

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

Williams Lake Timber Supply Area

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

Effective February 25, 2015

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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 the Williams Lake 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 Cariboo Chilcotin Natural Resource District, the Cariboo Region, and the Forest Analysis and Inventory Branch (FAIB). I am also grateful to the many organizations and individuals who contributed to this process by providing feedback on the *Public Discussion Paper*.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider a number of factors in determining AACs for timber supply areas (TSAs) and tree farm licences. 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 *Forest Act* is reproduced in full as Appendix 1 of this document.

Description of the Williams Lake TSA

The Williams Lake TSA is situated in central British Columbia. The boundary of the TSA covers a total area of approximately 4.93 million hectares, including parks and all ownerships, and is administered from the Cariboo Chilcotin Natural Resource District office in Williams Lake.

The TSA is bounded by the Quesnel TSA to the north; Wells Gray Park and Cariboo Mountains Park to the east; 100 Mile House and Lillooet TSAs to the south; and Tweedsmuir Park, Kingcome TSA and Sunshine Coast TSA to the west.

The climate, terrain and forests of the TSA are varied with three general landscape types. The Chilcotin Plateau, west of the Fraser River, is characterized by a drier climate with extensive lodgepole pine forests and some Douglas-fir, and is bounded to the west by the Coast Mountains. The central portion of the TSA, both east and west of the Fraser River, has mixed-species forests, primarily Douglas-fir and lodgepole pine, interspersed with open range lands. The eastern portion of the TSA consists of a rolling plateau that increases in elevation to meet the Cariboo Mountains and Quesnel Highlands where forests of spruce, pine, western redcedar, western hemlock, and subalpine fir occur.

The varied landscapes of the Williams Lake TSA provide for a diversity of habitats including grasslands, wetlands, forests, and alpine. Large mammals in the TSA include mule deer, moose, mountain goat, caribou, bighorn sheep, cougar, lynx, black bear, grizzly bear, coyote and wolf. Many smaller furbearing species occur in the TSA such as snowshoe hare, pine marten, fisher, and squirrel.

The TSA has numerous rivers, lakes and streams that support many species of fish such as sockeye and chinook salmon, steelhead, sturgeon, rainbow trout, kokanee and bull trout.

The total population within the area bounded by the Williams Lake TSA is about 25,000 with nearly 11,000 residing in Williams Lake. Other communities such as Horsefly, Likely, Miocene, Alexis Creek, Anahim Lake, Tatla Lake, Riske Creek, Big Creek, Nimpo Lake, 150 Mile House, Big Lake, and McLeese Lake contribute to the area's population. Some residents from these

outlying communities commute daily for employment or to use services available in Williams Lake.

The economy of the communities in the TSA is largely resource based with the forest sector being the main economic driver. Other important sectors include ranching, mining and tourism.

Ten First Nations communities occur within the area bounded by the Williams Lake TSA: Tl'etinqox (Anaham Band), Tsi Del Del (Alexis Creek Band), Yunesit'in (Stone Band), Xeni Gwet'in (Nemiah Valley Band), Tl'esqox (Toosey Band), Esketemc (Alkali Lake Band), Xat'süll (Soda Creek Band), T'exelc (Williams Lake Band), Ulkatcho First Nation, and Stswecem'c/Xgat'tem First Nation (Canoe/Dog Creek Band).

Other First Nations with asserted aboriginal rights and title (aboriginal interests) and asserted territories in the Williams Lake TSA include: ?Esdilagh (Alexandria Band), Bridge River Band, Tsq'escen' (Canim Lake Band), Da'naxda'xw/Awaetlala, High Bar, Homalco, Lhoosk'uz Dene (Kluskus First Nation), Lheidli T'enneh, Lil'wat, Nanwakolas, Nazko, Nuxalk, Lhtako Dene (Red Bluff Band), Simpcw (North Thompson), Skin Tyee, St'at'imc Chiefs Council (Lillooet), T'it'q'et, and Ts'kw'aylaxw (Pavilion).

The Tsilhqot'in National Government (TNG) represents the Tsilqot'in communities of Tl'etinqox (Anaham), Tsi Del Del (Alexis Creek), Esdilagh (Alexandria), Xeni Gwet'in (Nemiah), Tl'esqox (Toosey Band), and the Yunesit'in Government (Stone Band).

The Northern Shuswap Tribal Council are the Northern Secwepemc te Qelmucw (NStQ), meaning the Shuswap people of the north. NStQ represent the Tsq'escen' (Canim Lake), Stswecem'c/Xgat'tem (Canoe & Dog Creek), Xat'süll (Soda & Deep Creek), and T'exelc (Williams Lake a.k.a. Sugar Cane) communities.

History of the AAC

The Williams Lake TSA was established in 1981 with an AAC of 2 500 000 cubic metres. At that time, the three western supply blocks were not included for timber supply purposes. In 1985, the AAC was set at 3 750 000 cubic metres with a partition created to harvest stands infested or threatened by the mountain pine beetle (MPB). In 1989, the AAC was further increased to 4 092 510 cubic metres when another partition was added to include the contribution of stands in the three western supply blocks while reducing the partition for MPB impacted stands.

In 1992, the AAC was set at 3 975 000 cubic metres by further reducing the MPB partition while adding a partition for deciduous stands. In 1996, the AAC was reduced to 3 807 000 cubic metres by reducing the partition for the western supply blocks, deleting the deciduous partition, and adding a partition for problem forest types. In 2003, the AAC was slightly reduced to 3 768 400 cubic metres by decreasing the base AAC and increasing the partition for the western supply blocks.

In 2007, the current AAC was set by the chief forester at 5 770 000 cubic metres to provide an uplift to address the unprecedented MPB epidemic. The current AAC includes a partition of 450 000 cubic metres from the three western supply blocks, and a partition of 107 000 cubic metres for problem forest types in the Pulpwood Agreement 16 (PA 16) area. The chief forester's 2007 determination was predicated on directing the entire AAC at stands with at least 70 percent pine that are located west of the Fraser River.

Table 1 shows the apportionment of the current AAC by the Minister of Forests, Lands and Natural Resource Operations in 2007.

Table 1. Apportionment of the AAC

Apportionment	Volume (m ³)	% of AAC
Forest Licences Replaceable	1 702 190	29.50
Forest Licences Non-Replaceable	2 617 681	45.37
BCTS Timber Sale Licences	1 018 129	17.65
BCTS Forest Licence Non-Replaceable	30 000	0.52
Pulpwood Agreement Timber Sale Licence	107 000	1.85
Community Forest Agreements	45 000	0.78
Forest Service Reserve (FSR)	65 000	1.13
FSR Small Scale Salvage	185 000	3.21
Total	5 770 000	100.0

New AAC determination

Effective February 25, 2015, the new AAC for the Williams Lake TSA will be 3 000 000 cubic metres. This includes a partition of a maximum of 1 500 000 cubic metres per year for live volume which means the remainder of the AAC is for salvaging dead trees. It is my expectation that non-pine leading stands will contribute a maximum of 880 000 cubic metres to the AAC of this TSA. This AAC will remain in effect until a new AAC is determined, which must take place within 10 years of this determination.

On June 26, 2014, the Supreme Court of Canada (SCC) released its decision on *Tsilhqot'in Nation v. British Columbia* (Tsilhqot'in decision). In that decision the SCC outlined areas over which the Tsilhqot'in Nation had proven Aboriginal title. Proven Aboriginal title lands are not considered Crown land. As such, those lands have been excluded from this AAC determination, as have the areas that the courts determined were outside of the actual claim area but met the criteria for proof of aboriginal title.

I have identified several tasks under “**Implementation**” which I believe could produce new information regarding the mid-term timber supply that may support revisiting this decision within five years.

Information sources used in the AAC determination

In addition to other information sources mentioned in the specific factors that I address in this AAC rationale document, sources of information include:

- *Forest and Range Practices Act*;
- *Heritage Conservation Act*;
- *Provincial Logging Residue and Waste Management Procedures Manual*, British Columbia Ministry of Forests and Range, 2011 and subsequent amendments;
- *Declaration of the Cariboo-Chilcotin Land-Use Plan as a Higher Level Plan: Filing and Notice*, BC Ministry of Forests, 1996;

- *Cariboo-Chilcotin Land Use Plan: 90-day Implementation Plan, Final Report*, Province of BC, 1995;
- *Anahim Round Table Subregional Plan*, Integrated Land Management Bureau, March 2001;
- *Chilcotin Sustainable Resource Management Plan*, Integrated Land Management Bureau, June 2007;
- *Horsefly Sustainable Resource Management Plan*, Integrated Land Management Bureau, June 2007;
- *South Chilcotin Sustainable Resource Management Plan*, Integrated Land Management Bureau, September 1999;
- *Williams Lake Sustainable Resource Management Plan*, Integrated Land Management Bureau, October 2005;
- Land Use Order for the Cariboo–Chilcotin Land Use Plan, April 2011, and subsequent amendments;
- *Cariboo-Chilcotin Land Use Plan (CCLUP) Biodiversity Conservation Strategy*, Biodiversity Conservation Strategy Committee, 1996 and Update Notes #5 to #10, #13;
- *Management Strategy for Mule Deer Winter Ranges in the Cariboo-Chilcotin, Part 1a: Management Plan for Shallow and Moderate Snowpack Zones*, BC Ministry of Forests and Range Forest Science Program, 2007;
- *Management Strategy for Mule Deer Winter Ranges in the Cariboo-Chilcotin, Part 1b: Management Plan for Transition and Deep Snowpack Zones*, BC Ministry of Forests and Range Forest Science Program, 2006;
- Mountain Caribou Recovery Implementation Plan, Province of BC, 2007;
- *Northern Caribou Strategy*, CCLUP Caribou Strategy Committee, March 2002;
- *Cariboo Region Forest Health Strategy 2013 – 2016*, Cariboo Region, BC Ministry of Forests, Lands and Natural Resource Operations, 2013;
- *Preliminary Analysis of Climate Change in the Cariboo-Chilcotin Area of British Columbia*, Integrated Land Management Bureau and Pacific Climate Impacts Consortium (University of Victoria), September 2008;
- *Procedures for Factoring Visual Resources into Timber Supply Analysis*, British Columbia Ministry of Forests, 1998;
- *Modelling Visuals in Timber Supply Review III*, British Columbia Ministry of Forests and Range Bulletin, December 2003;
- *Summary of dead potential volume estimates for management units within the Northern and Southern Interior Forest Regions*, British Columbia Ministry of Forests and Range, 2006;
- *Provincial-Level Projection 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)*, A. Walton, British Columbia Ministry of Forests, Lands and Natural Resource Operations, 2012;
- *Guidance on Landscape- and Stand-Level Structural Retention in Large-Scale Mountain Pine Beetle Salvage Operations*, Chief Forester, BC Ministry of Forests and Range, 2005;

- *Williams Lake Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination*, British Columbia Ministry of Forests and Range, April 18, 2007;
- *Mid-Term Timber Supply in the Cariboo: Preliminary Assessment of Three Land Use Values, April 2013*;
- *Williams Lake Timber Supply Area Timber Supply Review Data Package*. British Columbia Ministry of Forests, Lands and Natural Resource Operations, April 2013 and public comments on the data package;
- *Williams Lake Timber Supply Area Timber Supply Analysis Public Discussion Paper*; British Columbia Ministry of Forests, Lands, and Natural Resource Operations, January 2014;
- Public review comments on the *Public Discussion Paper* (submitted January to April 2014);
- *Habitat Supply Analysis for Williams Lake TSA Timber Supply Review*; British Columbia Ministry of Forests, Lands and Natural Resource Operations and Ministry of Environment; April 2014;
- Letter from the Minister of Forests and Range to the Chief Forester stating the economic and social objectives of the Crown, July 4, 2006;
- 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;
- Letter from the Assistant Deputy Minister, Tenures and Revenue Division, Ministry of Forests and Range to all licensees concerning cut-control changes resulting from new log grades, February 24, 2006;
- First Nations Consultation Summary related to the Williams Lake Timber Supply Area Allowable Annual Cut Determination, Cariboo Chilcotin Natural Resource District, July 2014;
- *Updated Procedures for Meeting Legal Obligations When Consulting First Nations – Interim*; Province of British Columbia; May 7, 2010;
- Technical review and evaluation of current operating conditions in the Williams Lake TSA through comprehensive discussions with staff from the Ministry of Forests, Lands and Natural Resource Operations, including the AAC determination meeting held in Williams Lake, BC on April 15th and 16th, 2014.

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. On-going 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 Williams Lake 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 foresters, 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 timber harvesting land base (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 on-going 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 judgment 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 on-going 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

Aboriginal Title Lands and other areas, such as Treaty Lands or Indian Reserves, are not provincial Crown land. Consequently, the timber on these lands does not contribute to the AAC of the timber supply area or tree farm licence with which they overlap. For other areas, where aboriginal title has not been legally proven, 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' Aboriginal Interests are addressed through specific actions and forest practices.

Aboriginal Interests that may be adversely impacted by an AAC decision will be considered, and where appropriate, addressed in a manner that is 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 legal obligations owed to First Nations 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 and legal requirements.

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 projections 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 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 Williams Lake TSA

The timber supply analysis for this TSA was completed before the Tsilhqot’in decision was rendered by the SCC on June 26, 2014. As such, the Aboriginal Title area was not removed from the timber harvesting land base (THLB) in the base case. Under *First Nations considerations* I will discuss a sensitivity analysis where zone “D” as defined in the Tsilhqot’in Strategic Engagement Agreement, which overlaps the Aboriginal Title area, was removed from the THLB.

In the base case, the initial harvest level was set at 3 400 000 cubic metres per year, which is about the 10-year average volume harvested in the TSA from 2003 to 2012. Since there is still much beetle-killed pine volume remaining in the TSA, the short-term harvest focuses on dead, pine-leading stands. After 10 years, the harvest level drops to a mid-term level of 1 420 500 cubic metres per year. After year 60, the analysis shows the harvest level can then increase to a long-term harvest level of 2 994 000 cubic metres per year. Staff examined the

impact of lowering the long-term harvest level on mid-term timber supply and found that it had no effect (i.e. the mid-term harvest levels did not increase).

