

Type IV Silviculture Strategy

Morice Timber Supply Area

DRAFT Situation Analysis

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1 Introduction

The BC Ministry of Forests, Lands and Natural Resource Operations (MoFLNRO) have initiated a Type IV Silviculture Strategy for the Morice Timber Supply Area (TSA). An urgent timber supply review in 2008 set the allowable annual cut (AAC) at 2,165,000 m³ per year for the TSA. The Morice and Lakes Innovative Forest Practices Society completed an extensive analysis of a variety of management options between 2007 and 2010, and completed a Silviculture Type II analysis in 2009. In addition, MoFLNRO recently completed a special timber supply analysis as part of the Mid-term Timber Supply Project. These documents were reviewed and the most relevant options and factors were selected to provide a good base from which to pursue silviculture strategy development and/or more fully explore critical issues such as mountain pine beetle (MPB) related salvage strategies, priorities, and post-beetle timber supply. Given the focus of this project a new data package is in development and will take advantage of existing information from the previous analyses and district staff as required. **This Type 4 silviculture strategy aims to develop updated TSA objectives and strategic guidance on harvesting and basic / incremental silviculture - resulting in a tactical plan to support implementation. It will also be used to guide allocation of Land Base Investment Strategy (LBIS) resources**

1.1 Context

This document is the first of four documents that make up a type IV Silviculture Strategy, the documents are:

1. Situation Analysis – describes in general terms the situation for the unit. The Situational Analysis (draft) forms the starting point for the initial meeting to identify opportunities.
2. Data Package - describes the information that is material to the analysis including data inputs and assumptions.
3. Modeling and Analysis report –provides modeling outputs and rationale for choosing a preferred scenario.
4. Silviculture Strategy –provides treatment options, associated targets, timeframes and benefits.

2 Summary of Current Plans and Strategies

2.1 Timber Supply Review 2 (2002) and Urgent Timber Supply Review (2008)

Timber Supply Review (TSR) 2 was completed in 2002. It did not account for any beetle impacts and once the severity of the beetle infestation became apparent the Ministry of Forests and Range carried out an urgent timber supply review in 2008 to support an annual allowable cut (AAC) uplift from 1,961,000 m³ annually to 2,165,000 m³ annually (approximately 10%) to facilitate the salvage of dead and attacked pine stands¹.

¹ The partition includes a non-pine species partition, equating to 550 000 cubic metres per year

2.2 Morice Land and Resource Management Plan

The Morice Land and Resource Management Plan (LRMP) was approved in 2007. It covers approximately 1.5 million hectares of land in central northwestern British Columbia. The plan is a result of negotiations that involved public and provincial government sectors and two area First Nations. The plan contains direction for the sustainable management of Crown land and resources in the plan area.

The plan gives general management guidance regarding consultation, community values, economic values and ecosystem values. This guidance includes:

- Objectives for the protection of First Nations' traditional land uses and cultural sites;
- Best management practices for important wildlife habitat areas, fish habitat, water quality and rare and endangered ecosystems;
- Partnerships with local First Nations to ensure effective and ongoing plan implementation and monitoring;
- Targets for the treatment of detected mountain pine beetle infestations.

The plan further provides area specific management direction in twenty geographic resource management zones (RMZ). Additional objectives, measures and targets apply to certain resources or activities in these zones to reflect the specific values in each zone. In some cases no timber harvesting is allowed while in others timber harvesting is permitted with area-specific direction.

Protected areas have been identified for their natural, cultural heritage and/or recreational values in accordance with the Provincial Protected Areas Strategy (PAS). Logging, mining and hydroelectric development are prohibited in all these areas. The LRMP identifies seven new protected areas, in addition to previously existing provincial parks and ecological reserves. Approximately 123,000 hectares - 8.2 percent of the total plan area - are set aside as protected areas.

2.3 Morice and Lakes IFPA

Six forest licensees in both the Morice and Lakes TSAs hold an Innovative Forest Practices Agreement (IFPA). The IFPA was awarded in 1999 under Section 59.1 of the *Forest Act*. IFPAs are expected to provide the forest industry with opportunities to practice innovative forest management. Should such practises improve the productivity of the forest resource, a regional manager may approve a forestry plan and determine what annual allowable cut (AAC) increases, if any, should be awarded to specific IFPA licences as per Section 59.1 of the *Forest Act*.

