

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

# **Prince George Timber Supply Area**

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

**Effective October 11, 2017**

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Chief Forester**

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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 as Chief Forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Prince George 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 thank staff of the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (herein referred to as the Ministry) in the Prince George and Stuart Nechako Natural Resource Districts, Omineca Region and the Forest Analysis and Inventory Branch. I am also grateful to the First Nations, the public, and the licensees who have provided input.

In addition to typical timber supply review (TSR) processes, the Province engaged in a collaborative process with Carrier Sekani First Nations (including: Nadleh Whut'en, Nak'azdli Whut'en, Saik'uz First Nation, Stelat'en First Nation, Takla Lake First Nation, Tl'azt'en First Nation and Ts'il Kaz Koh) to explore their concerns related to timber supply and potential impacts of the decision to their Aboriginal title, rights and interests (Aboriginal Interests). Information resulting from this collaborative effort is discussed throughout this document and was considered in my AAC decision as discussed in '**Reasons for Decision**'. I am grateful to the Carrier Sekani First Nations Chiefs and technical representatives for their contributions which assisted me in making my determination.

## Description of the Prince George Timber Supply Area

The Prince George TSA is situated in the north-central interior of British Columbia (BC) and covers approximately 7.97 million hectares, making it one of the largest management units in the province. There are two natural resource districts within the TSA: Prince George and Stuart Nechako (previously known as the Fort St. James Forest District and Vanderhoof Forest District). Each district is responsible for the administration of forest management activities within its borders.

The Prince George TSA stretches from the Alberta border at its southeast corner to Tweedsmuir Provincial Park along its southwest arm, and northwest to the Spatsizi Plateau Wilderness Park. The central and southwestern 'plateau' portion of the TSA is fairly flat and rolling with gentle slopes, and supports forests of predominantly lodgepole pine and white spruce. The eastern part of the TSA is along the Rocky Mountains where spruce and subalpine fir dominate the higher elevations, and forests of large old western redcedar and western hemlock dominate the lower elevations. The northwestern portion of the TSA is covered by the Omineca and Skeena mountain ranges. In this part of the TSA, pine dominates the valley bottoms, spruce the lower and mid-slopes, and subalpine fir higher elevations. The TSA includes the Fraser, Nechako, Stuart, Skeena, Sustut, Nation, Parsnip and McGregor river systems, as well as numerous lakes of all sizes.

The forests of the Prince George TSA are very diverse and provide a wide range of resources including: timber, forage, non-timber forest products, and habitat for fish and wildlife. Residents and tourists enjoy outdoor recreation activities such as cross-country and back-country skiing, snowmobiling, mountain biking, hiking, camping, fishing and hunting.

Fish and wildlife species within the Prince George TSA contribute to biodiversity and ecosystem health, and also provide an important source of sustenance for Aboriginal and non-Aboriginal community members. The Prince George TSA provides habitat for a wide variety of fish and wildlife populations including: ungulates, large predators, small mammals, freshwater and anadromous fish, waterfowl, songbirds, raptors, reptiles and amphibians. The Prince George TSA is home to numerous plant and animal species at risk such as: Nechako white sturgeon, mountain caribou, grizzly bear, bull trout,

