

# Boundary TSA Timber Supply Analysis Public Discussion Paper

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Ministry of  
Forests, Lands and  
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## Introduction

The British Columbia (BC) Ministry of Forests, Lands and Natural Resource Operations (FLNR) regularly reviews the timber supply<sup>a</sup> for all timber supply areas<sup>b</sup> (TSA) and tree farm licences<sup>c</sup> (TFL) in the province. This timber supply review (TSR), the third for the Boundary TSA, examines the current factors that influence a sustainable long-term timber supply for this area. These factors include land base composition, forest management practices, along with the socio-economic and environmental conditions of the local area and the province. Based on this review the chief forester will determine a new allowable annual cut<sup>d</sup> (AAC) for the Boundary 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.

The objectives of the timber supply review are to:

- review relevant forest management practices, along with economic, environmental and social factors;
- seek and consider input from First Nations, the public and interested stakeholders;
- provide harvest level scenarios (including a base case) that will guide the chief forester to set a new sustainable AAC; and
- identify information required to improve future timber supply reviews.

This public discussion paper provides a summary of the results of the timber supply analysis that is completed as an integral part of the timber supply review process. Details about the information used in the analysis are provided in a June 2011 data package. 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 be needed to complete or refine existing analysis.

In May 2012, a Special Committee on Timber Supply 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), the Ministry of Forests, Lands and Natural Resource Operations has responded to the committee’s recommendations. Key ministry responses relating to the provincial timber supply review program include:

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

**<sup>a</sup>Timber supply**

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

**<sup>b</sup>Timber supply areas (TSAs)**

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

**<sup>c</sup>Tree farm licences (TFLs)**

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

**<sup>d</sup>Allowable 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.*

This public discussion paper and the associated June 2011 data package are to provide the public with information around forest management, including the management of non-timber objectives. Forest Analysis and Inventory Branch, will continue to make this information, as well as other products of the TSR, available to support other decision-making processes and the public, as required. First Nations, members of the public and stakeholders are encouraged to make inquiries and provide comments with respect to this TSR to the contact listed at the end of this document.

Based on these FLNR commitments, the Boundary TSA timber supply review examined the potential contribution of stands that are not required to provide other forest values, but are generally excluded from the THLB for economic reasons. The contribution of these stands to timber supply is discussed under 'marginally-economic stands' 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 the current legal requirements for forest management objectives and practices. For the purposes of the Boundary TSA timber supply review, resource management objectives are provided by the Kootenay-Boundary Higher Level Plan (KBHLP) Order and orders issued under the *Government Action Regulation*. In the event that resource management objectives and practices change, these changes will be reflected in future timber supply reviews.

## **Timber supply review in the Boundary TSA**

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The current AAC for the Boundary TSA, effective January 1, 2002 is 700 000 cubic metres. Since 2002, a number of changes have occurred in the TSA that may affect the timber supply. Some of these changes include: the introduction of the *Forest and Range Practices Act* (FRPA), revisions to the KBHLP, updated mountain pine beetle (MPB) information, issuance of new tenures, and updated mapping and inventories.

In June 2011, a data package documenting the information requirements and assumptions for the timber supply analysis was released for public review and to assist with First Nations consultation. This public discussion paper provides an overview of the timber supply review process and highlights the results of the timber supply analysis, including the base case timber supply forecast for the Boundary TSA.

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, First Nations and stakeholders. Following this review, the chief forester's determination will be outlined in a rationale statement that will be made publically available to all interested parties. The 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 paper. The chief forester must consider a wide range of information with varying implications. Ultimately, the chief forester's AAC determination is not a mathematical calculation but a 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 this 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 tenures.

## **Description of the Boundary TSA**

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The Boundary TSA is located in southern British Columbia and covers approximately 659 000 hectares of the Kootenay Boundary Region. It is bounded on the west by the Okanagan Highland Range of the Monashee Mountains and on the east by the Christina Range. The TSA's southern boundary is defined by the Canada-U.S.A. border. The TSA boundaries include TFL 8 and two large protected areas – Granby and Gladstone Parks. These areas do not contribute to TSA timber supply. The Boundary TSA is administered from the FLNR Selkirk office in Nelson.