The IFPA licensees have completed a Sustainable Forest Management Plan (SFMP) for the Morice TSA². As part of the SFMP, several timber supply scenarios were completed. These scenarios investigated LRMP impacts and mountain pine beetle (MPB) mitigation options. One of the scenarios, the Mitigation Composite Scenario (MCS) included the LRMP impacts with the addition of innovative practices and some updated assumptions. This last scenario was used as the basis for a request in 2007 for an AAC increase under Section 59.1 (7) of the *Forest Act*.

In 2008 the regional manager granted an AAC increase of 200,000 m³ to the IFPA. The increase was attributed to:

² <http://www.for.gov.bc.ca/bcts/areas/tba/SFMPPlanCanforMoriceFinal.pdf>

- Reduced operational adjustment factors through field studies;
- SIBEC site indices (PEM);
- Increased utilization, stump height surveys;
- Increased ratio of spruce to pine in plantations;
- Genetically improved seed, licensee seed orchards; and
- MPB mitigation through harvest scheduling.

Ongoing monitoring and reporting was set as a condition for the maintenance of the increased AAC.

The analysis work commissioned by the IFPA has provided information on a variety of policy issues. It has also demonstrated the importance of harvest rules, harvest scheduling (salvage), species selection and minimum operability on the mid-term timber supply.

2.4 Mid-term Timber Supply Technical Working Group Report for the Morice TSA

The Ministry of Forests, Lands and Natural Resource Operations (MoFLNRO) completed a timber supply analysis in 2012 which explored mid-term timber supply mitigation opportunities. The analysis explored the impact of selected management practices and changes in the management of non-timber values. This analysis is discussed below under section 3.

2.5 Silviculture Strategies

2.5.1 Type 1 Silviculture Strategy

A type 1 silviculture strategy was completed for the Morice Timber Supply Area (TSA) in March 2000. Due to the significant impact of the MPB epidemic on timber supply and habitat in the TSA, the Ministry of Forests and Range (MoFR) commissioned an update to the original type 1 silviculture strategy in August 2005. This update primarily dealt with government-funded intensive and backlog silviculture opportunities, and reforestation of dead lodgepole pine (PI)-dominated stands, which were not going to be salvaged.

The following strategies were recommended for timber supply (quality and quantity):

1. Comprehensive TSA fertilization strategy; localized candidate stand and site criteria; identify opportunity areas.
2. Fertilize young mature spruce- leading stands 60 to 80 years old to generate short-term volume gains.
3. Fertilize immature spruce- leading stands according to the TSA fertilization strategy. Pine-leading stands should be considered once the MPB epidemic subsides.
4. Non- Recoverable Losses Reforestation Strategy.
5. Treatment of NRL Areas.
6. Forest Health Surveys.
7. Seed collections; Douglas fir and possibly pine to replace seed prone to rust.

8. Backlog NSR, reclassification.
9. Past Wildfire Areas, mapping and surveys, machine knockdown, planting.

Basic Silviculture Strategies

1. Revisit TSA stocking standards.
2. Establish a diversity of tree species where ecologically feasible to attain full site occupancy and to buffer against future pest and disease losses.
3. When planting utilize improved seed.

Habitat

1. Underplant unsalvaged areas where no reforestation responsibility exists in sensitive watersheds linked to high value fish streams and temperature sensitive streams.
2. Underplant in riparian and enhanced riparian areas
3. Maximize diversity of underplanting stock.
4. Selected species habitat strategy; use incremental silviculture to speed recovery of habitat elements in short supply.
5. Mitigate loss of older forest stand structures by thinning mid-seral and mature forest to speed recovery of old growth structure habitat strategy. Focus on non- pine leading WTPs and OGMAs and use light burning in critical wildlife habitat areas, NRL areas, rare ecosystems and caribou habitat.
6. Road rehabilitation to manage access for species and ecosystems sensitive to access.

Silviculture Program:

- Funding level \$18 million over five yrs

2.5.2 Type 2 Analysis

In 2007, the Morice and Lakes IFPA commenced a Type 2 silviculture strategy for the Morice TSA developing silviculture strategies that would promote additional timber supply and enhance habitat for the mid term. The analysis focused on several issues such as treatments of stands that were not expected to be severely attacked by the MPB; prioritization of rehabilitation of MPB attacked stands and impact of the use of genetically improved stock. Those habitat indicators that were integral to the sustainable forest management plan (SFMP) were also investigated.

The Type 2 analysis modeled several learning scenarios and built a preferred scenario including components from the learning scenarios. The preferred scenario contained actions and treatments that were predicted to mitigate the MPB infestation and increase the mid-term harvest level. The predicted impacts were significant: the midterm harvest level increases were between 21.9% and 43.9% compared to the base case that was developed for the project.

