

**BRITISH COLUMBIA
MINISTRY OF FORESTS, LANDS AND
NATURAL RESOURCE OPERATIONS**

Boundary Timber Supply Area

**Rationale for
Allowable Annual Cut (AAC)
Determination**

Effective May 22, 2014

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Objective of this document

This document provides an accounting of the factors I have considered, and the rationale I have employed in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Boundary Timber Supply Area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Acknowledgement

For preparation of the information I have considered in this determination, I am indebted to staff of the BC Ministry of Forests, Lands and Natural Resource Operations (FLNR) in the Selkirk Natural Resource District in the Kootenay Boundary Region, and the Forest Analysis and Inventory Branch (FAIB). I am also grateful to local residents, First Nations, forestry consultants and licensees who contributed to this process.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider a number of specified factors in determining AACs for timber supply areas (TSAs) and tree farm licences (TFLs). In addition to the chief forester, Section 23 (3) of the *Interpretation Act* expressly authorizes the deputy chief forester to carry out the functions of the chief forester, including those required under Section 8 of the *Forest Act*. Section 8 of the *Act* is reproduced in full as Appendix 1 of this document.

Description of the Boundary TSA

The Boundary TSA is located in southern British Columbia in the Kootenay Boundary Region. It is bounded on the west by the Okanagan Highland Range of the Monashee Mountains, on the east by the Christina Range, and on the south by the Canada-U.S.A. border. Areas within the TSA boundary that do not contribute to the TSA timber supply include TFL 8 and two large protected areas, Granby and Gladstone Parks.

The TSA covers a total area of approximately 659 000 hectares, of which 406 433 hectares is considered to be Crown forest land base (CFLB). After all other resource requirements have been accounted for, about 272 286 hectares are considered available for timber harvesting. This area is referred to throughout this document as the *timber harvesting land base* (THLB). The Boundary TSA is administered from the FLNR Selkirk Natural Resource District office in Nelson.

The Boundary TSA is a sparsely populated area with several communities. The largest municipality, Grand Forks, with a population of approximately 3,860, has about one-third of the TSA's total population. Other communities within the TSA include Christina Lake, Greenwood, Midway, Rock Creek, Bridesville and Beaverdell.

Nine First Nations have asserted traditional territories which overlap with the Boundary TSA, these include: the Okanagan Nation Alliance, Lower Similkameen Indian Band, and Penticton Indian Band. The territories of the Adams Lake Indian Band, Okanagan Indian Band, Osoyoos Indian Band, Shuswap Indian band, Splots'in, and Westbank First Nation overlap portions of the TSA. The Okanagan Nation Alliance (ONA) also encompasses six of the above bands: Lower Similkameen, Penticton, Okanagan, Osoyoos, Upper Nicola Band, and Westbank. The ONA receives all consultation letters but defers the exchange of consultation comments to the six bands.

Three distinct ecosections occur in the Boundary TSA. The Northern Okanagan Highland ecosection, in the western portion of the TSA, is drained by the Kettle River and consists of rolling highlands with wide, deep, north-south valleys. The Selkirk Foothills ecosection, in the eastern portion of the TSA, is drained by the Granby River and has a subdued mountain terrain with wide, north-south valleys and trenches. The Southern Okanagan Highland ecosection is a narrow band along the Canada-U.S.A. border that has east-west valleys characterized by rounded forested hillsides on north-facing slopes and open grasslands on south slopes. The valley bottoms of this ecosection are the hottest and driest in the Kootenay region.

The forests of the Boundary TSA are diverse. Lodgepole pine, Douglas-fir and larch are the most prevalent 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. These forests support a wide variety of wildlife species, including wildlife designated as “species at risk” or “regionally significant”, including: northern goshawk, Lewis’s woodpecker and grizzly bear. The TSA 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.

Within the Boundary TSA, 10 legal land use and resource management objectives have been established under the 2001 Kootenay Boundary Higher Level Plan Order (HLPO). These objectives provide management direction on biodiversity, old and mature forests, caribou, green-up and patch size, grizzly bears, connectivity corridors, water resource usage, enhanced resource development zones, fire maintained ecosystems, visuals and the forest economy. The KBHLP Order was significantly revised in October 2002. Since that time there have been nine variances to the plan.

History of the AAC

From 1982 to 1993, the allowable annual cut (AAC) for the Boundary TSA was 700 000 cubic metres. In response to mountain pine beetle (MPB) infestations between 1993 and 1995, the AAC was temporarily increased to 900 000 cubic metres. In March, 1996 the AAC was decreased to 700 000 cubic metres.

The current AAC for the Boundary TSA under Section 8 of the *Forest Act* is 700 000 cubic metres and was set by the chief forester effective January 2002 and reconfirmed in the November 2006 postponement decision.

Table 1. Apportionment of current AAC

Apportionment	Volume (m ³)	% of AAC
Forest Licences Replaceable	353,565	50.51
Forest Licences Non-Replaceable	21,503	3.07
BCTS Timber Sale Licences	287,764	41.11
Woodlot Licences	23,000	3.29
Forest Service Reserve	14,168	2.02
Total	700,000	100.00

Source: <http://www.for.gov.bc.ca/ftp/hth/external!/publish/web/timber-tenures/apportionment/APTR011-Boundary.PDF> (report effective date 2013-08-30).

New AAC determination

Effective May 22, 2014, the new AAC for the Boundary TSA is 700 000 cubic metres. This AAC will remain in effect until a new AAC is determined, which must take place within 10 years of this determination.

Information sources used in the AAC determination

- *Forest and Range Practices Act*, current to May 7, 2014;
- *Forest Act*, current to May 7, 2014;
- *Ministry of Forests and Range Act*, current to May 7, 2014;
- Stone, J. 2013. *Boundary TSA timber supply review analysis report*. Unpublished. Version May 2013. Forest Analysis and Inventory Branch, Victoria, BC;
- MFLNRO. 2013. *Boundary Timber Supply Area Timber Supply Review Data Package*. May 2013 (unpublished), Ministry of Forests, Lands, and Natural Resource Operations, Forest Analysis and Inventory Branch, Victoria, BC and Selkirk Resource District, Castlegar, BC. 40 p;
- MFLNRO. 2013. *Boundary Timber Supply Area Timber Supply Review Public Discussion Paper*. July 2013, Ministry of Forests, Lands, and Natural Resource Operations, Forest Analysis and Inventory Branch, Victoria, BC. 15 p;
- Woods, A. and K.D. Coates. 2013. *Are biotic disturbance agents challenging basic tenets of growth and yield and sustainable forest management?* Forestry 2013; Advanced access from <http://forestry.oxfordjournals.org/> on August 14, 2013, 1-12;
- First Nations Consultation Record for the Boundary TSA AAC Determination. 2013;
- Walton, A. 2012. *Provincial-level project of the current mountain pine beetle outbreak: 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)*. February 28, 2012. Ministry of Forests, Lands, and Natural Resource Operations. Victoria, BC. 12p;

- Giles-Hansen, K. and K. Sherman. 2012. *First Nations woodland license land base scoping and timber supply analysis*. Prepared for Osoyoos Indian Band. Prepared by Ecora Resource Group Ltd. December 2012;
- MFLNRO. October 2012. *Beyond the Beetle: A Mid-term Timber Supply Action Plan*. Special Committee of the BC Legislature on Timber Supply. August 2012. Growing Fibre, Growing Value;
- Statistics Canada. 2011. www.statcan.gc.ca;
- Walton, A. 2011. *Provincial-level project of the current mountain pine beetle outbreak: update of the infestation projection based on the provincial aerial overview surveys of forest health conducted from 1999 through 2010 and the BCMPB model (year 8)*. June 22, 2011. Ministry of Forests, Lands, and Natural Resource Operations. Victoria, BC. 15p;
- MFLNRO. 2011. *Boundary Timber Supply Area Timber Supply Review Data Package*. June 2011. Ministry of Forests, Lands, and Natural Resource Operations, Forest Analysis and Inventory Branch, Victoria, BC and Selkirk Natural Resource District, Castlegar, BC. 38p;
- MOE. 2011. Approved wildlife habitat areas. Victoria, BC. <http://www.env.gov.bc.ca/wld/frpa/iwms/wha.html>;
- MOE. 2011. BC Species and Ecosystems Explorer. Ministry of Environment, Victoria, BC. <http://a100.gov.bc.ca/pub/eswp/>;
- MFLNRO. 2011. Harvest Billing System (HBS). <http://www.for.gov.bc.ca/hva/hbs/>;
- Province of British Columbia; May 7, 2010. *Updated Procedures for Meeting Legal Obligations When Consulting First Nations – Interim*;
- TNRG. 2008. *Enhanced type 2 silviculture analysis Boundary TSA information package*. Prepared for British Columbia Timber Sales. Timberline Natural Resource Group, Kelowna, BC. 52p;
- TNRG. 2008. *Enhanced type 2 silviculture analysis Boundary TSA analysis package*. Prepared for British Columbia Timber Sales. Timberline Natural Resource Group, Kelowna, BC. 102p;
- Snetsinger, J. 2006. Chief Forester Order respecting the AAC determination for the Boundary TSA. November 2, 2006. Ministry of Forests and Range, Victoria, BC. 2p;
- MOE. 2006a. Order – Ungulate Winter Range #U-8-007. May 8, 2006. Ministry of Environment, Victoria, BC. 2p;
- MOE. 2006b. Order – Ungulate Winter Range #U-8-008. May 8, 2006. Ministry of Environment, Victoria, BC. 5p;
- MOF. 1998. Boundary TSA Inventory Audit. Resources Inventory Branch, Ministry of Forests, Victoria, BC. 5p;
- Ministry of Forests and Range. March 2006. *Summary of dead potential volume estimates for management units within the Northern and Southern Interior Forest Regions*;
- MFR. 2005. *Order for the establishment of visual quality objectives and scenic area for the Arrow Boundary Forest District*. December 31, 2005. Ministry of Forest and Range, Castlegar, BC. 1p;

- MSRM. 2002. Kootenay-Boundary Higher Level Plan Order. October 26, 2002. Ministry of Forests, Ministry of Sustainable Resource Management, and Ministry of Energy and Mines. Victoria, BC. 13p;
- Pedersen, L. 2001. *Boundary Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination*. Effective January 1, 2002. British Columbia Ministry of Forests, Victoria, BC. 46p;
- Pedersen, L. 1996. *Boundary Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination*. Effective March 1, 1996. British Columbia Ministry of Forests, Victoria, BC. 39p;
- MFLNRO. 2013. *Boundary TSA Timber Supply Analysis Public Discussion Paper*. July 2013. Ministry of Forests, Lands, and Natural Resource Operations, Forest Analysis and Inventory Branch, Victoria, BC 16p;
- Boundary Timber Supply Area Allowable Annual Cut Determination Meeting. October 8-9, 2013. Ministry of Forests, Lands and Natural Resource Operations. Castlegar, BC;
- Letter from the Minister of Forests and Range to the Chief Forester stating the economic and social objectives of the Crown, July 4, 2006; and
- Letter from the Minister of Forests and Range to the Chief Forester stating the economic and social objectives of the Crown regarding mid-term timber supply in areas affected by the MPB, October 27, 2010.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester, in determining AACs, to consider biophysical, social and economic information. Most of the technical information used in determinations is in the form of a timber supply analysis and its inputs of inventory and growth and yield data. These are concerned primarily with biophysical factors – such as the rate of timber growth and the definition of the land base considered available for timber harvesting – and with management practices.

The analytical techniques used to assess timber supply necessarily are simplifications of the real world. Many of the factors used as inputs to timber supply analysis are uncertain, due in part to variation in physical, biological and social conditions. Ongoing scientific studies of ecological dynamics will help reduce some of this uncertainty.

Furthermore, computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Technical information and analysis; therefore, do not necessarily provide the complete answers or solutions to forest management decisions such as AAC determinations. Such information does provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information I must consider in AAC determinations.

In determining this AAC for the Boundary TSA, I have considered known limitations of the technical information provided. I am satisfied that the information provides a suitable basis for my determination.

Guiding principles for AAC determinations

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining the AACs for timber supply areas and tree farm licences.

Given the large number of periodic AAC determinations required for British Columbia's many forest management units, administrative fairness requires a reasonable degree of consistency of approach in addressing relevant factors associated with AAC determinations. In order to make our approach in these matters explicit, we, the chief forester and deputy chief forester, jointly established the following body of guiding principles. However, in any specific circumstance in a determination where we consider it necessary to deviate from these principles, we will explain our reasoning in detail.

