

Mackenzie TSA Timber Supply Analysis Public Discussion Paper

**Forest Analysis and Inventory Branch
Ministry of Forests, Lands and
Natural Resource Operations
727 Fisgard Street
Victoria, B.C. V8W 1R8**

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Ministry of
Forests, Lands and
Natural Resource Operations

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Mackenzie Natural Resource District

Introduction

The British Columbia Ministry of Forests, Lands and Natural Resource Operations (FLNR) regularly reviews the timber supply^a for all timber supply areas^b (TSA) and tree farm licences^c (TFL) in the province. This review, the third for the Mackenzie TSA, examines the impacts of current forest management practices on the timber supply, economy, environment and social conditions of the local area and the province. Based on this review the chief forester will determine a new allowable annual cut^d (AAC) for the Mackenzie TSA.

According to Section 8 of the *Forest Act* the chief forester must regularly review and set new AACs for all 38 TSAs and 34 TFLs in the Province of British Columbia (BC).

The objectives of the timber supply review are to:

- examine relevant forest management practices, environmental and social factors, and input from First Nations, forest licensees and the public;
- set a new AAC; and
- identify information to be improved for future timber supply reviews.

This public discussion paper (PDP) provides a summary of the results of the timber supply analysis for the timber supply review of the Mackenzie TSA. Details about the information used in the analysis are provided in a data package (September 2012). The timber supply analysis should be viewed as a “work in progress”. Prior to the chief forester’s AAC determination for the TSA, further analysis may need to be completed and existing analysis reassessed as a result of input received during this review process.

In May 2012, a Special Committee on Timber Supply (special committee) was appointed by the Legislative Assembly of British Columbia to make recommendations to address the loss of mid-term timber supply due to mountain pine beetle in the central interior of BC. Following its review of technical information and public, stakeholder and First Nations input, the committee issued a report entitled *Growing Fibre, Growing Value* (August 2012). As described in *Beyond the Beetle: A Mid-term Timber Supply Action Plan* (October 2012), FLNR has responded to the committee’s recommendations. Key ministry responses relating to the provincial timber supply review program include:

^aTimber supply

The amount of timber that is forecast to be available for harvesting over a specified time period, under a particular management regime.

^bTimber supply areas (TSAs)

An integrated resource management unit established in accordance with Section 7 of the Forest Act.

^cTree farm licences (TFLs)

Provides rights to harvest timber and outlines responsibilities for forest management in a particular area.

^dAllowable annual cut (AAC)

The maximum amount of timber harvest permitted each year from a specified area of land, usually expressed as cubic metres of wood.

1. Review marginally economic forest types within each TSA and quantify the types and areas of forest that might be justifiably included in a partition^e within the timber harvesting land base^f (THLB), while respecting resource objectives for other values, such as wildlife and water.
2. Where feasible and appropriate, provide information from the timber supply review to enhance public discussion of resource management objectives and practices.

With regard to the ministry's responses to the special committee, marginally-economic stands and operability in general are discussed in detail in this public discussion paper and this information will be provided to the chief forester for consideration in determining the new AAC.

Timber supply reviews undertaken in support of AAC determinations are based on current forest management objectives and management. For the purposes of the Mackenzie TSA timber supply review, resource management direction is provided by the Mackenzie Land and Resource Management Plan (LRMP) described in more detail under 'Land Use Plans'. The information compiled to support this timber supply review can be made available to support land-use planning activities, as required. In the event that resource management objectives and practices change, these changes can be reflected in future timber supply reviews.

Timber supply review in the Mackenzie TSA

The AAC for the Mackenzie TSA, effective December 1, 2001 is 3 050 000 cubic metres and includes a partition of 100 000 cubic metres for deciduous-leading stands.

Since 2004, mountain pine beetle has impacted about 75 percent of the lodgepole pine forest or about 37 percent of the THLB.

Before setting a new AAC, the chief forester will review all relevant information, including the results of the timber supply analysis and input from government agencies, the public, licensees and First Nations. Following this review, the chief forester's determination will be outlined in a rationale statement that will be publicly available. The actual AAC that is determined by the chief forester during this timber supply review may differ from the harvest projections, including the base case, presented in this public discussion paper as the chief forester must consider a wide range of information, some of which cannot be quantified. Ultimately, the chief forester's AAC determination is an independent, professional judgement based on the legal requirements set out in Section 8(8) of the *Forest Act*.

Once the chief forester has determined the new AAC, the Minister of Forests, Lands and Natural Resource Operations will apportion the AAC to the various licence types and programs. Based on the minister's apportionment, the regional executive director will establish a disposition plan that identifies how the available timber volume is assigned to the existing forest licences and, where possible, to new opportunities.

^ePartition

Under Section 8(5) of the Forest Act the chief forester in determining an AAC can specify a portion of the AAC that is attributable to certain types of timber, terrain or areas of the TSA.

^fTimber harvesting land base (THLB)

The portion of the Crown forest land base (CFLB) that is managed for timber supply by the Ministry of Forests, Lands, and Natural Resource Operations where timber harvesting is considered both acceptable and economically feasible, while meeting objectives for all relevant forest values, existing timber quality, market values and applicable technology.

Description of the Mackenzie TSA

The Mackenzie Timber Supply Area (TSA) is situated in the northeast interior of the province and is the fourth largest TSA in the province, covering 6.41 million hectares. The TSA is one of two in the Omineca Region and is administered from the FLNR Mackenzie Natural Resource District office located in Mackenzie.

The Rocky Mountain Trench, which consists of flat to gentle terrain, runs north-south through the centre of the TSA, with the rugged Rocky Mountains on the east side and the more rounded Omineca Mountains to the west. Williston Lake lies within the Rocky Mountain Trench in the central portion of the TSA. This lake is a hydro reservoir created by the W.A.C. Bennett Dam on the Peace River. At a length of 360 kilometres, Williston Lake is the largest fresh water body in BC. Figure 1 (overleaf) depicts the location of the TSA within the province, as well as the parks and reserves and distribution of Crown forest within the TSA.