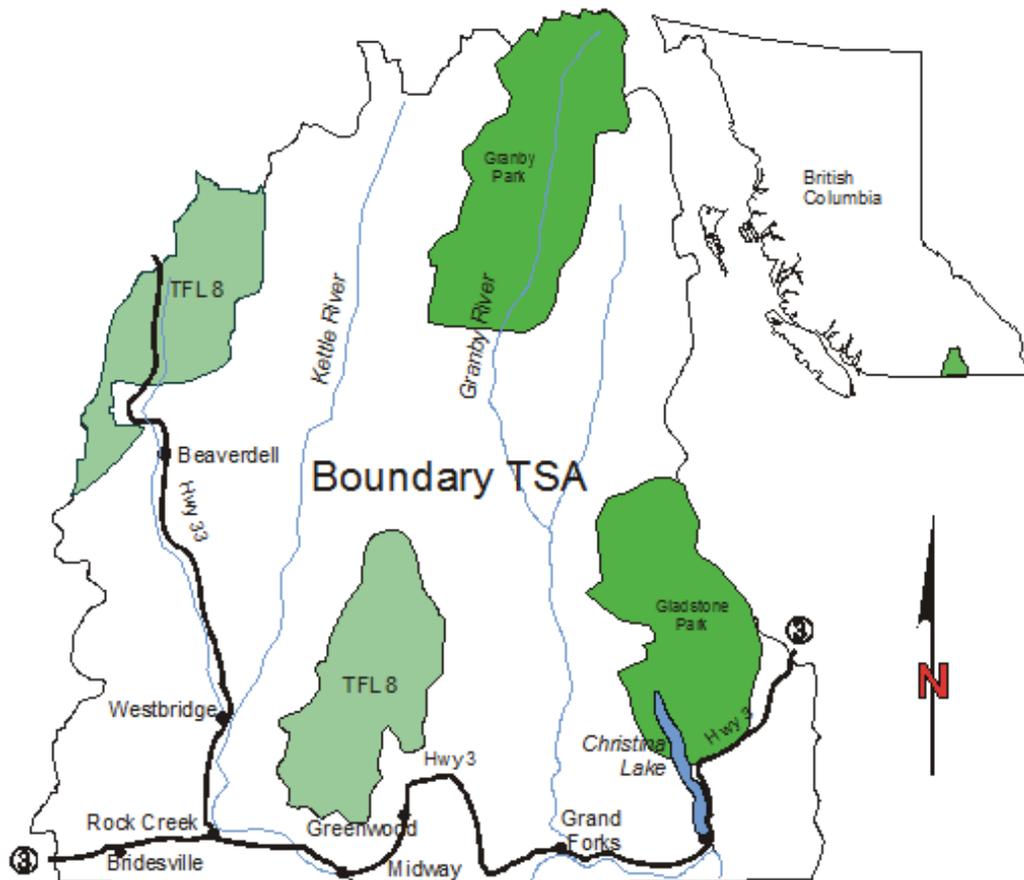


Figure 1. Map of the Boundary TSA.

## First Nations

Seven First Nations have traditional territories that overlap the Boundary TSA: Lower Similkameen, Okanagan, Osoyoos, Penticton, Westbank, Shuswap and Splt's'in.

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

## Land use plans

The Kootenay Boundary Higher Level Plan (KBHLP) Order was enacted in January 2001. The plan established ten legal objectives that provide management direction on biodiversity, old and mature forests, Caribou, green-up and patch size, grizzly bears, connectivity corridors, water usage, enhanced resource development zones, fire maintained ecosystems, scenic areas and the forest economy. The KBHLP Order was revised in October 2002 to better reflect the required balance of social, economic and environmental values. Since that time there have been nine variances to the plan.

Ungulate winter ranges (UWR) for mule deer, moose, mountain goat and sheep have been established under the *Forest and Range Practices Act*. Wildlife habitat areas (WHA) have also been established for grizzly bear, Williamson's sapsucker, Lewis's woodpecker, badger, racer and Great Basin gopher snake.

## **Land base and forest management changes since the previous TSR (2000)**

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The current AAC was determined on January 1, 2002. In November 2006, based on an assessment of available information and current forest practices, the chief forester concluded that a TSR at that time was unlikely to change the AAC, and therefore, the AAC determination was postponed. Since then, several changes have occurred to the land base and forest management information that are reflected in this timber supply analysis. The major changes are:

- changes to the KBHLP Order;
- new ungulate winter ranges and wildlife habitat areas;
- issuance of a Government Action Regulation order for visual quality;
- new site productivity estimates for managed stands;
- new woodlots; and
- revised mountain pine beetle information.

The gross area within the Boundary TSA is 659 000 hectares. The land base that is relevant for this AAC determination, called the Crown forested land base (CFLB), excludes non-provincial Crown lands, private lands, tenures not considered in this determination (e.g., tree farm licences), and lands not directly or indirectly impacting the timber supply (e.g., non-forested lands). The CFLB in the Boundary TSA is estimated to be 406 433 hectares.

Approximately 33 percent of the CFLB that is either unsuitable or unavailable for timber harvesting was excluded from the timber harvesting land base (THLB) used in the base case, which is estimated to be 272 286 hectares or about five percent less than in the previous timber supply review. The decrease in the size of the THLB is primarily the result of using different assumptions in the analysis rather than due to changes to forest management practices. About 32 percent of the THLB area may be constrained for harvesting because of forest management objectives for visual quality, ungulate winter range, mature seral forests, and community watersheds. The following table shows the different classes of land within the TSA that are excluded from the THLB. Note, some areas are subject to more than one classification or provide for more than one non-timber value, consequently, the total area associated with a particular factor may be significantly less than the net area excluded from the THLB.

Table 1. Areas excluded from timber harvesting

| Land class                                     | Gross land base (ha) | Within CFLB (ha) | Net area excluded from THLB (ha) |
|--|----------------------|------------------|----------------------------------|
| <b>Boundary TSA gross</b>                      | <b>659 000</b>       |                  |                                  |
| Non-provincial Crown lands                     | 59 932               | 0                | 22 147                           |
| Not managed for TSA AAC                        | 95 757               | 0                | 15 417                           |
| Non-forest and non-productive                  | 206 278              | 0                | 36 943                           |
| Roads, trails, landings and transmission lines | 8 268                | 0                | 4 068                            |
| <b>Crown forested land base</b>                |                      | <b>406 433</b>   |                                  |
| Parks & misc reserves                          | 79 252               | 55 921           | 17 558                           |
| PAS Goal 2 zones                               | 477                  | 447              | 26                               |
| Terrain stability (U & V)                      | 7 713                | 3 410            | 1 728                            |
| Environmentally sensitive area – regeneration  | 14 881               | 13 755           | 4 288                            |
| Inoperable                                     | 113 321              | 64 396           | 23 882                           |
| Low timber productivity                        | 15 924               | 7 029            | 1 760                            |
| Problem forest types                           | 7 904                | 5 526            | 3 362                            |
| Dense pine                                     | 13 480               | 4 341            | 3 269                            |
| Old growth management areas                    | 48 344               | 39 692           | 21 801                           |
| Wildlife habitat areas                         | 3 131                | 1 564            | 875                              |
| Archaeological sites                           | 189                  | 97               | 57                               |
| Research installations                         | 24                   | 22               | 9                                |
| Growth and yield permanent sample plots        | 1 043                | 648              | 605                              |
| Recreation sites                               | 5 536                | 4 238            | 3 017                            |
| Recreation trails                              | 580                  | 271              | 129                              |
| Riparian management                            | 16 545               | 5 541            | 3 126                            |
| <b>Timber harvesting land base</b>             |                      |                  | <b>272 286</b>                   |