When considering the factors required under Section 8, we are also mindful of our obligation as stewards of the forests of British Columbia, of the mandate of the Ministry of Forests, Lands and Natural Resource Operations as set out in Section 4 of the *Ministry of Forests and Range Act*, and of our responsibilities under the *Forest Act* and *Forest and Range Practices Act (FRPA)*.

Integrated decision making

One of the key objectives of the Ministry of Forests, Lands and Natural Resource Operations is to take an integrated approach to all resource management decisions that considers all resource values. In considering the factors outlined in Section 8 of the *Forest Act*, we will continue to consider all available information on timber and non-timber resources in the management unit, and all available information on the interactions of the management of those resources on timber supply.

Information uncertainty

Given the complex and dynamic nature of forest ecosystems coupled with changes in resource use patterns and social priorities there is always a degree of uncertainty in the information used in AAC determinations.

Two important ways of dealing with this uncertainty are:

- (i) managing risks by evaluating the significance of specific uncertainties associated with the current information and assessing the various potential current and future, social, economic and environmental risks associated with a range of possible AACs; and
- (ii) re-determining AACs frequently, in cases where projections of short-term timber supply are not stable, to ensure they incorporate current information and knowledge.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs, it is important to reflect those factors, as closely as possible, that are a reasonable extrapolation of current practices. It is not appropriate to base decisions on proposed or potential practices that could affect the timber supply but are not substantiated by demonstrated performance or are beyond current legal requirements.

In many areas, the timber supply implications of some legislative provisions remain uncertain, particularly when considered in combination with other factors. In each AAC determination, this uncertainty is taken into account to the extent possible in the context of the best available information.

It is not appropriate to speculate on timber supply impacts that may eventually result from land-use decisions not yet finalized by government. However, where specific protected areas, conservancies, or similar areas have been designated by legislation or by order in council, these areas are deducted from the THLB and are not considered to contribute any harvestable volume to the timber supply in AAC determinations, although they may contribute indirectly by providing forest cover to help in meeting resource management objectives such as for biodiversity.

In some cases, even when government has made a formal land-use decision, it is not necessarily possible to fully analyse and account for the consequent timber supply impacts in a current AAC determination. Many government land-use decisions must be followed by detailed implementation decisions requiring, for instance, further detailed planning or legal designations such as those provided for under the *Land Act* and FRPA. In cases where there is a clear intent by government to implement these decisions that have not yet been finalized, we will consider information that is relevant to the decision in a manner that is appropriate to the circumstance. The requirement for regular AAC reviews will ensure that future determinations address ongoing plan implementation decisions. Where appropriate, information will be considered regarding the types and extent of planned and implemented silviculture practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of their timber supply effects.

We acknowledge the perspective that alternate strategies for dealing with information uncertainty are to delay AAC determinations or to generally reduce AACs in the interest of caution. However, given that there will always be uncertainty in information and due to the significant impacts that AAC determinations can have on communities, we believe that no responsible AAC determination can be made solely on the basis of a response to uncertainty.

Nevertheless, in making a determination, allowances may need to be made to address risks that arise because of uncertainty by applying judgement to the available information. Where appropriate, the social and economic interests of the Crown, as articulated by the Minister of Forests, Lands and Natural Resource Operations, can assist in evaluating this uncertainty.

Climate change

One key area of uncertainty relates to climate change. While some controversy appears to remain on the causes of climate change, there is substantial scientific agreement that climate is changing, that the changes will affect forest ecosystems, and that forest management practices will need to be adapted. Nevertheless, the potential rate, amount, and specific characteristics of climate change in different parts of the province are uncertain. As research provides more definitive information on climate change, we will consider the findings in AAC determinations. Where forest practices are implemented to mitigate or adapt to the potential effects of climate change on forest resources, we will consider related information in our determinations.

In addition, vulnerability assessments can provide information on the potential risks associated with climate change, and could be useful in defining how to consider climate change in different AAC determinations. Such assessments could also highlight key topics in need of research that could improve climate change considerations for future determinations.

We note, however, that even with better information on climate change there will be a range of reasonable management responses. Considerations of how to respond in anticipation of uncertain, potential future impacts and risks differ from those related to responding to known or ongoing processes such as the recent MPB infestation. For example, it is not clear if either increases or decreases to current harvest levels would be appropriate in addressing potential future increases in natural disturbance due to climate change. Conversely, the present forest

conditions resulting from the MPB infestation provide a clearer circumstance to which to respond.

To some extent, decisions on the preferred management responses to potential future risks, including potential changes to allowable timber harvests, are appropriately informed by broad discussion among interested parties. We will monitor such discussions and consider them insofar as they are relevant to AAC determinations. In general, the requirement for regular AAC reviews will allow for the incorporation of new information on climate change and its effects on forests and timber supply as it emerges.

First Nations

The Crown has a legal obligation to consult with First Nations regarding their asserted rights and title (aboriginal interests) in a manner proportional to the strength of their aboriginal interests and the degree to which the decision may impact these interests. In this regard, full consideration will be given to:

- (i) the information provided to First Nations to explain the timber supply review process;
- (ii) any information brought forward respecting First Nations' aboriginal interests, including how these interests may be impacted; and
- (iii) any operational plans and/or other information that describe how First Nations' interests are addressed through specific actions and forest practices.

Aboriginal interests that may be impacted by AAC decisions will be addressed consistent with the scope of authority granted to the chief forester under Section 8 of the *Forest Act*. When information is brought forward that is outside of the chief forester's jurisdiction, this information will be forwarded to the appropriate decision makers for their consideration. Specific considerations identified by First Nations in relation to their aboriginal interests and the AAC determination are addressed in the various sections of this rationale.

AAC determinations should not be construed as limiting the Crown's obligations under court decisions in any way, and in this respect it should be noted that the determinations do not prescribe a particular plan of harvesting activity within the management units. They are also independent of any decisions by the Minister of Forests, Lands and Natural Resource Operations with respect to subsequent allocation of wood supply.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Provincial Timber Supply Review Program for TSAs and TFLs.

For most AAC determinations, a timber supply analysis is carried out using an information package including data and information from three categories: land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model, a series of timber supply forecasts can be produced to reflect different starting harvest levels, rates of decline or increase, and potential trade-offs between short- and long-term harvest levels.

From a range of possible forecasts, one is chosen in which an attempt is made to avoid both excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the "base case" forecast and forms the basis for comparison when assessing the effects of uncertainty on timber supply. The base case is designed to reflect current management practices. Because it represents only one in a

number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity – as with all the other forecasts provided – depends on the validity of the data and assumptions incorporated into the computer model used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which resulting predictions of timber supply must be adjusted to more properly reflect the current and foreseeable situation.

These adjustments are made on the basis of informed judgment using currently available information about forest management, and that information may well have changed since the original information package was assembled. Forest management data are particularly subject to change during periods of legislative or regulatory change, or during the implementation of new policies, procedures, guidelines or plans.

Thus, in reviewing the considerations that lead to the AAC determination, it is important to remember that the AAC determination itself is not simply a calculation. Even though the timber supply analysis I am provided is integral to those considerations, the AAC determination is a synthesis of judgment and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgments that in part may be based on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation would be gained by attempting a computer analysis of the combined considerations.

Base case for the Boundary TSA

The current AAC in the Boundary TSA is 700 000 cubic metres. This level was set by the chief forester in January 2002 and reconfirmed in a November 2006 postponement decision.

For this timber supply review, the objective of the analysis was to develop a base case in which the initial harvest level – set at the level of the current AAC – was maintained as long as possible before stepping down to the mid-term harvest level (“mid-term” is that period of a timber supply forecast when harvesting must transition from existing stands to regenerating (managed) stands).

Following this transition, the objective was to maximize the long-term harvest level while still maintaining a stable growing stock. In timber supply forecasts for MPB-affected management units, mid-term harvest levels may be exacerbated due to the loss of existing stand volume due to pine mortality.

The base case and the other timber supply forecasts for this timber supply review were prepared using the FAIB timber supply model FSSAM version 4_002. The data and assumptions used in the base case attempt to reflect current legislation, legally-established resource objectives, demonstrated current forest management practices and conditions as closely as possible. In order to reflect current performance in the Boundary TSA, pine harvest in the base case was constrained to about 55 percent of the total harvest.

In the base case an initial harvest flow of 700 000 cubic metres per year could be maintained for one decade before decreasing in two steps to a mid-term harvest level of 596 000 cubic metres per year, which is about 15 percent lower than the current AAC. After eight decades, the harvest level starts to increase to the long-term harvest level of 806 000 cubic metres per year, which is about 15 percent higher than the current AAC. The inventory used in the base case was updated

for depletion and projected for growth as of January 1, 2010. This is the starting date of the base case, which was completed in 2010.

The 2000 (TSR 2) base case maintained an even-flow of 749 000 cubic metres per year. The difference between the mid-term harvest level in the 2000 and current base case mid-term harvest levels reflects the current MPB infestation; whereas, the higher long-term harvest level in the current base case reflects new site productivity information.

After 55 years in the base case, managed stands contribute 50 percent of the harvest and by year 68 in the forecast, these stands account for 90 percent of the harvest. The mean harvest age in the first decade is 141 years and the average volume of harvested stands is 235 cubic metres per hectare. In the long term the mean harvest age decreases to 85 years; however, the average volume of harvested stands increases to 301 cubic metres per hectare. The younger harvest age and higher volumes reflect the increased productivity of managed stands in which the growing stock and stocking standards have been improved.

In the first decade of the base case an average of 3024 hectares is harvested annually, during the mid-term this decreases to 2741 hectares annually before increasing slightly to 2897 hectares in the long term. Note that due to the projected increase in stand productivity, fewer stands provide more harvest volume and the area disturbed annually decreases.

I have reviewed: the assumptions and methodology incorporated in the base case, the alternative harvest flows and the sensitivity analyses. Based on my review, I am satisfied, subject to the qualifications accounted for in various sections of this document, that the information presented to me provides a suitable basis from which I can assess the timber supply for the Boundary TSA.

Consideration of factors as required by Section 8 (8) of the *Forest Act*

I have reviewed the information for all of the factors required to be considered under Section 8 of the *Forest Act*. Where I have concluded that the modelling of a factor in the base case appropriately represents current management or the best available information, and uncertainties about the factor have little influence on the timber supply projected in the base case, no discussion is included in this rationale. These factors are listed in Table 2.

Table 2. List of accepted factors as modelled

<i>Forest Act section and description</i>	<i>Factors accepted as modelled</i>
8(8)(a)(i) the composition of the forest and its expected rate of growth on the area	Non-provincial Crown lands Area-based tenures Non-forest and non-productive Parks and miscellaneous reserves Environmentally sensitive areas – regeneration Low productivity sites Growth and yield research Existing stand volumes Minimum harvestable age
8(8)(a)(ii) the expected time that it will take the forest to become re-established on the area following denudation	-
8(8)(a)(iii) silviculture treatments to be applied to the area	Silvicultural systems Incremental silviculture Rehabilitation programs
8(8)(a)(iv) the standard of timber utilization and the allowance for decay, waste, and breakage expected to be applied with respect to timber harvesting on the area	-
8(8)(a)(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production	Landscape-level biodiversity Scenic resources Stand-level biodiversity Cultural heritage and archaeological resources
8(8)(a)(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber	
8(8)(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area	-
8(8)(c) [Repealed 2003-31-2]	-
8(8)(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia	-
8(8)(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area	-

For other factors, where more uncertainty exists, or where I have concern about the information used, or the modelling technique, or where public or First Nations' input suggests contention regarding the information used, the modelling, or some other aspect under consideration, I have explained below how I have considered and accounted for the uncertainty, the information, the modelling, or issues raised.

Section 8 (8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

The total area of the Boundary TSA is 659 000 hectares of which 272 286 hectares is considered to be available and suitable for inclusion in the timber harvesting land base (THLB) used for the base case.

The THLB is 5.5 percent smaller than reported in the previous timber supply review (2001). This reduction primarily reflects changes in modelling assumptions and approaches rather than changes to forest management objectives; for example old-seral objectives can be modelled as old-growth management areas or through a minimum retention rule.

As part of the process used to define the THLB, a series of deductions were made from the Crown forest land base. These modelled deductions account for economic or ecological factors that reduce the forest area available for harvesting under current management objectives. In reviewing these deductions, I am aware that some areas may have more than one classification. To ensure accuracy in defining the THLB, care has been taken to avoid any potential double-counting associated with overlapping objectives. The unique deduction presented in the timber supply analysis represents the area where only the one factor being discussed is present, and all others are absent.

For the Boundary TSA, I accept that the above approach was used appropriately in the timber supply analysis.