The current AAC for the Williams Lake TSA was determined in 2007 following an expedited timber supply review in response to the MPB epidemic sweeping the central interior of BC. The analysis conducted for that decision used an updated version of the 2001 timber supply analysis. Since then, several changes have occurred to the land base, and forest management data and practices, including:

- The estimate of mature pine mortality has decreased from 78 percent to 57 percent;
- The modelling assumptions for minimum harvestable volume increased from 65 cubic metres per hectare to 80 cubic metres per hectare for pine-leading stands, and 120 cubic metres per hectare for non-pine leading stands to better reflect current practices;
- A modelling assumption was added for minimum harvestable age: 60 years for pine-leading stands, and 80 years for non-pine leading stands;
- Visually effective green-up heights for scenic areas increased from three metres to, five to seven metres, depending on visual quality objectives;
- Spatial old growth management areas (OGMAs) have been established and are incorporated in the analysis;
- Goal 2 protected areas, that were announced by government in February 2013, were excluded from the timber harvesting land base; and
- Predictive Ecosystem Mapping (PEM) is now available, and therefore Site Index by Biogeoclimatic Ecosystem Classification (SIBEC) was used for managed stands.

Due primarily to the establishment of spatial OGMAs and the use of a higher minimum harvestable volume threshold, the THLB in the current analysis - 1.83 million hectares is lower than the 2.09 million hectares THLB assumed in the previous 2007 timber supply review.

I have reviewed the assumptions and methodology incorporated in the base case harvest forecasts and I am satisfied, subject to the considerations discussed in this rationale, that the information presented to me regarding the base case provides a suitable basis from which I can assess the timber supply for the Williams Lake TSA. In addition to the base case, I was provided with a number of alternative harvest flows and sensitivity analyses. This and other information, in the following sections, have been helpful in the considerations and reasoning leading to my determination.

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

I have reviewed the information for all of the factors that require consideration 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 generally included in this rationale. One exception is for factors that I discuss in order to respond to public input. The factors accepted as modelled where no discussion is provided are listed in Table 2.

Table 2. List of factors accepted as modelled

<i>Forest Act section and description</i>	Factors accepted as modelled and not discussed further in rationale
8(8)(a)(i) the composition of the forest and its expected rate of growth on the area	<ul style="list-style-type: none"> • Non-crown land • Non-forest areas • Recreation trails • Parks, protected areas and reserves • Community areas of special concern • Critical habitat for fish • Deciduous types • Volume estimates for existing stands • Operational adjustment factors (OAFs)
8(8)(a)(ii) the expected time that it will take the forest to become re-established on the area following denudation	<ul style="list-style-type: none"> • Not satisfactorily restocked (NSR) areas
8(8)(a)(iii) silviculture treatments to be applied to the area	-
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	<ul style="list-style-type: none"> • Decay, waste and breakage
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	-
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)(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 public or First Nations' input indicates contention regarding the information used, modelling, or some other aspect under consideration, this rationale incorporates an explanation of how I considered the essential issues raised and the reasoning that led to my conclusions. I have applied the same principles to discussion of public input as I applied to First Nations' interests; that is, 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 the public in relation to my powers under Section 8 of *the Forest Act* and the AAC determination are addressed in the various sections of this rationale.

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 within the outer boundary of the Williams Lake TSA is 4 934 367 hectares. Land within the outer boundary of the TSA that does not contribute to the TSA Crown forest land base or towards achieving integrated resource management objectives include non-crown land (e.g. private land), area-based tenures (e.g. community forests and woodlots), non-forest areas (such as alpine, lakes and rock), and existing roads. Excluding these areas leaves 3 238 194 hectares in the Crown forest management land base.

As part of the process used to define the timber harvesting land base (THLB), a series of deductions were made from the Crown forest management land base. These deductions account for land designations such as parks as well as economic or ecological factors that operate to reduce the forest area available for harvesting. In reviewing these deductions, I am aware that some areas may have more than one classification. To ensure accuracy in defining the THLB, care must be taken to avoid any potential double-counting associated with overlapping objectives. Hence, a specific deduction for a given factor reported in the analysis or the AAC rationale may either be the 'total area' (ignoring overlaps), or the 'net area' (minus overlaps based on the sequence of netdowns).

For the Williams Lake TSA, I acknowledge that the above approach was used in the timber supply analysis, resulting in a THLB - the area available for harvesting - of 1 829 922 hectares, which represents about 37 percent of the outer boundary of the TSA and 57 percent of the Crown forest management land base.

- area-based tenures

In January 2014 when the *Williams Lake TSA Timber Supply Analysis Public Discussion Paper* was released, there were 53 woodlot licences and three community forest agreements within the boundaries of the TSA. The AAC for these area-based tenures are determined through a separate process and they do not contribute to the AAC for the TSA. These areas were correctly deducted from the THLB in support of the timber supply analysis.

After the analysis was completed, the Williams Lake Community Forest was awarded in March 2014. This new community forests represents about 18 542 hectares or one percent of the TSA's timber harvesting land base (THLB). I therefore recognize in my "**Reasons for Decision**" a one percent overestimation in short-term timber supply based on this new community forest; there is also an impact on mid- to long-term timber supply.

Although there are also proposed new area-based tenures in the TSA, the tenures have not been awarded. The proposed areas currently remain in the TSA and were included in the base case.

- roads

The area associated with existing major highways was deducted from the THLB. The estimated length of existing mapped minor public roads and resource roads in the TSA is about 39 479 kilometres. District staff and forest licensees agreed on the average width by road type so that an appropriate area could be deducted from the THLB i.e. 25 metre width for minor public roads and Forest Service roads, 15 metre width for road permit and non-status roads, and no width for on-block roads as they were considered as temporary access structures that would be rehabilitated. This resulted in the removal of a 34 600-hectare total area to account for existing minor public roads and resource roads.

Reduction factors for future resource roads are based on average permanent access structures recorded in the ministry's Reporting Silviculture Updates and Land status Tracking System (RESULTS) in the five-year period from 2007 to 2012. This meant that an additional area of 30 558 hectares for future roads was deducted from the long-term THLB. These future road deductions are applied after stands are harvested in the timber supply model.

Licensees indicated that existing temporary access structures in the TSA are not always being rehabilitated if the maximum allowable permanent access percentage is not exceeded. A 2013 assessment of soil management practices in the southern and central interior of BC showed that approximately one-third of the evaluated blocks contained unrehabilitated temporary access structures. The 2013 assessment findings were reported in Forest and Range Evaluation Program (FREP) Extension Note #28.

If it is assumed that one-third of the existing 18 988 kilometres of temporary access structures in the Williams Lake TSA have not been rehabilitated, that could mean an additional 6329 kilometres of temporary roads should be removed from the THLB. Assuming a 10-metre right-of-way would mean an additional 6329 hectares of productive forest areas should be deducted from the THLB. This represents about a 0.3 percent overestimation of the timber supply in the mid- to long-term. In discussions with district staff, I account for this overestimation in my "**Reasons for Decision**".

- inoperable areas

Terrain classification and steep slopes were used to identify areas deemed to be inoperable and unsuitable for conventional timber harvesting. Using terrain stability mapping where it was available in the TSA, any unstable or potentially unstable terrain were excluded from the THLB.

Steep slopes that are unlikely to be harvested were also deducted from the THLB; this included all slopes exceeding 70 percent in the former Horsefly Forest District, and all slopes greater than 40 percent in the remainder of the TSA. It was assumed that slopes between 40 and 70 percent could be cable harvested in the former Horsefly Forest District, and there has been cable harvesting in this area in the past.

There was a public comment that cable harvesting is non-existent in the Cariboo, and that there has not been cable harvesting in the Williams Lake TSA in over 10 years. The comment recommended that cable ground should not be included in the regular AAC.

Although there has not been recent cable harvesting in the TSA, it has been used historically. District staff advise that it is reasonable to assume licensees can access cable equipment and expertise if required. The focus since the last determination and in the short term is on salvage harvesting dead pine stands west of the Fraser River. The focus is expected to shift to lands east of the Fraser River in the mid-term, and use of cable ground is likely to occur at that time.

In reviewing this factor with staff, I am satisfied that inoperable areas and cable ground were appropriately accounted for in the base case.

- low productivity sites

Low productivity sites are defined in the timber supply analysis as areas that are not able to meet the minimum harvestable volume criteria at 160 years of age. Nearly 400 000 hectares of net area were deducted from the THLB based on low productivity representing a significant factor when defining the THLB. Although poor inherent site quality is often a reason for low productivity, this may also occur due to poor stand conditions (e.g. stand density issues following fire) that are potentially treatable. District staff note however that some of these potentially treatable stands are in areas with poor access and/or where there are also forest health issues.

Although low productivity sites are defined considering what is economically harvestable from a sawlog perspective, there may be opportunities to utilize some of these stands for bio-energy in the future. Although there may be opportunities to either treat or utilize some low productivity sites in the future, I am satisfied that the base case reflects current practices for the purposes of this determination. If in the future there is some utilization or treatment in these sites, this can be factored into subsequent determinations. Therefore under “**Implementation**”, I encourage staff to explore opportunities for the use of some of the low productivity sites before the next determination.

Existing forest inventory

- forest inventory – recent wildfires

In the eastern portion of the Williams Lake TSA, a Vegetation Resource Inventory (VRI), completed in 2013, was used in the timber supply analysis. In the western portion of the TSA, the original forest cover inventory was used in the analysis. In the analysis, the inventory for the TSA was projected to the end of 2011 for growth and harvest depletions. The 2009 aerial forest health overview survey was used to estimate live and dead volumes, and this information was used to adjust yield curves for MPB impacted stands.

Although the inventory used in the base case was not updated to address recent 2009 and 2010 large wildfires, the timber supply analysis did account for these fire-related losses by estimating post-fire attribute adjustments for various stand types. Since these estimates were made, there have been considerable losses in Douglas-fir leading stands due to the Douglas-fir beetle inside fire boundaries. Although there has been salvage harvesting in some of these impacted stands, many stands impacted by the Douglas-fir beetle are not likely to be salvaged. Fires in 2009 and 2010 impacted 65 869 hectares of THLB, of which 19 103 hectares were in Douglas-fir leading stands. These Douglas-fir leading stands account for about one percent of THLB in the TSA, and the analysis assumed 70 percent of these stands survived the fire. The Douglas-fir beetle may

have impacted up to 0.7 percent of the THLB that was assumed to be available in the mid-term, and I account for this potential overestimation of mid-term timber supply in my “**Reasons for Decision**”.

A Landscape Vegetation Inventory (LVI) was initiated for the Williams Lake TSA in 2012. New LVI information was not yet available for use in this determination. Once the LVI is completed, under “**Implementation**”, I encourage staff to compare the LVI results with the current inventory so that the LVI information can be considered in the next determination. I would like to review the results of this comparison since it may affect the timing of the next determination.

- volume estimates for managed stands

In the timber supply analysis, all existing stands established after 1965 and all future regenerated stands are considered to be managed stands. The growth and yield of managed stands are projected using the Table Interpolation Program for Stand Yields (TIPSY) model version 4.1 modified by standard Operational Adjustment Factors (OAFs).

Preliminary results from FREP’s Stand Development Monitoring (SDM) plots that monitor the health and growth of post free-growing stands suggest that managed pine stands may have less volume due to forest health issues relative to what was assumed in the base case. I recognize these preliminary indications as an unquantified downward pressure on timber supply in the mid-term in my “**Reasons for Decision**”.

A number of Young Stand Monitoring (YSM) and Stand Development Monitoring (SDM) plots have been established in the TSA. Under “**Implementation**”, I encourage staff to assess the information collected from these plots to evaluate the volume estimates for managed stands assumed in timber supply analysis.

- dead potential volume

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 less than 50 percent of lumber produced is merchantable) were not charged to the AAC if harvested. Under the new system, grades are based on log size and quality at the time it is scaled, not simply whether it was alive or dead at harvest. To better account for all harvested volume in the AAC cut control, logs that were previously considered Grade 3 endemic or Grade 5 are now charged to the AAC. Therefore, this volume now needs to be taken into account in the AAC determination.

At this time the best estimates of this dead potential volume can be obtained from the harvest billing system (HBS). For the period 1995 to 2004, when dead potential volumes were not charged against the AAC, the HBS showed that grade 3 endemic and grade 5 log volumes totalled about 8.3 percent of the cut-accountable volume in the Williams Lake TSA.

The harvest of dead volume resulting from the MPB epidemic is discussed later under *mountain pine beetle infestation – shelf life*. The base case forecast does not account for dead potential volumes. Since harvesting of dead potential will add to the timber supply as compared to the base case forecast, I account for an underestimation in short-term timber supply of about 8.3 percent in my “**Reasons for Decision**”. By accounting for this factor in my determination, I note under “**Implementation**” that dead potential volumes that are harvested in the TSA should be charged against the AAC.

Expected rate of growth

- site productivity estimates

The productivity of a site, expressed in terms of its site index, largely determines how quickly trees grow. The rate of tree growth in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and be merchantable.

New provincial site productivity estimates, which incorporated the Predictive Ecosystem Mapping (PEM) completed for the Williams Lake TSA, were used in the timber supply analysis.

There was a public comment about the potential impacts of climate change on the growth and site productivity of forest stands with a suggestion that this should be assessed in the analysis. Although climate change may affect the growth of stands, at this time we do not have data to estimate what those impacts may be in the TSA. As noted in my *'Guiding Principles'*, 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.

I recognize that climate change may impact site productivity estimates, forest health and other factors that were addressed in this determination. Under **"Implementation"**, I therefore encourage staff to try and understand projected climate change impacts in the TSA so that this important consideration can be factored into future determinations.

Also as noted earlier under *'volume estimates for managed stands'*, under **"Implementation"** I encourage staff to review existing and future Young Stand Monitoring and Stand Development Monitoring plots to assess impacts on the volume estimates assumed in the analysis. These plots capture changes in growth that may result from climate change as well as impacts due to forest health factors.

- genetic gain

Genetic gain assumptions for existing managed stands used in the timber supply analysis were based on historical select seed use and genetic gain history records. Genetic gain assumptions for future managed stands were derived from a review of both current (recent seed use and genetic gain practices estimated over past five years) and future estimates of seed use and genetic gain projected over the next 10 years. The average genetic gains for existing planted stands are 0.1 percent for lodgepole pine, 1.7 percent for Douglas-fir, and 5.7 percent for spruce. The average genetic gains for future managed stands are 3.0 percent for lodgepole pine, 9.7 percent for Douglas-fir, and 12.8 percent for spruce. In reviewing this factor with ministry staff, I accept the existing and expected future genetic gains assumed for managed stands that were used in the timber supply analysis as reflecting both current and expected future practices regarding the use of select seed in the TSA.

- minimum harvest ages and volumes

In the timber supply analysis, it was assumed that the minimum harvest age for pine-leading stands is 60 years and that the minimum harvest volume is 80 cubic metres per hectare. For non-pine leading stands, the analysis assumed the minimum harvest age is 80 years and that the minimum harvest volume is 120 cubic metres per hectare. These criteria were derived from information compiled from cruise reports between 1997 and 2009.