## Integrated resource management

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The forests of the Boundary TSA support a wide variety of wildlife species, including wildlife designated as *species at risk* or *regionally significant*. Examples include: northern goshawk, Lewis's woodpecker and grizzly bear.

The TSA also has numerous lakes and streams that support many species of non-sport and sport fish such as rainbow trout, Kokanee, bass, walleye, brook trout and brown trout.

Recreational use of forests is high due to the proximity of several provincial parks (e.g., Granby, Gladstone and Conkle Lake Parks), as well as numerous smaller parks, recreation sites and trails, including the historic Dewdney Trail. Recreation activities in the Boundary TSA include: hiking, mountain biking, hunting, fishing, boating, backcountry recreation, snowmobiling, skiing and wildlife viewing.

Current forest management must be consistent with the requirements of the *Forest and Range Practices Act* and associated regulations, which are designed to maintain a range of biodiversity and wildlife values and the legal requirements of the KBHLP Order. All Crown forested lands, whether they contribute to timber supply or not, help to maintain the diverse values managed on the land base. The timber supply analysis first ensures that the forest cover required (age, species composition, and location) to meet non-timber values such as biodiversity, visual quality, wildlife habitat, community watersheds, recreation features, riparian management and protection of environmentally sensitive areas are met. Stands are scheduled for harvesting only if they are not required to provide for non-timber values.

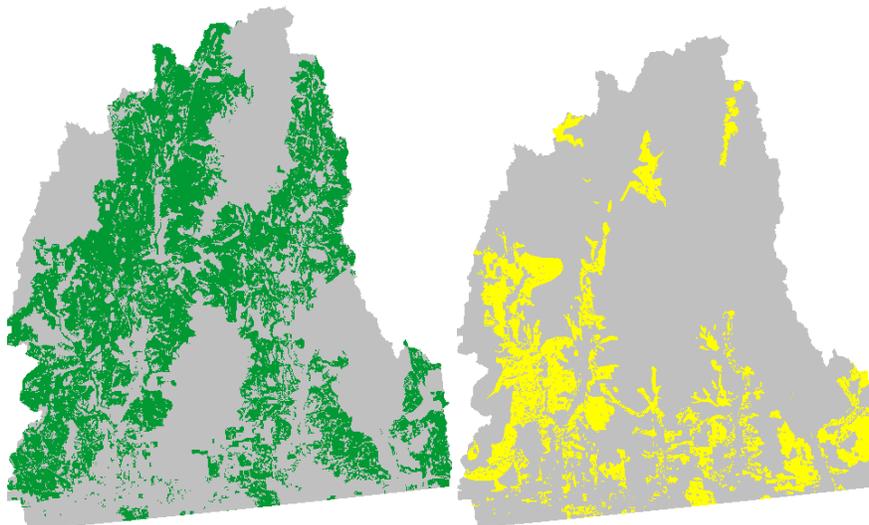


Figure 2. Timber harvesting land base (left) and land base with specialized non-timber management objectives: community watershed, ungulate winter range, visual quality, or mature seral (right).

**Marginally economic stands**

The Boundary TSA, relative to other TSAs, has a highly operable land base with over two-thirds of the Crown forested land base (CFLB) considered available for timber harvesting. The delineation of the timber harvesting land base (THLB) is, in part, based on the assumption that some stands are unsuitable for commercial harvesting. In the Boundary TSA timber supply analysis, about two percent of the CFLB was excluded from harvest because those stand types were considered undesirable for timber production or that the site productivity was too low. The stand types excluded were stands labeled as dense pine- and deciduous-leading. Inclusion of these stands types did not have a significant effect on the base case timber supply.

**Timber supply analysis**

Within the land base currently considered available for timber harvesting (THLB) (see Figure 3), lodgepole pine, Douglas-fir and larch are the dominant leading tree species, although significant areas are dominated by spruce and subalpine fir (balsam). Other species include: western redcedar, western hemlock, white pine, ponderosa pine, aspen and birch. The current age class distribution of the forest is shown in Figure 4.