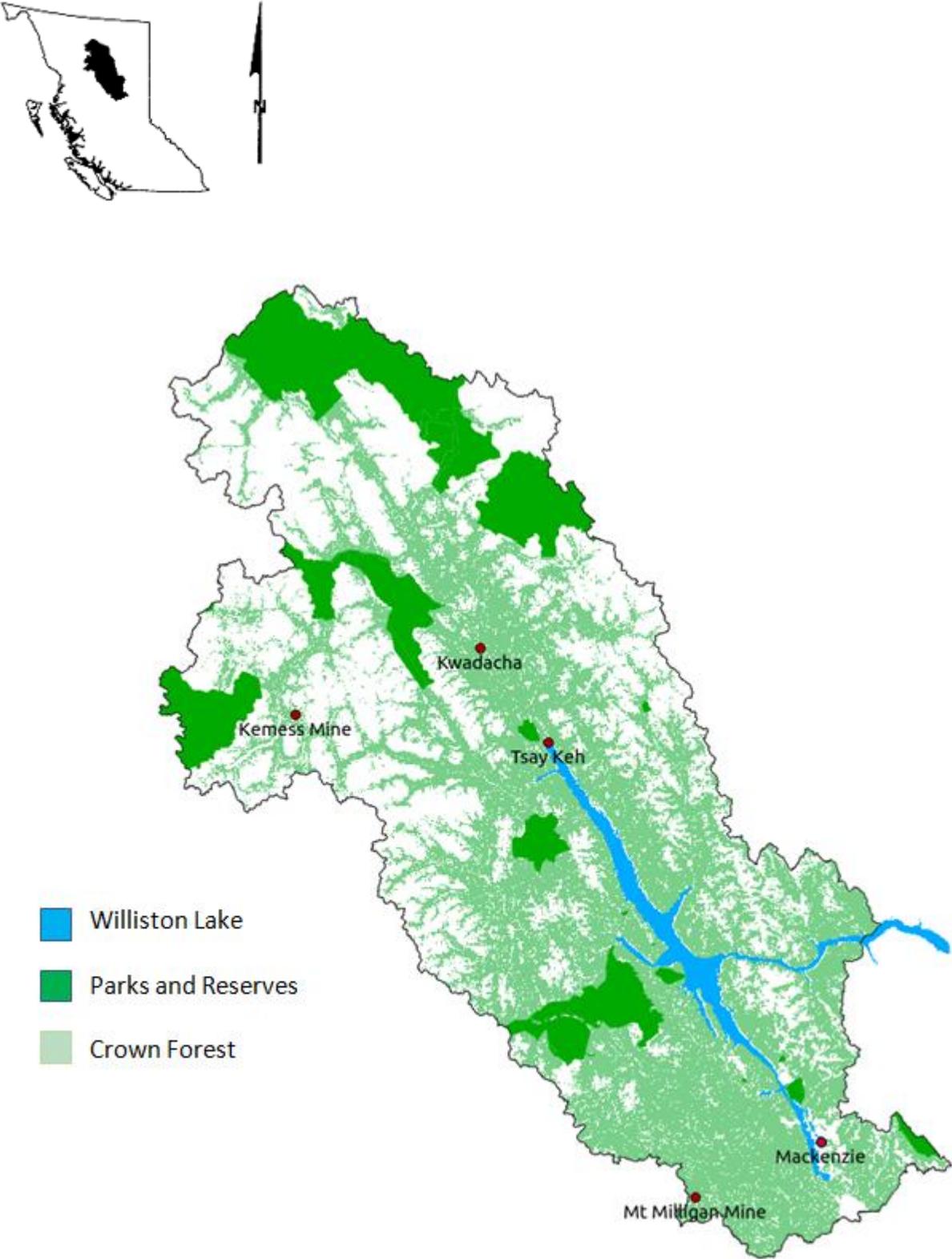


Figure 1. Map of the Mackenzie TSA.

Natural resources

Despite the diverse terrain of mountains and river valleys, which contribute to distinct ecological features and high biodiversity values, the forests of the Mackenzie TSA are fairly homogeneous. The primary tree species are lodgepole pine, spruce and subalpine fir. These coniferous species, along with several deciduous species make up the forests of the TSA. Forests of hybrid white spruce, lodgepole pine, alpine fir and boreal black spruce characterize the lower elevation areas. In flat terrain, the forest typically consists of hybrid spruce, and lodgepole pine with trembling aspen. The high elevation mountain-tops are blanketed with alpine shrubs, herbs, mosses and lichens. Figure 2 below depicts the distribution of (leading) species across the TSA.

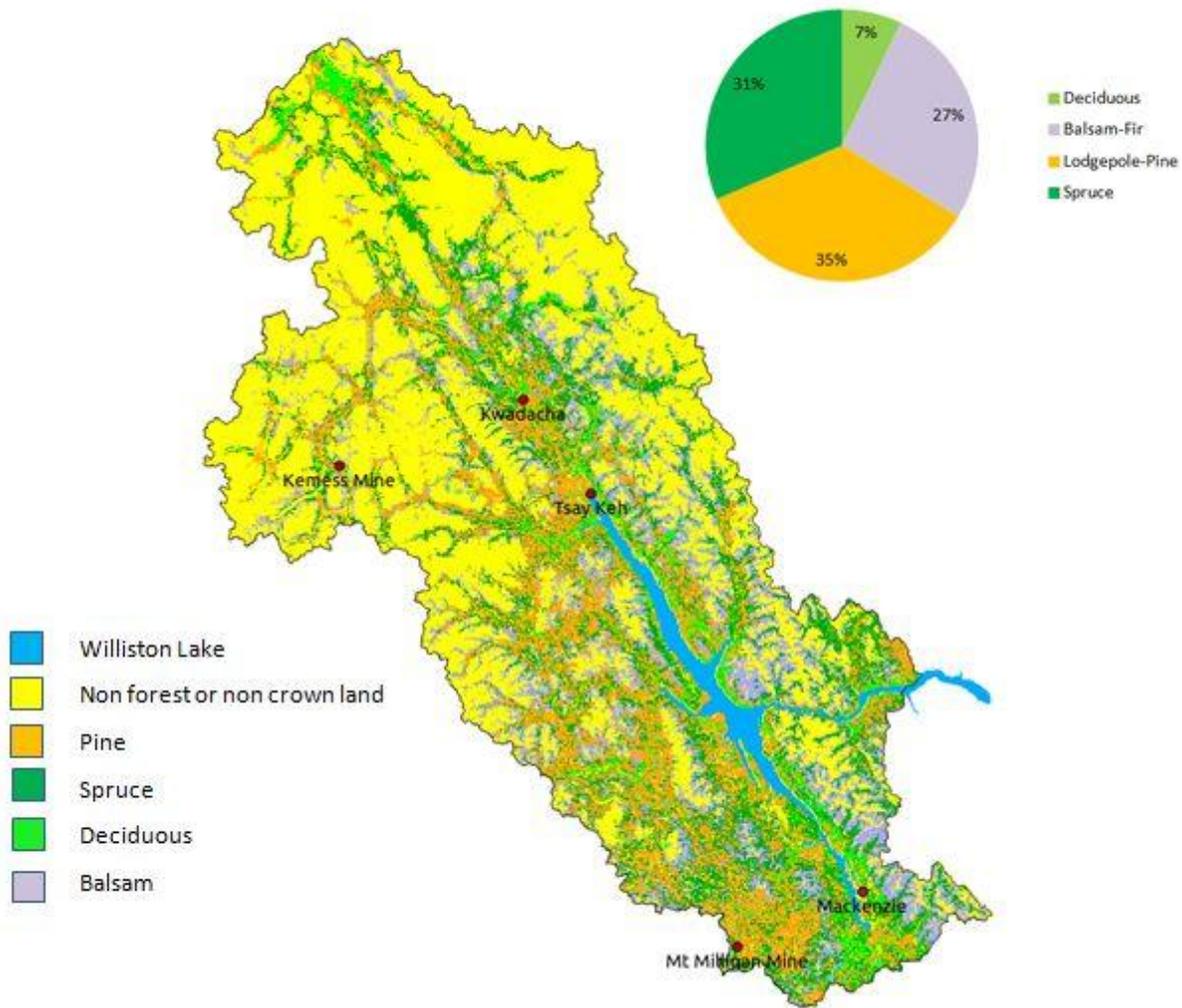


Figure 2. Map of leading species across the Mackenzie TSA.

Socio-economic information

The Mackenzie TSA straddles the Peace River, Fraser-Fort George, Bulkley-Neckako and Stikine Regional Districts. The Mackenzie TSA is sparsely populated, with most of the population living in the community of Mackenzie. Small settlements within the TSA include: Germansen Landing, Manson Creek, Tsay Keh, and Kwadacha. There is very little dispersed rural settlement within the area. Roads access extends along both sides of Williston Lake. Most of the northern third of the TSA has no road access and is mainly contained in the Muskwa-Kechika Management Area.

According to 2006 census data, the forestry sector accounts for 70 percent of the direct and indirect employment within the TSA, followed by the public sector at 17 percent. This is the most heavily forestry dependent TSA in BC. Between 2006 and 2011, the population decreased from 4539 to 3507 or by about 23 percent. During the recent economic downturn, local lumber manufacturing plants either ran at reduced harvest volumes or were temporarily closed. One paper manufacturing facility closed permanently, resulting in the loss of about 800 full-time employees. Modest gains in the local forest economy occurred in 2010 and there have been significant increases in harvesting and lumber processing.

Since the last AAC determination in 2004, the annual volume harvested from the TSA has ranged from a high of about 2.9 million cubic metres in 2005 to a low of 400 000 cubic metres in 2008. Harvesting increased to about 2 million cubic metres in 2011 and to 2.3 million cubic metres in 2012. The projected harvest for 2013 is about 4.5 million cubic metres.

First Nations

Ten First Nations have traditional territories that overlap the Mackenzie TSA. The traditional territories of the Kwadacha and Tsay Keh Dene First Nations, including their main communities of the same name, are almost entirely encompassed by the TSA.

The traditional territories of the McLeod Lake Indian Band, Takla Lake First Nation, and Nak'azdli First Nation overlap a portion of the TSA, as do small portions of West Moberly, Sauteau and Halfway River First Nations. In addition, significant portions of the "Treaty 8 Disputed Area" of West Moberly, Sauteau and Halfway River First Nations also overlap the TSA. Small portions of the TSA, near Thutade Lake, are within the traditional territories of the Gitksan and the Tahltan First Nations.