The treatments included in the preferred scenario were:

1. Seedling stock from genetically superior trees; the positive impact is attributable to improved growth rates. Faster and better growing trees can decrease the time for the regenerated stands to reach visually effective green-up (VEG) height allowing for the harvest of adjacent stands quicker. This impact may be in the short, medium and long term.

If green-up is not constraining the harvest in the land base, the positive impact is usually limited to the medium and long terms.

Late mid-term impact 10% - 24%, up to 200,000 m³ per year.

2. Increasing the spruce component in selected ecosystems was found to increase the harvest volume.

Late mid-term impact up to 2,000 m³ per year.

3. Fertilization of selected stands.

Late mid-term impact between 16,000 m³ and 160,000 m³ per year.

4. Rehabilitation of attacked pine stands; site productivity, management criteria, MPB attack. Attacked stands that could no more reach 140 m³/ha.

Late mid-term impact between 50,000 m³ and 300,000 m³ per year.

Five year program cost: \$42 million (average of \$8.4 million per year).

2.6 Forests for Tomorrow Program (2007 to 2011)

- Since 2006, 2,495 hectares of spruce stands fertilized;
- In next 10 years, an additional 3,000 hectares a year are expected to be fertilized;

2.7 Fire Management

A wildfire management plan is currently being prepared for the Morice TSA. The planning team is in the process of setting the planning priorities. The focus will be on risk to life and structures with appropriate buffers planned. This silviculture strategy will account for any draft fire management strategies that may be available.

2.8 Species Monitoring

The MPB epidemic and others have emphasized how susceptible monocultures can be to pest infestations. In 2009 the chief forester provided direction on the need to understanding current trends in species selection, developing species selection criteria for sustainable future ecosystems and setting up a monitoring framework for updated data. A 2012 report from MoFLRNO provides an assessment of the species distribution for the Morice TSA. The percent share of harvest by species for the Morice TSA is illustrated in Figure 1, while Figure 2 shows the planted species for the TSA.

Data indicate a trend of a significant increase in pine harvest from 2004 on. This is expected as the harvest has concentrated on MPB attacked and at risk pine stands for some time (Figure 1).

The share of spruce in reforestation has increased over time (Figure 2). This development is in response to the MPB epidemic as well; when ecologically appropriate, more spruce is planted in previously pine dominated areas to increase species diversity and buffer against pests and diseases. In addition, the IFPA found in their analysis that increasing the spruce component in selected ecosystems potentially increases the growth and yield of regenerated stands.

Survey data indicates that while not generally planted in large quantities, the natural ingress of balsam tends to bring the balsam component in young stands to historic levels (not shown).