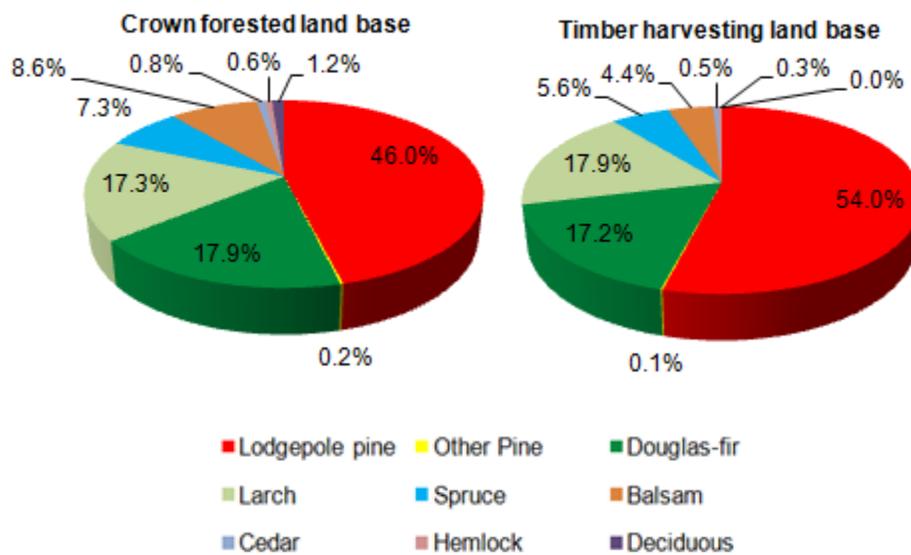


Figure 3. Proportion of leading species for the Crown forested land base<sup>e</sup> and timber harvesting land base<sup>f</sup> of the Boundary TSA (2011).

<sup>e</sup>**Crown 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.

<sup>f</sup>**Timber harvesting land base (THLB)**  
 The portion of the 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.

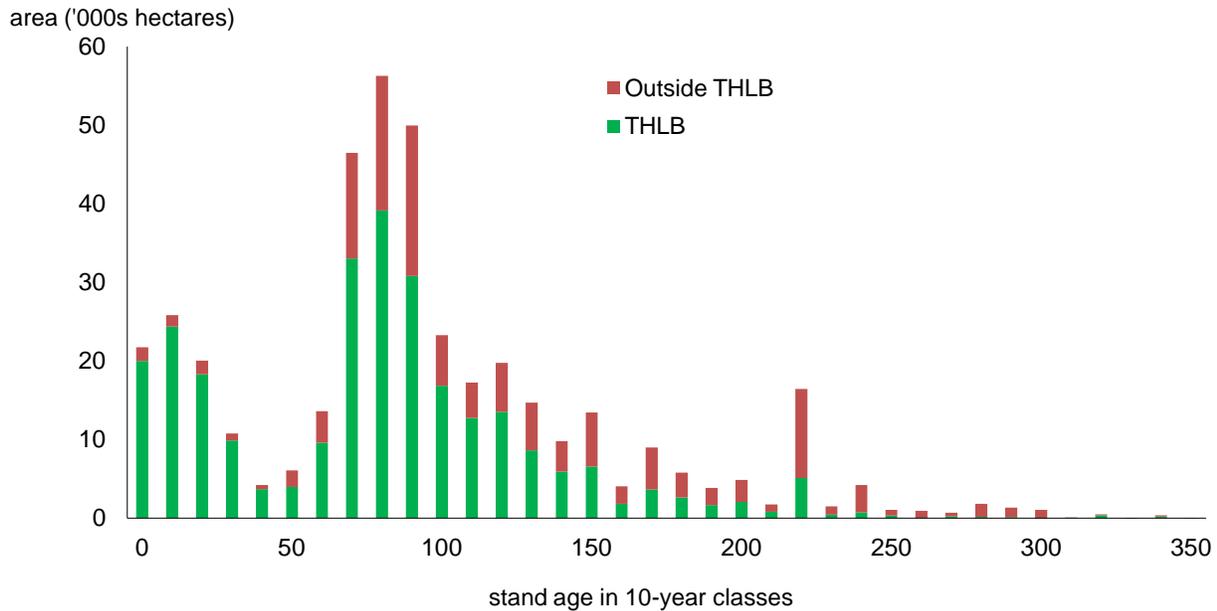


Figure 4. Age class distribution for the Crown forested land base of the Boundary TSA (2011).

For the AAC determination, 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 while respecting government's many timber and non-timber objectives. This section highlights some of the important findings from the timber supply analysis.

### The base case

The starting point for a timber supply analysis is to assess the existing land base and forest management considerations. This assessment is used to develop a timber supply forecast that the Ministry of Forests, Lands and Natural Resource Operations staff believe reflects the best available data, the current legal requirements and current forest management practices. This timber supply forecast is called the *base case*. The base case is not an AAC recommendation, but rather one of many sources of information the chief forester will consider when setting the AAC. The final AAC determined by the chief forester may differ from the harvest level forecast of the base case.

In the previous timber supply review, the impact of mountain pine beetle on timber supply was not considered to be significant enough to consider in the base case. However, since then aerial and ground surveys indicate the increased presence of mountain pine beetle (MPB) in the TSA; therefore, assumptions regarding the projected level of pine mortality and the length of time that dead pine stands remain an economically-viable source of wood fibre were used in this base case. Further information regarding these assumptions and the results of MPB sensitivity analyses are described in a later section of this report.

The base case (Figure 5) shows that the current AAC of 700 000 cubic metres per year can be maintained for one decade before stepping down to a mid-term level of 596 000 cubic metres per year in the third decade. Starting in the eighth decade, the harvest level increases in steps until the long-term harvest level of 806 000 cubic metres per year is reached in the eleventh decade. The increase in long-term harvest level above the level of the current AAC and also above the 2000 timber supply review base case reflects the increased managed stand volume expectation based on updated site productivity information.