An analysis of the age class distribution of stands within Boundary TSA shows that two-thirds of stands within the THLB are over 70 years of age with relatively few between 40 and 60 years. Within the THLB, lodgepole pine is the predominant species followed by larch and Douglas-fir. About 32 percent of the THLB has forest management objectives for visual quality, ungulate winter range, mature seral, and/or community watersheds.

- forest inventory

The Boundary TSA forest inventory, currently in a Vegetation Resource Inventory (VRI) format was converted from Forest Inventory Planning (FIP) data. The photographic interpretations were completed between 1954 and 2009, with the majority occurring in the late 1980's. The inventory is updated annually to reflect growth and depletions from harvest and other disturbances. An audit completed in 1998 found the mature component of the inventory to be statistically acceptable. Polygons missing inventory information, 1582 hectares within the Boundary TSA, were excluded from the timber supply analysis.

During public consultation, two comments were received regarding the inventory. Staff from Zellstoff Celgar Ltd. expressed the need for sufficient resources to be made available for the continued maintenance of the forest inventories. The Friends and Residents of the North Fork (FRNF) expressed concern that the majority of the inventory is based on interpretation of aerial photography completed more than 25 years ago.

I agree that the inventory is based on older information; however, FAIB staff indicate that they are undertaking new inventories in areas of the province with older inventories. However, as inventory work is both time consuming and costly, not all areas can be re-inventoried immediately. Consequently, inventory resources are directed to those management units in which the need for new information is most pressing, for example management units that have been severely impacted by mountain pine beetle.

The inventory used in the base case was updated for depletion until 2010. A comparison of the 2010 inventory to FAIB's consolidated cutblock layer (mapping) for 2013 indicated that the THLB was overestimated by 17 821 hectares. In a sensitivity analysis, resetting the ages of these stands to reflect depletion resulted in a 20 000 cubic metre or three percent decrease in the mid-term timber supply projected in the base case.

With the exception of not accounting for recent depletions, the inventory used in the base case represents the best available information and is suitable for use in this determination. However, as the base case did not account for depletion after 2010, I conclude that the base case mid-term timber supply is overestimated by 20 000 cubic metres per year or about three percent. I will discuss this further in '**Reasons for Decision**'.

- roads, trails and landings

FLNR staff used updated road coverage in order to identify and classify existing roads, trails and landings (RTL). The location and length of transmission corridors were identified using separate information. Applying the results of a road measurement project, which was completed in response to concerns identified by the chief forester during the previous timber supply review, total buffer widths of 60 metres, 14 metres, 8.5 metres and 3 metres were applied to highways, main lines, operational roads and spur roads, respectively. Trails were assigned a buffer width of zero because it was assumed that there would be no gap in the canopy of a future forest and no decrease in stand productivity. The area associated with transmission line corridors was estimated by applying the provincial average corridor width of 60 metres.

The total area occupied by existing RTLs was estimated to be 8268 hectares. After accounting for overlap with areas already excluded from the THLB, a net area of 4068 hectares was excluded from the THLB. No additional area was excluded to account for future RTLs.

Based on the assumption that unharvested stands more than 200 metres from an existing road or trail will require access in the future, an additional 8000 hectares were excluded from the future THLB to account for future RTLs. District staff expect that future access development will occur within the legal limit of seven percent of the cutblock area. Application of this limit to the area associated with future RTLs represents up to a three-percent overestimation in the base case long-term harvest level.

Several members of the public submitted that a THLB reduction of 4068 hectares was insufficient to account for all existing RTLs and noted that road density in the TSA had increased significantly in the last 11 years. In response, district staff noted that the area excluded had been estimated using new road coverage and actual road measurements. They also indicated that although the net area excluded was 4068 hectares the total area associated with this factor was 8268 hectares.

Although I find it unlikely that there will be no loss in productive forest associated with small roads and trails, in the absence of information from which to assess this issue, I accept that the best available information was used to account for existing roads, trails and landings in the base case.

In order to account for future roads, trails and landings, I will account for up to a three-percent overestimation in the base case long-term harvest level, as discussed in '**Reasons for Decision**'. With regard to increasing road density: road development may adversely impact a range of forest resources and values. Not only does the potential loss of productive forest affect timber supply, the increase in access may adversely impact wildlife and I have provided recommendations to both licensees and FLNR staff to address this issue, as described under '**Implementation**'.

- terrain stability

An environmentally sensitive area (ESA) for soils is an area identified in the forest inventory as sensitive to disturbance; these areas were excluded from the THLB in the previous TSR.

Terrain stability level "C" and "D" mapping, completed by Pope and Talbot Ltd. since the previous TSR provides similar information on area sensitive to disturbance and was used in the current analysis instead of ESA for soils.

In this analysis, all areas mapped as unstable (U) or Terrain Stability Class (TSC) V were completely excluded from the THLB; whereas, all areas mapped as potentially unstable (P) or TSC IV were completely included. District staff and licensees agreed this was an oversimplification, and that about 80 percent of TSC class U or V is unharvestable, rather than the modelled 100 percent, and that about 20 percent of class P or IV is unharvestable, rather than the modelled zero percent. Because the area categorized as potentially unstable is far greater than the area categorized as unstable, this oversimplification suggests that the THLB may be overestimated by 3366 hectares or about one percent.

In the 2002 AAC rationale for the Boundary TSA, the chief forester asked district staff to examine the terrain stability mapping that was being completed at the time and ensure that the mapping was used in the next analysis. While I am satisfied that the method used to map unstable terrain in this analysis is significantly better than that used in the 2002 analysis, I agree with district and licensee staff that the modelling approach was overly simplistic and that the THLB was overestimated by 3366 hectares. On this basis, I conclude that the base case timber supply has been overestimated by about one percent and I will account for this in my determination as discussed in '**Reasons for Decision**'.

- economic and physical operability

Using operability mapping for the Boundary TSA that was completed in 1991, a total of 113 321 hectares within the Boundary TSA were classified as inoperable. After accounting for overlaps with other areas previously removed to account for other factors, a net area of 23 882 hectares was excluded from the THLB.

In the previous timber supply review, Ministry of Environment staff commented that licensees were not harvesting stands in all terrain types. At that time, the chief forester recommended that the operability mapping be refined, particularly in difficult terrain. Due to resource constraints, new operability mapping was not completed.

In order to assess the validity of the operability information used in this TSR, district staff compared the location of harvested blocks to the operability mapping. They found that only 2.4 percent of the area harvested fell within areas classified as inoperable. Offsetting this, they also identified small unharvested areas within harvested areas mapped as operable. Although the net difference between misclassified areas is unknown, the magnitude is very small. On this basis, staff concluded that the 1999 operability mapping reasonably reflects current management.

Operable areas with slopes greater than 35 percent that are expected to be harvested through cable logging represent about 18 percent of the THLB in the Boundary TSA. An examination of cutblock information indicated that in 2001, eight percent of harvesting occurred in areas with slopes greater than 35 percent. In 2011, the level of harvesting on steep slopes decreased to four percent. The results of a sensitivity analysis in which areas with slopes greater than 35 percent were excluded from the THLB, showed that the mid-term timber supply decreased from the base case level of 596 000 cubic metres per year to 476 000 cubic metres per year or by about 20 percent.

Public input was received indicating that “economic timber” is becoming harder to locate, and asserting that this opinion is shared by “forest harvest planners at the ground level”. I share this concern and note that economic operability is one of the key factors in this determination. However, I am also aware that what constitutes “economic timber” fluctuates with market demand and is influenced by other factors, such as the availability of technology and processing facilities. Consequently, the recovery in lumber markets may increase the economic viability of some stands.

For this determination, I accept that the economic and physical operability assumptions used in the base case reflect the best available information and are suitable for use in this determination. While I expect that the use of cable harvesting will eventually increase, I am mindful that continued avoidance of harvesting timber on steep slopes significantly decreases mid-term timber supply. As described under ‘**Implementation**’, it is my expectation that district staff will monitor harvest performance on slopes greater than 35 percent and will provide me with this information two years after and five years after the date of this determination. In the event that harvesting on slopes greater than 35 percent does not increase to a level proportionate with the contribution of these stands to the THLB, I am prepared to revisit this determination earlier than the 10 year-period specified in Section 8 of the *Forest Act*.

- marginally-economic forest types

Marginally-economic forest types (previously referred to as “problem” forest types) are physically-operable stands that exceed low site criteria but are not currently utilized or have marginal merchantability. In the Boundary TSA these types include deciduous-leading stands and dense/low productivity pine stands.

Only a very small amount of deciduous timber is harvested in the Boundary TSA. In order to reflect this in the base case, a net area of 3362 hectares of deciduous-leading stands were excluded from the THLB. For coniferous-leading stands, the deciduous component was excluded from the yield tables.

Dense pine stands are stands in which the number of stems per hectare is so high that the trees grow slowly such that the stand eventually stagnates. Prior to the 2002 AAC determination, district staff reviewed the age, height, stocking class and site index (a measure of site productivity) information in the inventory in an attempt to identify these stands. Subsequent field study results indicated that the inventory-based classification was only accurate for about half of the area sampled.

The current Vegetation Resources Inventory (VRI) does not include stocking class information. As such it is no longer possible to identify dense pine stands using the inventory. Based on input from licensees and information from field reviews, district staff developed minimum harvest criteria that could be used to approximate dense pine stands. For the base case, pine-leading stands with more than 70 percent pine by volume were required to reach a minimum volume of 100 cubic metres per hectare within 120 years. This resulted in the exclusion of a total area of 13 480 hectares, or a net area of 3269 hectares from the THLB. By comparison, in the previous TSR, about 6000 hectares of stands classified as dense pine were excluded from the THLB, which was about the same as in the current timber supply review.

To test the validity of this alternative approach, district staff compared mapped cutblocks to the stands identified using the minimum harvest criteria. The results indicate that only 490 hectares or about 3.6 percent of the excluded area overlapped with areas harvested since 1996 and only 82 hectares or 0.6 percent overlapped with stands harvested since 2007.

At a meeting with staff from Zellstoff Celgar, the local pulp mill, they indicated that the alternative approach to identifying low productivity/dense pine stands used in the base case was overly conservative and as a consequence too large an area had been excluded from the THLB. Consequently, they maintained that the mid- to long-term harvest levels could be higher than projected in the base case. They also noted that although these dense pine stands had been avoided in the past by licensees, the stands could represent an opportunity to ameliorate the projected decrease in the mid-term timber supply of residual chips for use in the pulp mill. Furthermore, they suggested that if the stagnant dense pine stands growing on productive sites were harvested, this material could be used directly as pulpwood.

In addition to the information discussed above, I am aware of the recommendations of the 2012 Special Committee on Timber Supply that was appointed by the BC Legislature to make recommendations to address the reduction of mid-term timber supply due to mountain pine beetle. One of the key ministry responses indicated that the chief forester would review the “marginally economic forest types within each timber supply area and quantify the types and areas of forest that might justifiably be included in a partition within the timber harvesting land base”, while respecting resource objectives for other values, such as wildlife and water.

I have considered all of the information received regarding marginally-economic forest types (“problem” forest types) and conclude that the base case assumptions are a reasonable approximation of current practices and the best available information. Consequently, I will make no adjustments to the base case on this account.

With regard to stands previously classified as dense pine and currently defined using minimum harvest criteria, I note that although the size of the THLB in this TSR is approximately the same as in the previous TSR, the amount of area excluded from the THLB to account for dense pine/low productivity pine has decreased by about 50 percent. From this, I conclude that those areas of marginally-economic stands that had the potential to contribute to timber supply are now contributing to the base case. The remaining 3340 hectares are unlikely to be harvested in the near future as evidenced by the historic avoidance of these stands.

- site productivity estimates

Site index, which is a measure of productivity based on the relationship between a species' height and its age, can be derived using several methodologies. Site indices based on forest inventory attributes of height and age have been found to underestimate the potential site productivity for stands greater than 140 years and younger than 30 years. As such, various sampling methods have been used in British Columbia to better represent potential site index.

In the Boundary TSA, two alternative methodologies to derive site indices are available based on: (1) SIBEC relationships and (2) a site index adjustment (SIA) project. Both methodologies have inherent uncertainty and variability.

SIBEC relationships: The FLNR maintains a database of potential site indices by biogeoclimatic zone site series. Site indices included in this database were collected and summarized to specified standards. SIBEC-based site indices can be applied to a land base where the biogeoclimatic site series are known or estimated through Terrestrial Ecosystem Mapping (TEM) or Predictive Ecosystem Mapping (PEM). PEM was completed for the Boundary TSA in 2003, in accordance with Resource Information Committee standards, and was then used as a base to generate SIBEC values in 2011.