There was a public comment that 60 years is too young to expect pine to be harvestable given harsh growing conditions in the Chilcotin. This is accounted for in the base case as pine stands must meet both the minimum stand age and volume criteria (i.e. stands must be both at least 60 years of age and have at least 80 cubic metres of volume per hectare). District staff note that the minimum age criteria was included to prevent the timber supply model from harvesting faster growing stands too early as they may still be growing and accumulating significant volume.

In the previous 2007 timber supply review, the analysis used 65 cubic metres per hectare for pine-leading stands as the minimum harvest volume. The cruise data showed that 80 cubic metres per hectare better represents current practice for the merchantability of pine-leading stands.

A sensitivity analysis examined using 65 cubic metres per hectare as the only minimum merchantability criterion for pine-leading stands. This analysis showed that mid-term timber supply could increase 480 600 cubic metres per year (34 percent more than base case) to 1 901 100 cubic metres per year. Lowering the minimum harvest volumes allow more MPB-killed pine stands to be harvested and reforested thus contributing to future timber supply as managed stands.

A public comment noted that there is little harvesting below 80 cubic metres per hectare in pine-leading stands in the TSA, and that although harvesting 65 to 80 cubic metres per hectare stands could have a dramatic impact on mid-term harvest levels it is currently uneconomic to do so. The comment stressed the importance of considering appropriate policies to better encourage and enable access to low value stands.

Although few low volume pine-leading stands (65 to 80 cubic metres per hectare) are currently being harvested in the TSA, this could change as we move to the mid-term to address timber supply shortfalls. Low volume stands are being examined as part of the ministry's Mid-Term Supply Action Plan to mitigate reductions in mid-term timber supply. In reviewing this factor with staff, I conclude in my "**Reasons for Decision**", that there is potentially more volume in the mid-term than assumed in the base case based on this factor.

Under "**Implementation**", I encourage staff to monitor operational practices to see whether assumptions about minimum harvest ages and/or volumes are changing, and how these changes may impact mid-term timber supply relative to what was assumed in the base case.

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

Expected time to re-establish the forest following denudation

- regeneration delay

Regeneration delay is the period between harvesting an existing stand and the re-establishment of the next stand to an approved standard. Regeneration delay assumptions used in the timber supply analysis for managed stands are based on data in RESULTS, and range from one to four years with shorter delays common for planted stands and longer delays common for stands that are naturally regenerated.

A regeneration delay of 15 years was assumed for mature, fire-killed stands. A shorter regeneration delay of seven years was assumed for young, fire-killed stands since it is expected that the Forests for Tomorrow Program will fund the re-establishment of the majority of these stands.

For mature, MPB-killed stands that are not projected to be salvage harvested (e.g. that do not meet the minimum harvest volume criterion of 80 cubic metres per hectare), the analysis assumed a natural stand of age 40 would occur 25 years after disturbance¹. In effect, this assumes that most MPB-impacted stands are expected to have advanced regeneration equivalent to a stand aged 15 years. It should be noted that this is a modelling assumption to support a strategic AAC determination; operationally, through Forests for Tomorrow, silviculture surveys identify sites that are not expected to regenerate to an acceptable level and where treatments such as planting may be warranted.

Although Forest Analysis and Inventory Branch have established monitoring plots throughout the area of the MPB infestation to determine regeneration and growth in post-attacked stands, we do not have any information at this time that would enable us to examine the assumptions used in the analysis. Given that the actual performance of post-attacked MPB stands is currently not well known, there is uncertainty associated with the regeneration delay assumptions used for unsalvaged stands. Information collected from the monitoring plots however can reduce uncertainty in this factor in subsequent determinations.

I also recognize that uncertainty in this factor does not affect my determination about a short-term AAC, but does affect harvest flows in the mid- to long-term. I accept the regeneration delays assumed as representing best available information for managed stands following harvesting, and best judgment of staff for fire- and MPB-killed stands.

Under “**Implementation**” I encourage staff to review these regeneration delay assumptions for MPB-impacted stands that are not projected to be salvage harvested given information compiled provincially - along with any future information from locally established monitoring plots. For example, a ministry 2012 provincial review of *Current State of Knowledge Regarding Secondary Structure in MPB Impacted Landscapes* focused on the natural recovery of unmanaged natural stands. The review concluded that MPB-impacted stands in the ESSF and ICH zones pose few problems and are expected to recover fairly well, whereas impacted stands in the SBS zone pose the greatest risk for future timber supply.

Section 8 (8) (a) (iii) silvicultural treatments to be applied to the area:

Silvicultural treatments

- *silvicultural systems*

In the base case, uneven-aged dry-belt Douglas-fir leading stands in the Interior Douglas-fir (IDF) and Sub-Boreal Pine – Spruce (SBPS) zones outside of mule deer winter ranges were assumed to be harvested using a single tree selection silvicultural system. All other stands were assumed to be harvested by the clearcut with reserve system. The merchantable volume growth of these Douglas-fir stands was assumed in the timber supply analysis to be one cubic metre per hectare per year.

¹ Page 10 in the *Public Discussion Paper* inadvertently described regeneration delay incorrectly for these stands.

Given uncertainty in the growth rates of these Douglas-fir stands, a sensitivity analysis examined the impacts of assuming volume growth of two cubic metres per hectare per year. This analysis showed a 5.5 percent increase in mid-term timber supply with no effect in the short term.

Since the sensitivity analysis was completed, Forest Analysis and Inventory Branch assessed the growth of these Douglas-fir stands based on existing sample plots. The estimated weighted average volume growth was 1.4 cubic metres per hectare per year. That represents 40 percent of increased growth assumed in the sensitivity analysis; therefore the expected impact is a 2.2 percent increase in mid-term timber supply. Based on these findings, I recognize in my “**Reasons for Decision**” that the base case underestimated mid-term timber supply by about 2.2 percent.

Under “**Implementation**”, I encourage staff to explore innovative ways (such as use of LiDAR) to improve the inventory, including growth and yield, of Interior Douglas-fir stands given their contribution to mid-term timber supply.

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 standards

The minimum utilization criterion used in the timber supply analysis was 12.5 centimetres diameter at breast height (dbh) for both pine and non-pine species. The utilization standard for non-pine, however, is 17.5 centimetres dbh. Any utilization of non-pine below 17.5 dbh is not charged to the AAC. Therefore the analysis should have used the utilization standard of 17.5 centimetres dbh for non-pine. Staff advise that there is very little volume in the 12.5 to 17.5-centimetre dbh range for non-pine, so the impact on timber supply is likely minimal. I recognize the application of 12.5 centimetre dbh for non-pine species in the base case slightly overestimated timber supply relative to the 17.5 centimetre dbh standards that are applied when charging harvested volumes towards the AAC in my “**Reasons for Decision**”.

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 and Range (now part of 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, 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. The *Forest and Range Practices Act* and other legislation provide for, or enable, the legal protection and conservation of timber and non-timber values. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

- *cultural heritage resources*

A cultural heritage resource (CHR) is defined under the *Forest Act* as an object, site, or location of a traditional societal practice that is of historical, cultural or archaeological significance to the province, a community, or an aboriginal people. CHRs include, but are not limited to, archaeological sites, structural features, heritage landscape features and traditional use sites.

Features associated with past and current human use, including aboriginal use, are found throughout the Williams Lake TSA. Hunting grounds, fishing areas, travel corridors and campsites are predominantly found along the major water courses in the TSA. Other sites within the TSA include spiritual sites, battle sites, and gathering sites (berries, wood, medicinal plants).

The First Nations who have asserted territory in the Williams Lake TSA fall into three cultural groups: Secwepemc, Tsilhqot'in, and Carrier. Available ethno-historic reports provide insights on the use within the TSA by these cultural groups as described below.

Historically, Secwepemc use of resources in the TSA varied seasonally. Fishing, hunting and gathering were conducted between early spring and late fall, with different resources harvested from each of the biogeoclimatic zones and different elevations within their territory. In the late fall, people would return to their village and semi-subterranean houses where they spent the winter. Land use was based on the use of seasonally available and geographically dispersed resources. Although each band had an area which they customarily used and within which they were involved in the stewardship of some resources, all land and all resources were available to all Secwepemc people.

Ethno-historical records indicates that the Tsilhqot'in territory encompassed an area roughly described as west of Hanceville, east of the Coast Range, north of the Cascades, and south of the Itcha-Ilgachuz Range. In pre-contact times, this included places in the vicinity of Anahim Lake, Tatlayoko Lake, and the Nazko Lakes, as well as locations within the Chilcotin River watershed such as Tatla Lake, Puntzi Lake, Eagle Lake, Chilcotin Lake, Choelquoit Lake, Chilko Lake, Taseko Lake(s), Yohetta Lake, and Alexis Lake(s). In the period between contact (1793) and provincial sovereignty (1846), the Tsilhqot'in continued in their use of these areas. The Tsilhqot'in relied extensively on salmon and other fish. In late summer and fall, they congregated along rivers, such as the Chilcotin and Chilko, to harvest and dry adequate salmon supplies for the winter. Freshwater fish were equally important; the earliest Tsilhqot'in habitations were situated near lakes abundant in freshwater fish. The Tsilhqot'in were skilled hunters who roamed vast areas in search of game, often from remote, isolated base camps, while those awaiting in settlements for their return collected dried berries, roasted roots, and gathered plants and wood.

Carrier lived in permanent villages, usually located near salmon fisheries, though they also spent part of the year harvesting resources from surrounding areas. The Southern Carrier followed a seasonal pattern of resource harvesting. The main sources of food were the Fraser River salmon runs, which were harvested around Fort Alexandria, the mouth of the Quesnel River, near the mouth of the West Road, and elsewhere on the Fraser in the late summer and early autumn. The Ulkatcho would travel to Bella Coola along the Alexander Mackenzie Trail (Grease Trail) to collect eulachon oil and trade with the Nuxalk.

Archaeological sites are established and protected under the *Heritage Conservation Act*. Archaeological sites within the Williams Lake TSA are found along the major water courses within riparian reserve areas, are incorporated into wildlife tree reserves as part of stand-level retention, or are removed from the harvest area. If a forest tenure holder plans to harvest over a known site, they must apply to the Archaeological Branch for a 'site alteration permit', which may be granted under the *Heritage Conservation Act*.

The *Williams Lake TSA Archaeological Overview Assessment* (AOA) is used as a coarse filter approach to assess the archaeological potential of an area. Most of the high to moderate potential areas are around water bodies such as lakes, creeks, and wetlands. If proposed harvesting is within a 'high' potential area, current management practices follow one of the following three options: remove the 'high' potential area from the proposed harvest; complete an archaeological assessment of the area; or propose to proceed with harvest with management recommendations shared with affected First Nations for input.

Those CHR that are not archaeological sites are addressed under the *Forest and Range Practices Act*. In most cases, CHRs often meet the test for and are therefore, considered to be asserted aboriginal rights. As such, they are addressed during the information sharing and consultation process for operational plans and permits. A major licensee is required to share information regarding the proposed FSP and to obtain CHR information from First Nations. The licensee develops results or strategies in their Forest Stewardship Plans as to how they intend to address CHR values that become known during operations. This information sharing process undertaken by the licensee forms part of the overall consultation process regarding First Nations' aboriginal interests.

First Nations have expressed aboriginal interests and concerns linked to management and protection of trail networks, cumulative effects on wildlife and wildlife habitat, and protection of medicinal and food source plants and culturally modified trees (CMTs), as well as concerns regarding the protection of known and unknown archaeological sites.

Forest licensees within the TSA have been undertaking the information sharing and engaging First Nations during the development of cutting permits. Forest licensees generally work with First Nations and often employ them to conduct preliminary field reconnaissance prior to the development of a cutting permit to identify any culturally sensitive and important areas. First Nations who are affected generally bring forward their cultural concerns and where appropriate, the licensees make accommodations and mitigations to their cutting permits to address the First Nations' aboriginal interests in the area. When aboriginal interests have been identified that may be adversely impacted by proposed operations, accommodation may occur at the operational level by incorporating the aboriginal interests in wildlife tree patches for stand-level biodiversity, riparian reserves, or other types of reserves or designations.

In summary, staff are satisfied that the timber supply analysis has captured current practices in the 'stand-level biodiversity' factor and other factors that are addressed through exclusion of area from the THLB or through forest cover requirements. Additional areas over and above those already excluded for other management objectives are anticipated to be minimal; therefore no additional land base reduction was applied to account for CHR in the base case.

In reviewing this factor with ministry staff, I am satisfied that cultural heritage resources were addressed appropriately in the base case.

Some cultural heritage values, such as hunting, can be affected due to cumulative impacts where, for example, high harvest rates in concentrated areas affect wildlife habitat. During operational planning, attempts are made to mitigate these risks based on information received during the consultation process described earlier in this section.

- land use plans

The Cariboo-Chilcotin Land Use Plan (CCLUP) was approved by government in 1994, and designated a higher level plan under the *Forest Practices Code of BC Act* in 1995. The higher level plan was amended in 1999. The higher level plan continues to apply under the *Forest and Range Practices Act* (FRPA).

As part of CCLUP implementation, seven Sustainable Resource Management Plans (SRMPs) were completed covering the entire CCLUP regional area. SRMPs address CCLUP strategies and targets on an area-specific basis, and provide detailed objectives and strategies for the management of natural resources and the maintenance of environmental values. Five of the SRMPs cover the Williams Lake TSA: Anahim Round Table, Chilcotin, Williams Lake, South Chilcotin, and Horsefly.

Based on the SRMPs, a land use order was declared in 2010 under the Land Use Objectives Regulation of the *Land Act* that provides legal direction for forestry activities under FRPA for a number of important resources including: biodiversity, old growth, critical habitat for fish, community areas of special concern, lakes, riparian, mature birch retention, grasslands, scenic area, trails, high value wetlands for moose, and grizzly bears. A minor amendment was made to the riparian objectives in the order in 2011, and another amendment was made to the order in 2013 regarding trails.

The land use order complements ungulate winter ranges and wildlife habitat areas that were mapped and declared by the Ministry of Environment under the Government Actions Regulation (GAR) of FRPA.

The land use order became fully in effect in 2012; that means that all new Forest Stewardship Plans (FSPs) must comply with the order, and FSPs prepared before the order were required to be in compliance by 2014.

The timber supply analysis modelled the legal provisions in the CCLUP higher level plan and the land use order as amended. I am therefore satisfied that in general land use plans have been appropriately accounted for in the base case. I discuss this further in some of the factors below.

There was a public comment that an independent evaluation of the implementation of the CCLUP should be undertaken to ensure environmental values such as old growth and biodiversity are being managed effectively and in compliance with CCLUP provisions.