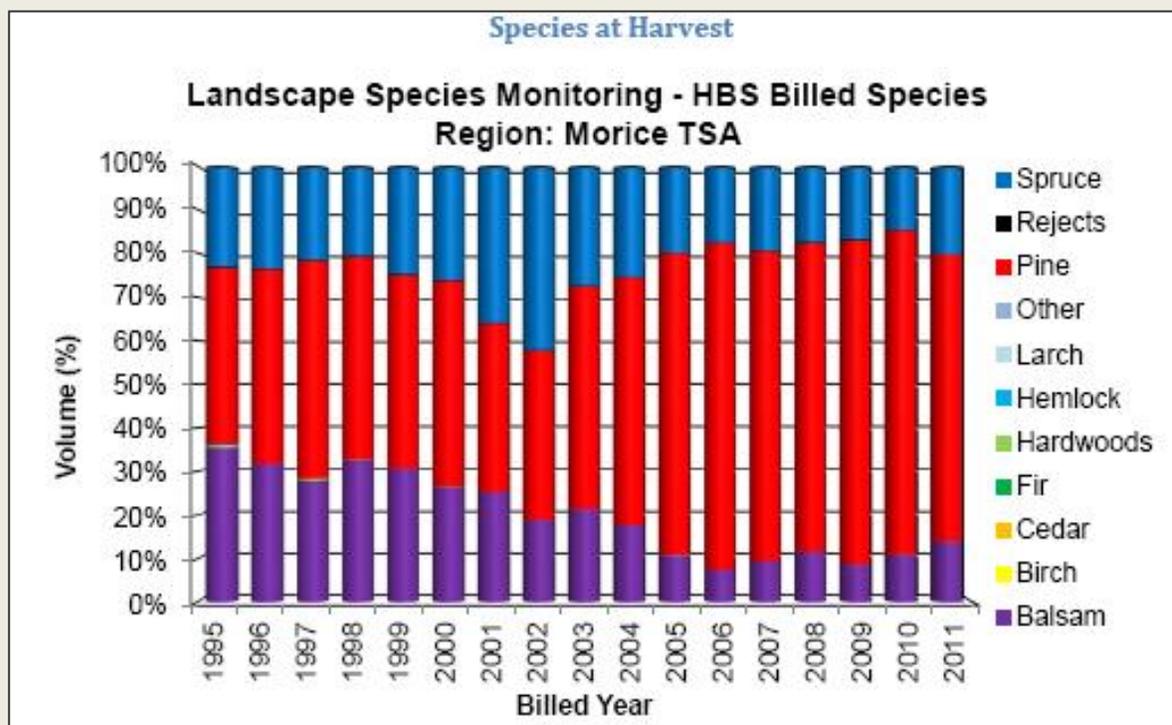


Figure 1 – HSB billed species in the Morice TSA, source MoFLNRO 2012

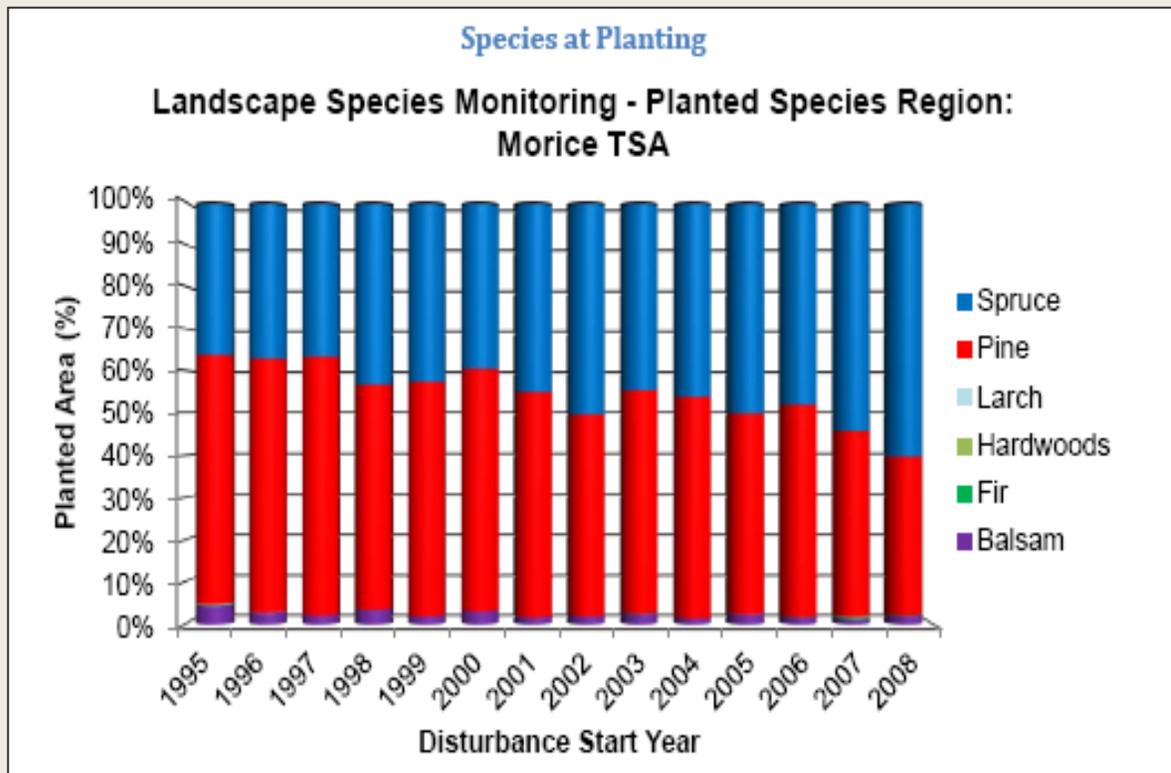


Figure 2 – Planted species in the Morice TSA, source MoFLNRO 2012

3 Timber Supply

3.1 Historical and Current AAC

The current AAC in the Morice TSA is 2.165 million m³ per year with 550,000 cubic metres attributable to non-pine species. It was increased in 2008 from 1.961 million m³ (*Table 1*) in response to the MPB epidemic to facilitate salvage of the attacked pine stands.

Table 1 Historical and current AAC

| | 1996 | 2002 | 2008 | Current |
|------------------------------|-------|-------|-------|---------|
| AAC (000,000m ³) | 1.986 | 1.961 | 2.165 | 2.165 |

The harvest performance in the TSA has mostly met expectations; from 2007 to 2011 the average annual harvest level in the Morice TSA has been approximately 104% of the AAC of which 71% was pine.