Site index adjustment project: Licensees in the Boundary TSA contracted TECO Natural Resource Group Ltd. to complete a site index adjustment project, which was completed in 2011. In this approach, preliminary site indices are assigned to stands in the TSA. The preliminary site indices are based on SIBEC values or, where these are not available, site indices based on forest cover attributes from the inventory. Once assigned, the preliminary site index estimates are adjusted based on field sampling. A third party quality assessment of the SIA project found that the field samples met quality standards and were statistically valid.

In the base case, SIA-derived site index adjustments were applied to most of the CFLB except for the Engelmann-spruce/sub-alpine fir zone, where samples were not collected, and a small area for which there is no PEM information.

During consultation, one respondent questioned the use of estimates based on the licensee-funded SIA project, rather than on SIBEC, given the latter resulted in more conservative estimates of site productivity. For this determination, I accept that the licensee used an acceptable approach for estimating site productivity that was reviewed by a third party.

Following a review of the site productivity information available in British Columbia, FAIB has created a Provincial Site Productivity Layer (map) that describes the best available information for each management unit. For the Boundary TSA, the best available information is considered to be the PEM/SIBEC derived site indices.

In order to assess the effect of uncertain site productivity estimates on the base case, a sensitivity analysis was prepared in which the SIA-derived site indices were replaced with SIBEC site indices. In the resultant harvest forecast, mid- and long-term harvest levels were 16-percent and 14-percent lower than in the base case, respectively.

Based on the recommendations of FAIB growth and yield experts, I accept that the PEM/SIBEC site index estimates represent the best available information for the Boundary TSA. On this basis, I conclude that the base case mid- to long-term harvest levels have been overestimated by 16-percent and 14-percent, respectively, as discussed in '**Reasons for Decision**'.

- existing and managed stand yields

Stands with no harvest history or that were harvested before 1987 are referred to as “existing stands”. Stands harvested after 1987 are referred to as “managed stands”. The ministry’s Variable Density Yield Prediction model (VDYP) version 7 was used to generate existing stand yields for the base case. Managed stand yields were generated using the ministry’s Table Interpolation of Projected Stand Yields model (TIPSY) version 4.2.

TIPSY does not use forest inventory as input but relies on information about the stand at establishment, such as species composition, planting density, tree distribution, regeneration delay, and genetic gain. For the base case, species composition and planting density were obtained from information recorded in the ministry’s RESULTS database. Where data was not available for an analysis unit, average information from the most similar analysis unit was used.

Operational adjustment factors (OAF) are applied to TIPSY projections for managed stands. OAF 1 accounts for less than ideal tree distribution, small non-productive areas, endemic pests and disease, and random risk factors such as wind throw; and OAF 2 accounts for decay, waste and breakage. In the absence of local data, the provincial standard values of 15 percent and five percent were used for OAF 1 and OAF 2, respectively.

During public consultation, the Friends and Residents of the North Fork commented that the productivity estimates for managed stands are overstated. They referred to the results of a study of young stands growing to the west of the Boundary TSA that showed more loss of dominant trees in post free-growing stands than is predicted by forest growth models. They also expressed concern about the assumption that younger, managed stands will be more productive than older, unmanaged stands, and that harvesting will occur close to culmination of mean annual increment, i.e., the point at which tree growth has peaked. In addition, they were concerned that climate change is not accounted for in the base case.

I am aware of the results of the study referenced above and note that the findings do raise concerns about the health and productivity of young stands. However, the information collected for this study represents a “snapshot” in time and does not follow the development of young stands over time. As such it is difficult to know if the observed mortality in young stands is part of the normal thinning of stand density that occurs as stands continue to mature or whether it exceeds this level. It is also unclear to what extent the results from one area can be extrapolated to other areas of the province. In order to answer such questions, FAIB has instituted a young stand monitoring program that will follow the development of such stands over time. As these results become available they will be used to inform AAC determinations.

In a separate submission, a licensee noted that the mean annual increment (MAI) used in the base case is higher than he has observed in his woodlot. In addition to anecdotal information, the respondent asserted that silviculturists have informed him that climate change and clearcut harvesting practices in sensitive areas will impact successful reforestation and will likely impact future stand yields. FAIB staff reviewed the information provided by the woodlot licensee and compared it to the information available for the TSA as a whole. Based on this comparison, they concluded that although the MAI provided by the woodlot owner may be representative of the woodlot, it is not representative of the broader TSA. With regard to the final comment, the regeneration delay assumptions used in the base case were derived using RESULTS data, which is compiled from regeneration surveys and free-to-grow surveys.

With regard to climate change, although the causes of climate change are still controversial there is significant agreement amongst scientists that climate is changing and that these changes will affect forest ecosystems. However, there is still significant uncertainty how climate change will manifest in different parts of the province.

FLNR's *Forest Stewardship Action Plan for Climate Change Adaptation* identifies goals and objectives for anticipating and managing forests in a changing climate. Associated actions include climate based seed transfer guidelines, maintaining or enhancing tree species diversity, and reducing the amount of monocultures. The overall goal is to set up a structural model for adapting BC's forest management practices to foster resilient forests in a changing climate.

As discussed in '**Guiding principles for AAC determinations**', climate change is a key area of uncertainty. As research provides more definitive information and where forest practices are implemented to mitigate or adapt to the potential effects of climate change on forest resources, the information will be considered in AAC determinations. The requirement for regular AAC reviews will allow for the incorporation of new information from research and new forest practices as they are implemented.

In conclusion, I accept that the existing and managed stand yields used in the base case reflect the best available information and are; therefore, suitable for use in this determination.

Section 8 (8) (a) (ii) the expected time that it will take the forest to become re-established on the area following denudation,

- regeneration

Stands harvested under most tenures are required to be reforested. Operationally there may be a delay between the harvest of a stand and when the site is fully regenerated. Similarly, a delay may occur following other disturbances, such as fire.

In order to provide the necessary inputs for the base case, staff reviewed RESULTS data for the years between 1999 and 2012. According to this data the average regeneration delay was about three years. Assuming that planted trees are at least one-year old, the regeneration delay used in the base case was two years. In addition to regeneration delay, the RESULTS data indicated that the average planting density was 1140 stems per hectare.

The district has received a significant number of silviculture prescription stocking standards amendments over the last five years or more, requesting lowering of the minima for either inter-tree distance or stocking. Harvesting practices (such as clearcutting stands on dry sites with thin soils) and silvicultural practices (such as late regeneration) and subsequent vulnerability to adverse range impacts seem to be the cause of most of these difficult to regenerate or problem sites. Many of the stands that are eventually re-established on these sites fail to maintain the required stocking minima and revert to "not sufficiently restocked" status for a variety of reasons.

Over the 10-year period from 2000 to 2009, 4171 hectares were either fill planted or replanted, as evidenced in RESULTS data. District staff believe that the number of amendments together with the number of not satisfactorily restocked (NSR) stands suggests that some proportion of managed stands will not meet the densities assumed in the base case. Although the exact magnitude of this issue is unknown, it is likely that the managed stand yields for these stands may have been overestimated in the base case.

In addition to the issues associated with the regeneration of stands on some sites, district staff have observed an increase in the percentage of lodgepole pine being planted and that this is decreasing the species diversity on individual blocks. Overall, between 1999 and 2012, 41 percent of all species planted were lodgepole pine, 24 percent were spruce, 22 percent were larch, and six percent were Douglas-fir. Ponderosa and white pine, balsam, and cedar made up the remainder of the species mix planted. The very low percentage of Douglas-fir planted may, in part, be a response to the past and current stocking standards for the Boundary TSA. Current standards limit the Douglas-fir component to a maximum of 50 percent as a preferred and acceptable species on all but the wettest Interior Cedar Hemlock (ICH) and moderately wet Interior Douglas-fir sites that have not been subject to stump removal.

Based on my review of the information and discussions with district staff, I conclude that the regeneration information used for the base case adequately reflects current practice for most stands. However, I am concerned that if harvesting and silvicultural practices that result in difficult regeneration do not change, the future productivity of these stands may be compromised, thereby decreasing the long-term timber supply in the Boundary TSA. On this basis, I encourage licensees to reduce the delay between harvesting and planting, explore ways to increase plantation success and maintain species diversity in planted stands, as discussed under '**Implementation**'.

Section 8 (8) (a) (iii) silviculture treatments to be applied to the area,

Silvicultural treatments

I accept the assumptions pertaining to the 'Silviculture systems', 'Incremental Silviculture' and 'Rehabilitation Programs' factors as modelled in the base case as noted in Table 2.

Section 8 (8) (a) (iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Utilization

- utilization, decay, waste and breakage

The utilization standards modelled within the growth and yield projections from both VDYP and TIPSY used in the base case were consistent with the *Interior Timber Merchantability Specifications of the Provincial Logging Residue and Waste Management Procedures Manual* (Table 1-2).

District staff indicate that there has been significant discussion in the Boundary TSA, including public comments, regarding the disparity between cruise volumes and scale volumes. On average, scaled volumes are lower than cruise volumes.

In order to explore this apparent disparity, ministry staff with forest industry involvement conducted a small pilot study that included the Arrow-Boundary, Kootenay Lake and Columbia Natural Resource Districts. The results of the study indicated that the average cut control waste was about 14 percent of the cruise volume. This is 11 percentage points higher than the three percent average cut-accountable waste identified in the ministry's cut to cruise database. As cut-accountable waste counts towards the AAC, this difference suggests that about 11 percent of the merchantable volume being harvested in the TSA is not being charged to the AAC.

In a sensitivity analysis, increasing the short-term harvest level in the base case by 10 percent resulted in a 20 percent decrease in mid-term timber supply.

I accept that the base case reflects the current legal requirements as provided by government in the *Interior Timber Merchantability Specifications of the Provincial Logging Residue and Waste Management Procedures Manual*.

With regard to the results of the pilot study and sensitivity analysis described above, underestimation of cut-accountable waste could adversely affect the mid-term timber supply in the Boundary TSA. However, given the limited nature of the study, I will not account for the difference in cruise to scale volumes in this determination. In order to reduce the uncertainty associated with cut-accountable volumes, I encourage the ministry's Timber Pricing Branch, in conjunction with licensees, to expand on the pilot study as described in '**Implementation**'.

- log grades

In April 2006, new log grades were implemented for the BC Interior. Previously, a log was assessed according to whether the tree it came from was alive or dead at the time of harvest. Prior to April 2006, grade 3 endemic (the 'normal' mortality observed in a mature stand) and grade 5 (dead tree with less than 50 percent firmwood and/or defects making the log unsuitable for lumber) were referred to as 'dead potential' and were not charged to the licensee's AAC if harvested. Under the new system, grades are based on log size and quality at the time it is scaled and all logs that meet merchantability specifications will be charged to cut control regardless whether the tree they originate from was alive or dead at the time of harvest.

Dead potential volume was not assumed to be part of the AAC in previous timber supply reviews so, as a transitional measure, species adjustment factors were implemented to reduce the volume charged to cut control to reflect the expected dead potential volumes. In November 2007 these credits were repealed for the Boundary TSA as the chief forester considered the log grade changes in his decision under *Section 8(3.1) of the Forest Act* that postponed the AAC determination until October 2011.

Dead potential volumes are not included in the VRI estimates of timber volume used in the base case. Consequently, dead potential volume is not included in the base case harvest levels.

A number of possible sources of data about dead potential volume exist, including: inventory audit plots, VRI ground samples, permanent and temporary sample plots, and harvest billing records. Of these, the audit is considered to be, at this time, one of the best sources of data regarding dead potential timber in the Boundary TSA. These data indicate that dead potential volume is about 10.7 percent of the sum of live and dead potential volume for the forested land base in this TSA. VRI phase II ground samples suggest 12.9 percent and temporary sample plots suggest 15.9 percent dead potential.

An additional consideration related to log grade is the administrative practice of implementing grade 4 credits. At the introduction of the new log grades in 2006 major licensees maintained that not all grade 4 was economic to harvest. FLNR agreed to allow licensees to determine if the dead grade 4 could be harvested and created a dry grade 4 category, effectively the old grade 5, that would not be measured in a waste assessment and hence not charged to cut control if left on the block. However, to encourage utilization of grade 4 (pulp logs) and to limit the amount left in the bush, Section 17 (6) of the *Cut Control Regulation* allows licensees to apply for a cut control credit for any grade 4 log shipped to a facility other than a sawmill or veneer plant. This regulation applies to all grade 4 logs, and the credit applies to both replaceable and non-replaceable forest licences.

The volume exempted from cut control in the Boundary TSA from January 1, 2007 to December 31, 2012 due to grade 4 credit was 23 827 cubic metres. This represents 0.5 percent of

the current AAC and 1.7 percent of the total volume harvested, 1 432 625 cubic metres, during that time period.