The Ministry of Forests, Lands and Natural Resource Operations has been communicating with First Nations about this timber supply review and intends to continue to fulfill its legal obligations to consult with First Nations in conjunction with the release of this public discussion paper.

Land use plans

The Mackenzie Land and Resource Management Plan (LRMP) received final government approval on November 14, 2000, adding over 600 000 hectares to BC's parks and recreation areas. Legal objectives have been established to create the Mugaha Marsh sensitive area (2002), agriculture development and settlement reserve areas (2006), Obo River and Fox landscape unit management objectives (2002), old growth management areas in several landscape units in the southern portion of the TSA (2010) and revised non-spatial biodiversity management objectives in the other landscape units of the TSA (2010).

These objectives define the legal requirements for forest management and have been incorporated in the harvest forecasts presented in this publication. If there are new or revised legal objectives that differ significantly from those used in these forecasts prior to the AAC determination, sensitivity analyses can be used to assess the potential impacts. Any changes in legal objectives that occur following this determination can be addressed in subsequent timber supply reviews.

Forest management

The dominant factor influencing forest management and harvest activities in the TSA is the unprecedented mountain pine beetle (MPB) infestation. This infestation has devastated hundreds of thousands of hectares of lodgepole pine stands. Due to the vast numbers of MPB within the TSA, extreme beetle behaviour has occurred, including the attack of previously harvested stands, as young as 25 years and spruce. Neither young pine trees nor spruce are considered suitable for MPB survival and infestation of these stand types suggest that the MPB population is collapsing.

Current forest management must be consistent with the requirements of the *Forest and Range Practices Act* (FRPA) and associated regulations, which are designed to maintain a range of biodiversity and wildlife values. All forested lands, whether they contribute to timber supply or not, help to maintain critical habitats for many species. Therefore, the timber supply analysis includes constraints or forest cover requirements for biodiversity, visual quality, wildlife habitat, community watersheds, recreation features, riparian management and protection of environmentally sensitive areas. These requirements are applied to the Crown forest land base⁸ (CFLB).

The Crown forest land base in the Mackenzie TSA is about 3.3 million hectares. However, not all of this area is available for timber harvesting (Figure 3). Areas excluded from harvest include:

- protected areas or special resource management zones (19 percent);
- uneconomic or physically inoperable stands (29 percent); and
- areas otherwise unsuitable for timber harvesting (11 percent).

Although these areas are not assumed to contribute to timber supply, they provide for other important natural resource values.

The timber harvesting land base (THLB) is estimated to be about 1.36 million hectares, about 90 000 hectares less than as 2001. This decrease is primarily due to the establishment of old growth management areas (OGMAs) in several southern landscape units and the revised definition of physical and economic operability used for this timber supply review.

⁸Crown forested land base (CFLB)

The forested area of the TSA that the provincial government manages for a variety of natural resource values. This excludes non-forested areas (e.g., water, rock and ice), non-productive forest (e.g., alpine areas, areas with very low productivity), and non-commercial forest (e.g., brush areas). The CFLB does include federal protected areas because of their contribution to biodiversity.

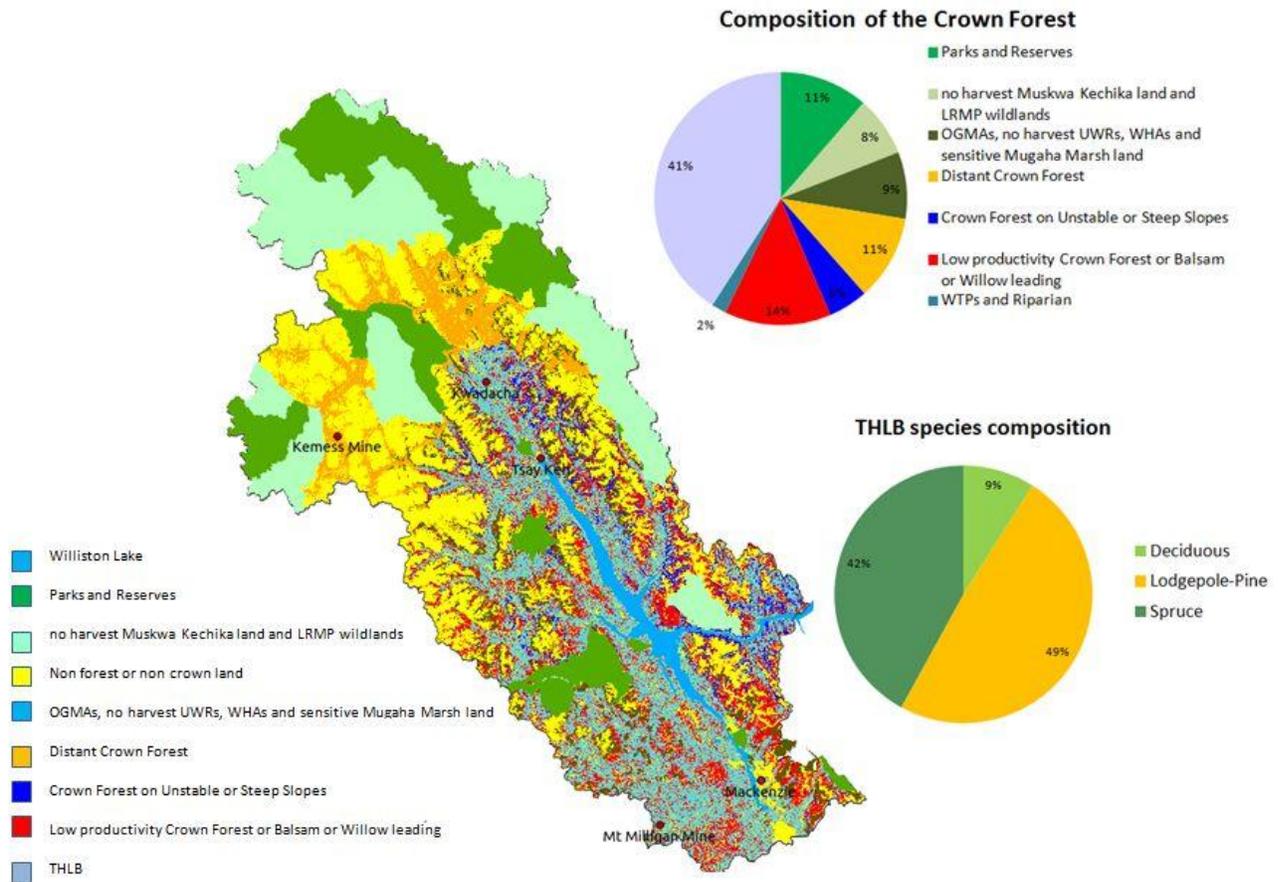


Figure 3. Reductions to the Crown forest land base (CFLB) and the species composition of the timber harvesting land base (THLB).

Land base and forest management changes since 2001

The timber supply analysis provided for determination of the current AAC was published in December 2001. In June 2004, the chief forester decided that it was unlikely that a timber supply review would result in any significant change in the AAC and on this basis postponed the AAC determination. Since the 2001 timber supply analysis was published, several changes have occurred to the land base and forest management information and these changes are reflected in the current timber supply analysis. The major changes are:

- the change from the *Forest Practices Code of British Columbia Act* to the *Forest and Range Practices Act*;
- new or refined legal requirements including: OGMAs in several landscape units in the southern portion of the TSA, revised old seral requirements in the remaining landscape units, the creation of the Mugaha Marsh sensitive area, the establishment of agriculture development and settlement reserve areas, the establishment of the Obo River and Fox landscape unit management objectives, visual landscape objectives and the establishment of ungulate winter ranges;

- issuance of a new community forest agreement;
- updated mapping for roads;
- a re-examination of economic operability;
- the new vegetation resources inventory in the southern two-thirds of the TSA;
- improved site productivity information and mapping; and
- mountain pine beetle.

Mountain pine beetle

The mountain pine beetle entered the Mackenzie Natural Resource District in 2004. The infestation peaked in 2009 and has since sharply declined.