3.2 Current Timber Supply Situation

Figure 3 shows several harvest forecasts for the Morice TSA.

- TSR 2 predicted a mid-term and a long-term harvest level of 1,803,000 m³ per year; however, no beetle impacts were included in that analysis.
- The urgent timber supply review in 2008 presented 3 scenarios with different assumptions regarding the short-term harvest and shelf life. Figure 3 presents one of those scenarios, scenario 1. Scenario 1 predicted a mid-term harvest level of 895,000 m³.
- The 2009 Type 2 silviculture analysis base case shows a significantly different timber supply forecast; the mid-term harvest level drops as low as 674,595 m³ per year for 40 years (Figure 3).
- In 2012 the Ministry of Forests, Lands and Natural Resources Operations (MoFLNRO) completed the so called mid-term mitigation analysis using mostly TSR 2 assumption with the estimated beetle impacts accounted for. The mitigation analysis predicted a mid-term harvest level of 1,504,000 m³ annually from year 11 until year 70.

Note that the analysis assumptions in the above analyses differed resulting in dissimilar harvest forecasts. Notable differences were:

- TSR 2 did not incorporate MPB;
- Size of the timber harvesting land base was different in different analyses;
- The Type 2 base case used no genetic gain;
- Spatial patch targets were incorporated in the Type 2 analysis;
- Seral stage targets as per the Morice LRMP were used as constraints in the Type 2 analysis. All the analyses by the MoFLNRO used the provincial old growth order;

- SIBEC based site indices were used as the basis for future managed stands and their modelling in the Type 2 analysis. MoFLNRO analyses used adjusted site indices for pine leading stands only;
- MPB related mortality was accounted for differently in all analyses.