Based on my review of the above information, I agree with FLNR staff that deadwood now included in billing is not accounted for in the base case, since the inventory information used in the base case did not account for the contribution of dead potential volume that is now charged to cut control. I also agree with FLNR staff that a small amount of the harvested grade 4 volume is not accounted for in cut control, and that although Section 17 (6) of the *Cut Control Regulation* currently only applies to grade 4 volumes sold or delivered until June 1, 2014, I am aware this deadline has been extended twice.

After considering the information regarding the log grade changes, I conclude that the base case short- to mid-term harvest level is underestimated by about 11 percent. With regard to grade 4 credits, although the current volume exempted from cut control is relatively low, it does represent a significant risk to the mid-term timber supply for this TSA. I will discuss my further consideration of the log grade changes and grade 4 credits in '**Reasons for Decision**'.

In the event that grade 4 credits are continued beyond June 1, 2014, it is my expectation that district staff will monitor the volume being exempted from AAC cut control and provide me with this information, as described in '**Implementation**'.

Section 8 (8) (a) (v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management

- general comments

The Ministry of Forests, Lands and Natural Resource Operations is required under the *Ministry of Forests and Range Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, harvesting of timber, grazing of livestock and realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Integrated resource management (IRM) objectives for various forest resources and values affect timber supply, and the extent of that affect must be considered when making an AAC determination.

I am aware of the IRM objectives set by government in FRPA's *Forest Planning and Practices Regulation* (FPPR) and other legislation, and that in the Boundary TSA, additional guidance is provided by the Kootenay Boundary Higher Level Plan Order (KBHLPO) and subsequent amendments, and I will consider these in my determination.

- cutblock adjacency and maximum cutblock size

Patch size and adjacency in the Boundary TSA are governed by block size and adjacency constraints in the *Forest Planning and Practices Regulation*. It is current practice that, for the most part, licensees comply with *Section 64* and limit block size to 40 hectares. Larger blocks may be harvested with an appropriate forest health or natural disturbance rationale. Most licensees have also chosen to comply with *Section 65*, which limits harvesting adjacent to an existing cutblock that has not achieved green-up. As with cutblock size, adjacency constraints do not apply to salvage openings or openings designed to emulate natural disturbance.

In timber supply analyses, the forest estate model limits how cutblock adjacency and patch size can be modelled. The forest estate model, FSSAM, enables a soft target of patch size distribution but does not have spatial adjacency constraints. Consequently, patch size requirements in the base case were modelled by setting the maximum cutblock size target at 40 hectares. As a surrogate to spatial adjacency, a constraint was modelled where a maximum of 35 percent of the THLB within each landscape, unit where no other objectives exist, can be three metres in height or less at any given time.

District staff note that although the base case maximum cutblock size target was set at 40 hectares in the base case, it is common to see larger openings, or aggregates, based on patch size analyses prepared by the licensees and there is a trend towards larger patch size.

In a sensitivity analysis, removing the maximum disturbance limit of 35 percent had no effect on the initial harvest level in the base case; however, mid-term harvest levels declined by three percent.

I have reviewed the approach used to approximate cutblock adjacency and maximum cutblock size in the base case and conclude that it is a reasonable reflection of current practices. However, I am concerned that if the trend towards increasing cutblock size persists it may reduce mid-term timber supply. Consequently, I recommend that district staff work closely with licensees to limit the use of larger cutblocks to those situations in which it is required to address forest health concerns, as described in '**Implementation**'.

- community and domestic watersheds

There are five designated community watersheds and numerous consumptive use domestic watersheds in the Boundary TSA. Under *Forest and Range Practices Act*, most licensees have committed to watershed assessments in community watersheds, similar to those completed under the *Forest Practices Code of BC Act*. In these assessments, a 30 percent equivalent clearcut area (ECA) is commonly considered as a red flag that indicates need for further assessment. However, depending on the overall condition of the watershed, it is possible to exceed the 30 percent ECA benchmark. Licensees are prohibited, under FRPA, from harvesting within 100 metres upslope of a community water intake.

Under the Kootenay Boundary Higher Level Plan Order licensees must specify measures to safeguard water licenced for human consumption. Frequently, licensees employ the same 100-metre upslope restriction on harvesting in domestic watersheds as required for community watersheds, and operationally a maximum ECA is often applied. Based on licensee feedback, a 40 percent maximum ECA is considered representative.

In the base case, a maximum of 30 percent of the area within a community watershed could be less than two metres in height. No constraints were applied in the model for domestic watersheds, beyond the 35 percent discussed in the previous section '*cutblock adjacency and maximum cutblock size*'. The 100-metre restriction on harvesting upslope of an intake was not modelled, due to the small size of the aggregate area.

Public input was received that the TSR should be informed by the Kettle River Watershed Management Plan that is being drafted. In addition, concerns were expressed about the ECA in a number of tributaries to the Kettle and Granby Rivers. The respondents noted that although areas were excluded from the THLB to account for riparian areas, there was no analysis of the potential impacts of the cumulative effect of ECAs in the sensitivity analyses. They recommended that a sensitivity analysis should be done to examine the potential impacts of ECA on the available timber supply for the TSA.

District staff responded indicating that the maximum disturbance limits for community watersheds and for areas outside of ungulate winter ranges and scenic areas had been applied in the base case.

For this determination, I accept that the assumptions used in the base case to account for community and domestic watersheds are a reasonable extrapolation of current management. With regard to the Kettle River Watershed Management Plan, if this plan results in changes to the legal disturbance limits required in community and/or domestic watersheds, these requirements can be reflected in the next timber supply review.

- *riparian areas*

The protection of riparian areas is governed by the *Forest Planning and Practices Regulation* and results and strategies are required in the licensees' forest stewardship plans.

In the analysis completed for TSR 2, riparian areas were buffered by a width defined by the classification of the water body and other riparian management parameters. This buffered layer was used to determine the riparian area in the current TSR. For the base case an aspatial THLB reduction by polygon was applied to account for riparian areas. District staff believe that these base case reductions represent the average licensee commitment.

District staff compared the buffered stream data from TSR 2 to fish passage data modelled using TRIM. The TSR 2 data were found to underestimate the length of small streams by about 4580 kilometres or, following application of buffers, an area of 3435 hectares. After accounting for overlaps with areas previously excluded, an additional 687 hectares should have been excluded from the THLB. This represents about a 0.2 percent overestimation in the size of the THLB.

I acknowledge that the THLB used in the base case may have been overestimated by about 0.2 percent; however, this has little or no effect on the base case. On this account, I accept that the information used in the analysis for riparian areas is adequate for use in this determination. In the event that better riparian information becomes available, it can be used in the next AAC determination.

- *ungulate winter range*

Ungulate winter ranges (UWR) for mule deer, moose, bighorn sheep and mountain goat were established in the Boundary TSA in 2006 through issuance of *Government Actions Regulation* (GAR) orders. In the base case, each legal objective was modelled according to the requirements specified in each order. Mountain goat habitat protected by the GAR order is generally steep and rocky, and has little overlap with the THLB. The order for bighorn sheep does not preclude harvesting. As such, the GAR orders for mountain goat and bighorn sheep were not specifically modelled in the base case.

The Snow Interception Cover (SIC) and forage requirements for moose, as identified under GAR Order U-8-007, require that at least 20 percent of stands in each moose winter range planning cell must be taller than 16 metres and no more than 40 percent of the stands within each planning cell can be less than 30 years of age. These constraints were applied in the base case.

Although GAR Order U-8-008, which identifies winter range requirements for mule deer, has been difficult to implement operationally, the SIC retention requirements provided in the order were modelled in the base case.

Public input was received suggesting that setting aside more rather than less area for UWR would benefit other resource values, including biodiversity.

In response, I note that the assumptions used in the base case reasonably reflect the current legal objectives for UWR. In the event that government decides to establish more UWRs, these requirements can be accounted for in the next AAC determination.

- *identified wildlife*

Identified wildlife are species ‘at risk’ and ‘regionally important wildlife’ in BC that have been designated as requiring special management attention.

The Identified Wildlife Management Strategy (IWMS) provides direction and guidance for managing identified wildlife where their habitat needs are not already addressed. According to provincial policy, in the absence of strategic plan direction, all habitat requirements for identified wildlife are to be addressed within a one percent THLB impact limit, managed at the district level.

Under the IWMS through the authority of Section 9(2) and 10(1) of the *Government Actions Regulation*, wildlife habitat areas (WHA) have been established within the Boundary TSA. The general wildlife measures (GWM) associated with these WHAs prohibit timber harvesting, with a few exceptions.

Wildlife habitat areas established up to December 31, 2010, totalled 3131 hectares. After accounting for overlaps with areas previously excluded, a net area of 875 hectares were excluded from the THLB. Since this time, new GAR orders have been issued that increased the wildlife habitat area by 167 hectares. Of this area, eight hectares were included in the THLB.

On this basis, I conclude that not accounting for the new wildlife habitat areas represents an eight hectare overestimation in the size of the THLB. However, an area of this size is unlikely to affect the base case harvest levels and I will consider this factor no further in this determination.

Under the IWMS through the authority of Section 9(1) of the *Government Actions Regulation*, the Grizzly Bear Specified Area #8-373 has been established that identifies general wildlife measures that place restrictions and requirements on forestry activity across 342 133 hectares of the Boundary TSA. An assessment by ministry staff of these measures concluded they do not contribute to further timber supply restrictions beyond those already modelled in the base case for existing legal objectives and constraints.

In addition to the written submissions received from the Friends and Residents of the North Fork, I met with representatives of this group on October 15, 2013 to discuss their concerns and answer the questions they had regarding the Boundary TSA timber supply review. The FRNF expressed their position that an unsustainable AAC exacerbates the threat to the Kettle-Granby grizzly bear population and the large number of red- and blue-listed species in the Boundary TSA. Also discussed were concerns that the land use plan did not constrain enough area within the TSA; disturbances in non-contributing areas were not considered, resulting in harvesting in wildlife connectivity corridors and grizzly bear habitat; and road density is adversely impacting grizzly bears.

With regard to red- and blue-listed species in the TSA, the FRNF noted the number of red- and blue-listed species in the TSA and raised a concern that management for these species may not have been considered in the TSR. In response I noted that the base case did account for the WHAs that have been established for the protection of identified wildlife in the Boundary TSA. Species and plant communities with established WHAs include Williamson’s sapsucker,

Lewis’s woodpecker, grizzly bear, badger, ponderosa pine, black cottonwood, snowberry and “data sensitive species” (primarily snakes). During this meeting, the FRNF also indicated that a grizzly bear strategy should be completed and that the current GAR order for grizzly bear is not

effective. This issue was also raised by a member of the public who also informed me that after the introduction of the KBHLPO, a grizzly bear strategy was to be developed, but has not been at this time; a suggestion was made that this process consider the likely development of this strategy.

As discussed, I am not in a position to make land use and management decisions in AAC determinations beyond setting the allowable timber harvest level. Therefore, I cannot define a management strategy for bears. Deciding on whether and how to undertake such a strategy is the responsibility of other parts of the provincial government, and the existing management strategy is reflected in the Kootenay-Boundary Land Use Plan and associated plans, orders, land use designations, and measures. If additional or new plans, strategies, objectives, or orders are established, they will be considered in subsequent AAC determinations.

- areas with high recreational value

Areas with high recreational value are protected through several mechanisms within the Boundary TSA including Crown use, controlled recreation areas (CRAs) established through the *Resort Timber Administration Act* (RTAA), and recreation sites and trails established through FRPA.

CRAs are managed primarily for recreational purposes such as resort development, and timber if harvested from these areas is not attributed to the TSA AAC. There are three CRAs (ski hills) located within, or partly within, the Boundary TSA that total 1815 hectares. These areas were not excluded from the THLB used in the base case.

Conversely, recreation sites and trails do not preclude timber harvesting and, although licensees generally avoid harvesting in these areas except for reasons such as site development or beetle management, they are considered to be legally-available for timber harvesting. In the Boundary TSA a net area of 3017 hectares were excluded from the THLB.

In combination, inclusion of CRAs and exclusion of recreation sites and trails results in a negligible (0.2 percent) underestimation in the base case harvest levels. Given the magnitude of this impact, I will not consider this factor further in my determination.

Section 8 (8) (a) (vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Other information

- First Nations considerations

The Crown has a duty to consult with, and accommodate if warranted, those First Nations for whom it has knowledge of the potential existence of aboriginal interests that may be impacted by a proposed decision, including strategic-level decisions such as AAC determinations. As deputy chief forester, I must therefore consider information arising from the consultation process with First Nations respecting aboriginal interests and treaty rights that may be affected by my AAC determination. As well, I will consider other relevant information available to the ministry regarding aboriginal interests, including information gathered during other consultation processes.