The BC Mountain Pine Beetle model (BCMPB) was developed by FLNR to project the annual volume of mature pine killed by MPB. Aerial overview survey data are fundamental to calibration of BCMPB and these data are provided by a series of annual surveys. Weather conditions in 2007 and 2008 prevented aerial overview surveys from being conducted for the Mackenzie TSA. In 2009, weather conditions precluded surveys of the northern half of the TSA. Consequently, there is a great deal of uncertainty associated with the MPB mortality projections available for this TSA that indicate about 56 percent of the pine volume on the THLB (as defined in 2002) had been killed by 2011 and that mortality would increase by 12 percent prior to the end of the epidemic.

Based on direct observations made during repeated aerial reconnaissance of the TSA, district staff estimate that about three-quarters of the pine in the TSA is dead. District staff note that the development of the MPB epidemic had two distinct phases. The first phase, which started in 2004 but occurred primarily in 2005, was limited to the area west of Williston Lake and south of the Omineca Arm of the lake. The outbreak appeared contained in this area of the TSA until 2009. In the summer of 2009, it spread to the rest of the TSA.

Since the MPB infestation entered the district in 2004, harvesting has been focused on the salvage of dead and dying pine, so that pine accounts for approximately 70 percent of the total volume harvested.

Table 1 summarizes the fluctuation in the total volume harvested, the approximate amount of volume which had some sort of initial processing and the percentage of pine in the harvest during the past eight years.

Table 1. Harvest volumes, percent of volume processed within the district and the percent of harvest in mountain pine beetle stands for the last seven years and the current projection for this year

Year	2006	2007	2008	2009	2010	2011	2012	2013 projected
Volume in millions of cubic metres	2.44	1.786	.412	.473	1.022	2.080	2.331	3.500
Percent processed within the district	90%	89%	77%	61%	88%	94%	98%	90%
Percent of volume harvested in pine	63%	62%	61%	71%	71%	73%	65%	60%

Timber supply analysis

In order to determine an AAC, the chief forester reviews many sources of information, including a timber supply analysis that models the development of the forest through time and its response to harvesting and natural disturbance while respecting government's many timber and non-timber objectives. This section highlights some of the important findings from the timber supply analysis.

Timber supply forecasts

One of the key issues in this, and potentially subsequent AAC determinations, is how to manage the remaining mature, non-pine forest following the MPB infestation until the currently immature stands are suitable for harvesting. Another issue is the highly uncertain and variable economics of harvesting across the Mackenzie TSA. While the September 2012 data package details criteria defining an individual stand's eligibility for harvest based on past performance, what is unknown is the mix of stands and operating conditions that licensees will require to operate.

Eight timber supply projections are presented in this discussion paper. These forecasts have been designed to explore the following themes:

- What is the impact of a given average harvest volume on mid-term timber supply?
- How does increasing the harvest rate above the level of the current AAC to allow for the salvage of more dead pine affect timber supply?
- What effect does limiting the harvest of non-pine have on timber supply? (the resultant information assists the chief forester to assess whether a partition is required in the AAC).
- What contribution could marginal stands, the deciduous component of conifer stands and bio-energy make to future timber supply?

While all eight forecasts reflect current legal requirements and the best available information; where they differ is projected future licensee behaviour which is dependent on future economics and their response to impending AAC decisions. For comparison purposes a single forecast has been used as a reference when discussing the other seven forecasts. For the remainder of the document this reference forecast will be referred to as the "base case". It is discussed in detail in the next section.

The other seven forecasts examine the effect of the following on timber supply:

- Forecasts 2 and 3—average harvest volume;
- Forecast 4—the impact of an initial harvest level higher than the current AAC;
- Forecast 5—the effect of immediately stopping the salvage of dead pine while continuing to harvest at the level of the current AAC;
- Forecast 6—the effect of immediately stopping the salvage of dead pine while harvesting at a level higher than the current AAC;
- Forecast 7—increasing the haul distances used in the base case by 40 kilometres; and
- Forecast 8—utilizing the deciduous component of conifer stands.

Each of the eight harvest projections are based on the same minimum harvest volume assumptions and non-timber objectives. Due to the level of uncertainty associated with the BCMPB mortality projections, the district pine mortality estimate was used. Therefore, in the analysis it was assumed 75% of the pine west of Williston Lake and south of the Omineca Arm of Williston Lake was killed in 2004 and 75% of the pine throughout the rest of the TSA was killed in 2009. No further mortality projected beyond 2009. All the forecasts assume that the mid-term period commences when the last infected stands have exceeded their

economic shelf life of 15 years. Given the second wave of the infestation was observed by district staff in 2009, the mid-term period commences in 2025.

With the exception of Forecast 8, all the forecasts share the same growth and regeneration information. The deciduous-component of conifer stands is excluded when calculating projected volumes. However, the deciduous-component of deciduous-leading stands is included. In the case of Forecast 8, the deciduous-component of deciduous and conifer stands is included. In all cases the volume contribution from non-commercial deciduous species such as willow is excluded.

With the exception of Forecast 7, all of the forecasts are based on the same THLB.

In this public discussion paper none of the forecasts presented in this paper are AAC recommendations, but rather one of many sources of information the chief forester will consider when setting the AAC. The AAC determined by the chief forester may be greater or less than the initial level in any of these forecasts.

The base case

In order to reflect current practices, a retrospective study of harvesting was conducted using both the provincial inventory and data provided by licensees to allow the province to calculate stumpage^h. The results indicate that licensees have harvested stands within the TSA with a volume in excess of 150 cubic metres¹ per hectare with an average of approximately 300 cubic metres per hectare². The historic average stand value was not used in the base case because it does not account for the decreases in harvested stand volume that occur over time. (Generally harvesting in an area begins in the higher volume stands and/or stands closer processing facilities and proceeds to lower volume stands and/or stands further from processing facilities).

In the base case, not only was it assumed that all harvested stands will have a volume in excess of 150 cubic metres per hectare, it was also assumed that all the stands harvested in a given year combined will have an average volume in excess of 200 cubic metres per hectare.

The harvest of non-pine leading stands is limited in the base case to 905 000 cubic metres per year during the salvage period—the first 15 years of the forecast period. This harvest level approximates the non-pine contribution to the total harvest over the past several years (approximately 30 percent).

In the base case (see Figure 4), the current AAC (3.05 million cubic metres) is maintained for 15 years before declining to 2.58 million cubic metres per year until the end of century, after which it increases to the level of the current AAC. There was no attempt to ascertain whether the longer term harvest levels could exceed the current AAC, as the recovery in harvest level occurs in the distant future.

^hStumpage

Stumpage is the fee that individuals and firms are required to pay the government when they harvest Crown timber in British Columbia.

¹151 cubic metres per hectare based on the inventory and 158 cubic metres per hectare based on stumpage data.

²312 cubic metres per hectare based on the inventory and 306 cubic metres per hectare based on stumpage data.

The average harvested stand volume falls below 250 cubic metres per hectare mid-century, after which it averages 219 cubic metres per hectare (with a minimum in some years of 201 cubic metres per hectare) for the remainder of the forecast.