The FLNR-led Forest and Range Evaluation Program (FREP) evaluates the effectiveness of forest and range practices in achieving management objectives. Multiple resource value assessments (MRVAs) document the results of stand and landscape-level monitoring carried out under FREP before and after the inception of FRPA. Two MRVAs are available for the Williams Lake TSA: one for the former Central Cariboo Forest District, and one for the former Chilcotin Forest District. Both MRVAs address stand-level biodiversity with FREP monitoring plots in former Central Cariboo district showing an improvement to the biodiversity in harvested blocks, and monitoring in the Chilcotin showing a slight increase in stand level retention since the inception of FRPA.

FREP and MRVAs provide useful information regarding the effectiveness of FRPA and associated legal provisions such as higher level plans, land use orders, and orders under the Government Actions Regulation for a variety of resource values. However, it would be useful to evaluate CCLUP implementation as noted in the public comment. Some steps are being undertaken in that regard as part of the ministry's mid-term timber supply assessments that support FLNR's *Mid-Term Timber Supply Action Plan*. For example, district staff note that the land use orders related to old growth management areas (OGMAs), visual quality objectives (VQOs) in scenic areas, and mule deer winter range are currently under review - initially regarding completeness of implementation, and then later regarding effectiveness.

I recognize that the review may result in changes or amendments to the land use order regarding these values. If changes do occur, they can be factored in future AAC determinations. Meanwhile, consistent with my *'Guiding Principles'*, I will not speculate on potential changes to

the land use order. In discussions with district staff, I am confident that current practices are consistent with the existing land use orders.

- landscape-level biodiversity

Landscape-level biodiversity can be conserved by maintaining forests with a variety of patch sizes and seral stages across a variety of ecosystems and landscapes. Given other forest management provisions that provide for a diversity of forest stand conditions, old forest retention is often considered a key landscape-level biodiversity consideration.

For the Williams Lake TSA, there are spatial old growth management areas (OGMAs), and non-spatial mature plus old seral targets. The OGMAs were established under the 2010 land use order to ensure a portion of older forest was retained in each type of ecosystem (landscape unit, natural disturbance type or NDT, and biogeoclimatic ecosystem classification or BEC). Although there are three types of OGMAs (permanent static, permanent rotating, and transition), all are no harvest areas (with exemptions to address issues like compelling forest health emergencies). The permanent OGMA types were excluded from the THLB in the base case. The timber supply analysis modelled the direction of the land use order for transitional OGMAs where they are maintained (excluded from harvest) until 2030. The total area excluded from the THLB to account for OGMAs in the timber supply analysis was 295 713 hectares – about twice the area of Bowron Lake Provincial Park.

Non-spatial mature plus old seral targets are applied at the NDT-BEC subzone level consistent with biodiversity emphasis options assigned to landscape units. OGMAs, other reserves, and non-THLB forested areas contribute to meeting these targets. In the non-THLB all stands older than 350-years of age were assumed to be naturally disturbed and then regrow as natural stands. This was done to try to mimic natural disturbances. The model supporting the base case assumes the mature + old targets are the minimum that must be maintained.

In addition to contributing to conservation of biodiversity at the landscape level, mature and old growth forests are also an important component of accommodating First Nations interests in wildlife for food and ceremonial purposes. The maintenance of landscape-level biodiversity can support First Nations in sustaining their traditional ways of life.

In reviewing with staff how mature and old growth forests were modelled in the timber supply analysis to support landscape-level biodiversity, I am satisfied that it was consistent with the existing legal direction that applies to the Williams Lake TSA.

District staff advise that there are on-going efforts to reconcile OGMAs - given impacts such as the mountain pine beetle - with a new or amended land use order expected later in 2015. The overall net area of the new OGMAs would be similar as the existing ones, so impacts to timber supply are expected to be very minor. Any changes to OGMAs can be addressed when these have been legally implemented during the next AAC determination.

- stand-level biodiversity

Stand-level biodiversity can be conserved through stand-level retention as it maintains or restores in managed stands important structural attributes such as wildlife trees, coarse woody debris, tree species diversity, and understory vegetation diversity. Stand-level retention is provided through wildlife tree patches (WTPs), and dispersed wildlife tree retention.

Stand-level retention targets are provided in the 2010 land use order with targets ranging from 0 to 12 percent depending on the BEC site series grouping. The legal requirements in the land use order were approximated in the timber supply analysis, and resulted in a total area of

143 489 hectares being excluded from the THLB. Due to overlaps with other factors, and since riparian reserves can contribute up to 50 percent of the wildlife tree retention target, the net area deducted from the THLB was 46 450 hectares.

In 2005, the chief forester provided *Guidance on Landscape- and Stand-level Structural Retention in Large-Scale Mountain Pine Beetle Salvage Operations* where increased levels of stand-level retention are recommended in large MPB salvage cutblocks. The area of retention in MPB salvage cutblocks in the Williams Lake TSA has increased to account for the chief forester's guidance. Since this increased retention was not intended to be reserved for the entire rotation, the timber supply analysis did not apply a land base reduction or forest cover constraint to account for it.

The retention of wildlife trees contributes to conservation of biodiversity at the stand level, and is also an important component of accommodating First Nations interests in wildlife for food and ceremonial purposes.

Following discussions regarding this factor with staff, I am satisfied that the legal requirements in the land use order for wildlife tree retention were appropriately accounted for in the base case.

- cutblock size and adjacency

For the Williams Lake TSA under FRPA, a 'default' provision is that the maximum aggregate block size is 60 hectares, and adjacent blocks must have a minimum of 75 percent of the net area greater than three metres in height. The requirements do not apply where an agreement holder is salvage harvesting to recover damaged timber or where the opening is designed to be "consistent with the structural characteristics and the temporal and spatial distribution of an opening that would result from a natural disturbance and resemble an opening that would result from a natural disturbance".

Due to the emphasis on pine salvage in the short term, the base case did not apply cutblock size, adjacency/green-up constraints in the short- to long-term. Non-pine/non-salvage harvest in the mid- and long-term however would operationally be subject to adjacency and green-up constraints under FRPA. District staff note that there are many opportunities to obtain exemptions to the constraints; as a consequence it was decided not to model the requirements in the base case.

In partial response to the Williams Lake TSA Timber Supply Review (TSR), the Northern Shuswap Tribal Council commissioned a *TSR Assumption Testing on Williams Lake TSA* prepared by Ecora Resource Group Ltd in 2014. The author of the report discussed key findings with me and other ministry staff. One of the findings is that if FRPA cutblock size and adjacency provisions are applied there would be a reduction, as you would expect, in mid-term harvest levels relative to the base case. I appreciate the information that this report provides and thank the Northern Shuswap Tribal Council for having the work undertaken.

In review of this factor with ministry staff, I reasoned as follows: the AAC that I determine depends on short-term timber supply. In the short term, the focus is on harvesting pine-leading stands affected by the mountain pine beetle (MPB) in order to salvage potential losses before the dead pine decays to the point that it no longer is economically viable. Current practices provide for large harvested cutblocks along with large areas of retention. The timber supply analysis therefore correctly did not apply adjacency and cutblock size constraints.

However in the mid- to long-term, when the harvest is no longer focused on the salvage of pine-leading stands, the base case does not reflect adjacency and green-up requirements that are expected to apply when harvesting returns to stands that have not been impacted by the MPB.

I therefore recognize this factor as an unquantified overestimation of timber supply in the mid-term in my “**Reasons for Decision**”. Under “**Implementation**”, I encourage staff to determine appropriate constraints for this factor in the mid-term so that they can be considered in the next timber supply analysis.

- *scenic areas and visual quality objectives*

Scenic areas were established under the *Forest Practices Code* in the former Central Cariboo District and were grandparented under FRPA. Visual quality objectives (VQOs) within scenic areas were established as part of the 2010 land use order.

The provincial *Procedures for Factoring Visual Resources into Timber Supply Analysis* was used for the Williams Lake TSA timber supply analysis. The Forest Planning and Practices Regulation provides qualitative descriptions of VQOs while the procedures provide quantitative guidance to help model the requirements for timber supply review. In the procedures, a range of allowable disturbance is identified (percent area) with the mid-point values used in the analysis. The procedures also address visually effective green-up (VEG) height (ranging from 5.5 to 7 metres) for adjacent areas that was applied in the analysis.

District staff believe that the provincial procedures, in particular the VEG heights, overly constrain timber supply in the base case relative to actual practices in scenic areas in the Williams Lake TSA. A sensitivity analysis was carried out that examined the impact of reducing green-up height to three metres within scenic areas; this enabled a 70 500 cubic metre per year increase (about five percent) in mid-term timber supply.

Based on the advice of district staff regarding current practices and the findings of the sensitivity analysis, I recognize in my “**Reasons for Decision**” an up to five percent underestimation of mid-term timber supply based on this factor. Given the uncertainty in this factor and importance to mid-term timber supply, under “**Implementation**”, I encourage staff to provide information so that the most appropriate VEG heights can be modelled in support of the next determination.

- *community watersheds*

Four community watersheds have been designated in the Williams Lake TSA: Harold (Dog Creek), Nemaiah, Rim Rock (Alexis Creek), and Weetman (Williams Lake). The total area associated with these community watersheds is nearly 26 000 hectares – less than one percent of the Crown forest land base in the TSA.

The largest community watershed – the Nemaiah – occurs within the claim area originally brought to court in 1990 (“Tsilhqot’in case”) by the Xeni Gwet’in and Tsilhqot’in First Nations. In June 2014, the Supreme Court of Canada (SCC) ruled that the Tsilhqot’in Nation holds Aboriginal title over this area. The SCC also concluded that the Tsilhqot’in had demonstrated, with respect to certain areas outside of the area originally claimed in the court proceedings, that Tsilhqot’in historical occupation of those lands would meet the test for Aboriginal title. Based on the SCC ruling, I have determined that neither the proven Aboriginal title area nor the area for which Aboriginal title would have also been declared if it had been included in the claim area as put before the courts should contribute to timber supply for the purposes of my AAC determination for this TSA.

No additional constraints on timber supply were used in the base case to account for community watersheds. The 1996 *Community Watershed Guidebook* developed under the *Forest Practices Code* recommends that in the absence of a completed watershed assessment, harvesting activity should be limited to five percent of the productive forest area over a five-year period.

Although the base case did not remove the Nemaiah community watershed or apply the *Guidebook* recommendations to the other community watersheds, the timber supply impact is expected to be negligible given the relatively small area of community watersheds in the TSA. For this reason, I will not identify this factor in my “**Reasons for Decision**” as a consequential downward pressure on timber supply.

- riparian and lakeshore management areas

Riparian reserve zones and riparian management zones for streams, lakes and wetlands in the Cariboo Region were estimated using GIS tools. Each stream, lake and wetland was spatially identified, classified, and buffered consistent with the requirements under the Forest Planning and Practices Regulation. A total area of 208 190 hectares was deducted from the THLB for riparian reserve zones. Various basal area retention percentages were applied to riparian management zones depending on stream classification, and for wetlands and lakes.

In addition to the provisions for riparian management under the FRPA Planning and Practices Regulation, the 2010 land use order provided additional requirements for lakeshore management. For example, a 10-metre reserve is required for L1 and L3 lakes; and visual and retention objectives are provided for classified lakeshores ranging from a VQO of preservation with no harvest for Class A lakeshores, to a VQO of modification with 50 percent removal every 20 years for Class E lakeshores. The no-harvest area for Class A lakeshores was excluded from the THLB as part of the above-mentioned deductions for riparian reserve zones. The visual and retention objectives were modelled in the timber supply analysis for various lakeshore management classes.

Other requirements in the land use order for lakeshore management, in particular the 10-metre reserve for L1 and L3 lakes, were not modelled in the analysis; however the total area of these reserves is estimated to be about 650 hectares – a very small area relative to the TSA’s Crown forest land base. I account for this very minor (less than 0.1 percent) overestimation of short- to long-term timber supply in my “**Reasons for Decision**”.

- mule deer winter range

A legal order under FRPA’s Government Actions Regulation has established ungulate winter ranges in the Williams Lake TSA for mule deer; the order recognizes both ‘Shallow/Moderate’ and ‘Transition/Deep’ snowpack zones. The total area of the mule deer winter range in the TSA is 473 743 hectares – nearly 15 percent of the TSA’s Crown forest land base. The modelling assumptions in the timber supply analysis, as described below, were designed to approximate requirements in the order.

For the Shallow/Moderate snowpack zone, stand-level objectives are achieved through uneven-aged selection harvesting using basal area control and a minimum 30-year cutting cycle. Each winter range has a specified mix of low, moderate, and high habitat class for stands with greater than 40 percent Douglas-fir based on their value to over-wintering mule deer, and then an associated expected percent timber flow; for example 100 percent timber flow availability in the low habitat class (meaning no impact on timber supply), to 60 percent timber flow in the high habitat class.

For the Transition/Deep snowpack zone, stand-level objectives can be achieved by a group selection harvesting system, and a minimum cutting cycle of 40 years with an expected rotation of 120 years. High, moderate and low habitat classes are specified for greater than 40 percent Douglas-fir stands with expected timber flows ranging from 100 percent in the low habitat class, to 60 percent timber flow in the high habitat class.

Based on these assumptions, the timber supply analysis projects that mule deer winter ranges will provide about 22 percent of the harvest about 25 years from now. Given current harvest constraints and conditions in mule deer winter range, district staff do not believe these volumes are attainable. For example, there are minimum basal area operating thresholds for the winter ranges and current conditions are often below those minimums; any harvesting in the winter ranges needs to demonstrate value to mule deer; there are few incentives to licensees to apply non-clearcut approaches that are required in the winter ranges; and there are added administrative and planning costs to support any intended harvest activity.

A concern about avoidance of the winter ranges is that impacts from forest health factors such as bark beetles further reduce the stands' basal area, and (without forest health treatments) can further worsen the forest health of the winter range.

Although consistent objectives are provided for mule deer winter range for the Cariboo Region in the GAR order, there was a public comment that the modelling approach for the Williams Lake TSA should have been similar to the one applied for the 100 Mile House timber supply review. I agree that a common region-wide modelling approach should be developed for each of the TSAs in the Cariboo Region for mule deer winter range, and for objectives for other values that apply to entire Cariboo Region, as this should make the assumptions used clearer as well as consistent.

A challenge with respect to accounting for mule deer winter range in a strategic timber supply analysis is that the forest inventory normally does not have the basal area information to address basal area targets set for the winter ranges.

Based on current harvest constraints, I concur with district staff that the high harvest contribution expected in the mid-term in the base case is likely not attainable based on current practices. I therefore recognize this factor as an unquantified downward pressure on mid-term timber supply in my "**Reasons for Decision**".