In the first decade of the base case, the average area harvested in the model is 3024 hectares per year, the average age of harvested stands is 141 years and the average volume of harvested stands is 235 cubic metres per hectare. Once the sustainable long-term harvest level is reached, after 110 years, the average age of harvested stands is expected to be younger, 85 years, the average volume is expected to be higher at 301 cubic metres per hectare, and the average area harvested is projected to be lower, 2698 hectares.

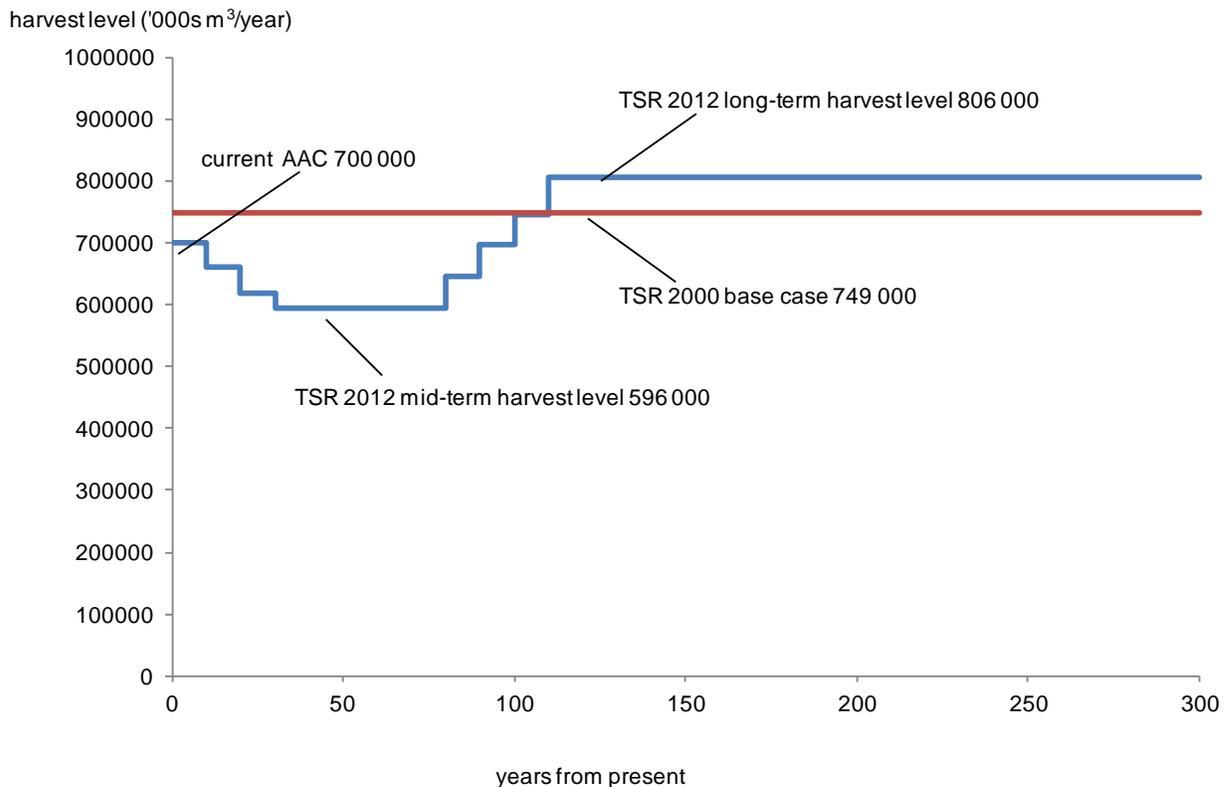


Figure 5. Base case timber supply forecast for the Boundary TSA (2012).

### Sensitivity analyses

The base case uses the best available data and forest management assumptions that attempt to capture current forest conditions and management practices. Sensitivity analysis is used to examine how timber supply may be affected by uncertainty or changes to the base case assumptions. Table 1 presents the difference between the base case harvest levels and a number of sensitivity analyses at three significant points in the harvest flow. The numbers indicate the percent difference between the base case harvest levels and those of the sensitivity analysis.

Sensitivity analyses are often performed on a variety of model inputs that are subject to uncertainty. For example, actual stand volumes may be different than the stand volume expectations used in the base case. The results of the sensitivity analysis in which natural stand volumes were varied by 10 percent can be used to assess the impact of under- or over-estimating natural stand productivity. The results are also useful in assessing how the model is performing. For example, as shown in Table 1, a 10-percent change in natural stand volumes, has the expected proportionate effect on the short- to mid-term harvest levels.

In the base case, managed stand volume tables were used for stands harvested since 1987 and account for most of the volume harvested starting in the sixth decade. Increasing managed stand volumes by 10 percent results in a proportionate change in the long-term harvest level; however, as some managed stands begin to be harvested in the model during the mid-term, this level changes, but to a lesser extent. A change in THLB similarly results in an equal change in the long-term harvest level but also affects mid-term timber supply. The minimum harvestable age sensitivity analysis indicates that decreasing the minimum age at which a stand is assumed to be available for harvest periodically limits mid-term harvest levels. Minimum harvestable age (MHA) was modelled based on theoretical ages near which stands would be maximizing their volume production.

Additional sensitivity analyses were prepared to examine any uncertainty associated with visual quality management and harvest priorities. Visual absorption capacity is the extent to which a stand can be harvested without visible change from a particular viewpoint. Harvest priority rules direct the model on the sequence in which stands are to be harvested, for example harvest the oldest stands first.