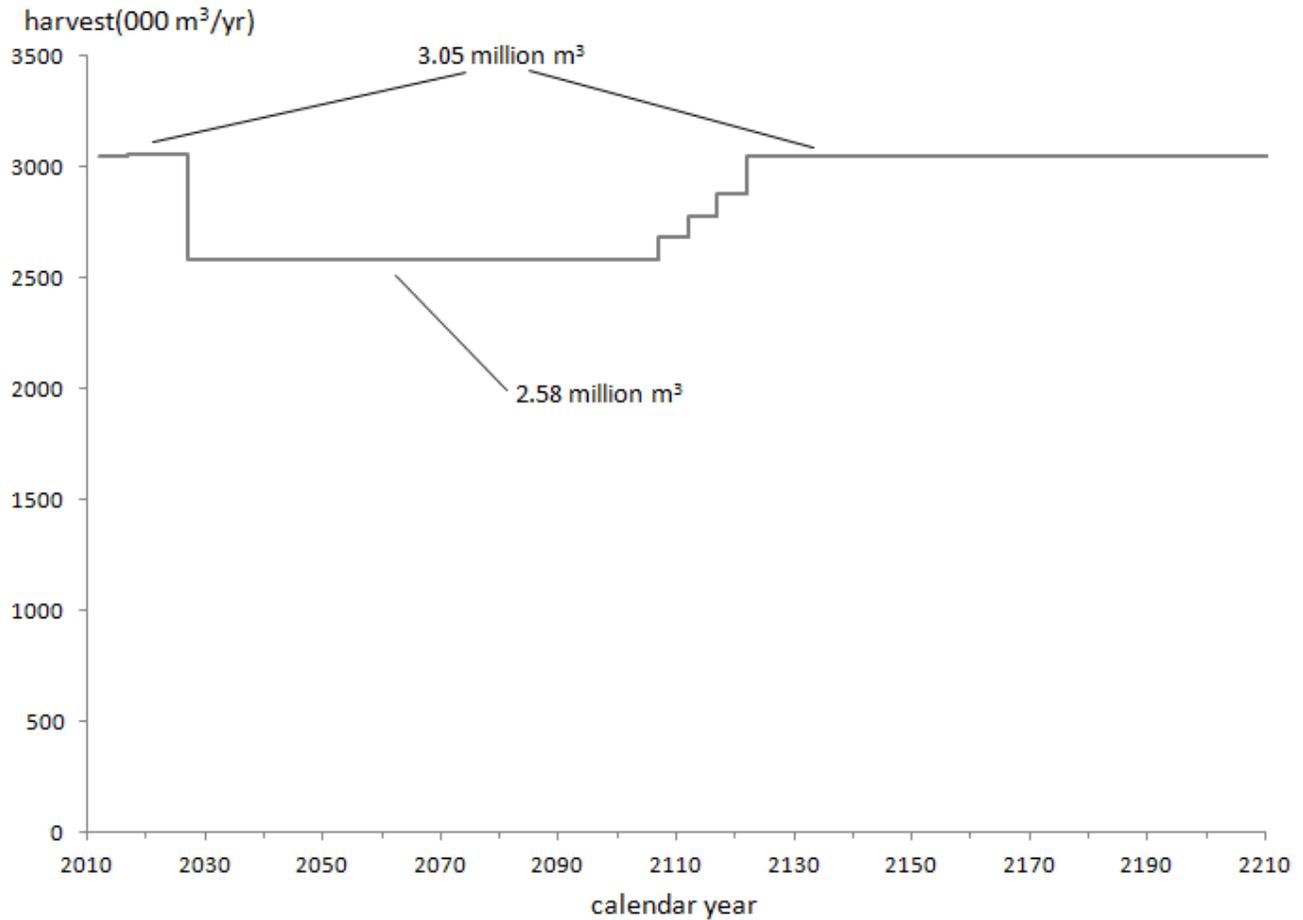


Figure 4. Base case forecast for the Mackenzie TSA.

While volume per hectare has been used in this analysis as an indicator of value, one-way haul distance has been used as an indicator of cost. In order to assess this cost, the contribution of stands by haul distance was tracked in the base case. For stands north of the Peace Arm of Williston Lake and north of Omineca Park, the modelled haul distances reflect travel down valleys to log dumps and barging or booming logs down the lake to the District of Mackenzie (Mackenzie). South of these two geographic features the distances are simply linear or “as the crow flies” to Mackenzie. This simplification was made for the southern portion of the TSA as it was unclear whether timber would be hauled around the bottom of Williston Lake to Mackenzie, hauled to a log dump and barged or boomed to Mackenzie, or hauled outside of the TSA for processing. For clarity, a map of the modelled haul distances associated with the base case has been provided (Figure 5).

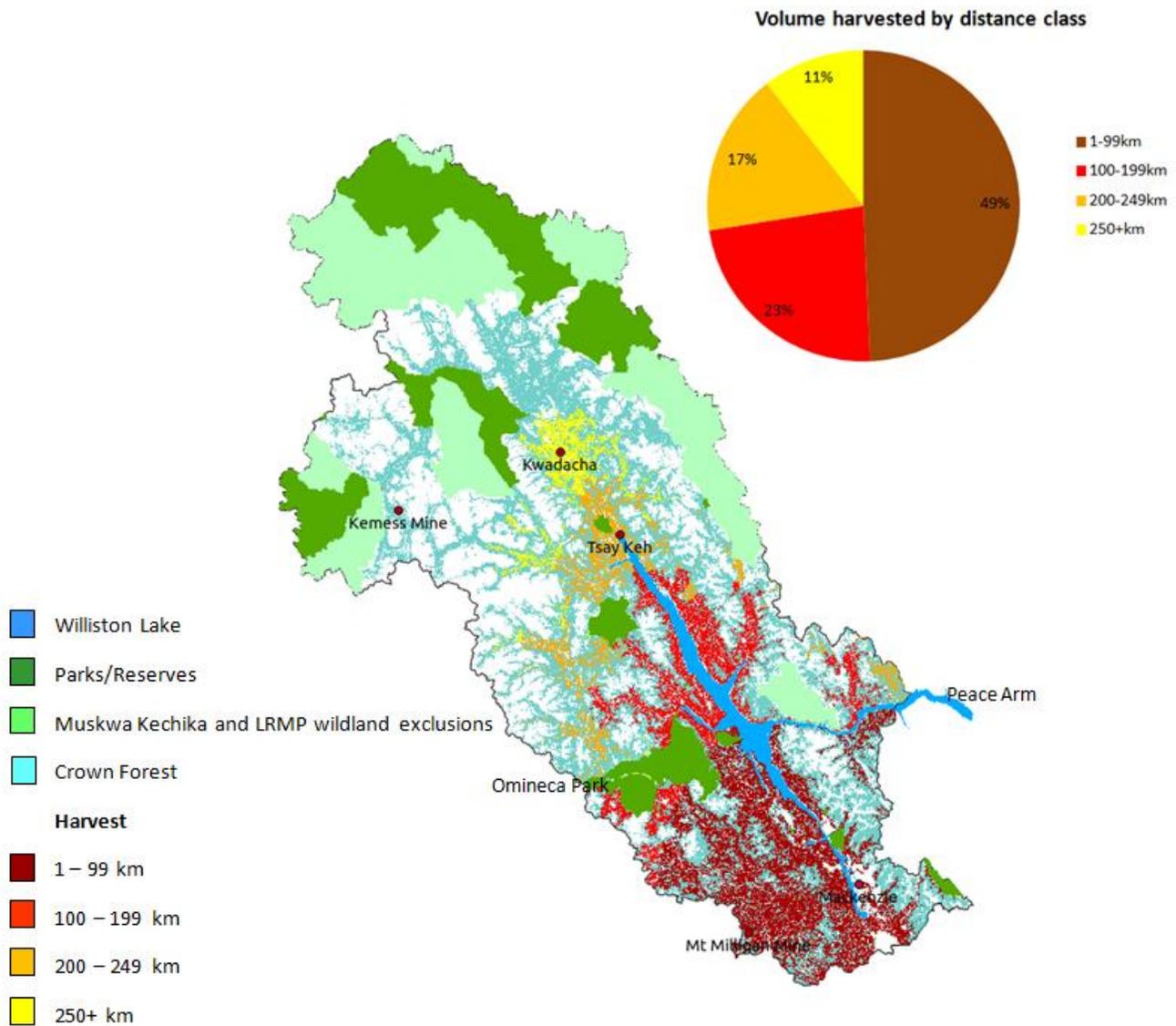


Figure 5. Harvest by haul distance class for the base case.

As can be seen from Figure 5, approximately half of the projected harvest in the base case is assumed to come from that portion of the TSA south of Omineca Park and south of the Peace Arm of Williston Lake. Approximately 90 percent of the harvest is assumed to come from within the modelled distance of 250 km of Mackenzie.

The impact of a given average harvest volume on mid-term harvest levels (Forecasts 2 and 3)

The impact of the average volume assumption associated with the base case forecast was examined by generating two alternate forecasts with different assumptions around average harvest volume. Like the base case both these forecasts have initial- and long-term harvest levels equal to the AAC, however the mid-term levels differ from the base case. As in the base case the harvest of non-pine leading stands is limited to 905 000 during the salvage period.