Because of the importance of this factor to mid-term timber supply in the Williams Lake TSA, under "**Implementation**", I identify the harvest constraint issues identified by district staff, and encourage them to address as many of these, and other issues associated with the winter ranges, before the next determination so that this factor can be better considered. I also recognize the need for a standard Cariboo region-wide approach to modelling winter range requirements.

- caribou habitat

There are two ecotypes of woodland caribou in the Williams Lake TSA. The northern caribou ecotype occurs in the West Chilcotin portion of the TSA particularly in the Itcha-Ilgachuz area. The mountain caribou ecotype occurs in the Cariboo Mountains and Quesnel Highlands portion of the TSA. A significant portion of caribou habitat occurs in parks and protected areas, areas outside of the THLB such as high elevation subalpine forests and alpine, and in areas that been designated as no-harvest areas through wildlife habitat area (WHA) orders under the Government Actions Regulation. None of these areas contribute to timber supply in the base case.

The no harvest and modified harvest modelling assumptions used in the base case for the northern and mountain caribou in the TSA are based on: (i) 2000 CCLUP Mountain Caribou Strategy; (ii) 2002 CCLUP Northern Caribou Strategy; and (iii) various wildlife habitat area (WHA) designations and their associated general wildlife measures.

Most of the 'modified harvest' portion of the WHAs for mountain caribou occur in the Quesnel TSA (about 23 500 hectares) with a much smaller portion occurring in the Williams Lake TSA (about 2450 hectares). The harvest guidelines modelled in the base case (in

accordance with the general wildlife measures) provide for 33 percent volume exclusion per entry, 80 years between entries, and a planned rotation of 240 years.

The ‘modified harvest’ portion of the WHAs for northern caribou account for both terrestrial lichen and arboreal lichen sites and were modelled in accordance with the general wildlife measures. For terrestrial lichen sites, the analysis provided for 50 percent volume exclusion per entry, 70-years between entries, and 140-year rotation age. For arboreal lichen sites, the base case assumed 33 percent volume exclusion per entry, 80 years between entries, and a planned rotation of 240 years.

There was a comment from the public that the caribou modified harvest area WHA 5-087 was not included in the modelling assumptions supporting the base case. District staff confirmed that this was an inadvertent error, and that the direction in the WHA order should have been included in the analysis. A subsequent analysis by staff indicates that the WHA had provided 55 000 cubic metres per year to the base case harvest flow for the first 10 years - about 4.5 percent of the short-term harvest flow in the base case. Applying the general wildlife measures for the WHA would constrain that harvest flow. I therefore recognize in my “**Reasons for Decision**”, that the base case overestimated timber supply in the short term by up to 4.5 percent.

- wildlife habitat areas

In addition to several wildlife habitat areas (WHAs) for caribou (see above), there are also WHAs for prairie falcon and American white pelican. The impact to timber supply from the WHAs for prairie falcon and American white pelican are expected to be low due to their small areas and limited forest inclusion, and to be mitigated through thoughtful location of wildlife tree retention and other existing land use constraints such as OGMAs, riparian protection, lakeshore management zones and Goal 2 protected areas. As a consequence, no additional constraints were applied for these WHAs in the timber supply analysis.

In the analysis, it was assumed that a grizzly bear WHA was established, and a 650-hectare net area was excluded from the THLB. Follow-up after the determination meeting revealed that there are two proposed WHAs for grizzly bears - one near Chilko Lake, and another near Taseko Lake - but none have yet been legally established. The area inadvertently excluded from the THLB in the analysis represents a negligible impact on the base case given its relatively small size. Given the small effect, I have not identified this factor in my “**Reasons for Decision**” as a consequential upward pressure on timber supply.

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

- harvest performance

Data from the Ministry’s Harvest Billing System (HBS) show that the average volume harvested during the 10-year period from 2003 to 2012 from the Williams Lake TSA was 3.31 million cubic metres per year. This influenced the decision to set the initial base case harvest levels at 3.4 million cubic metres per year.

Review of HBS data indicates that more recent harvest levels have been lower, likely due to poor markets and mill closures. During the seven-year period from 2007 to 2013, the average volume harvested was 2.88 million cubic metres per year (about 50 percent of the AAC) with 70 percent of the volume being pine.

The average volume of non-pine harvested - about 880 000 cubic metres per year – has remained relatively steady, while the pine volume harvested has decreased. Even though the focus has been on salvaging MPB-killed pine-leading stands, most stands have a component of live pine and non-pine volume that is also harvested. As well, some live volume is needed to support the veneer and plywood mills that contribute to the local employment in the TSA, and sawlog companies are cutting a component of non-pine for market reasons.

In the base case, 94 percent of the harvest during the first five years is comprised of pine, with only about 190 000 cubic metres per year from non-pine. Harvesting pine at this rate for the first five years is not likely achievable given current practices in the TSA.

Staff advise that the impact of increasing the non-pine component of harvest during the first five years to 900 000 cubic metres per year would result in about a 65 000 cubic metre per year decrease in mid-term harvest levels – about 4.5 percent less than assumed in the base case. Since this reflects current practice, I recognize this downward pressure on mid-term timber supply in my “**Reasons for Decision**”.

There was public comment that whitebark pine should not be harvested in the TSA given its special role in the ecosystem. District staff advise that licensees are currently not harvesting whitebark pine. HBS data confirms that this species is not being harvested. Although whitebark pine-leading stands were not excluded from the THLB in the analysis, the total area in the THLB is 816 hectares representing 0.04 percent of the THLB. Therefore not harvesting these stands would have a negligible impact on the base case.

- partition

In determining an AAC, the chief forester may specify a portion of the AAC that is attributable to certain timber types, species, etc. - often referred to as an AAC partition. Under the *Forest Act*, the minister has the authority to issue partition orders to ensure that the recommended AAC partition harvest levels are adhered to.

The current AAC includes the following partitions:

- 450 000 cubic metres attributable to three western supply block in the TSA, and
- 107 000 cubic metres attributable to the harvesting of problem forest types under Pulpwood Agreement 16.

The focus of the current AAC and in the short term under the base case is harvesting MPB-killed pine-leading stands. To accomplish this, the harvesting has been and will continue to be focused west of the Fraser River including the western supply blocks. Given this focus, I no longer see the need for an AAC partition for the western supply blocks.

The focus of the problem forest type partition was on pulpwood-quality stands with little sawlog value that could support the pulpwood agreement holder. This agreement expires in April 2015, and currently there has been no harvesting in the TSA under the agreement. Based on this information, there is little value in maintaining this AAC partition.

As noted in *'harvest performance'*, some live – pine and non-pine - component of the harvest is needed to support existing mills and local employment. There is also the need to ensure the harvest in the short-term continues to be directed at MPB-killed pine-leading stands. I therefore address, in my determination, the need for a partition for live volume and for the remainder of the harvest to be used for salvaging dead trees. The partition is intended to help protect mid-term harvest levels that are dependent on live trees. The level of the partition in my determination is provided mindful of current practices and the need for some live volume to help maintain the viability of some existing mills and associated forest sector employment.

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

Alternative rates of harvesting

- alternative harvest forecasts

An alternative harvest forecast was presented in the *Public Discussion Paper* and presented to me at the determination meeting. This alternative harvest forecast maintained the initial harvest level in the base case of 3 400 000 cubic metres per year for five years (*vs.* 10 years in the base case) and then lowers the harvest level to 2 200 000 cubic metres until year 10. This lower harvest from years six to ten enabled the mid-term timber supply to be increased to 1 505 000 cubic metres per year – which is 84 500 cubic metres per year (six percent) higher than in the base case. Compared to the base case, the total reduction in harvest in the short term is six million cubic metres, whereas the total increase in the mid-term (2022 to 2072) is about 4.2 million cubic metres. I have considered this alternative harvest forecast in my determination and I am aware that any live volume not harvested in the short term contributes to mid-term timber supply.

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 (attached as Appendix 4). 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. The minister, in his 2010 letter, provided the Crown's objectives with respect to mid-term timber supply in areas affected by the mountain pine beetle.

With respect to this, the objective of the alternative harvest forecast described above was to examine if a more stable timber supply for the Williams Lake TSA can be provided in the mid-term by lowering short-term harvest levels during year six to ten. This forecast provides a six percent increase mid-term harvest levels relative to the base case that I have considered along with other factors in my determination.

I have accounted for the mountain pine beetle impacts in the Williams Lake TSA in my determination (see below) and impacts on mid-term timber supply have been tested through a number of sensitivity analyses.

Finally, the minister suggested that the chief forester should consider the local social and economic objectives expressed by the public and 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 Cariboo–Chilcotin Land Use Plan (CCLUP), Sustainable Resource Management Plans (SRMPs), and legal orders under the Land Use Objectives Regulation or the Government Actions Regulation. I have also reviewed the public and First Nations consultation process undertaken by the district and considered the input received in making my determination. I have accounted for this input in the various applicable factors described in this document, and as noted below. On this basis, I am satisfied that this determination accords with the objectives of government as expressed by the minister.

- employment and community dependence

According to BC Stats' *2006 Economic Dependency Tables for Forest Districts*, the forest sector accounts for 27 percent of the (after-tax) basic income in the Williams Lake area. Other sectors providing employment in the Williams Lake area include the public sector (22 percent), construction (7 percent), mining (5 percent), tourism (4 percent), and agriculture (2 percent). The report indicates that the local forestry sector (logging and manufacturing) employed about 4,700 people directly or indirectly.

The Williams Lake area has a large processing sector with three major lumber mills, one veneer/plywood plant, a smaller lumber mill, two log home manufacturers, a remanufacturing plant, and a pellet mill. There are other small processing plants in some outlying areas, but their operations are intermittent. In 2012, sawmills and other solid wood mills processed approximately 3.4 million cubic metres of logs, which includes volume harvested from within and outside the Williams Lake TSA.

There is a large wood waste-fuelled electric generating plant in Williams Lake. Each year it consumes over 600-000 tons of wood waste from local sawmills to generate about 66 megawatts of electricity for sale primarily to BC Hydro.

Since the last AAC determination, one major sawmill in Williams Lake was closed indefinitely, primarily due to poor market conditions.

I have reviewed this information regarding employment and community dependence related to the Williams Lake TSA. I am aware of the linkages between AAC and employment, both locally and provincially, and have taken this into account in this determination.

- *public input*

The Cariboo Chilcotin Natural Resource District sought public input on the January 2014 *Williams Lake TSA Timber Supply Analysis Public Discussion Paper*. A number of comments were provided by First Nations, forest licensees, other organizations, and individuals. At the determination meeting I reviewed specific comments for each factor I must consider in my determination.

Some of the public feedback noted confusion between the Timber Supply Review (TSR) process and other initiatives such as the mid-term timber supply mitigation activities and the Type 4 Silviculture Strategies. TSRs undertaken in support of AAC determinations are based on current resource management objectives and practices.

Because of the impact of the MPB on timber supply and the economy of BC's central interior, the Special Committee on Timber Supply of MLAs was appointed by the Legislative Assembly on May 2012. After numerous public hearings and review of written submissions, the MLA Committee released its report in August 2012 entitled *Growing Fibre, Growing Value*. The ministry responded to each of the recommendations provided by the MLA Committee in October 2012 in a report entitled *Beyond the Beetle: A Mid-Term Timber Supply Action Plan*. The ministry is still working on many aspects of the Action Plan in areas such as the Williams Lake TSA. For example, in April 2013, a report titled, *Mid-Term Timber Supply in the Cariboo: Preliminary Assessment of Three Land Use Values* was prepared. That report estimated a higher mid-term timber supply than the *TSR Public Discussion Paper* as the preliminary assessment was based on different assumptions than the base case (e.g. 20-year shelf life, minimum harvest volume of 65 cubic metres per hectare for pine).

One of the ministry commitments in the Action Plan was to complete Type 4 silviculture strategies (comprehensive TSA plans which identify key silviculture objectives, tree species selection, harvesting and retention priorities and climate change) for several TSAs including the Williams Lake TSA. The silviculture strategies look at how management practices could change to improve mid-term timber supply and help set objectives for silviculture investments.

In short TSR looks at 'what is' occurring with respect to management practices, while the activities associated with the Mid-Term Timber Supply Action Plan such as Type 4 silviculture strategies look at 'what could be' if management objectives and practices were to change. If management objectives and practices do change, then these can be reflected in future TSRs.

The more general comments received from the public regarding the TSR process for the Williams Lake TSA can be grouped into four themes: concern about impacts on environmental values; need to consider climate change; uncertainty regarding shelf life of MPB-killed pine; and the level of the AAC. I address First Nations input under '*First Nations consultation*' below.

Several comments expressed concern about the impacts of harvesting on environmental values. The ministry, and I as chief forester, very much recognize that forests are more than trees to be harvested. Forests have many other values, and these values are important factors that I must consider when making an AAC determination. The timber supply review process is conducted to help determine an AAC for a management unit like the Williams Lake TSA in a manner that accounts for other values in the forest. There are legal provisions under the *Forest and Range Practices Act*, in the Cariboo-Chilcotin Land Use Plan which is declared a higher level plan, and in legal orders under the Land Use Objectives Regulation and Government Actions Regulation that are collectively intended to help protect and sustain non-timber values. I have addressed several of these legal provisions under the various factors in this document, and am satisfied that environmental values were appropriately accounted for in this determination.

I also received comments related to climate change and the ensuing uncertainty about how this might affect future forests and timber supply. I have described my approach to considering climate change in guiding principles, which indicate that the impact of climate change and management responses to it is uncertain. In practice this means that although we acknowledge that climate is changing, we cannot account for the changes in any single AAC determination; however, the periodic nature of AAC determinations ensures that as information and forest management practices evolve, the timber supply implications are regularly reassessed.

Although I agree there is some uncertainty due to climate change, the ministry is actively undertaking several projects to enable future forests to adapt to climate change. These projects are outlined in the *BC Forest Stewardship Action Plan for Climate Change Adaptation* and should generate new information for consideration in future AAC determinations.

I address uncertainty regarding the shelf life of beetle-killed pine, an important consideration regarding short-term timber supply, later in this document when I address the '*mountain pine beetle epidemic – shelf life*'.

There was some public feedback that the initial harvest level shown in the base case is too high. In my "**Reasons for Decision**", I provide my reasoning for what I believe an appropriate AAC should be for the Williams Lake TSA.

- First Nations considerations

I will begin this section by emphasizing that the proven Aboriginal title area as declared by the SCC will not contribute to my AAC determination for the Williams Lake TSA. On June 26, 2014, the Supreme Court of Canada (SCC) released its decision on *Tsilhqot'in Nation v. British Columbia* (Tsilhqot'in decision). In that decision the SCC outlined areas over which the Tsilhqot'in Nation had proven Aboriginal title. Proven Aboriginal title lands are not considered Crown land. As such, those lands have been excluded from the AAC determination, as have the areas that the courts determined were outside of the actual claim area but met the criteria for proof of aboriginal title. I will discuss the implications of the Tsilhqot'in decision further at other points in this section.