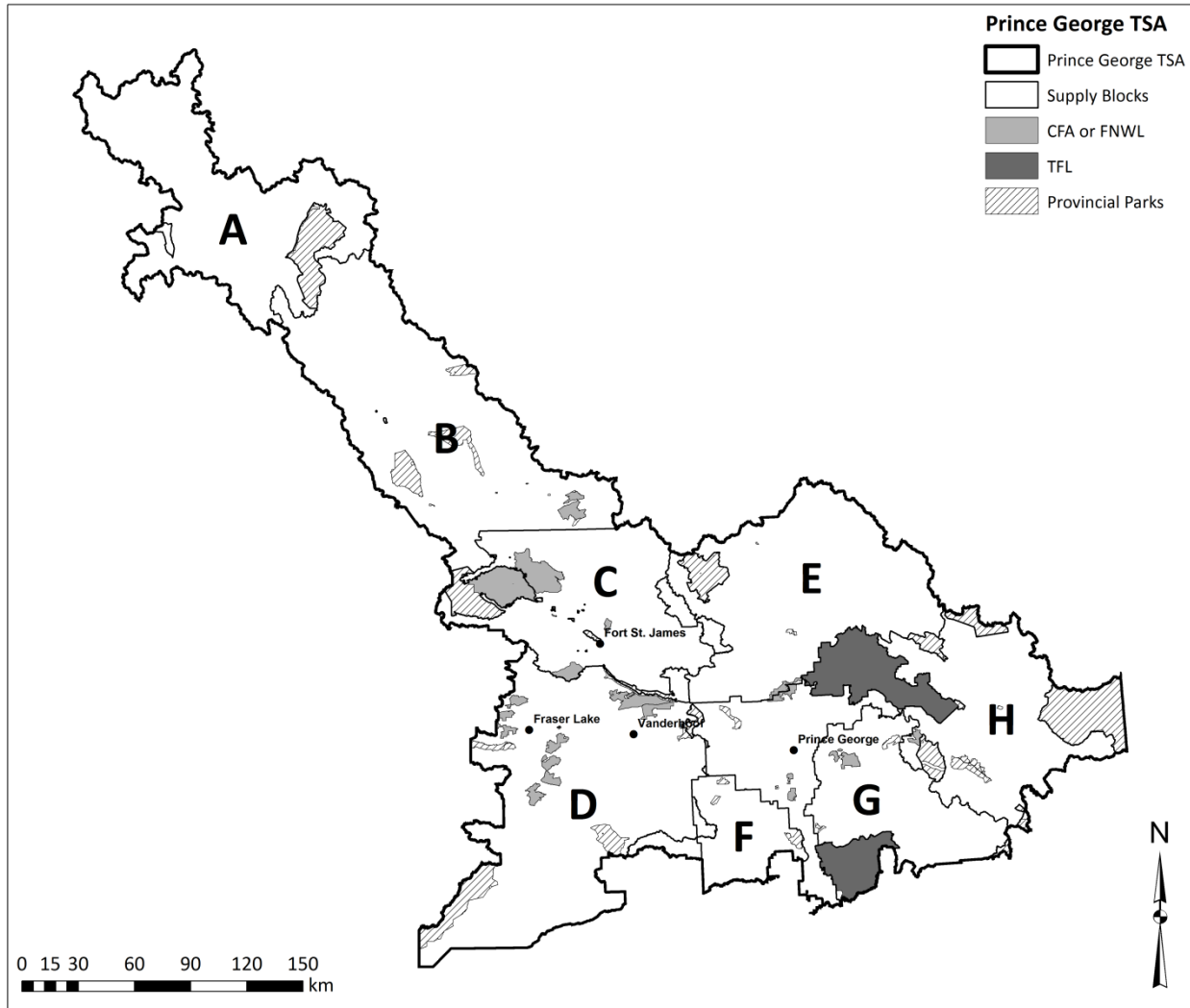
western toad, olive-sided flycatcher, northern myotis and whitebark pine. Several ecosystems within the Prince George TSA are also identified as at risk and are monitored through the provincial Conservation Data Centre including grassland, wetland and forested ecosystems.

Twenty-seven First Nations groups, comprising about six percent of the Prince George TSA's population have asserted traditional territories overlapping the TSA. First Nations whose traditional territory overlaps Prince George TSA are predominantly Carrier and Sekani, but other groups also claim traditional territories in the TSA. The traditional territories of the Carrier and Sekani comprise approximately 7.6 million hectares in the Interior Plateau Region of BC (much of which is outside of the Prince George TSA), which is bounded to the east by the Rocky Mountains, to the north by the Omineca Mountains, and to the west by the Coast Mountains. The traditional territories of the upper and central Carrier occupy the Nechako, Stuart, and Fraser River watersheds, while those of the Sekani coincide with the Finlay, Parsnip and Peace Rivers. The traditional territories of their southern Carrier neighbours include the basins of the Dean, Blackwater, and Quesnel Rivers. First Nations with communities within the Prince George TSA include: Nak'azdli Whut'en, Takla Lake First Nation, TI'azt'en Nation, Nadleh Whut'en, Stellat'en First Nation, Saik'uz First Nation, Lheidli T'enneh First Nation, Yekooche First Nation and McLeod Lake Indian Band.

Each First Nation has its own traditional territory, usually corresponding to a watershed or lake system. Aboriginal peoples with traditional territory which overlaps with the Prince George TSA have Aboriginal Interests or treaty rights. These Aboriginal Interests and treaty rights may be connected to biophysical, spatial, social, cultural, spiritual or experiential values. The ability of Aboriginal peoples to meaningfully exercise their Aboriginal rights and/or treaty rights is protected under Section 35 of the *Constitution Act*.

