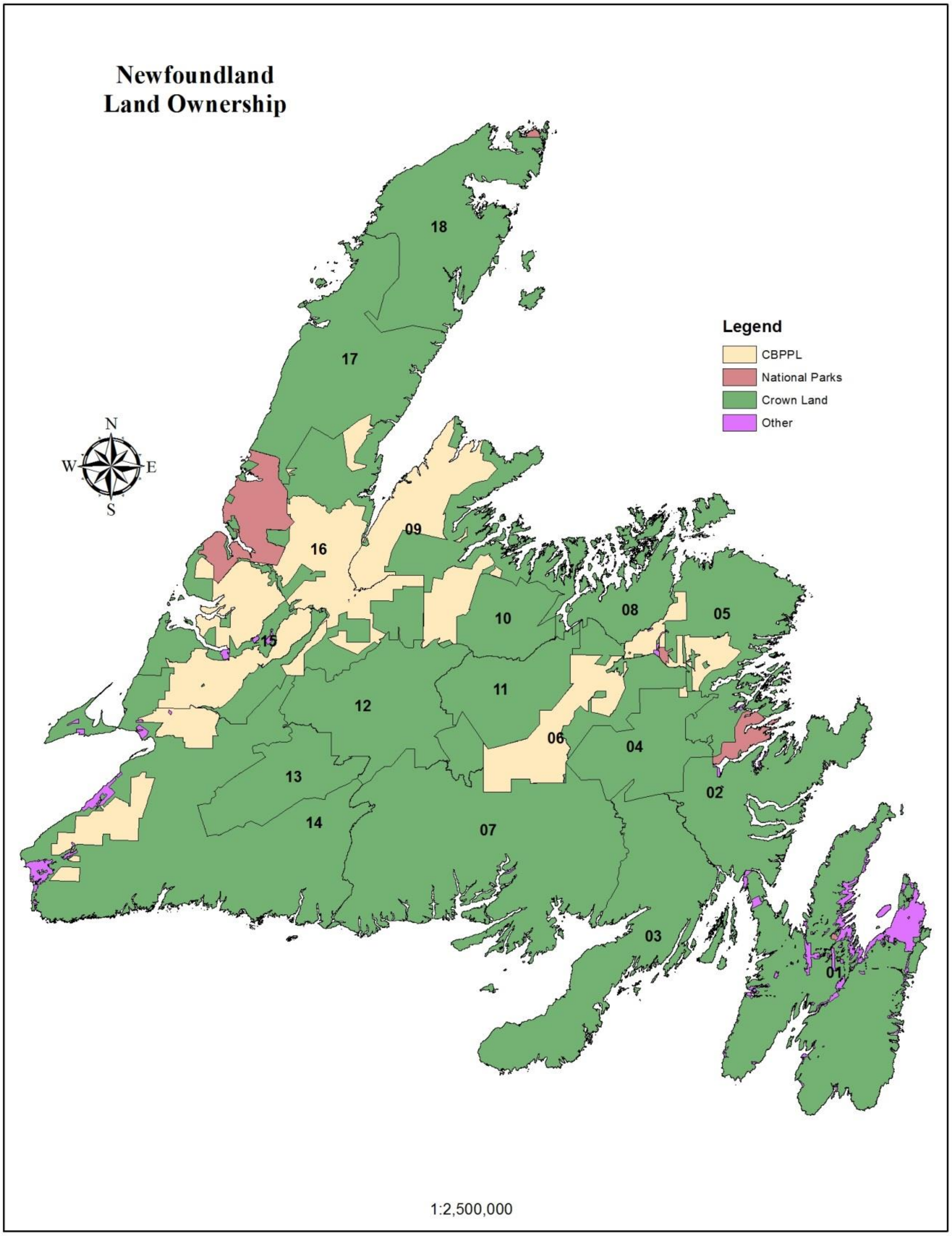
APPENDIX 3: PROVINCIAL 2016 – 2020 SOFTWOOD AAC'S BY DISTRICT, TENURE AND LAND CLASS

District	Softwood AAC (m^3)			
	Core	Operational	Domestic	Total
Crown				
1	21,080	85	101,320	122,485
2	60,840	8,112	32,292	101,244
3			13,391	13,391
4	41,140	13,345	1,275	55,760
5	35,155	21,251	41,001	97,407
6	61,699	4,740	-	66,439
7	22,308	2,652	858	25,818
8	75,840	22,640	-	98,480
9	38,376	1,968	53,874	94,218
10	74,885	3,060	-	77,945
11	169,745	4,930	-	174,675
12	180,072	6,478	-	186,550
13	18,942	287	-	19,229
14	41,164	8,774	43,706	93,644
15	6,109	12,546	35,916	54,571
16	14,596	54,940	18,696	88,232
17	79,492	17,964	25,344	122,800
18	73,365	13,213	40,081	126,659
Crown Total	1,014,808	196,985	407,754	1,619,547
CBPPL				
5	50,687	2,639		53,326
6	65,611	3,731		69,342
9	161,622	7,626		169,248
14	114,226	8,036		122,262
15	262,974	20,457		283,431
16	120,212	19,188		139,400
CBPPL Total	775,332	61,677		837,009
Island Total	1,790,140	258,662	407,754	2,456,556
Crown Labrador				
19	200000			200,000
20	30100			30,100
21	48700			48,700
22	13000			13,000
23	15700			15,700
24				
Crown Total	307500			307,500
Provincial Total	2,097,640	258,662	407,754	2,764,056

APPENDIX 4: PROVINCIAL 2016 – 2020 HARDWOOD AAC'S BY DISTRICT, TENURE AND LAND CLASS

District	Hardwood AAC (m^3)			
	Core	Operational	Domestic	Total
Crown				
1	157	-	-	157
2	2,161	234	663	3,058
3				-
4	935	340	-	1,275
5	2,173	909	2,647	5,728
6	1,161	593	-	1,754
7	1,061	-	-	1,061
8	2,640	674	120	3,434
9	2,542	-	2,829	5,371
10	4,505	-	-	4,505
11	4,335	-	-	4,335
12	7,257	-	-	7,257
13	882	-	-	882
14	1,804	328	1,435	3,567
15	2,214	656	1,107	3,977
16	206	123	205	534
17	468	180	108	756
18	-	-	-	-
Crown Total	34,500	4,036	9,114	47,649
CBPPL				
5	3,795			3,795
6	2,730			2,730
9	5,084			5,084
14	5,002			5,002
15	3,116	82		3,198
16	1,312			1,312
CBPPL Total	21,039	82		21,121
Island Total	55,539	4,118	9,114	68,770

APPENDIX 5: ISLAND TENURE AND FOREST MANAGEMENT DISTRICT BOUNDARIES



APPENDIX 6: LABRADOR TENURE AND FOREST MANAGEMENT DISTRICT BOUNDARIES