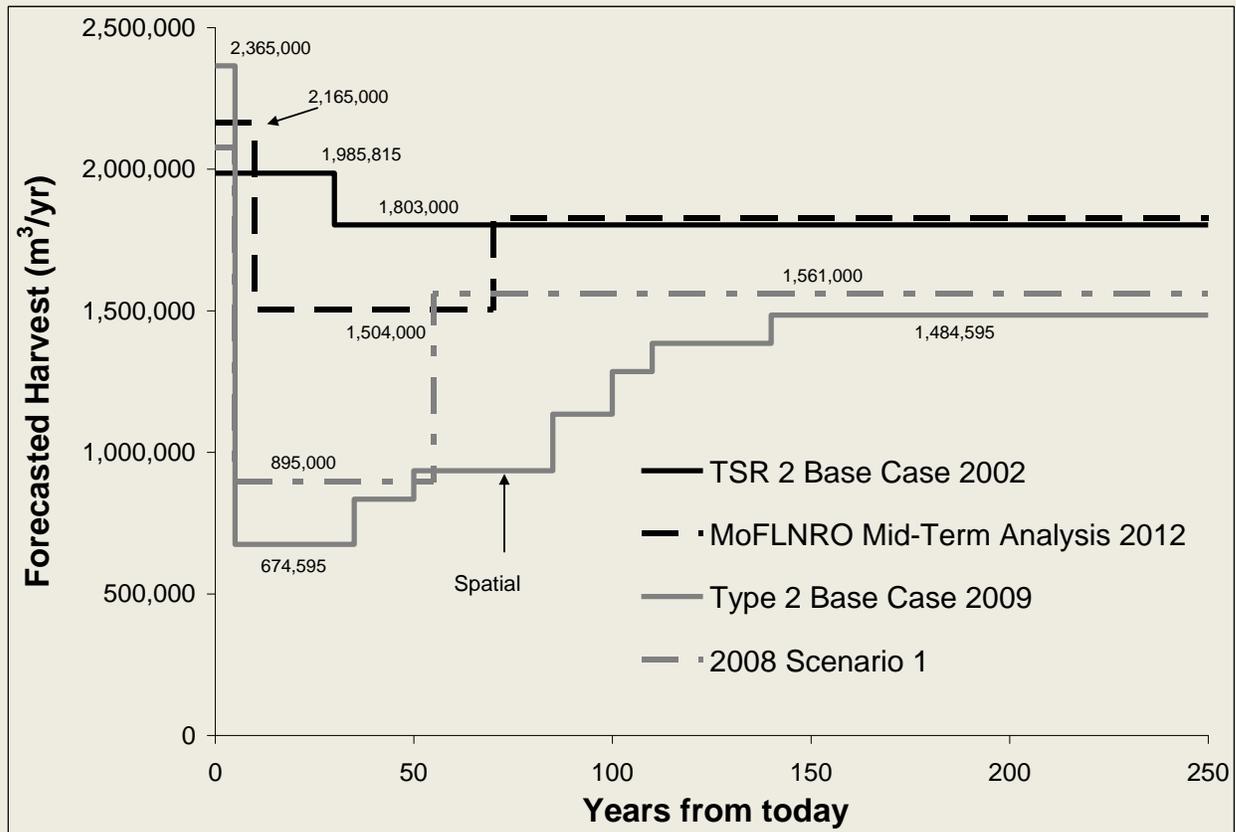


Figure 3 – Various timber supply forecasts for the Morice TSA

3.3 Timber supply projections considering MPB, mid-term harvest level

The latest version of the British Columbia Mountain Pine Beetle Model (BCMPB 9) predicts a total mature pine kill of 35.6 million cubic metres for the Morice TSA by 2021. This is approximately 62% of the mature pine that was on the timber harvesting land base in 1999.

It is uncertain what the mid-term harvest forecast for the Morice TSA is. Table 2 presents several predicted mid-term harvest levels from past analyses. The mid-term harvest forecasts for those analyses that considered MPB impacts and did not investigate mitigation options range from 675,000 m³ per year (Type 2 base case) to 1,504,000 m³ annually (2012 Mid-term mitigation analysis).

Table 2 Mid-term harvest forecast scenarios

| Years from today | TSR 2 | Urgent TSR S1 | Urgent TSR S2 | Urgent TSR S3 | Type 2 Base | Type 2 Comp | 2012 Base | 2012 Mitigation |
|------------------|--------------|---------------|---------------|---------------|--------------|--------------|--------------|-----------------|
| 6-10 | 1.985 | 0.895 | 1.076 | 2.076 | 2.365 | 2.365 | 2.165 | 2.165 |
| 11-15 | 1.985 | 0.895 | 1.076 | 1.085 | 0.675 | 0.823 | 1.504 | 1.857 |
| 16-20 | 1.985 | 0.895 | 1.076 | 1.085 | 0.675 | 0.823 | 1.504 | 1.857 |
| 21-25 | 1.985 | 0.895 | 1.076 | 1.085 | 0.675 | 0.971 | 1.504 | 1.857 |
| 26-30 | 1.985 | 0.895 | 1.076 | 1.085 | 0.675 | 0.971 | 1.504 | 1.857 |
| 31-35 | 1.803 | 0.895 | 1.076 | 1.085 | 0.675 | 0.971 | 1.504 | 1.857 |
| 36-40 | 1.803 | 0.895 | 1.076 | 1.085 | 0.835 | 1.104 | 1.504 | 1.857 |
| 41-45 | 1.803 | 0.895 | 1.076 | 1.085 | 0.835 | 1.104 | 1.504 | 1.857 |
| 46-50 | 1.803 | 0.895 | 1.076 | 1.085 | 0.835 | 1.104 | 1.504 | 1.857 |

3.3.1 Land Base Constraints

A recent analysis by the MoFLNRO (2012) investigated the mid-term timber supply mitigation options. One scenario was presented:

- Relax visual constraints in areas with visual quality objectives (VQO) of preservation, retention and partial retention. Eliminate visual constraints in areas with VQO of modification;
- Relax the constraint for the provincial non-spatial old-growth order by assuming that all stands older than 120 years of age are old in all biogeoclimatic zones;
- Reduce stand-level biodiversity requirements by at least one-half;
- Eliminate cutblock adjacency constraints;
- Increase the timber harvesting land base 3% by adding marginally economic stands within the no-timber harvesting area.

The above changes improved the mid-term timber supply by 353,000 m³ annually.

3.3.2 Attack in young pine stands

Data on the MPB attack in young stands were collected in the Lakes TSA between 2006 and 2008. According to the Nadina Forest District staff similar pattern exists in the Morice TSA. 29% of age class 2 stands showed attack with 1% of the stands reverting back to NSR status (Table 3). 48% of the age class 3 stands indicated MPB attack with 24% of these stands classified as NSR.