One area of uncertainty in the Boundary TSA is around the volumes that second-growth stands will have. Numerous studies throughout British Columbia have indicated that stand growth estimates based on inventory information from old-growth stands underestimate the productivity of second-growth managed stands. For this timber supply analysis, the increase in long-term harvest level above the level in the previous TSR base case, is the result of updated site productivity information. The current base case used estimates based on a site index adjustment project completed by the TSA licensees that found potential site productivity to be higher than forest inventory based estimates. An alternative approach to determine potential site productivity was also available. This method is based on correlating measured site indices with the biogeoclimatic site series. As shown in Table 1 this alternative approach suggests a lower forecast in the mid- and long-term.

Table 2. Sensitivity analysis results.

Initial = years 1-10, Mid-term Low = years 31-80, Long = years 110-300.

| Issue tested   | Sensitivity levels  | Percent Impact |     |      |
|--|---|----------------|-----|------|
|  |   | Initial        | Mid | Long |
| Natural stand volumes  | Change all volume tables by +10%                                      | 0              | 11  | 0    |
|  | Change all volume tables by -10%                                      | 0              | -13 | 0    |
| Managed stand volumes  | Change all volume tables by +10%                                      | 0              | 3   | 10   |
|  | Change all volume tables by -10%                                      | 0              | -3  | -8   |
| Minimum harvestable age  | Change MHA by +10 years   | 0              | -19 | 0    |
|  | Change MHA by -10 years   | 0              | 13  | -2   |
| THLB   | Change THLB by +10%   | 0              | 12  | 8    |
|  | Change THLB by -10%   | 0              | -16 | -10  |
| Management for visual quality  | Use only low VAC alteration   | 0              | -2  | -1   |
| (application of lowest/highest Visual Absorption Capacity (VAC) – i.e.: landscape is least/most likely to 'hide' evidence of harvesting) | Use only high VAC alteration  | 0              | 2   | -0   |
| Harvest priorities   |   |                |     |      |
| (volume is taken from the highest volume stands first <i>versus</i> across the profile of stands)  | Use highest volume percent  | 0              | -5  | -6   |
| Site productivity for older stands   | Use a SIBEC approach  | 0              | -16 | -14  |
| Old-growth management  | Use current old-seral objectives with natural disturbance in non-THLB | 0              | 5   | 2    |
| (a percentage requirement for old-seral stage area was applied as per the KBLUP; explained further below)                                |   |                |     |      |

The base case used the draft old-growth management areas (OGMAs) that are currently being used operationally to meet the old-seral stage requirements in KBLUP Order. However, the draft spatial OGMAs have not yet been legally-established in the Boundary TSA and although it is likely that use of the draft OGMAs will continue, Cabinet has not issued an order to change the legal requirements. Therefore, the base case should have used the aspatial old-seral objectives provided in the KBHLP Order. In order to assess the impact this has on the base case, a sensitivity analysis was prepared in which seral objectives were applied directly in place of the draft OGMAs. This change resulted in an increase of 21 801 hectares in the THLB, a five-percent increase in the mid-term harvest level and two-percent increase in the long-term harvest level. This sensitivity analysis did not include connectivity objectives but did consider the effects of natural disturbances in the non-timber harvesting land base.

The results in Table 1 indicate that the first decade harvest level can be maintained at the level of the current AAC for all the sensitivity analyses. The objective of the analyses was to keep the initial harvest level at the current AAC unless the AAC could not be met. Higher harvest levels were not attempted unless a harvest level equal to or greater than the current AAC could be maintained in all future time periods.

A sensitivity analysis to explore the effect on timber supply of the proposed Midway Community Forest was identified in the data package but was not completed as the community forest boundaries have not been finalized. If the community forest is established prior to the AAC determination, the chief forester will be provided with a sensitivity analysis to assess the impact on timber supply. If the community forest is approved following the determination of a new AAC, the TSA AAC will be automatically reduced by the same amount as the new community forest AAC.

### **Mountain Pine Beetle**

Mountain pine beetle (MPB) is native to BC and usually occurs at endemic levels. Epidemic outbreaks have occurred periodically throughout the Interior of BC and have played a vital role in the natural disturbance of pine forests, contributing to biodiversity and variation across the landscape.

Prior to the current epidemic, the largest outbreak in recorded history occurred between 1930 and 1936 on the Chilcotin Plateau. At its peak, this infestation affected 650 000 hectares, whereas the area infested in the current epidemic is about 14.5 million hectares. In the early 1980's a severe MPB epidemic swept across the Chilcotin Plateau and was subdued by extremely cold early winter weather in 1984 and 1985. The current beetle epidemic is much larger than any previously recorded outbreaks. In 2010, MPB was estimated to have killed a cumulative total of 726 million cubic metres of pine in BC. The cumulative area of the province affected by beetles was estimated to be 17.5 million hectares – an area more than five times the size of Vancouver Island.

The magnitude of the current outbreak has been attributed to two factors. First, due to the success of fire suppression over the past century, the area of mature lodgepole pine — the beetle's preferred host — has increased six-fold since 1910. Second, climate change has resulted in warmer winter temperatures over the last several years. Beetle populations die off during extended periods of extremely cold temperatures; however, the recent absence of sufficiently-cold temperatures in the Interior has allowed large populations of beetles to survive the winters under the bark of the pine trees.