The Crown has a duty to consult with, and accommodate if necessary, 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 chief forester, I must therefore consider information arising from the consultation process with First Nations respecting aboriginal interests or 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.

Ten First Nations communities occur within the area bounded by the Williams Lake TSA: Tl'etinqox (Anaham Band), Tsi Del Del (Alexis Creek Band), Yunesit'in (Stone Band), Xenigwet'in (Nemiah), Tl'esqox (Toosey Band), Esketemc (Alkali Lake Band), Xat'sull (Soda Creek Band), T'exelc (Williams Lake Band), Ulkatcho First Nation, and Stswecem'c/Xgat'tem First Nation (Canoe/Dog Creek Band).

All of these bands, except Stswecem'c/Xgat'tem First Nation, have been offered replaceable forest tenure in the Williams Lake TSA. The Stswecem'c/Xgat'tem First Nation have been offered forest tenure in the 100 Mile House TSA.

Other First Nations with aboriginal interests and asserted territories in the Williams Lake TSA include: ?Esdilagh (Alexandria Band), Bridge River Band, Tsq'escen' (Canim Lake Band), Da'naxda'xw/Awaetlala, High Bar, Homalco, Lhoosk'uz Dene (Kluskus First Nation), Lheidli T'enneh, Lil'wat, Nanwakolas, Nazko, Nuxalk, Lhtako Dene (Red Bluff Band), Simpcw (North Thompson), Skin Tyee, St'át'imc Chiefs Council (Lillooet), T'it'q'et, and Ts'kw'aylaxw (Pavilion).

The Tsilhqot'in National Government (TNG) represents the Tsilhqot'in communities of Tl'etingox (Anaham), Tsi Del Del (Alexis Creek), ?Esdilagh (Alexandria), Xení Gwet'in (Nemiah), Tl'esqox (Toosey Band), and the Yunesit'in Government (Stone Band).

The Northern Shuswap Tribal Council represents the Tsq'escen' (Canim Lake), Stswecem'c/Xgat'tem (Canoe & Dog Creek), Xat'süll (Soda & Deep Creek), and T'exelc (Williams Lake a.k.a. Sugar Cane) communities. The Northern Shuswap Tribal Council are the Northern Secwepemc te Qelmuw (NStQ), meaning the Shuswap people of the north.

As noted under '*cultural heritage resources*' earlier, First Nations in the Williams Lake TSA area were historically reliant on a more transient lifestyle required to access food resources throughout the seasons across a large geographic area. Although winter habitation was generally in the same location for each band, early spring initiated a time of travel for hunting, fishing and gathering various plants, roots, wood products, and berries that lasted until late fall.

Through various forms of consultation with district staff over the years, First Nations have informed district staff of their interests regarding ethno-botanical forest resources and areas of cultural, medicinal and spiritual importance, as well as fisheries and wildlife resources. Special concerns have been identified regarding hydrology in key watersheds, moose and other ungulate populations and their ability to sustain traditional uses and aboriginal interests, and the protection of archaeological sites (both known and potential) in the Cariboo Chilcotin Natural Resource District.

Timber harvesting done pursuant to the AAC determination could potentially and indirectly impact the aboriginal interests that First Nations have in the area. Based on the timber supply analysis, as described in the *Public Discussion Paper*, harvesting is projected to be concentrated over the first 10 years on MPB-killed pine-dominated stands west of the Fraser River. A large number of hectares could be harvested in areas predominantly within the traditional territory of the TNG. This harvesting footprint could potentially have an impact on hunting, fishing and gathering west of the Fraser River. With this in mind, the TNG have asked that I consider a partition limiting the amount of live volume harvested in my AAC decision. Mitigating timber harvesting impacts would require adequate consultation with affected parties and commitments to best practices by the ministry and forest licensees. I am aware that an example of such commitments already exists formally through the South Chilcotin Stewardship Plan. In this plan forest licensees and BCTS have agreed to measures to mitigate the effects of timber harvesting and road development on moose and other wildlife in the South Chilcotin Planning Area.

Information sharing packages were sent on July 20, 2012 to all First Nations with asserted territories in the Williams Lake TSA. The information included the steps in the timber supply review (TSR) consultation process, and a copy of the general overview of the TSR process.

An initial consultation letter was sent by mail on April 11, 2013 to all First Nations with asserted territories in the TSA; the letter provided them with an opportunity to comment on the Williams Lake TSA TSR Data Package.

A consultation letter was sent to each First Nation on January 23, 2014 asking for comments on the *Public Discussion Paper* within a 60-day time frame. This letter was followed-up with another letter sent on February 28, 2014 reminding the First Nations of the desired response time, and communicating that an AAC decision would be made after March 24, 2014. The NStQ and TNG requested an extension to the consultation period up until the determination meeting with the chief forester, which was held on April 15-16, 2014.

I met with the TNG on April 14, 2014 to discuss the comments they provided me in a letter dated April 1, 2014 about the timber supply review for the TSA. I also had a follow-up meeting with the TNG on June 13, 2014 where they reiterated that a harvest focused on pine salvage would concentrate operations in their territories for a short while followed by a long period of minimal economic activity as the harvest migrates to live trees in the mid-term. Staff also met with TNG representatives on December 10, 2014 where they asked that I consider a partition limiting the amount of live volume harvested.

A meeting with NStQ was also scheduled for April 14, 2014 so that I could hear their comments. Representatives from NStQ were not able to attend the meeting; instead, the consultant (Ecora Resource Group Ltd.) that NStQ hired was able to attend and took the opportunity to discuss with me and other ministry staff the March 2014 *TSR Assumption Testing on Williams Lake TSA* analysis and report Ecora prepared for the NStQ.

At the determination meeting, I was provided with all comments and related information made available by First Nations, and examined them as they relate to the various factors I must consider when making an AAC determination and as they relate to First Nations interests. Following the determination meeting, the First Nations comments were consolidated by district staff into a First Nations consultation summary document.

Much of the feedback from First Nations can be grouped into five themes: (i) rate of cut; (ii) consultation/communication; (iii) constraints; (iv) modelling; and (v) habitat supply. Some of that feedback is summarized below.

(i) Rate of cut. In their review of the data package, TNG requested that the TSR report out on amount of harvesting projected to occur in the timber supply analysis over time both west and east of the Fraser River. In response, the ministry provided that information graphically in the *Public Discussion Paper* in Appendix 2 where both the projected harvest volume and area by landscape unit for 2012-2021 and 2022-2031 are shown. No landscape units cross the Fraser River, so the information can be grouped into units east and west of Fraser River. Tabular summaries of the information were provided to TNG. The information in the summaries appears to have been used by the TNG in developing comments and questions received in written correspondence (April 1, 2014) and at the April 14, 2014 meeting.

The NStQ requested a spatial harvest distribution map based on the base case. The ministry cautioned that such a detailed map just reflects a set of assumptions made in the timber supply analysis, that the actual harvesting operations may differ significantly from what a strategic level model projects, and that in fact it is not possible to predict the exact timing and location of specific future harvest activities since they will be products of operator decisions made under uncertain future markets and other circumstances.

The Xení Gwet'in expressed concern that the TSA has been overcut, that a significant reduction in AAC is needed, that other non-timber land uses and activities be promoted to diversify the local economy. They also stated their strong opposition to the inclusion of their Caretaker Area in the THLB. In August 2014, I sent a letter to the TNG stating that I have reviewed the SCC decision in *Tsilhqot'in*, and as noted above, confirm that the proven Aboriginal title area as declared by the SCC will not contribute to my AAC determination for the Williams Lake TSA.

The remainder of the Caretaker Area that is outside of the proven Aboriginal title area has not been assigned a formal designation and management regime under provincial legislation that generally precludes timber harvesting in the area, and therefore for this AAC determination, I assume it still contributes to the THLB. On the THLB, land base exclusions and forest cover requirements that represent management for values other than timber, which in some cases is aimed in part at addressing proven aboriginal rights of the Tsilhqot'in, were modelled in the base case. These components of the forest management regime are discussed in several sections of this rationale.

A sensitivity analysis was performed in which zone "D" as defined in the Tsilhqot'in Strategic Engagement Agreement - which overlaps the Aboriginal Title area - was excluded from the THLB. That analysis showed no impact on the short-term supply projected in the base case. Therefore, while I will exclude the proven title area from the THLB that contributes to my determinations, that exclusion does not require an adjustment to the short-term timber supply for this determination.

(ii) Consultation/communication. TNG expressed a need for more spatial tools, such as a five-year harvest plan, so that community members can visualize and provide responses based on an understanding of how the AAC might be operationally implemented. They noted that the data package is mostly a description of inputs into timber supply analysis, but what matters most to them are the management outcomes that result from these inputs. Outcomes of particular interest to TNG are the conservation and sustainability of forest and stream habitats at regional, landscape and human scales.

The habitat supply assessment done for the TSA to support the TSR did not result in a spatially explicit assessment of habitat based on a specific spatial configuration of future harvest activities. As discussed above, it is not possible to accurately predict the timing and location of future harvests, which makes it impossible to predict the future spatial configuration of habitats across the TSA. Further, a change in the AAC for the entire management unit would not on its own account necessarily change the amount and quality of habitat for different wildlife species. The best way to increase confidence that a particular value in a particular location will be protected is to define and formalize a management regime for the value, for example, land base exclusions or forest cover requirements, and to incorporate the regime into forest operations. If that is done, then information on the regime can be incorporated into TSR processes and AAC determinations.

Nevertheless, District staff have informed me that individual licensees are providing maps showing their future harvesting plans over the next few years; in addition, staff are encouraging licensees to work together to provide a consolidated map to help improve consultations. However, at this time this is not a formal requirement and existing maps do not provide a comprehensive coverage of the district. Therefore, while useful as a basis for consultation, the harvest planning maps do not provide sufficiently consolidated information at this time to enable me to consider the implications in this AAC determination.

The NStQ expressed concerns that 10 years is too long a time period between TSRs. They also mentioned their interest to better understand factors important to them that can be evaluated in a timber supply analysis. This led to NStQ commissioning the March 2014 *TSR Assumption Testing on Williams Lake TSA* prepared by Ecora. The timber supply results of that analysis were significantly different from those of the FLNR base case, partially based on the use by Ecora of different integrated resource management constraints. I have compared the Ecora analysis and the FLNR base case, and conclude that given the formal management objectives in the CCLUP, the modelling of IRM objectives in the FLNR base case adequately represent formal management objectives, and that other concerns identified by NStQ can be addressed through the current work

on the South Chilcotin Stewardship Plan, and consultation with First Nations during operational planning in the District.

(iii) Constraints. TNG recommended that the timber supply analysis include an adjacency rule; and had several questions about how seral stage constraints (e.g. old growth management areas) were applied in the analysis to which district staff responded. Forest cover requirements to represent adjacency restriction were not included in the analysis base case because such constraints have been relaxed for salvage operations in beetle-killed timber. Adjacency requirements should apply to operations outside of the MPB-affect area and once salvage operations are completed in beetle-affected areas. Therefore, such requirements should be included in future TSRs, but given the focus on salvage in the short term, their exclusion from the base case for this TSR appropriately reflects operational requirements for the period of this determination.

NStQ noted that the Crown has a land use plan – the Cariboo-Chilcotin Land Use Plan (CCLUP) – and the NStQ have their own land use plan, that these plans have never been reconciled, and that the NStQ plan is not addressed in the TSR. Components of CCLUP that the provincial government has legally established via a higher level plan, a land use order, a Government Actions Regulation order, or designation as a park or protected area, are either fully excluded from the areas assumed to be available for timber harvesting or the areas are subject to forest cover constraints in the timber supply analysis. Those components of the CCLUP that have not been legally established cannot be confidently assumed to be current practice, and therefore are not accounted for in the AAC determination. As chief forester, I do not have the authority to make land use decisions, so in the absence of legal direction from the provincial government through legislation, regulation, or orders, I can only assume that an unencumbered area is available for timber harvesting. If the provincial government endorses the NStQ plan and changes the legal status of areas subject to the plan, either under Treaty, ministerial designation or land use order, etc., then I can account for those aspects of the plan.

(iv) Modelling. A number of modelling questions were raised by First Nations. In their input on the data package, Xeni Gwet'in requested that their Caretaker Area be delineated within the analysis so that information on it could be reported out. TNG had questions including the timber yield assumptions in selectively harvested mule deer winter range Douglas-fir stands, and the shelf life of MPB-killed pine volumes for sawlogs. NStQ had a number of technical questions, such as how stand-level retention was addressed in the analysis, to help support Ecora's analysis work – so that their efforts can closely replicate TSR. District staff responded to First Nations on the various modelling-related questions and have shared their responses with me.

(v) Habitat supply. First Nations have identified the importance of wildlife in the Williams Lake TSA and the need to consider impacts of harvest levels on First Nations proven rights and aboriginal interests with respect to wildlife. The availability of moose was of particular significance. To assist with this understanding, the ministry conducted a preliminary '*habitat supply analysis*' (see below) with projections for moose, grizzly bear, and pine marten.

In their comments on the data package, TNG supported the intent to undertake an analysis of habitat supply, but wanted to see and review the habitat supply model. District staff responded in July 2013 that decisions on which models to use were still being discussed at the time. The ministry met with TNG on October 4, 2013 to discuss the plans for the habitat supply analysis and the intended outputs. Appendix A of the January 2014 *Public Discussion Paper* provides a summary of the habitat supply analysis. TNG had follow-up questions that ministry staff responded to about the habitat supply analysis following release of the *Public Discussion Paper*.

I previously reviewed ‘cultural heritage resources’ and concluded that I was satisfied that this factor was appropriately addressed in the timber supply analysis. I have also reviewed factors related to wildlife (mule deer winter range, caribou habitat, wildlife habitat areas, landscape- and stand-level biodiversity, and the habitat supply analysis), and have accounted for these important factors in my determination. I recognize that the condition of wildlife habitat is very important to First Nations to help support their traditional use of wildlife.

Based on my review of the information sharing and consultation processes conducted by district staff, the available information regarding aboriginal interests and proven rights, and the potential impact my decision may have on these interests and rights, I am satisfied that the consultation process is consistent with the Province of British Columbia’s 2010 *Updated Procedures for Meeting Legal Obligations When Consulting First Nations*. Furthermore, I note that district 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 and proven aboriginal rights 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*, I have considered those aboriginal interests that were made known to me during consultation on this decision. 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.

- *habitat supply analysis*

The AAC determination reflects the level of timber supply available under current forest management, including legal land use and management decisions made by government for other resource values (e.g. caribou habitat, ungulate winter ranges, wildlife habitat areas). In this determination I do not make any decisions related to establishment of land use or management zones or practices that might affect the levels of other resources such as wildlife populations.