Table 3 Summary of 2006 - 2008 Survey in pine-leading plantations in the Lakes TSA, source MoFNRO, Nadina FD, 2012

| Age Class | Total Area (ha) | Total Area With MPB (ha) | MPB % | NSR % MPB |
|-----------|-----------------|--------------------------|-------|-----------|
| 1 | 6,140 | 270 | 0.04% | 0% |
| 2 | 10,874 | 3,144 | 29% | 1% |
| 3 | 1,699 | 819 | 48% | 24% |

3.4 Unsalvaged MPB-killed timber with poor or no regeneration

There is uncertainty regarding the area or volume of MPB killed pine stands that will remain unharvested in the Morice TSA. The 2009 Type 2 analysis predicted that this area would be approximately 128,954 ha. The stands forming this area were further used in the Type 2 analysis as candidate stands for rehabilitation.

According to the Nadina Forest District, these stands are scattered over a wide area and the rehabilitation of them on a large scale may not be feasible. Some of the dead stands have potentially viable secondary structure, which could help in mitigation of the mid-term timber supply without treatment.

3.5 Reliance on non-pine leading stands

Once the salvage of dead pine stands is complete, most of the post salvage harvest will come from spruce and balsam leading stands. The harvest of these stands today will have an impact on the mid-term timber supply.

Managed pine leading stands will start contributing to timber supply towards the end of the mid-term starting at around year 60.

3.6 Impacts on Age Class Distribution

The MPB epidemic and associated high level of salvage harvesting have skewed the current age class distribution in the TSA in favour of young stands between 0 and 20 years old. Figure 4 depicts the age class distribution as of 2009 in the Type 2 analysis. This trend is expected to continue for some time yet as a result of continued harvest and dying and breaking up of unsalvaged pine stands. The notable shortfall of stands in age class 3 will constrain the harvest in the medium term.

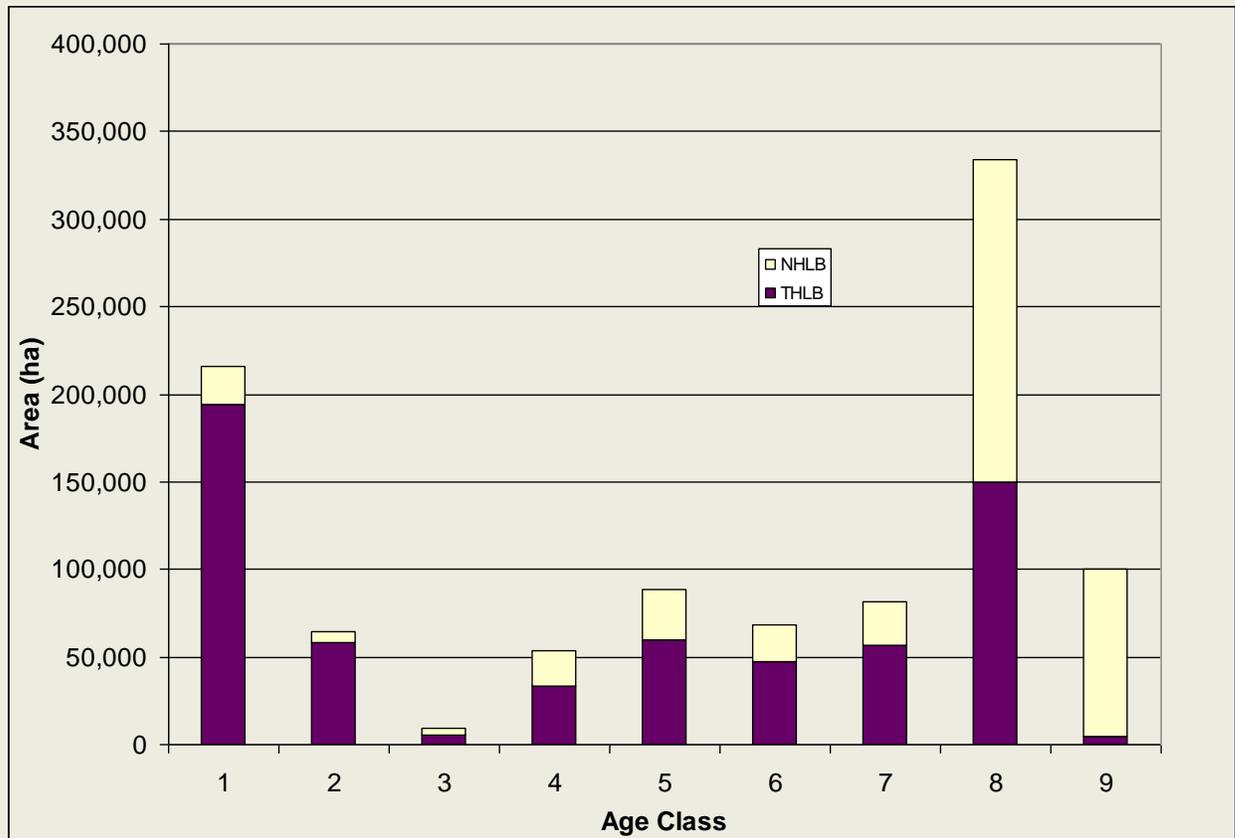


Figure 4 – Age class distribution in 2009, Morice TSA (Tesera systems Inc.)