Nine First Nations have asserted traditional territories which overlap with the Boundary TSA, these include: the Okanagan Nation Alliance, Lower Similkameen Indian Band, and Penticton Indian Band. The territories of the Adams Lake Indian Band, Okanagan Indian Band, Osoyoos Indian Band, Shuswap Indian band, Splots'in, and Westbank First Nation overlap portions of the

TSA. The Okanagan Nation Alliance (ONA) also encompasses six of the above bands: Lower Similkameen, Penticton, Okanagan, Osoyoos, Upper Nicola Band, and Westbank. The ONA receives all consultation letters but defers the exchange of consultation comments to the six bands.

With the exception of the ONA, all First Nations have entered into one or more of the following agreements with the province: Forestry Consultation and Revenue Sharing Agreements (FCRSAs), Economic Development Agreements (ECDAs), Forest Tenure Opportunity Agreements (FTOAs), Interim Agreement on Forest and Range Opportunities (IAFRO), Mountain Pine Beetle Agreements (MPBs), and the Secwépemc Reconciliation Framework Agreement (SRFA). FCRSAs, IAFROs and the SRFA provide for revenue sharing and contain a framework for establishing consultation processes to guide consultation on administrative decisions, including AAC determinations. The First Nations consultation requirements specified in these agreements were followed during the consultation conducted as part of this timber supply review. For those First Nations communities who have not established consultation processes, consultation was conducted in accordance with the *Updated Procedures for Meeting Legal Obligations When Consulting First Nations* and with the *Thompson Okanagan Region 2013-2014 Forest and Range Annual Decision List*, which is also used by those bands with FCRSAs.

Economic Development Agreements, Forest Tenure Opportunity Agreements and Mountain Pine beetle agreements provide forest tenures to First Nations thereby supplying them with direct access to timber volume. All agreements are designed to aid in improving the government to government relationship between the province and each First Nation and to close the social and economic gap between First Nations and other British Columbians.

Currently, the Westbank First Nation is the only band whose territory overlaps the Boundary TSA to have participated in the treaty process. They suspended their participation in the BC Treaty Process as of November 2009.

As part of consultation, preliminary assessments were undertaken by FLNR staff that considered First Nations' asserted territorial boundaries, readily available information, information from previous consultation processes and comments provided by First Nations regarding the strength of aboriginal interests and the potential impact this AAC determination decision may have on these interests. None of the First Nations have communities within the Boundary TSA and there is little information available at this time to suggest that any of the bands extensively used or occupied portions of the TSA. No comments were provided by any of the bands identifying how or where their aboriginal rights could be affected by this decision. Based on all of the above, none of the bands were found to have a high strength of claim.

The First Nations consultation process was comprised of three main phases of engagement:

- announcement letters of the upcoming AAC determination and invitation to share information (January 2011);
- information release to all First Nations on the Draft Data Package (July 2011); and
- information release to all First Nations on the Timber Supply Analysis and Public Discussion Paper (July 2013).

Adams Lake Indian Band asserted a new territorial boundary that was accepted by the province in 2013, after the first two phases of engagement regarding this AAC determination were complete. Therefore, they were only included in consultation for the timber supply analysis public discussion paper. The other eight First Nations were included in all phases of the consultation process.

The initial announcement letters indicated that a timber supply review and AAC determination would commence later that year and that FLNR staff would be in contact with all affected First Nations when the draft data package was prepared. No consultation timeline for response was provided.

A 60-day consultation period was provided to all First Nations for both the data package and the timber supply analysis public discussion paper. A two-week extension was provided to one of the bands, at their request, to the consultation period on the data package. Only one comment from a First Nation was received during this phase. The First Nation commented that in areas proposed for harvest, where there is a medium/high potential for archaeological artifacts to be found, and where an AOA is required, that a First Nations' representative be included in the field assessment. FLNR staff informed me that they have responded to this concern, which is outside the scope of this determination.

During the consultation process on the timber supply analysis public discussion paper several comments were received from First Nations expressing their interest in acquiring forest tenure within the Boundary TSA. One of the bands submitted a request for a replaceable forest tenure and submitted their own analysis report. They commented to the minister that they cannot support any decision that will exclude or restrict their ability to obtain long-term economic benefits that the province and licensees now enjoy. I note that allocation of wood supply is not part of the AAC determination, and lies outside my jurisdiction as deputy chief forester. Regional staff inform me that this request will be provided to the minister prior to the apportionment of the AAC. No comments were received from any of the bands, during the three phases of consultation, indicating how this decision would specifically affect their aboriginal rights.

Based on my review of the information sharing and consultation processes described above, the available information regarding aboriginal interests, and the potential impact my decision may have on these interests, I conclude that the consultation requirements established in agreements between government and First Nations or as outlined in the *Haida* decision have been met and are consistent with the 2010 Consultation Procedures. Furthermore, I note that FLNR staff will continue to be available to meet and consult with First Nations at the operational planning level.

I am satisfied that opportunities were provided to all First Nations to share their concerns related to specific aboriginal interests that may be impacted by this decision and to the extent possible within the scope of my authority under Section 8 of the *Forest Act*. If new information regarding First Nations' aboriginal interests becomes available that significantly varies from the information that was available for this determination and that may affect timber supply, I am prepared to revisit this determination sooner than required by legislation.

Section 8(8) (b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

Implications for alternative rates of harvest

- harvest sequencing and alternative harvest forecasts

As described in 'The role of the base case', more than one harvest forecast can be produced using the same land base inventory, timber growth and yield and management practice assumptions.

The initial harvest level in the base case was established using the objective of maintaining the current AAC while minimizing the need for excessive decadal changes in harvest levels during

the transition to the mid-term level. In the model, older stands were selected for harvest first. In addition to the base case and sensitivity analyses, two alternative harvest forecasts were prepared. The first changed the objective of maintaining an initial harvest at the level of the current AAC, and the second changed the assumption of harvesting oldest stands first.

Increasing or decreasing the initial harvest level by 10 percent had the consequence of requiring the mid-term to increase or decrease by 20 000 cubic metres per year. Changing the stand selection rule from harvesting the oldest stands first to harvesting stands with the greatest volume first decreased the mid- and long-term harvest levels by 30 000 cubic metres per year and 50 000 cubic metres per year, respectively.

Public input was received that expressed concern that a strategy of timber harvesting at the current pace until the ‘last minute’ would not adequately address the potential need to implement a mitigation strategy for the consequences expected from climate change. Other input was received that noted that climate changes are occurring, and forest environments are likely to be subject to changes over the next few decades leading to uncertain forest establishment, growth, and health.

I agree, as noted in the section ‘**Guiding principles for AAC determinations**’ and as discussed in ‘*existing and managed stand yields*’, that there is substantial scientific agreement that the climate is changing, that the changes will affect forest ecosystems, and that forest management practices will need to be adapted. Regular timber supply reviews will incorporate new information on climate change and its effects on forests and changes in forest management as it becomes available.

I have reviewed the alternative harvest forecasts prepared for this determination and I am mindful that the harvest priority used in the base case – oldest stands first – does not fully represent the actual sequence in which stands are harvested operationally. As evidenced by the results of alternative forecast, harvesting the highest volume stands first regardless of age decreases the mid- and long-term harvest levels projected in the base case. However, I accept that the harvest rules used in timber supply analysis, including the base case are by necessity simplifications of actual operations.

- harvest performance

In the Boundary TSA, actual harvest performance, as reported in cut control letters between 2005 and 2012, has been less than the AAC. For the period 2008 to 2010, forest licensees harvested about half of the 700 000 cubic metre AAC. In 2011, the total harvest exceeded the AAC by 30 percent; however, total volume harvested during the cut control period was still less than the available AAC.

The term “undercut” refers to that portion of the volume available to a licence holder that is not harvested within a cut control period. The regional executive director has the authority to dispose of undercut volume through the issuance of non-replaceable forest licences (NRFL). In 2012, the district issued NRFLs totalling 230 000 cubic metres from undercut that accrued in the 2004 to 2009 cut control period. In June, 2013, the regional executive director disposed of 494 670 cubic metres undercut that accrued in the 2007 to 2011 cut control period to NRFLs.

Given the lag between the time when a licence is awarded and the time when harvesting occurs, it is unlikely that any of 230 000 cubic metres and 494 000 cubic metres of undercut disposed of in 2012 and 2013, respectively, was depleted from the inventory used in the base case. This means that stands that would provide the undercut volume are also assumed to contribute to the harvest levels projected in the base case. Given that the base case is one of the key sources of

information used in a determination, stands harvested as undercut are also assumed to contribute to the AAC.

While disposition of the undercut has the potential to result in harvesting above the level of the AAC, I do not expect that this will be an issue in the Boundary TSA during the short time that the NRFLs described above are in effect. This conclusion is based on my observation that harvest performance in the Boundary TSA, with the exception of 2011, has been consistently lower than AAC. Furthermore, as district staff have informed me that the undercut NRFLs are being directed to those components of profile that are being underutilized, (see '*steep slopes*'), I am not concerned that disposition of the undercut will result in a concentration of harvesting with lower operating costs or higher value wood.

Public input was received expressing concern that the AAC was exceeded in 2011 and the potential impact that cut would have on the sustainability of public forests and ecosystems. An additional concern was raised that the logs were exported to mills outside the local market. In response, district staff note that although the cut was exceeded in 2011, an acceptable annual fluctuation, the average harvest over a five-year cut control period was below the AAC.

- economic and employment implications

The implication of changes in the AAC for local communities is an important consideration in the timber supply review.

In the Grand Forks and Midway areas, about 150 people are directly employed in mills and woodlands operations. The Midway sawmill reopened in 2011 under the new ownership of Vaagen Canada Ltd. 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.

Public input was received reminding me that although forestry is one of the main industries in the Boundary TSA, tourism, agriculture and mining are also important, and all are dependent on healthy ecosystems. I was informed that, during a Healthy Forest Healthy Community exercise undertaken a couple of years back, public feedback suggested a strong desire for the forest to be managed with a focus on all features and amenities, rather than exclusively on timber harvesting. Hope was expressed that with the creation of the Ministry of Forests, Lands and Natural Resource Operations, competing resources and interests would be managed with less conflict. Input was received requesting that, while recognizing the importance of natural resources to the economic well-being of the province, I be mindful of the potential for a sharp dip in available harvest levels in the future, if we do not begin a gradual step down reduction in harvest now.

I have reviewed the information regarding employment and community dependence related to the Boundary TSA. I am aware of the linkages between AAC and employment, both locally and provincially, of the importance of a balance between competing resources, and the need for healthy ecosystems. I have been mindful of these factors throughout my determination.

Section 8(8) (c) repealed [2003-31-2 (B.C. Reg. 401/2003)]

This section of the *Forest Act* has been repealed [2003-31-2 (B.C. Reg. 401/2003)].

Section 8(8) (d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia,

Economic and social objectives

- Minister's letters

The Minister of Forests and Range expressed the economic and social objectives of the Crown in two letters to the chief forester, dated July 4, 2006 (attached as Appendix 3) and October 27, 2010. The minister asked for consideration, during AAC determinations, of the importance of a stable timber supply in maintaining a competitive and sustainable forest industry while being mindful of other forest values.

In this respect, I note that in the base case one of the key objectives has been to minimize decadal changes in harvest levels and to attain a stable, long-term harvest level where the growing stock stabilizes, while ensuring that the requirements for other forest values are accounted for.

The minister also asked the chief forester to consider the local social and economic objectives expressed by the public and the relevant information received from First Nations.

During my consideration of the factors required under Section 8 of the *Forest Act*, I have been mindful of the local objectives, as provided in the Kootenay Boundary Higher Level Plan Order and associated plans and orders. I have reviewed the public consultation process undertaken by the district, I believe there was an appropriate level of public review conducted, and I considered the input received in making my determination. As requested, I have met with staff from a local mill, Zellstoff Celgar, and with members of Friends and Residents of the North Fork, and I have listened and considered their concerns. On this basis, I am satisfied that this determination accords with the objectives of government as expressed by the minister.

Section 8(8)(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Abnormal infestations, devastations and salvage programs

- mountain pine beetle

Mountain pine beetles (MPB) occur naturally at endemic levels in the Boundary TSA. However, since 2002, population levels have increased and it is uncertain whether or not the epidemic will continue to expand.