On a provincial level, the rate of infestation peaked in 2005 and has slowed considerably since then. This decline is due to the decreasing level of suitable live-host trees. Mountain pine beetle has significantly impacted the timber supply of management units throughout the southern interior of British Columbia. However in some units such as the Boundary TSA, the rate of spread into and within the TSA has been slower than expected due to the terrain and the lower occurrence of pure or pine-dominated stands.

The BC Mountain Pine Beetle Model (BCMPB) is used to predict how much pine will eventually be killed by beetles. The Boundary TSA is considered a stable unit with no more than +/-10 percent change expected in projected pine mortality according to the report "Update of the Infestation Projection Based on the Provincial Aerial Overview Surveys of Forest Health conducted from 1999 through 2011 and the BCMPB model (year 9)".

Information about the infestation in the Boundary TSA is supplemented by ground surveys. These surveys suggest that in some areas MPB-killed trees are particularly scattered within stands and that some of these stands may not be captured in the overview surveys. Conversely, provincial experts have found that the MPB mortality projections for areas on the periphery of the core MPB infested area have been consistently higher than actual mortality and over time mortality projections for peripheral units, such as the Boundary TSA, have been decreasing (see Figure 6).

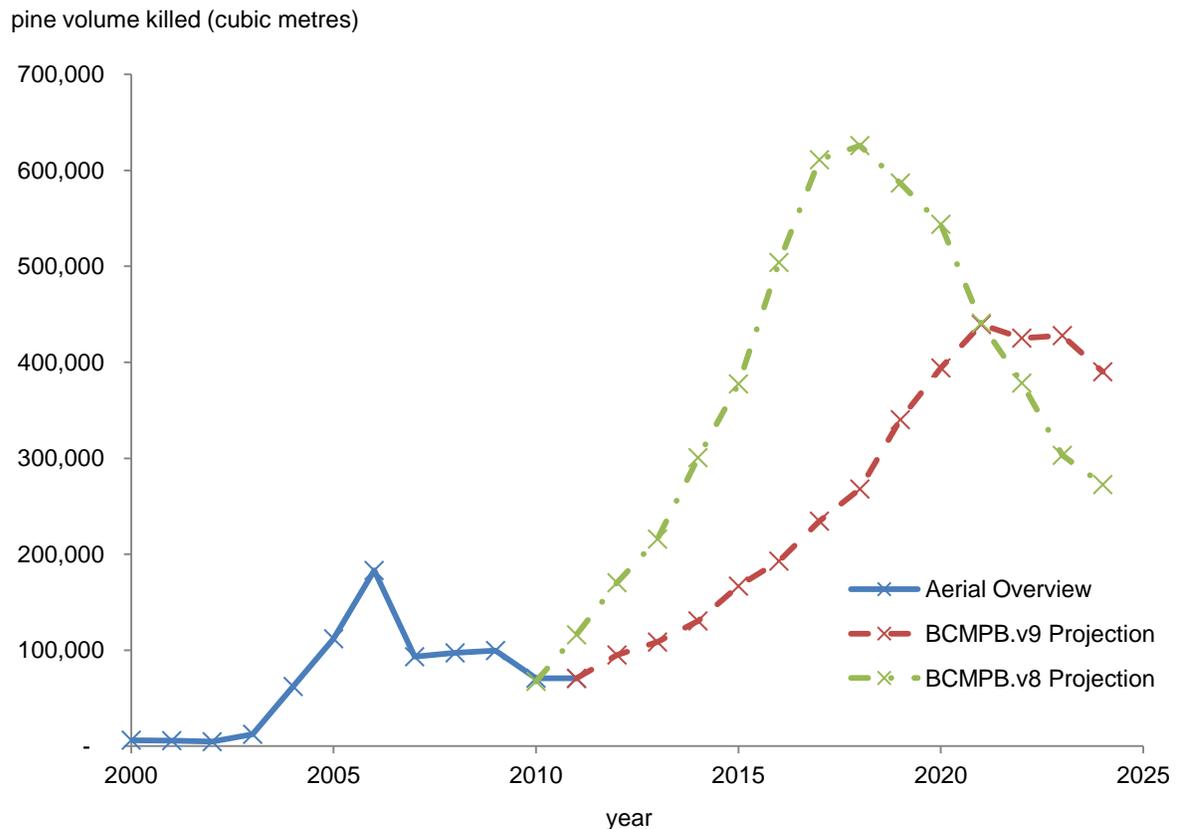


Figure 6. 1999-2011 Aerial overview surveys and BCMPB (version 8 & 9) projections of pine mortality in the Boundary TSA from mountain pine beetle.

Source: <http://www.for.gov.bc.ca/hre/bcmpb/year8.htm> and <http://www.for.gov.bc.ca/hre/bcmpb/year9.htm>

The pine mortality estimates used in the current base case are from the BCMPB (year 9) projection. If the BCMPB pine mortality projections and current management assumptions in the base case are correct, then the MPB infestation may have a significant effect on the short- to mid-term timber supply of the Boundary TSA. Conversely, if BCMPB continues to overestimate actual MBP mortality for this TSA and/or there are significant differences between the assumptions used in the base case and current management, then the projected decrease in short- to mid-term timber supply may not be significant.

In order to assess some of the uncertainties associated with the MPB-related assumptions used in the base case, additional sensitivity analyses examined changing the focus on pine harvest, the length of time dead pine retains economic value and changes in the mortality projections. The results of these analyses are shown in Table 3.