For the first alternate forecast—Forecast 2—both historical minimum harvest volumes and historical average harvest volumes are assumed (Figure 6). With these assumptions the mid-term harvest level decreases to 0.89 million cubic metres per year in the third five-year period, before increasing to 1.79 million cubic metres per year in early next century.

In the second alternate forecast—Forecast 3—removing average volume requirements, the mid-term only declines 100 000 cubic metres after 15 years. However, for this forecast to be achieved, the average annual volume per hectare projected to be harvested drops below 200 cubic metres per hectare in the seventh decade and stays there for the next 105 years. Only five percent of the historical harvest has been in stands less than 200 cubic metres per hectare.

Forecasts 2 and 3 indicate the actual future harvest levels in this TSA will be highly dependent on licensee behaviour, future markets and economics.

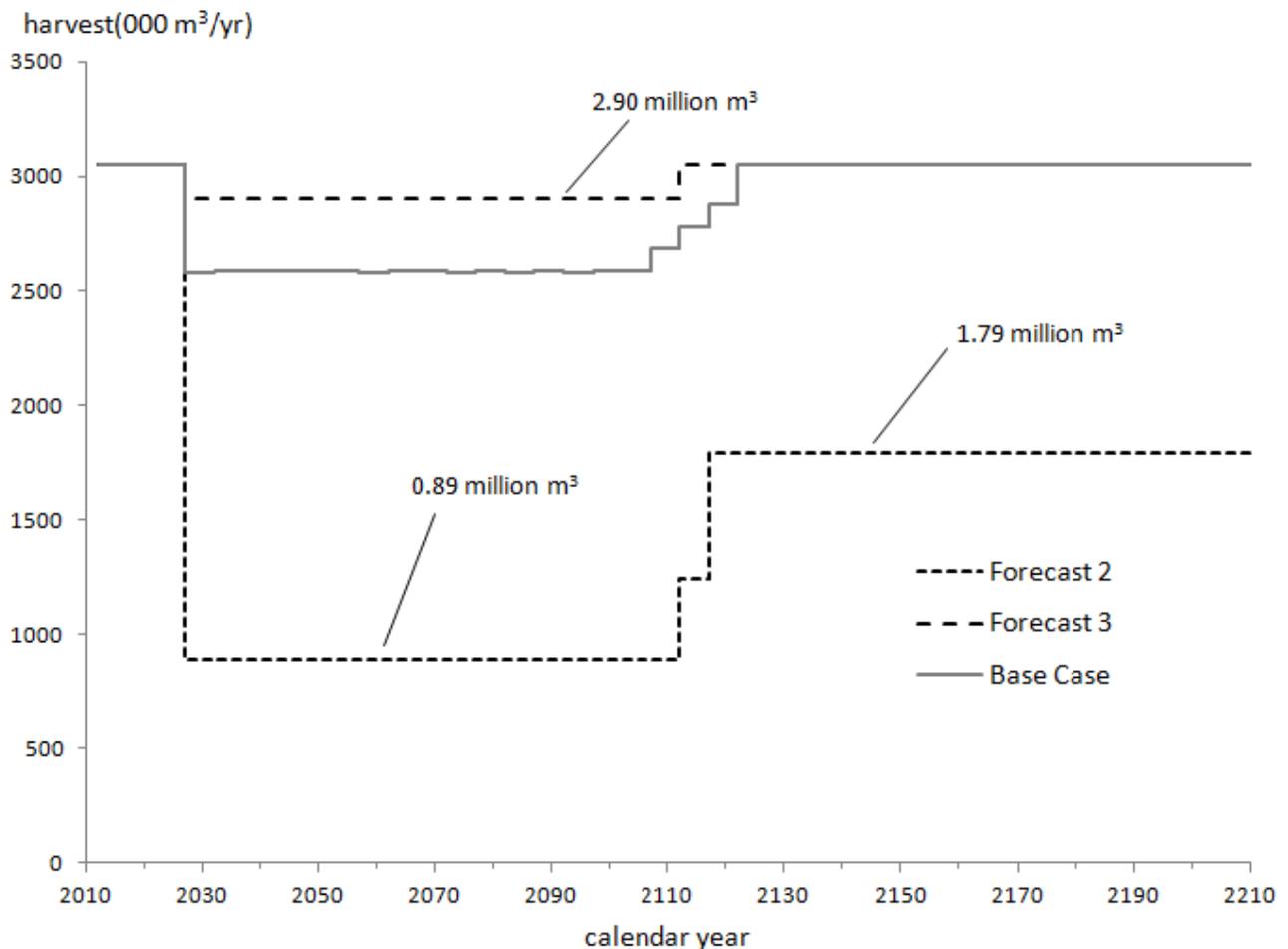


Figure 6. The impact of average harvest volume on harvest levels in the Mackenzie TSA.

Opportunities for increasing the AAC to increase salvage (Forecast 4)

In the absence of further salvage, 53 million cubic metres of pine is projected to be lost to mountain pine beetle by 2029. Assuming the current AAC of 3 050 000 cubic metres per year is actually harvested and 70 percent of the harvest is dedicated to salvage, only 32 million cubic metres of dead pine is projected to be salvaged. An opportunity therefore exists to considerably increase the level of salvage to capture the projected 21 million cubic metres non-recovered lossⁱ (NRL). This projected NRL could theoretically be captured by either increasing initial harvest level by 2.1 million cubic metres for 10 years or by increasing the initial harvest level by 1.4 million cubic metres for 15 years targeting the dead pine with that increase in both options. The first option, in which 2.1 million cubic metres is harvested for 10 years, was modelled in Forecast 4 (see Figure 7). Again like the base case, average volumes were not allowed to drop below 200 cubic metres per hectare.