4 Additional Silviculture and Forest Management Challenges

4.1 Uncertainty Regarding the Health of Mature Non-Pine Leading Stands

After the MPB-related salvage is completed, most of the harvest will depend on mature stands of non-pine species. Spruce and balsam bark beetles have periodically attacked portions of the TSA. The non-pine species health issues should be considered to ensure that the mature non-pine volume will be available in the future.

4.2 Uncertainty Regarding the Health, Quality and Yield of Managed Stands

The timber supply in the mid-term is dependent on currently young, managed stands. The timing and magnitude of silviculture investments in these immature stands could have significant timber supply impacts. Many of these stands are pine-leading with observed and surveyed MPB infestations. The magnitude and frequency of this attack in young stands is uncertain.

According to the Morice TSA foresters there are also incidents of stem rusts in immature pine. *Conartium* spp. and *Endocronartium* spp. and needle blights such as *Dothistroma* have negative effects on both stand productivity and wood quality of pine. These forest health issues may impact timber supply and merchantability in the mid-term even if the young pine stands survive the current MPB infestation.

4.3 Basic Silviculture

The success of basic silviculture is crucial to future timber supply. Basic silviculture is also the basis for future incremental treatments. The following questions have been discussed throughout British Columbia in the silviculture strategy workshops:

- Are the initial stocking densities sufficient to ensure the production of a reasonable volume of timber on a given site?
- Are the initial densities sufficient in providing the quality of timber for future markets?
- Are the initial densities sufficient to buffer against future abiotic and biotic damaging agents?
- Should there be more of a mix of species, where ecologically feasible, to buffer against future abiotic and biotic damaging agents?
- What is the potential impact of climate change on species choices, should some species be demoted or promoted?

5 Timber Quality Situation

The current provincial target for premium logs is 10% of the AAC for each TSA. The 2009 Type 2 silviculture analysis initially defined a premium log as a log coming from stand with an average stand diameter of 32.5 cm. The subsequent analysis did not set any targets for premium logs. Timber quality definitions and targets will be discussed with the TSA stakeholders at the silviculture strategy workshop.

6 Biodiversity and habitat issues

The loss of mature and old forest due to the MPB infestation has a significant impact on aquatic and terrestrial habitat and other values such as:

- Overall Biodiversity, including old and mature seral stage objectives; connectivity and patch size objectives;
- Visual Quality;
- Tourism;
- Parks;

- Lakeshore and Riparian Management;
- Wildlife Habitat Areas;
- Ungulate Habitat;
- Community Watersheds;
- Water quality and fisheries;
- Species at Risk;
- Retention strategies;

The previous Type 1 silviculture strategies have made recommendations to address these habitat concerns as documented earlier in this report.

The Morice sustainable forest management plan (SFMP) and the Morice Land and Resource Management Plan (LRMP) guide forest management in the TSA and set biodiversity and habitat related objectives that are beyond those specified by legislation.

6.1 Description of any existing retention strategies

The Morice LRMP sets retention targets for different land use zones. In some cases the targets do not exist, rather a commitment to establish targets is outlined in the document. The monitoring of retention is accomplished through the LRMP Monitoring Report.

6.2 Ecosystem Restoration

The provincial ecosystem restoration program aims to restore identified ecosystems to an ecologically appropriate condition. Its goal is to create resilient landscapes that support the economic, social, and cultural interests of British Columbia. Ecosystem Restoration is a process that helps degraded, damaged, or destroyed ecosystems in their recovery. The program's focus has been fire maintained ecosystems and their restoration. These ecosystems do not exist in the Morice TSA.

7 OBJECTIVES OF WORKSHOP

The objective of this initial workshop is to:

- Review basic data and clarify key issues around future timber supply, timber quality, and habitat supply (non-timber issues).
- Define working targets for timber supply, timber quality, and habitat supply (non-timber issues).
- Review draft strategies and discuss additional strategies to address issues and achieve the working targets;
- Review key strategies/recommendations from IFPA and Type II
- Review options/discuss management of secondary structure

- Define indicators to be used to evaluate the results of the forest level modeling

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