The term *shelf life* refers to the length of time that a MPB-killed pine tree remains an economically-viable source of wood. Shelf life estimates vary depending on the wood fibre quality required for a particular product. The base case uses a conservative four-year shelf life, after which the dead pine is no longer assumed to be a viable source of saw logs. A pulpwood shelf life assumption was not used in the base case; however, the volume of dead pine available was tracked for an additional six years. This information was used to examine the effect of an increased saw log shelf life and the effect on the base case of assuming that all of the volume harvested had to be of saw log quality. Assumptions about how much pine volume to include in the total harvest levels in the first decade of the base case were based on recent harvest information.

Table 3. *Mountain Pine Beetle: sensitivity and critical issue analyses.*  
*Initial = years 1-10, Mid-term, Low = years 21-70, Long = years 110-300*

| Issue tested                        | Sensitivity levels   | Percent Impact |     |      |
|-------------------------------------|--|----------------|-----|------|
|                                     |  | Short          | Mid | Long |
| No mountain pine beetle infestation | Did not include MPB mortality.   | 1              | 15  | 0    |
| Shelf life                          | Shelf life was increased to 100% available for 10 years from the present four years. | 0              | 3   | 0    |
| No pine targets                     | No priorities or targets for pine. Harvest priority was oldest first.                | 0              | -5  | 0    |
| BCMPB.v8                            | Replaced with previous year BCMPB projections that had higher mortality.             | 0              | -11 | 0    |

The first sensitivity analysis described in Table 3, indicates that in the absence of epidemic pine mortality, the short-term harvest increases by one percent, the mid-term harvest increases by 15 percent and the long-term harvest level is unchanged. These results are slightly low because the non-recoverable losses<sup>§</sup> due to endemic MPB mortality were not modelled. These results can be used to assess the effect of the uncertainty surrounding MPB mortality in the Boundary TSA.

Shelf life is a key assumption required to project timber supply for areas affected by MPB. Shelf life is defined as the length of time the wood from an attacked tree is assumed to remain viable for an end product. This will vary according to the potential end use of the dead pine (i.e., whether or not the fibre is of sufficient quality for use as saw log, pulp or for bioenergy). In a sensitivity analysis, assuming that dead pine remains a useable source of wood fibre for up to 10 years after death has no effect in the short term or the long term; however, mid-term timber supply is increased by three percent. The lack of response in short-term timber supply to a longer shelf life is due to the focused harvesting of both live and dead pine that has already occurred in the TSA. This means that the pine still available for harvest or salvage occurs at stands that have an increasing amount of non-pine species.

In the base case, pine stands are given priority for harvesting. Instructing the model to harvest older stands first had no effect in the short- or long-term; however, mid-term harvest levels were five percent lower than in the base case. This decrease occurs because harvesting old stands first in the model results in an increase in the volume of dead pine that exceeds its shelf life and is; therefore, no longer considered suitable for harvest.

Increasing the projected pine mortality above the levels used in the base case had no effect on the short- or long-term harvest levels; however, the mid-term harvest level decreased by 11 percent.

**<sup>§</sup>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.*

## Socio-economic conditions

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According to the 2011 Statistics Canada census, the population of the Boundary TSA is approximately 12,000. The major population centres of Grand Forks, Greenwood and Midway account for about 45 percent of the population. The remainder of the population is located in smaller communities such as Rock Creek, Beaverdell, Christina Lake and in outlying rural areas.

The total population of the region has declined by less than two percent since the previous census in 2006. The population of the larger centres has increased slightly but the rural population has declined.

About 150 people are directly employed in mills and woodlands operations in the Grand Forks and Midway areas. The Midway sawmill reopened in 2011 under the new ownership of Boundary Sawmills Incorporated. The contractor workforce involved in forestry is roughly equivalent to or somewhat greater than the number directly employed by local mills and forest companies. At the time of the 2006 Census, forestry constituted roughly 16 percent of the area economy.

In the period of 2008-2010, forest licensees harvested about half of the AAC of 700 000 cubic metres. An exception to this was in 2011 when the total harvest exceeded the AAC by 30 percent but this level of harvest is considered to be an anomaly, and not reflective of average current practice.

## Summary

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In the proposed base case for this TSR, the initial harvest level of 700 000 cubic metres per year, which is the level of the current AAC, can be maintained for one decade before stepping down to a mid-term level of 596 000 cubic metres per year or 15 percent in the third decade. Starting in the eighth decade, the harvest level increases in steps until a stable long-term harvest level of 806 000 cubic metres per year is reached in the eleventh decade. The increase in long-term harvest level above the level of the current AAC and also above the 2000 timber supply review base case reflects the increased managed stand volume expectation based on updated site productivity information.

Due to the uncertainty surrounding primarily pine mortality and shelf life and the use of draft spatial OGMAs in place of the current higher level plan order requirements, the mid-term harvest levels projected in the base case may be too low. The decrease in mid-term timber supply may also be mitigated if licensees are able to salvage more pine volume than assumed in the base case.

Finally, the provincial chief forester's AAC determination is a judgement based on professional experience and the 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 any of the initial harvest levels depicted in any of the forecasts included in this document.

## Your input is needed

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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 Boundary TSA. Ministry staff would be pleased to answer questions to help you prepare your response. Please send your comments to the resource manager at the address below.

Your comments will be accepted until September 5, 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:

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Further information regarding the technical details of the timber supply analysis are available on request by contacting [Forests.ForestAnalysisBranchOffice@gov.bc.ca](mailto:Forests.ForestAnalysisBranchOffice@gov.bc.ca)

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