However, to help better understand the implications of the base case harvest forecast on wildlife, particularly to provide information to support First Nations consultation, the habitat implications of the base case compared to a ‘no harvest’ scenario were investigated for three wildlife species - pine marten, moose and grizzly bear – over a 100-year projection period. In consultation with the TNG and recognizing modelling and resource limitations, the above three species were selected.

The habitat supply analysis used existing Wildlife Habitat Suitability Rating models that are based on ecosystem information and resource rating values determined by species experts. The models for moose and marten habitat were based on needs for winter food, security, and thermal cover. The Grizzly bear habitat model was based on food and denning needs.

The results of the habitat supply analysis are reported in Appendix A of the January 2014 *Public Discussion Paper*. In general, the habitat supply under the base case and ‘no harvest’ scenarios are both seen to increase or remain relatively constant over the next 100 years.

Marten habitat supply is linked largely to contiguous tracts of mature and old forests. The increasing habitat supply (as shown in Appendix A of the *Public Discussion Paper*) for both the base case and ‘no harvest’ scenario reflects the overall aging of the forests over time; the higher habitat supply in the ‘no harvest’ scenario as compared to the base case reflects the difference in mature forest availability.

The wildlife habitat suitability rating for moose was a function of the amount of both immature forest for feeding and mature forest for cover. Moose habitat supply is less affected by the presence of mature forest but moose still require suitable forest cover adjacent to feeding areas. The analysis shows that modelled suitable habitat is generally maintained for the next few decades under base case harvest levels, but that there is slightly less suitable habitat in the long term than under a no harvest scenario.

Grizzly bear habitat is largely linked to the availability of early seral habitat in early spring for feeding. Grizzly bear habitat supply projections remain stable throughout the 100-year projection period under both the base case and 'no harvest' scenarios. Although habitat is important to grizzly bears, human activity and availability of 'roadless areas' are important to maintaining populations.

The existing models provide general temporal information for understanding changes in habitat supply associated with harvesting. It is important to note that the modelling approach used was aspatial in that the model sums up all areas of available habitat whether they are functional or not for wildlife. The following three factors would likely decrease the estimate of the amount of habitat that is usable (functional) relative to the total modelled amount: (i) forest patches that are small in size and distributed in a dispersed or fragmented manner, as this can significantly affect actual wildlife use; (ii) a high-density and heavily utilized road network; and (iii) natural disturbances including fire and damaging insects and diseases, as they may reduce the effectiveness of some of the modelled habitat.

In reviewing this factor with district staff, I appreciate and am encouraged by the habitat supply analysis work undertaken. The aspatial analysis indicates that habitat supply for the three species remains roughly stable over the 100-year projection period under the base case scenario, and also suggests no dramatic differences between the base case and 'no harvest' scenarios. However, as staff have noted, other important considerations, such as roads and cutblock design, affect how functional the habitat is for a particular species. During the Cumulative Effects Assessment and Management (CEAM) project, functional considerations led to reductions from the total habitat supply to arrive at what was believed to be a more realistic assessment of the habitat useable by wildlife. Nevertheless, while recognizing the influence of non-habitat elements like roads on wildlife, I am not aware of information to suggest that a significant decrease in the AAC beyond levels identified in the base case would be necessary to allow for the management of roads in a way that would limit impacts on wildlife. My expectation is that forest professionals will consider wildlife in all phases of road management, including the spatial and temporal arrangement of harvests that influence the need for roads.

Consistent with the general comments in the previous paragraph, I have been informed by FLNR wildlife experts that timber harvesting is only one of several pressures on moose, and that hunting mortality linked to relatively easy access is likely a predominant pressure. I have been made aware that research is ongoing to better determine causes of moose mortality, and that census work is being undertaken to ascertain better information on the moose population. Therefore, it appears that substantial planning and research efforts have been undertaken, and additional work is underway that can inform future management decisions. I am also aware that licensees, First Nations and the provincial government have been involved in developing the South Chilcotin Stewardship Plan. Among the many provisions of this plan is an agreement among forest licensees and BCTS to measures to mitigate the effects of timber harvesting and road development on moose and other wildlife in the plan area. To the extent that the outcomes of this research and planning result in formal modifications to land use or forest management practices, the changes will be reflected in future TSRs.

Ministry staff note that assessments of habitat supply are undertaken through the CEAM project and the Forest and Range Evaluation Program (FREP) – and that there might be opportunities to develop a common approach to wildlife and habitat assessment that could work for these initiatives as well as to support AAC determination. Under “**Implementation**”, I encourage staff to build on the habitat supply analysis work undertaken for this TSR and work to enhance the modelling approach in the future in order to improve our projections of the effects of the strategic timber supply decisions on habitat supply.

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 infestation – shelf life

The MPB epidemic has severely impacted timber supply in many interior management units in BC. For most units, we are in the wake of the infestation. The MPB attack peaked in 2005-2006 in the Williams Lake TSA and there has been little new attack since 2009.

The Williams Lake TSA has a large pine component that has been killed by the MPB. About 64 percent of the stands in the THLB are pine-leading, and about 49 percent of THLB volume is pine. By 2012, the MPB killed around 51 million cubic metres, or approximately 57 percent of the mature pine volume in the THLB.

I have already addressed under ‘*regeneration delay*’, the assumptions made in the analysis about the regeneration of MPB-impacted stands that are not salvage harvested.

In the Data Package, it was planned to use a shelf life of 20 years, i.e. MPB-killed pine would remain standing for 20 years after death and be useable for some purpose but not necessarily sawlogs. Since the majority of trees harvested in the TSA are used to produce lumber rather than other forest products, it was later decided that a sawlog shelf life estimate of 10 years should be used for the base case as this more accurately reflect actual practices. Sawlog shelf life is defined in the analysis as the length of time a tree is capable of producing sawlogs after attack by the MPB.

Since sawlog shelf life depends on mill technology, market prices and environmental conditions, it was decided to conduct a sensitivity analysis using a shelf life of 20 years. The results of the sensitivity analysis indicate that assuming a 20-year shelf life substantially increases mid-term by 531 800 cubic metres per year - 37 percent higher than the base case - to 1 952 300 cubic metres per year. Over a 20-year time frame, using the assumptions in the timber supply analysis, nearly all of the dead pine is salvaged.

There was a comment that the timber supply analysis assumed that all dead pine is potentially available for sawlog salvage within the assumed 10-year shelf life whereas you can expect some degradation over the 10-year time frame; and in response to the 20-year shelf life sensitivity analysis, that the shape and slope of all shelf life curves will ultimately be determined by economic conditions.

The NStQ commissioned *TSR Assumption Testing on Williams Lake TSA* report used a shelf life curve over a 15-year period, based on assumptions made in the Type 4 silviculture strategy project for the TSA. I reviewed the report findings with ministry staff.

I note the sensitivity analysis (#3 in the *Public Discussion Paper*) that reviewed the impact of assuming both a 20-year shelf life, and a 65 cubic metre per hectare minimum harvest volume for pine stands for 60 years. This sensitivity analysis found that the mid-term harvest level could be 2 193 900 cubic metres per year – 54 percent higher than that assumed in the base case. In reviewing these analyses with staff, I conclude in my “**Reasons for Decision**” there is potentially more volume in the mid-term than assumed in the base case considering these factors.

Since sensitivity analysis has noted that projected mid-term timber supply levels are particularly sensitive to changes in assumptions about the economic shelf life of MPB-killed pine trees, under “**Implementation**”, I encourage staff over the next five years to try to improve our knowledge regarding shelf life so that assumptions can be refined in support of the next determination. This will also have a significant impact on short-term timber supply assumed in the next determination.

- non-recoverable losses

Non-recoverable loss factors are used in the 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. Unsalvaged losses due to the MPB infestation are addressed separately in the previous factor.

The non-recoverable losses in the Williams Lake TSA for Douglas-fir beetle, spruce beetle, western spruce budworm and wind were estimated based on a five-year review of losses detected from the annual forest health overview surveys. Losses from fires are based on 15-year averages provided from wildfire mapping. Non-recoverable losses assumed in the base case total 149 553 cubic metres per year.

The timber supply analysis assumed that 80 percent of the losses from the Douglas-fir beetle could be salvaged. District staff believe that it is unlikely that this much volume can be salvaged particularly considering that 30 percent of the losses occur in the Chilcotin where very little Douglas-fir beetle salvage has occurred in recent years. If no salvage occurred in the Chilcotin, this would double unsalvaged losses from the Douglas-fir beetle, relative to what was assumed in the base case, and would mean that mid-term timber supply was overestimated by about 1.3 percent. I recognize this potential overestimation of mid-term timber supply in my “**Reasons for Decision**”.

- young pine stands – mortality

In the base case, the impacts of the MPB on young pine stands in the Central Cariboo portion of the TSA was based on a provincial review of the percentage of stands attacked and the average percent mortality.

FREP Stand Development Monitoring (SDM) data in the TSA indicate much lower impacts from the MPB for pine stands less than 40 years of age relative to that assumed in the base case. I therefore recognize in my “**Reasons for Decision**” that analysis assumptions about this factor may have underestimated timber supply in the mid-term, but the amount of underestimation cannot be quantified at this time.

Reasons for Decision

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

The base case harvest forecast presented in the *Williams Lake TSA Timber Supply Analysis Public Discussion Paper* (January 2014) showed that an initial harvest level of 3 400 000 cubic metres per year can be maintained for 10 years before decreasing to a mid-term level of 1 420 500 cubic metres per year. After year 60, the analysis shows the harvest level can then increase to a long-term harvest level of 2 994 000 cubic metres per year.

I am satisfied that the assumptions applied in the base case for the majority of the factors applicable to the Williams Lake TSA were appropriate, as detailed in Table 2 or elsewhere in this rationale. Following is my consideration of those factors for which I consider it necessary in this determination to further take into account implications to the timber supply projected in the harvest forecasts.

In determining an AAC for the Williams Lake TSA, I have identified factors that, considered separately, indicate that the timber supply may be either greater or less than projected in the base case. Some of these factors can be readily quantified and their impact on the harvest level assessed with reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision, but cannot be reliably quantified at this time.

Short-term timber supply

I have identified the following factors in my considerations as indicating that the timber supply projected in the reference forecast may have been overestimated in the short term:

- *Community forests*: the base case does not include community forests or woodlot licences within the perimeter of the TSA with one exception. After the analysis was completed, the Williams Lake Community Forest was awarded in March 2014. This new community forests represents about 18 542 hectares or one percent of the TSA's timber harvesting land base (THLB). I therefore recognize a one percent overestimation in short-term timber supply based on this new community forest; there is also an impact on mid- to long-term timber supply.
- *Caribou wildlife habitat area*: legal management constraints for a caribou wildlife habitat area (WHA 5-087) were inadvertently overlooked in the base case. In the base case, the WHA contributes 155 000 cubic metres per year to short-term timber supply. I therefore recognize this volume as an up to 4.4 percent overestimation in short-term timber supply; there is also an impact on mid- to long-term timber supply.
- *Riparian and lakeshore management areas*: the base case modelled the riparian reserves and riparian management zones consistent with the direction in the *Forest and Range Practices Act* and regulations. The base case, however, did not model additional riparian management requirements under a Land Use Order under the *Land Act*. The Land Use Order also required that there be a 10-metre reserve on Crown forest land on L3 and selected L1 lakes. These requirements represent about 650 hectares that should have been deducted from the THLB. I account for this very minor (less than 0.1 percent) overestimation in my determination.

I have identified the following factor in my considerations as indicating that the timber supply projected in the reference forecast may have been underestimated in the short term:

- *Dead potential volume estimates:* the timber supply analysis did not show the contribution of dead potential volumes. Prior to 2006, logs that were considered Grade 3 (endemic) and Grade 5 were not charged to the AAC. Since 2006, this dead potential volume has become cut-accountable. Accounting for the dead potential that is harvested will add to the timber supply as compared to the base case forecast. Data from the harvest billing system indicates that the dead potential volume represents about 8.3 percent of the cut-accountable volume in the Williams Lake TSA. I have therefore recognized this underestimation in short-term timber supply in my determination.

When I take into account the factors that represent an over- and underestimation of timber supply relative to the base case in the short term, I conclude that, given uncertainties in the data and the nature of my determination, that they in general offset each other.

I also note that while I have excluded the proven Tsilhqot'in First Nation Aboriginal title areas from the THLB that contributes to my determinations, that exclusion does not require an adjustment to the short-term timber supply for this determination.

Mid-term timber supply

In addition to the upward and downward pressures on short-term timber supply noted above, the following factors were considered to overestimate mid-term timber supply:

- *Roads:* the base case assumed temporary access structures would be rehabilitated and would eventually contribute to the THLB. Licensees indicated that temporary access structures in the TSA are not always being rehabilitated if the maximum allowable permanent access percentage is not exceeded. An assessment of soil management practices in the southern and central interior of BC showed that approximately one-third of the evaluated blocks contained unrehabilitated temporary access structures. If it is assumed that one-third of the existing temporary access structures in the Williams Lake TSA have not been rehabilitated, that could mean an additional 6329 kilometres of temporary roads should be removed from the THLB. Assuming a 10-metre right of way would mean an additional 6329 hectares of productive forest areas should be deducted from the THLB. This represents about a 0.3 percent overestimation of the timber supply in the mid- to long-term.
- *Forest inventory – recent wildfires:* although the inventory used in the base case was not updated to account for recent 2009 and 2010 large wildfires, the timber supply analysis did account for these fire-related losses by estimating post-fire attribute adjustments for various stand types. Since the time these estimates were made, there have been considerable losses due to the Douglas-fir beetle inside fire boundaries. Fires in 2009 and 2010 impacted 65 869 hectares of THLB, of which 19 103 hectares were in Douglas-fir leading stands. These Douglas-fir leading stands account for about one percent of THLB in the TSA, and the analysis assumed 70 percent of these stands survived the fire. The Douglas-fir beetle may have impacted up to 0.7 percent of the THLB that was assumed to be available in the mid-term.
- *Volume estimates for managed stands:* the timber supply analysis assumed that all stands established after 1965 following timber harvesting were managed stands with stand yields based on TIPSy modified by standard Operational Adjustment Factors (OAFs). Preliminary results from FREP's Stand Development Monitoring (SDM) plots that monitor the health and performance of post free-growing stands suggest that managed

pine stands may have less volume due to forest health issues relative to what was assumed in the base case. I recognize these preliminary indications as an unquantified downward pressure on timber supply in the mid-term.