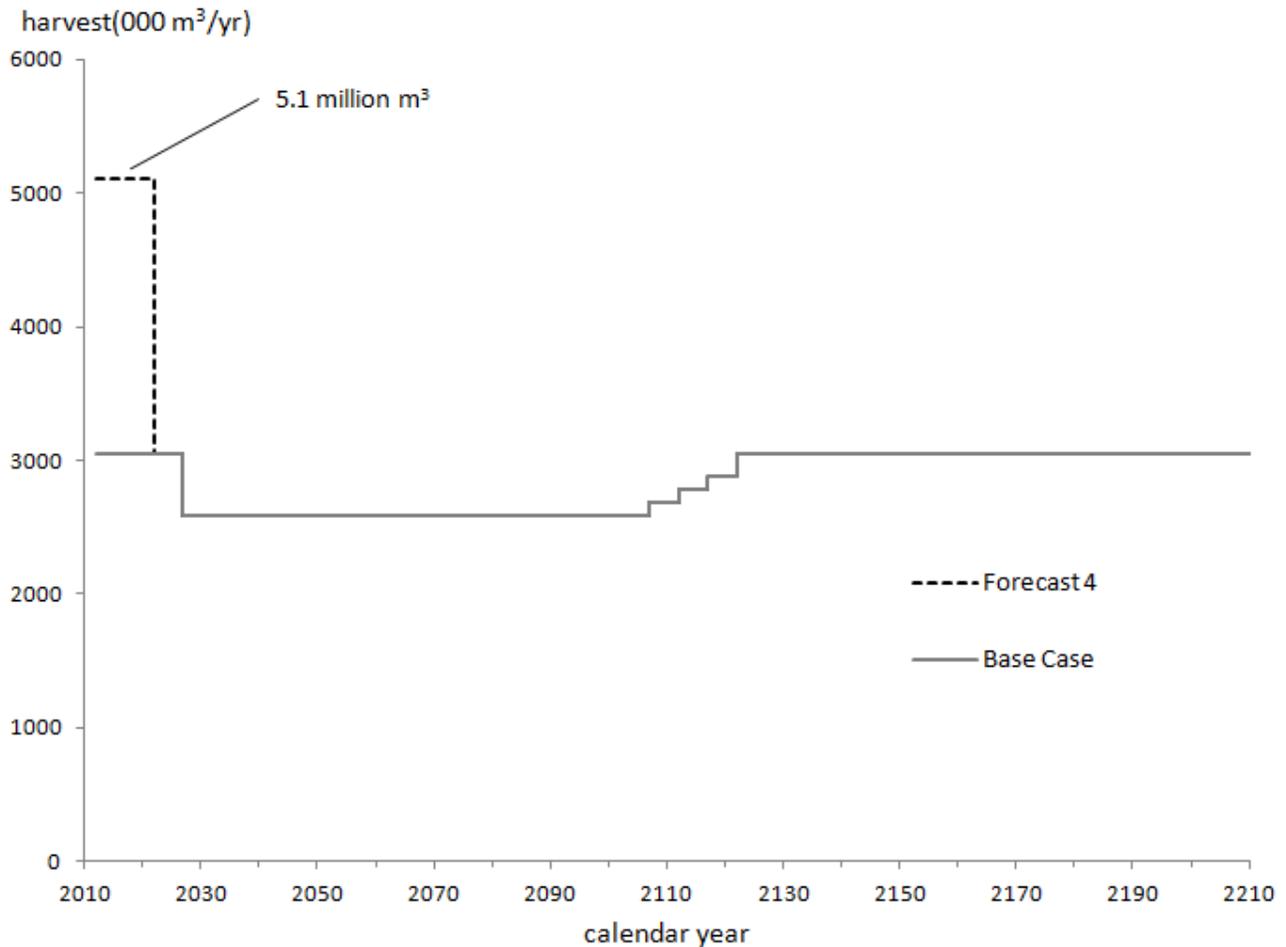


Figure 7. The impact of an elevated initial harvest of mid-term timber supply.

ⁱ**Non-recoverable loss**
 Non-recoverable losses are timber volumes destroyed or damaged by natural causes such as fire and disease that are not recovered through salvage operations.

In Forecast 4, maintaining an elevated harvest of 5.1 million cubic metres for 10 years followed by a harvest of 3.05 million cubic metres (the AAC) for five years has no impact on the 2.58 million cubic metre mid-term associated with the base case, provided the increase in harvest is dedicated to the salvage of dead pine.

Testing the requirement for a pine *versus* non-pine partition required within the TSA (Forecasts 5 and 6)

All of the forecasts presented to this point have capped the harvest of non-pine leading stands to 905 000 cubic metres per year. To test whether it would be worthwhile implementing this cap as a partition in the upcoming AAC decision two more harvest scenarios were generated:

- 1) request the same initial harvest level as the “base case” but assume zero salvage of dead pine— Forecast 5; and
- 2) request the same initial elevated harvest level as Forecast 4 but assuming zero salvage of dead pine— Forecast 6.

For both Forecasts 5 and 6 the restriction of average volumes not dropping below 200 cubic metres per hectare was applied. Forecasts 5 and 6 are portrayed in Figure 8 with the base case and Forecast 4 for reference.

If the initial harvest is left at the current AAC, without salvage of dead pine, the mid-term harvest level is 160 000 cubic metres less than that of the base case (Forecast 5, Figure 8). However, in the case of Forecast 6 (elevated initial harvest and no salvage), mid-term harvest levels would need to drop by 560 000 cubic metres if the elevated harvest was not directed to salvage.

In both forecasts, abandoning salvage does appear to reduce the duration of the mid-term trough. This is due to natural spruce stands being converted over to more productive genetically improved stands with stocking control sooner.

At a harvest level of three million cubic metres the productivity gains associated with converting natural spruce stands to genetically improved spruce stands earlier in the forecast largely offsets the earlier depletion of the surviving mature stands. However, at a harvest level of 5.1 million cubic metres those productivity gains are not anywhere near sufficient to offset the much earlier depletion of the surviving mature stands.

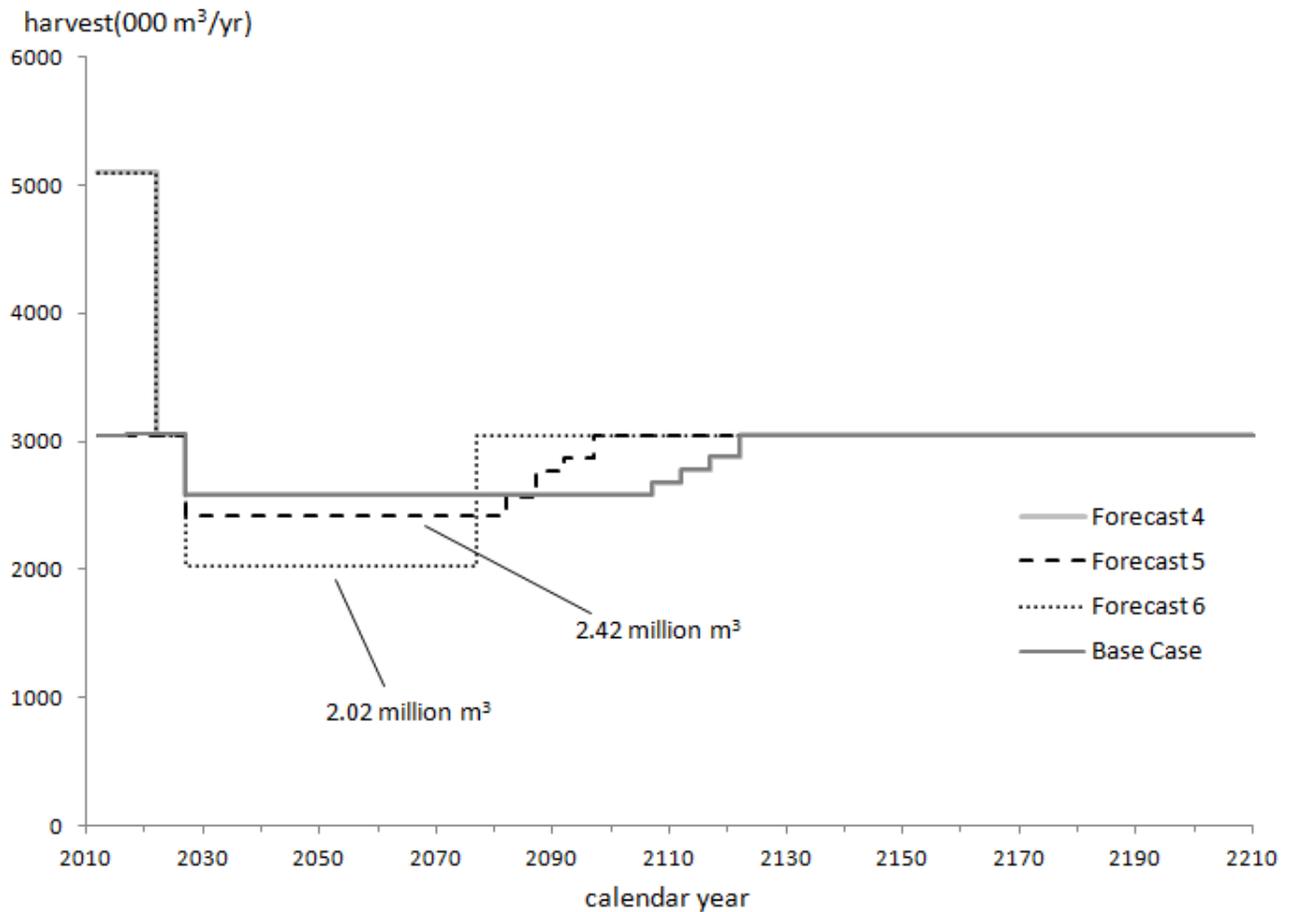


Figure 8. Impact of stopping the salvage of pine assuming the current AAC (Forecast 5 compared to the base case) and an elevated harvest (Forecast 6 compared to a salvage directed elevated harvest—Forecast 4).

The contribution of marginal stands, the deciduous component of conifer stands and bio-energy to future timber supply (Forecasts 7 and 8)

Prior to AbitibiBowater (AB) indefinitely closing their Mackenzie milling complex in 2008 they had planned to harvest some blocks approximately 40 kilometres north of the First Nations community of Kwadacha. If the land base is expanded (in all directions) so these blocks are harvested by the timber supply model the mid-term harvest can be increased from 2.58 million to approximately 2.64 million cubic metres while still harvesting stands with average volumes in excess of 200 cubic metres per hectare (Forecast 7, Figure 9). A 12 percent increase in haul distance only resulted in a two percent increase in timber supply as the majority of these distant stands were either in protected areas, balsam leading, low volume or located on steep slopes.