According to the ministry report entitled *Provincial-level Projection of the Current Mountain Pine Beetle Outbreak: Update on the infestation projection based on the Provincial Overview Surveys of Forest Health conducted from 1999 through 2012 and the BCMPB model (year 10)* (April 12, 2013), the peak in annual volume of mature merchantable red-attack pine occurred in 2006 in the Boundary TSA. (Note that the mortality caused by MPB occurs in the year prior to which the red-attack pine is observed by the aerial overview surveys.) From 2006 to 2011, the observed annual volume of mature merchantable red-attack pine in the TSA has remained constant at 100 000 cubic metres.

The BC Mountain Pine Beetle model (BCMPB) continues to project that the annual volume of mature merchantable red-attack pine on the THLB will continue to increase in the southeast of the province – most notably in the Boundary TSA – even though most of this area of the province has already experienced peak infestation. However, in the opinion of the provincial BCMPB

expert, BCMPB v. 10 overestimates the epidemic growth in the southeast of the province, and that the infestation in this area is essentially over.

This conclusion is based on the fact that over the past four to seven years the infestation in the southeast of the province has decreased on average. Additionally, there is considerable uncertainty on the degree to which areas at the periphery of the infestation (such as the Boundary TSA) are driven by influx from the now-collapsing core of the MPB outbreak. Outbreaks in peripheral landscapes with marginal climatic suitability, mixed tree types, and larger topographic barriers may not experience the annual mortality projected by BCMPB once the central outbreak subsides.

District staff are concerned that overview surveys underestimate the actual pine mortality, particularly in the Boundary TSA where MPB-infestation tends to occur in small, widely dispersed patches. They noted that the provincial overview surveys show an increase in the area of MPB-infested stands from 9119 hectares in 2011 to 13 932 hectares in 2012 and an increase in the number of trees killed in “spot attacks” from 7147 hectares in 2010 to 9580 hectares in 2012.

Currently, all beetle mapping units (BMU) within the Boundary TSA have a “holding strategy”. By the end of 2012, four BMUs that had a “suppression” strategy have been downgraded because the infestation level in the unit has increased to levels where the implemented suppression strategy could not achieve the strategy target.

Harvest levels of interior lodgepole pine (Pli) in the Boundary TSA have not been adequate to reduce the levels of Pli attacked nor reduce non-recoverable losses significantly. Over the past several years both licensees and British Columbia Timber Sales (BCTS) staff have targeted Pli stands, and these stands comprise a high percentage of their harvest. However, with the exception of 2011, in the last five years harvest levels have been significantly below the AAC and therefore the absolute volume of Pli harvested has been significantly lower than that suggested to reduce attack and mitigate losses.

In the base case, dead pine volume is calculated based on the percentage of killed pine from the ministry’s BCMPB model estimates and the percentage of pine that remains merchantable given the years since death. At the time of the first infestation, the model separates the pine and non-pine components of a polygon. The non-pine component is considered to age and grow as if the stand had not been impacted by MPB. However, in a compromise of not “growing” dead pine, the model keeps the volume of the pine component static from the time of infestation until five years after the infestation ended, at which time the remaining live pine component continues to grow.

In the base case the length of time that a MPB-killed pine tree remains a commercially-viable, which is referred to as “shelf life”, was set at four years for a sawlog. In the absence of a local study, shelf life was established based on discussions with field layout crews and FLNR staff.

During public consultation, concern was expressed that the MPB infestation in the Boundary TSA was increasing and that much of the dead pine in recently harvested areas does not seem to be utilized and therefore changing the shelf life value in the model would not improve its accuracy.

One licensee commented that there were large variations in modelling assumptions across the management units both in shelf life length and how infested stands that were not harvested by the model start growing. In some models, dead pine was not considered part of the NRL volume for up to 20 years, and modelling variations are as great in how dead pine that is not harvested is handled once an infestation is over.

According to FAIB analysts, the assumptions and methods used to reflect shelf life in timber supply models vary for a variety of reasons, such as differences in environmental conditions and hence the rate at which dead pine deteriorates, differences in what is considered economically viable, which depends on factors such as market conditions and end use, and differences in the model being used. For this timber supply analysis, shelf life was based on discussions with local field staff, who indicated that shelf life in the Boundary TSA is significantly shorter in this unit than in other areas in which they have worked.

In recent years, licensees have been targeting pine-leading stands for harvest in consideration of the MPB infestation. As a result, the average pine volume harvested for the years between 2007 and 2009 in the Boundary TSA has been about 50 percent of the total volume harvested. This was reflected in the base case by requiring the model to achieve a harvest in which 50 percent of the volume is pine for the first decade of the forecast.

A number of sensitivity analyses were prepared to examine the uncertainty associated with the MPB assumptions used in the base case, these include: increasing the shelf life, not modelling MPB and not targeting pine for harvest during the first decade in the forecast. In the first, increasing shelf life from four years to 10 years increased the mid-term harvest level from the base case level of 596 000 cubic metres per year to 616 000 cubic metres per year. In the second, not including MPB assumptions increased the mid-term harvest level to 686 000 cubic metres per year. And in the third, not focusing the harvest on pine stands for the first three decades decreased the mid-term harvest level from the base case level by 20 000 cubic metres per year to 576 000 cubic metres per year. In this forecast, the average pine component during the first decade was 23 percent.

Based on my consideration of the information presented to me regarding MPB, discussions with ministry staff, expert opinion and public input, I have reasoned as follows. Although the MPB infestation appears to have peaked in the Boundary TSA there is uncertainty regarding the future level of infestation. On one hand, a ministry expert opines that BCMPB may overestimate the total mortality projected in the Boundary TSA, while on the other hand, district staff indicate that they are observing increases in infestation that are not readily apparent from aerial overview surveys. This opinion is shared by members of the public who commented on this issue. On this basis, although I accept that the assumptions used in the base case reflect the best available information, I will consider this uncertainty further in my determination, as discussed in '**Reasons for Decision**'.

Given the uncertainty described above, the level of current mortality and potential expansion of the MPB infestation in the Boundary TSA, it is my expectation that licensees will continue to target MPB-killed pine for harvesting, as described in '**Implementation**'.

Other forest health and unsalvaged losses

Unsalvaged losses are modelled in timber supply analysis to account for the average volume lost each year due to natural causes, such as pests, fire and wind, that are not recovered or salvaged. Endemic pest losses are considered natural processes within stands and are accounted for within growth and yield models either through the empirical nature of the model or specifically through operational adjustment factors.

Area estimates for unsalvaged losses were calculated using data from the aerial overview survey adjusted by a factor representing the likelihood of future salvage. The adjustment factor was determined based on FLNR district staff opinion. Given that estimates for losses are based on the aerial overview survey which does not pick up 100 percent of all mortality, district staff assume that unsalvaged losses are underestimated. Losses occurring within harvested areas are not

accounted for and they could increase the total annual losses by an estimated five to 10 percent, contributing further to an underestimate.

Causes for unsalvaged losses and the estimate for the area impacted include mountain pine beetle (24 090 cubic metres), spruce bark beetle (four cubic metres), Douglas-fir bark beetle (837 cubic metres), balsam bark beetle (1528 cubic metres), blowdown and landslides (2500 cubic metres), and wildfire (614 cubic metres).

The estimated area for each loss was modelled each year for the first three decades, with the exception of the area representing the unsalvaged loss due to MPB, which is modelled using a different methodology as discussed under the '*mountain pine beetle*'. For decade four and onwards, the entire area, including the unsalvaged loss due to MPB, is modelled annually.

Currently, 14 168 cubic metres is apportioned to the Forest Service Reserve. The average small scale salvage volume between 1999 and 2011 was 14 600 cubic metres a year. Because the entire AAC is not currently being harvested, the 432 cubic metres discrepancy between the allotted Forest Service Reserve and small scale volume does not cause a problem. District small scale salvage staff believe that salvage operations are typically Douglas-fir focussed and that the pine harvest portion is less than 20 percent.

Public input was received expressing concern about the unsalvaged losses from mountain pine beetle and the impact of those losses to the provincial economy, and in particular, the Boundary TSA, given that over 54 percent of the total timber profile is pine.

Concern was expressed as to how the salvage volume will be considered in this determination and subsequent allocation. Concern was raised that Douglas-fir bark beetle damage is more significant than was indicated in the forest health report and that forest health impacts were generally underestimated. Input included concerns over the use of historical data to model future scenarios for factors likely to be impacted by climate change.

For Douglas-fir leading stands in the ICH subzone, losses due to *Armillaria sp.* root rot were modelled separately from unsalvaged losses. These losses, which increase as a stand ages, were modelled based on algorithms within TIPSYS developed in conjunction with the Canadian Forest Service.

Although western gall rust is a minor concern in the Boundary TSA, it can be significant in young stands, and low levels were noted in the post free-growing stand development monitoring (SDM) plots completed from 2008-2011.

I have considered the information regarding forest health and unsalvaged losses, and the concerns raised on how these losses are modelled. For this determination, I conclude that the best available information was used in the base case. With regard to the potential negative effect of forest pests on young regenerating stands, I note that the SDM results for this unit indicate that western gall rust is a minor concern in the Boundary TSA. However, due to concerns in the province about the performance of young stands, FAIB has undertaken a young stand monitoring program. The information from this program will be used in timber supply reviews as the results become available. My considerations on climate change have been provided in earlier portions of this document.

Reasons for Decision

In reaching my AAC determination for the Boundary TSA I have considered all of the factors required under Section 8 of the *Forest Act*, and I have reasoned as follows.

In the base case, the initial harvest of 700 000 cubic metres per year, which is the level of the current AAC, can be maintained for one decade before decreasing in two decadal steps to a mid-term level of 596 000 cubic metres per year. After eight decades, the harvest level begins to increase to the stable, long-term level of 806 000 cubic metres per year.

In my considerations for the Boundary TSA, the following factors have been identified as a reason why the timber supply projected in the base case may have been overestimated:

- *Forest inventory* – not accounting for depletion of the inventory after 2010 represents a 20 000 cubic metre per year or about three percent overestimation in the base case mid-term harvest level.
- *Future roads, trails and landings* – not accounting for future roads, trails and landings represents up to a three percent overestimation in the base case long-term harvest level.
- *Terrain stability* – using an overly simplistic modelling approach to account for unstable and potentially unstable terrain represents about a one percent overestimation in the base case harvest levels.
- *Site productivity estimates* – using the SIA-derived site index estimates instead of the PEM/SIBEC site index estimates represents a 16 percent and 14 percent overestimation in the base case mid- to long-term harvest levels, respectively.

I have also identified factors in my considerations that indicate the timber supply projected in the base case was underestimated:

- *Log grade adjustments* – not accounting for the log grade changes represents an 11 percent underestimation in the base case short-term harvest level. After considering the information regarding the log grade changes, I conclude that the base case short- to mid-term harvest levels are underestimated by about 11 percent.

In considering the above-mentioned influences, I find that the combined effect of accounting for factors other than log grade adjustments represents a one percent overestimation of the short-term timber supply, a 20 percent overestimation of the mid-term timber supply and an 18 percent overestimation of the long-term timber supply projected in the base case. Including the effect of log grade changes, results in a net 10 percent underestimation in the short-term timber supply and a net nine percent overestimation of mid-term timber supply. The long-term harvest level remains unchanged.

Although log grade changes represent a significant underestimation in the initial and mid-term harvest levels, it is not a reason to contemplate an increase in harvest level when considered in the context of the projected decrease in mid-term timber supply. However, I am mindful that any dead potential volume harvested in the short term in place of live timber will provide for a more robust timber supply in the future.

In addition to the factors that represent either an over- or underestimation of the timber supply projected in the base case, there are a number of unquantified factors that introduce significant uncertainty regarding the future timber supply of the Boundary TSA. These include: increasing road density, avoidance of harvesting stands on steep slopes, increasing difficulty in regenerating some stand types, apparent discrepancy between cruise and scale volumes, increasing cutblock size, the use of simplistic harvest rules and the eventual outcome of the current MPB infestation.

Of these, I consider not harvesting the full profile of the THLB and the uncertain outcome of the MPB to be the most significant.

As discussed in ‘*economic and physical operability*’, licensees have not been harvesting stands growing on slopes greater than 35 percent in proportion to their contribution to the THLB. Specifically, stands growing on steep slopes represent 18 percent of the profile; whereas, only eight percent of harvesting prior to 2001 and four percent of harvesting after 2001 has occurred in these stands. I am aware of the sensitivity analysis in which the exclusion of areas with slopes greater than 35 percent from the THLB resulted in a 20 percent decrease in mid-term timber supply. From this I have concluded, that if harvest performance in these stands continues to be significantly lower than their contribution to the THLB, it will be necessary to revisit this determination and lower the AAC. To this end, I have included specific instructions for district staff to monitor harvest performance in relation to the timber profile. This is described in more detail in ‘**Implementation**’.