- *Utilization standards:* the base case assumed a minimum diameter breast height (dbh) of 12.5 centimetres for non-pine whereas the utilization standard is 17.5 centimetres. Therefore the base case has slightly overestimated timber supply relative to the standards that are applied when charging harvested volumes towards the AAC.
- *IRM – adjacency and block size distribution:* in the short term, the focus is on harvesting pine-leading stands impacted by the mountain pine beetle (MPB) in order to salvage potential losses before the dead pine decays to the point that it no longer is economically viable to salvage. Current practices provide for large harvested cutblocks along with large areas of retention. The timber supply analysis therefore did not apply adjacency and cutblock size constraints. However in the mid- to long-term, when the harvest is no longer focused on the salvage of pine-leading stands, the base case does not reflect adjacency and green-up requirements that are expected to apply when harvesting returns to stands that have not been impacted by the MPB. I therefore recognize this as an unquantified overestimation of timber supply in the mid-term.
- *Mule deer winter range:* in the base case, about 22 percent of the harvest volumes in year 25 are from mule deer winter ranges. Given current harvest constraints and the condition of mule deer winter ranges, district staff do not believe these volumes are attainable. I therefore recognize this factor as an unquantified downward pressure on mid-term timber supply.
- *Unsalvaged losses:* the timber supply analysis assumed that 80 percent of the losses from the Douglas-fir beetle could be salvaged. District staff believe that it is unlikely that this much volume can be salvaged particularly considering that 30 percent of the losses occur in the Chilcotin where very little Douglas-fir beetle salvage has occurred in recent years. If no salvage occurred in the Chilcotin, this would double unsalvaged losses from the Douglas-fir beetle, relative to what was assumed in the base case, and would mean that mid-term timber supply was overestimated by about 1.3 percent.
- *Harvest performance – live and dead volumes:* given the impact of the MPB, the need to salvage dead pine, and to protect live stands for the mid-term, licensees have targeted their harvest on beetle-killed pine-leading stands. Between 2007 and 2013, approximately 70 percent of the harvest volume was pine and it is assumed that most of this volume was dead pine. The seven year (2007 to 2013) average annual harvest of pine has been about two million cubic metres while the average annual harvest of non-pine has been about 880 000 cubic metres. The base case modelled a short-term harvest level of 3.4 million cubic metres with 94 percent of the harvest for the first five years being pine, and only six percent (about 190 000 cubic metres per year) being non-pine. Harvesting 94 percent pine in the first five years is not likely achievable given current practices. Increasing the harvest of non-pine to 900 000 cubic metres per year for the first five years would decrease mid-term timber supply by about 65 000 cubic metres per year – about 4.5 percent less than that assumed in the base case.

I have identified the following factors in my considerations as indicating that the timber supply projected in the reference forecast may have been underestimated in the mid-term:

- *Silvicultural systems – uneven-aged dry-belt Douglas-fir stands:* the merchantable volume growth of uneven-aged dry-belt Douglas-fir stands was modelled at one

cubic metre per hectare per year in the base case. Given uncertainty in growth rates, a sensitivity analysis indicated that if growth rates were increased to two cubic metres per hectare per year, this would result in a 5.5 percent increase in mid-term timber supply. Since the sensitivity analysis was completed, growth rates were compiled based on various sample plots – and a weighted average growth of 1.4 cubic metres per hectare per year was determined. Based on these findings, I recognize that the base case underestimated mid-term timber supply by about 2.2 percent.

- *Scenic areas:* modelling that supported the base case used the visually effective green-up (VEG) heights for various visual quality objectives (VQOs) based on provincial procedures developed to support timber supply reviews. District staff pointed out that the VEG heights in the modelling procedures are greater than what occurs in current practice. A sensitivity analysis estimated the impact of reducing modelled green-up heights to three metres, and found that this could increase mid-term timber supply by about five percent. Based on the advice of district staff regarding current practices and the findings of the sensitivity analysis, I recognize an up to five percent underestimation of mid-term timber supply based on this factor.
- *Mountain pine beetle – shelf life:* it was assumed in the timber supply analysis that the economic shelf life of mountain pine beetle (MPB) killed pine trees is 10 years for sawlogs. Estimates of the utility of MPB killed pine range from 7 to 25 years depending on the ecosystem and the end product to be produced from the logs. Lumber markets and harvest costs also play a role in how long dead timber can be utilized. Given this uncertainty, a sensitivity analysis assuming a shelf life of 20 years was conducted; this showed that the mid-term harvest level could be increased by 531 800 cubic metres per year to 1 952 300 cubic metres per year – which is 41 percent higher than in the base case. In reviewing this factor with ministry staff, I note there is potentially more volume in the mid-term than indicated in the base case.
- *Minimum harvest age and volumes, and shelf life:* in the base case, a minimum harvest age of 60 years was assumed for pine-leading stands, and 80 years for non-pine leading stands. In addition, a minimum volume of 80 cubic metres per hectare was assumed for pine and 120 cubic metres per hectare was assumed for non-pine. Harvest data records showed that 80 cubic metres per hectare for pine represents current practices for the merchantability of these stands. A sensitivity analysis used a 65 cubic metres per hectare minimum volume for pine-leading stands and found that this could increase mid-term timber supply by 34 percent – an increase of 480 600 cubic metres per year to a mid-term of 1 901 100 cubic metres per year. Another sensitivity analysis assumed both a 20-year shelf life and a 65 cubic metres per hectare minimum harvest volume for pine stands and found that the mid-term harvest level could be 2 193 900 cubic metres per year – 54 percent higher than that assumed in the base case. In reviewing these analyses with staff, I conclude there is potentially more volume in the mid-term than shown in the base case considering these factors.
- *Young pine stands – mortality:* in the base case, the impacts of the MPB on young pine stands in the Central Cariboo portion of the TSA was based on a provincial review of the percentage of stands attacked and the average percent mortality. FREP Stand Development Monitoring (SDM) data in the TSA indicate much lower impacts from the MPB for pine stands less than 40 years of age relative to that assumed in the

base case. I recognize therefore that this factor may have underestimated timber supply in the mid-term, but the amount of underestimation cannot be quantified at this time.

When I take into account the factors that represent an over- and underestimation of timber supply relative to the base case in the mid-term, I am cautiously optimistic that the mid-term harvest levels may be higher than assumed in the base case. To reduce uncertainty in projected mid-term harvest levels, I have noted a number of “**Implementation**” tasks that ideally should be undertaken before the next AAC determination.

Actual harvest levels

In addition to upward and downward pressures on timber supply as noted above, I have also considered whether the initial harvest level in the base case can be realistically achieved and how much of this harvest should be live volume.

- During the seven-year period between 2007 and 2013 an average of about 2 880 000 cubic metres per year has been harvested in the TSA. Of this volume, about 880 000 cubic metres per year was non-pine. The pine harvest was targeted to beetle-killed pine-leading stands. In these stands there is typically about 30 percent of live volume. Given this recent harvesting history and all the considerations listed above, I consider that an AAC of 3 000 000 cubic metres would be appropriate for this TSA. The live component of this AAC would be 1 500 000 cubic metres. This live component is assumed to be comprised of 880 000 cubic metres of non-pine plus approximately 620 000 cubic metres of live volume recovered from harvesting MPB-killed pine-leading stands. This level of live harvest (1 500 000 cubic metres per year) is approximately equal to the mid-term harvest level projected in the base case.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates 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 Williams Lake TSA by establishing an AAC of 3 000 000 cubic metres.

This AAC includes a partition of a maximum of 1 500 000 cubic metres per year for live trees so that one-half of the harvest is for salvaging dead trees killed by the mountain pine beetle and other agents. It is my expectation that non-pine leading stands will contribute a maximum of 880 000 cubic metres to the AAC of this TSA. The remainder of the live volume in this AAC is expected to come from harvesting beetle-killed pine-leading stands. The level of the partition is provided mindful of current practices and the need for some live volume to help maintain the viability of some existing mills and associated forest sector employment.

I reiterate that proven Aboriginal Title lands are not considered Crown land and those lands recognised in the Tsilhqot’in decision have been excluded from this AAC determination.

I recognize that focusing the harvest on pine salvage in the short term will concentrate operations west of the Fraser River and could potentially impact the interests that First Nations, particularly the TNG, have in the area. However, it is important that dead and dying pine be salvaged while it still has economic value so that as much live volume as possible is available in the mid-term. To this end, I acted on the advice of the TNG and established a partition limiting the amount of live volume harvested. I urge forest licensees to discuss harvesting operations with affected

First Nations and commit to best practices so as to mitigate any potential impacts on First Nations' aboriginal interests.

All dead trees that are harvested in the future in the TSA should be charged against the AAC as I have accounted for this volume in my determination.

This determination is effective February 25, 2015, and will remain in effect until a new AAC is determined which must take place within 10 years of the effective date of this determination.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the 10 years required by legislation. Given the tasks noted under "**Implementation**" below, I believe there may be important new information regarding the mid-term timber supply which could support revisiting this decision within five years.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage Ministry of Forests, Lands and Natural Resource Operations (FLNR) staff, other agencies and licensees (as appropriate) to undertake or support the tasks and studies noted below, the particular benefits of which are described in greater detail in appropriate sections of this rationale document. I recognize that the ability of staff and licensees to undertake or support these projects is dependent on available resources including funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Williams Lake TSA. Many of these factors address uncertainty in mid-term timber supply as noted below.

Short-term considerations:

1. I expect licensees to continue to focus harvesting as much as possible on mountain pine beetle-impacted pine-leading stands in the Williams Lake TSA; and to harvest no more than their share of the AAC partition attributable to live tree volume.
2. I request that district staff monitor the following and report semi-annually to the chief forester:
 - a. harvest performance within MPB-killed pine-leading stands and the volume attributable to live trees within those stands;
 - b. harvest contribution from non-pine leading stands; and
 - c. a recommendation to initiate a new timber supply review if warranted.
3. I expect district staff to make recommendations to the minister if a partition order appears to be necessary to implement the AAC partition.

Mid-term timber supply considerations:

1. *Low productivity sites:* nearly 400 000 hectares of low productivity sites that are not able to meet minimum harvestable volume criteria at 160 years of age were deducted from the THLB in the base case. There may be opportunities to rehabilitate some of these stands e.g. where the minimum volume criteria are not being met because of site quality/density issues following wildfires or due to forest health factors. Also some of the low productivity sites could provide opportunities for use as bioenergy in the future. I encourage staff to explore opportunities for the use of some of the low productivity sites before the next determination.

2. *Volume estimates for managed stands:* a number of Young Stand Monitoring (YSM) and Stand Development Monitoring (SDM) plots have been established in the TSA. I encourage staff to assess the information collected from these plots in order to evaluate the volume estimates for regenerated stands assumed in the current timber supply analysis.
3. *Minimum harvest age and volumes:* staff are encouraged to monitor operational practices to see whether assumptions about minimum harvest ages and/or volumes are changing, and how these changes may impact mid-term timber supply relative to what was assumed in the base case.
4. *MPB impacted stands – regeneration delay:* the base case assumed that mature, MPB impacted stands that do not meet the minimum harvest volume criteria of 80 cubic metres per hectare and therefore will not be salvage harvested will revert to a natural stand of age 40 after 25 years from the year of disturbance. This essentially assumes a negative regeneration delay because it is assumed that the new stand will be composed of green residual stems and advanced regeneration. Staff are encouraged to review these assumptions given information compiled provincially and locally.
5. *IRM – adjacency and block size distribution:* the base case did not model adjacency or block size distribution given the short-term focus on salvage harvesting MPB impacted pine stands. I encourage staff to determine appropriate constraints in the mid-term so that they can be considered in the next timber supply analysis.
6. *Scenic areas – visually effective green-up (VEG):* district staff do not believe the VEG heights modelled in the base case reflect current practices. I encourage staff to provide information so that the most appropriate VEG heights can be modelled in support of the next determination.
7. *Mule deer winter range:* it was evident at the determination meeting that there is considerable uncertainty regarding the extent to which mule deer winter ranges can contribute to mid-term timber supply, yet the timber supply analysis supporting the base case is predicated on significant harvest volume contributions from these areas in the mid-term. Issues include meeting minimum basal area targets relative to current or projected stand conditions; incentives for non-clearcut harvesting approaches given higher administrative and planning costs; and addressing poor forest health conditions that may be exacerbated by lack of management. I encourage staff to address as many of these and other issues before the next determination so that this factor can be better considered. There is also a need for a standard Cariboo region-wide approach to modelling winter range requirements stemming from an order under the Government Actions Regulation.
8. *Douglas-fir stands:* I encourage staff to explore innovative ways (such as use of LiDAR) to improve the inventory, including growth and yield, of Interior Douglas-fir stands given their contribution to mid-term timber supply.
9. *Shelf life:* sensitivity analysis has noted that projected mid-term timber supply levels are particularly sensitive to changes in assumptions about the economic shelf life of MPB-killed pine trees. I encourage staff over the next five years to try to improve our knowledge regarding shelf life so that assumptions can be refined in support of the next determination. This will also have a significant impact on short-term timber supply assumed in the next determination.

Other considerations:

1. *Inventory – Landscape Vegetation Inventory (LVI):* An LVI for the western portion of the TSA was initiated in 2012. New LVI information was not yet available for use in this determination. Once the LVI is completed, I encourage staff to compare the LVI results with the current inventory so that the LVI information can be considered in support of the next determination. I would like to review the comparisons made with staff as this information may affect the timing of the next determination.
2. *Climate change:* Climate change may impact site productivity estimates, forest health and other factors that were addressed in this determination. I encourage staff to try and understand projected climate change impacts in the TSA so that this important consideration can be factored into the next determination.
3. *Habitat supply modelling:* I am encouraged to see this new modelling work for my consideration in support of this determination. Staff have noted opportunities to build on this good work and improve the modelling approach in the future, and I encourage staff to undertake that work.
4. *Dead potential volume:* By accounting for this factor in my determination, all dead volumes that are harvested in the future in the TSA should be charged against the AAC.



Dave Peterson, RPF
Chief Forester

February 25, 2015

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, c. 157, (current to February 11, 2015), 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 reasonably can be expected by use of the area for purposes other than 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 February 11, 2015) 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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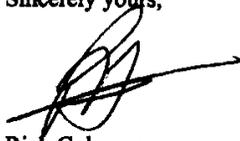
Jim Snetsinger

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.

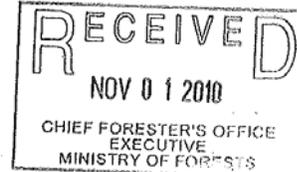
You should also consider important local social and economic objectives expressed by the public during the Timber Supply Review process, where these are consistent with the government's broader objectives as well as any relevant information received from First Nations.

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
Ref: 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
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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

pc: Dana Hayden, Deputy Minister