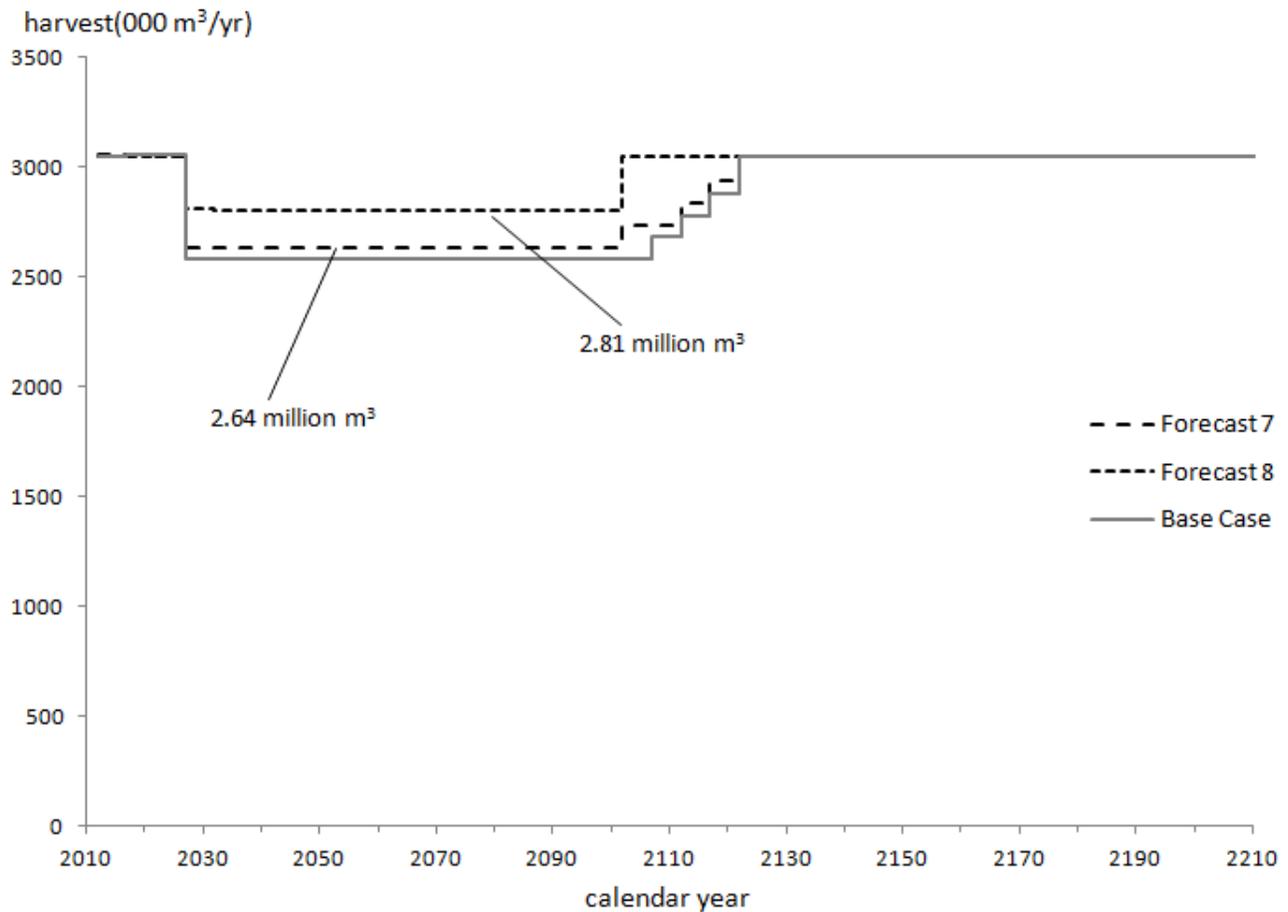


Figure 9. Impact of increasing the haul distances by approximately 40 kilometres relative to the base case.

Cable logging was also considered as a means of ameliorating the decline in mid-term timber supply but often the steeper slopes were also low volume stands, balsam leading or resided in visual quality polygons. Further there has been little history of cable logging in the TSA. For these reasons the impact of introducing cable logging to the TSA was not explored further.

As can be seen from Figure 6, considerable opportunity may exist without cable logging or hauling greater distances if licensees can economically log lower volume stands than assumed in the base case (compare Forecast 3 to the base case, Figure 6). If licensees could economically log stands with average volumes of approximately 180 cubic metres per hectare the mid-term could be increased by approximately 320 000 cubic metres per year.

Figure 9 suggests mid-term timber supply could be increased by 230 000 cubic metres without increasing haul distance, if licensees could economically utilize the deciduous component of the conifer stands harvested—Forecast 8.

Bio-energy may provide an opportunity to use more of the available fibre supply. Depending on economics, bio-energy opportunities may exist within at least 100 kilometres of Mackenzie and possibly up to 250 kilometres of the town. In this analysis, pine volumes were compiled to 12.5 centimetres DBH and other species were compiled to 17.5 centimetres DBH. Assuming stems down to four centimetres might be suitable for bio-energy, approximately 10 percent additional volume from stands harvested primarily for sawlog may be available for bio-energy. Using the base case and the distance breakdowns from Figure 5, this implies that

during the salvage period there might be about 150 000 cubic metres per year available for bio-energy within 100 kilometres of Mackenzie and about an additional 120 000 cubic metres per year available for bio-energy if the distance is extended to 250 kilometres. Post salvage, these numbers would fall to approximately 125 000 and 105 000 respectively.

Summary

Considerable uncertainty exists with regard to mid-term timber supply in the TSA. This uncertainty is driven by unknown future licensee stand preferences. That said, it is probably reasonable to assume that post-salvage harvest levels will fall below the level of the current AAC. A mid-term in the neighbourhood of 2.58 million cubic metres may be reasonable. Depending on how long the dead pine will remain standing, current salvage levels may continue another decade to 15 years or end much sooner.

An opportunity exists to increase the AAC by 2.1 million cubic metres for the next decade without negatively impacting mid-term timber supply provided it is accompanied by a pine/non-pine partition. Without a partition and a curtailment of salvage, future timber supply could be impacted by 22 percent. This impact is reduced to six percent if the AAC is not increased from current levels.

Moderate opportunities may exist within the TSA to bolster mid-term timber supply by two, nine or twelve percent by hauling logs greater distances, utilizing deciduous volume or harvesting lower volume stands respectively, provided these activities could be done so economically. Finally, between 150 000 and 270 000 cubic metres per year might be available for bio-energy during the salvage period depending on whether material is limited to 100 kilometres of town or can be extended to 250 kilometres. These numbers would be expected to decline by eight percent post salvage.

The provincial chief forester's AAC determination is a judgment based on his professional experience and his consideration of a wide range of information as required under Section 8 of the *Forest Act*. An AAC is neither the result of a calculation nor limited to the results of timber supply analysis; therefore, the new AAC may not be the same as the harvest level in any of the scenarios presented in this public discussion paper.

Your input is needed

Public input is a vital part of establishing the allowable annual cut. Feedback is welcomed on any aspect of this public discussion paper or any other issues related to the timber supply review for the Mackenzie TSA. Ministry staff would be pleased to answer questions to help you prepare your response. Please send your comments to the district manager at the address below.

Your comments will be accepted until December 16, 2013.

You may identify yourself on the response if you wish. If you do, you are reminded that responses will be subject to the *Freedom of Information and Protection of Privacy Act* and may be made public. If the responses are made public, personal identifiers will be removed before the responses are released.

For more information or to send your comments, contact:

District Manager
B.C. Ministry of Forests, Lands and Natural Resource Operations
Mackenzie Natural Resource District

Mail: 1 Cicada Road; PO Box 2260
Mackenzie, B.C.
V0J 2C0

Phone: (250) 997-2200, Fax: (250) 997-2236

Electronic mail: Sam.Davis@gov.bc.ca

Further information regarding the technical details of the timber supply analysis is available on request by contacting Forests.ForestAnalysisBranchOffice@gov.bc.ca

Visit the Forest Analysis and Inventory Branch web site at <http://www.for.gov.bc.ca/hts>.