In considering whether I should decrease the AAC in order to mitigate the projected decrease in mid-term timber supply or increase the AAC to increase the flexibility in the rate of pine harvest should the MPB infestation worsen, I have reasoned as follows. Although the actual rate of harvest in the Boundary TSA is uncertain, and may be higher than indicated from the scale volume reported in the ministry’s harvest billing system, the AAC has been consistently underutilized. On this basis there appears to be sufficient harvesting capacity within the current AAC of 700 000 cubic metres to accelerate pine harvesting should the MPB infestation worsen. In considering whether I should increase the AAC to further increase the harvest capacity, I am also mindful that increasing the initial harvest level in the base case above the level of the current AAC exacerbates the projected decline in mid-term timber supply.

Based on my consideration of the factors I am required to consider under Section 8 of the *Forest Act*, and the reasoning described above, I have decided to maintain the AAC at its current level of 700 000 cubic metres.

Determination

Having considered and reasoned from all of the factors as documented above, including the risks and uncertainties in the information provided, it is my determination that:

A timber harvest level that accommodates, as far as possible, the objectives for all forest resources during the next 10 years, and that reflects current management practices as well as the socio-economic objectives of the Crown can be best achieved in the Boundary TSA by establishing an AAC of 700 000 cubic metres.

This AAC is effective immediately. Section 8 of the *Forest Act* requires a new AAC determination within 10 years of the effective date of this determination. However, if additional significant new information is made available to me, including the harvest performance information I have requested in ‘**Implementation**’, I am prepared to revisit this determination sooner than indicated above.

Implementation

In the period following this decision and leading to the subsequent AAC determination, I encourage FLNR staff and licensees to undertake or support the tasks noted below, the particular benefits of which are described in appropriate sections of this document. I recognize that the ability of staff and licensees to undertake or support these projects is dependent on available resources, including funding.

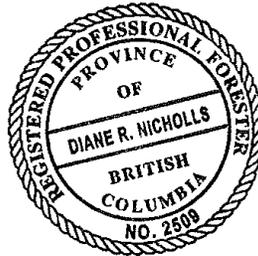
In order to reduce the risk and uncertainty associated with key factors that affect the timber supply in the Boundary TSA:

- I expect district staff to monitor harvest performance on slopes greater than 35 percent and to provide me with this information two years after and five years after the date of this determination. In the event that harvesting on slopes greater than 35 percent does not increase to a level proportionate with the contribution of these stands to the THLB, I am prepared to revisit this determination earlier than the 10 year-period specified in Section 8 of the *Forest Act*.
- I encourage licensees to reduce the delay between harvesting and planting and to explore ways to increase plantation success, particularly in low- to mid-elevation sites with a southerly aspect and thin soils, and to maintain species diversity in planted stands.
- I encourage Timber Pricing Branch and licensees to expand on the pilot study conducted to explore the difference between cruise-based and scale-based volumes and that this information be made available for use in subsequent timber supply reviews.
- In the event that grade 4 credits are continued beyond June 1, 2014, I expect district staff to monitor the volume being exempted from AAC cut control and provide me with this information on an annual basis.
- I recommend district staff monitor the forest health or natural disturbance rationales accompanying licensee requests of cutblocks larger than 40 hectares.
- I expect licensees to focus harvesting on mountain pine beetle impacted pine-leading stands in the Boundary TSA.
- I expect district staff to continue monitoring the extent of the MPB epidemic and in the event that the infestation worsens to inform me.



Diane Nicholls, RPF
Deputy Chief Forester

May 22, 2014



Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, c. 157, (current to May 7, 2014), reads as follows:

Allowable annual cut

- 8 (1) The chief forester must determine an allowable annual cut at least once every 10 years after the date of the last determination, for
- (a) the Crown land in each timber supply area, excluding the Crown land in the following areas:
 - (i) tree farm licence areas;
 - (ii) community forest agreement areas;
 - (iii) first nations woodland licence areas;
 - (iv) woodlot licence areas, and
 - (b) each tree farm licence area.
- (2) If the minister
- (a) makes an order under section 7 (b) respecting a timber supply area, or
 - (b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (2) or (3),
- the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area
- (c) within 10 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and
 - (d) after the determination under paragraph (c), at least once every 10 years after the date of the last determination.
- (3) If
- (a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and
 - (b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,
- the chief forester must determine an allowable annual cut at least once every 10 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).
- (3.1) If, in respect of the allowable annual cut for a timber supply area or tree farm licence area, the chief forester considers that the allowable annual cut that was determined under subsection (1) is not likely to be changed significantly with a new determination, then, despite subsections (1) to (3), the chief forester
- (a) by written order may postpone the next determination under subsection (1) to a date that is up to 15 years after the date of the relevant last determination, and
 - (b) must give written reasons for the postponement.

(3.2) If the chief forester, having made an order under subsection (3.1), considers that because of changed circumstances the allowable annual cut that was determined under subsection (1) for a timber supply area or tree farm licence area is likely to be changed significantly with a new determination, he or she

(a) by written order may rescind the order made under subsection (3.1) and set an earlier date for the next determination under subsection (1), and

(b) must give written reasons for setting the earlier date.

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify that portions of the allowable annual cut are attributable to one or more of the following:

(a) different types of timber or terrain in different parts of Crown land within a timber supply area or tree farm licence area;

(a.1) different areas of Crown land within a timber supply area or tree farm licence area;

(b) different types of timber or terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The minister must determine an allowable annual cut for each woodlot licence area, in accordance with the woodlot licence for that area.

(7) The minister must determine an allowable annual cut for

(a) each community forest agreement area in accordance with the community forest agreement for that area, and

(b) each first nations woodland licence area in accordance with the first nations woodland licence for that area.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silviculture treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) [Repealed 2003-31-2.]

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

(9) Subsections (1) to (4) of this section do not apply in respect of the management area, as defined in section 1 (1) of the *Haida Gwaii Reconciliation Act*.

(10) Within one year after the chief forester receives notice under section 5 (4) (a) of the *Haida Gwaii Reconciliation Act*, the chief forester must determine, in accordance with this section, the allowable annual cut for

(a) the Crown land in each timber supply area, except the areas excluded under subsection (1) (a) of this section, and

(b) each tree farm licence area

in the management area, as defined in section 1 (1) of the *Haida Gwaii Reconciliation Act*.

(11) The aggregate of the allowable annual cuts determined under subsections (6), (7) and (10) that apply in the management area, as defined in section 1 (1) of the *Haida Gwaii Reconciliation Act*, must not exceed the amount set out in a notice to the chief forester under section 5 (4) (a) of that Act.

Appendix 2: Section 4 of the *Ministry of Forests and Range Act*

Section 4 of the *Ministry of Forests and Range Act* (current to May 7, 2014) reads as follows:

Purposes and functions of ministry

4 The purposes and functions of the ministry are, under the direction of the minister, to do the following:

- (a) encourage maximum productivity of the forest and range resources in British Columbia;
- (b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;
- (c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;
- (d) encourage a vigorous, efficient and world competitive
 - (i) timber processing industry, and
 - (ii) ranching sectorin British Columbia;
- (e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Appendix 3: Minister's letter of July 4, 2006



JUL 04 2006

Jim Snetsinger
Chief Forester
Ministry of Forests and Range
3rd Floor, 1520 Blanshard Street
Victoria, British Columbia
V8W 3C8

Dear Jim:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the responsibility for determining Allowable Annual Cuts—decisions with significant implications for the province's economy, communities and environment. This letter outlines the economic and social objectives of the Crown you should consider in determining Allowable Annual Cuts, as required by Section 8 of the *Forest Act*. This letter replaces the July 28, 1994 letter expressing the economic and social objectives of the Crown, and the February 26, 1996 letter expressing the Crown's economic and social objectives for visual resources. The government's objective for visual quality is now stated in the Forest Practices and Planning Regulation of the *Forest and Range Practices Act*.

Two of this government's goals are to create more jobs per capita than anywhere in Canada and to lead the world in sustainable environmental management. The Ministry of Forests and Range supports these objectives through its own goals of sustainable forest and range resources and benefits. In making Allowable Annual Cut determinations, I ask that you consider the importance of a stable timber supply in maintaining a competitive and sustainable forest industry, while being mindful of other forest values.

The interior of British Columbia is in the midst of an unprecedented mountain pine beetle outbreak. Government's objectives for management of the infestation are contained in British Columbia's Mountain Pine Beetle Action Plan. Of particular relevance to Allowable Annual Cut determinations are the objectives of encouraging long-term economic sustainability for communities affected by the epidemic; recovering the greatest value from dead timber before it burns or decays, while respecting other forest values; and conserving the long-term forest values identified in land use plans.

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Minister of
Forests and Range
and Minister Responsible
for Housing

Office of the
Minister

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Location:
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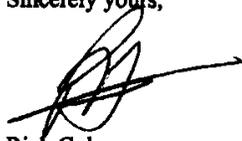
Jim Snetsinger

To assist the province and affected communities in planning their responses to the beetle infestation, it would be best to have realistic assessments of timber volumes that can be utilized economically. Therefore, in determining the best rate of harvest to capture the economic value from beetle-killed timber, I ask that you examine factors that affect the demand for such timber and products manufactured from it, the time period over which it can be utilized, and consider ways to maintain or enhance the mid-term timber supply.

The coast of British Columbia is experiencing a period of significant change and transition. In making Allowable Annual Cut determinations I urge you to consider the nature of timber supply that can contribute to a sustainable coast forest industry, while reflecting decisions made in land and resource management plans.

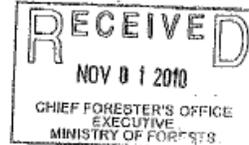
You should also consider important local social and economic objectives expressed by the public during the Timber Supply Review process, where these are consistent with the government's broader objectives as well as any relevant information received from First Nations.

Sincerely yours,

A handwritten signature in black ink, appearing to be 'Rich Coleman', with a long horizontal stroke extending to the right.

Rich Coleman
Minister

Appendix 4: Minister's letter of October 27, 2010



File: 280-30/MPB
Rcf: 126097

OCT 27 2010

Jim Snetsinger, Chief Forester
ADM Forest Resource Stewardship Division
Ministry of Forests and Range
3rd Floor, 1520 Blanshard Street
Victoria, British Columbia
V8W 3C8

Dear Mr. Snetsinger:

Re: Economic and Social Objectives of the Crown Regarding Mid-Term Timber Supply in Areas Affected by the Mountain Pine Beetle

On July 4, 2006, Rich Coleman, former Minister of Forests and Range, wrote to you outlining the social and economic objectives of the Crown for AAC determination (in accordance with Section 8 of the *Forest Act*) with respect to issues associated with the Mountain Pine Beetle (MPB) epidemic. The aforementioned letter articulated the Crown's objectives of ensuring long-term economic sustainability for communities affected by the epidemic; recovering the greatest value from dead timber before it burns or decays, while respecting other forest values; and conserving the long-term forest values identified in land use plans. I am writing to you regarding the Crown's objectives with respect to mid-term timber supply in areas affected by the mountain pine beetle.

The MPB infestation has had a profound impact on the timber supply outlook for the interior of the province. In particular, forecasts of timber supply in the mid-term—the period between the ending of the economic shelf life of killed pine and the time when the forest has re-grown and again become merchantable—are now significantly lower than prior to the infestation. These shortages threaten the wellbeing of forest-dependent cities and towns. The

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Ministry of Forests and Range and
Minister Responsible for Integrated
Land Management Bureau

Minister's Office

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Jim Snetsinger, Chief Forester

Government of British Columbia is working closely with beetle action committees, municipalities, and the private sector to diversify economies. However, for many forestry-dependent towns mid-term timber supply shortages could still have significant socio-economic impacts.

During this challenging time it will be necessary to reassess management objectives and administrative approaches that were developed when forest conditions in the province's interior were very different than now exist. In this reassessment it will be important to enhance the understanding of how best to balance objectives for non-timber forest values with objectives for timber supply to achieve a range of socio-economic benefits. It will also be important to assess how innovative practices and incremental silviculture could mitigate mid-term timber supply shortfalls in MPB affected areas, and if flexibilities can be found in timber supply administration.

During the Timber Supply Review process, in addition to the considerations included in the July 2006 letter, I would like you to undertake analysis that can provide information on how changes to current management practices and administration could increase mid-term timber availability in MPB-affected areas. This information should be shared with Ministry of Forest and Range Executive and used to inform discussions among interested parties, and considered by appropriate land use and management decision makers. If formal changes are made to management objectives and administration, you will be in a position to incorporate those changes in Timber Supply Reviews and AAC determinations.

Sincerely,



Pat Bell
Minister

cc: Dana Hayden, Deputy Minister