Approximately 66 percent (5.24 million hectares) of the Prince George TSA land base is Crown forest land. About 60 percent of the Crown forest land (3 096 125 hectares or 44 percent of the total TSA land base) is considered available for timber harvesting. About 49 percent of the timber harvesting land base (THLB) is dominated by lodgepole pine stands. The remainder is made up of stands dominated by spruce (33 percent), subalpine fir (9 percent), deciduous (6 percent), Douglas-fir (2 percent), and cedar (1 percent). A high proportion of the pine-leading stands were established 40 or more years ago following major fires. These stands have been impacted by the mountain pine beetle (MPB) infestation, which peaked in the Vanderhoof and Prince George Forest Districts in 2004 and in the Fort St. James District in 2006. Recently harvested stands have been planted with predominantly lodgepole pine, spruce and Douglas-fir. There are also some relatively old stands, mainly comprised of spruce and subalpine fir, in areas with higher precipitation. In addition, there are some very old western redcedar and western hemlock stands in the Interior Cedar Hemlock biogeoclimatic zone located in the eastern portion of the TSA.

The Prince George TSA is subdivided into eight supply blocks, distributed alphabetically from supply block A in the far northwest, supply block D in the former Vanderhoof District, to supply block H in the south-eastern portion of the Prince George District (refer to map inset).



The City of Prince George is the largest community in the TSA with a population of over 80,000. Other communities include Bear Lake, Fort Fraser, Fort St. James, Fraser Lake, Giscome, Hixon, Strathnaver, Upper Fraser, Vanderhoof and Willow River. The largest Aboriginal populations occur in urban areas of the TSA; however Aboriginal community members also live on Indian Reserves including: McLeod Lake, Nak’azdli, Shelley, Stellaquo, Stoney Creek, Tache, Takla Landing and Yekooche. A total of 131 Indian Reserves occur within the boundaries of the Prince George TSA.

The forest industry is an important source of employment and income for Aboriginal and non-Aboriginal residents of the Prince George TSA. During 2007 to 2009 the economic downturn forced some mills to undergo temporary shutdowns and implement shift reductions to reduce total production. Prince George has seven large lumber mills, three pulp mills, one log home operation, one utility mill, two pellet operations and two cogeneration facilities. Fort St. James has two large lumber mills and a bioenergy facility that is expected to begin operations in 2017. The Vanderhoof area has four large lumber mills, one small lumber mill and two pellet producers. Combined these mills can process up to eleven million cubic metres of logs annually.

Opportunities continue to exist in the Prince George TSA for bioenergy production from biomass associated with utilization of waste from traditional sawlog harvesting or from the harvest of stands where salvageable volume has declined below levels which are considered economically operable. These

opportunities for harvest of standing dead timber for bioenergy vary by district. Bioenergy is currently produced at several facilities in Fort St. James, Vanderhoof and Prince George.

### **History of the AAC**

The AAC for the Prince George TSA was determined and adjusted to account for the issuance of area-based tenures several times prior to 1996. In 1996, the AAC was set at 9 363 661 cubic metres.

In response to the emerging MPB outbreak, on June 1, 2002, the AAC for the Prince George TSA was uplited to 12 244 000 cubic metres per year, including the following partitions:

- 110 000 cubic metres attributable to cedar- and hemlock-stands;
- 160 000 cubic metres to deciduous-leading stands;
- 400 000 cubic metres to Supply Block A; and
- 3 million cubic metres for MPB management and salvage.

On October 1, 2004, the AAC was further increased to 14 944 000 cubic metres per year again in response to the MPB outbreak, to encourage harvest of impacted timber. The partitions for cedar and hemlock, deciduous-leading stands and Supply Block A were maintained at the 2002 levels. The chief forester indicated that 5.7 million cubic metres per year of the AAC was for MPB management and salvage.

On January 11, 2011, the AAC was decreased to 12.5 million cubic metres per year including the following partitions:

- A maximum of 3.5 million cubic metre partition attributable to non-pine species, and non-cedar and non-deciduous-leading stands;
- A maximum of 23 000 cubic metre partition attributable to cedar-leading stands; and
- A maximum of 160 000 cubic metre partition attributable to deciduous-leading stands in Prince George and (former) Fort St. James forest districts.

In addition to the partitions, the chief forester stated his expectation that a maximum of 875 000 cubic metres would be taken from spruce-leading stands. In his '**Reasons for Decision**' the chief forester also indicated that 1.5 million cubic metres per year was available for bioenergy opportunities.



Table 1 shows the apportionment of the AAC by the Minister of Forests, Lands and Natural Resource Operations, effective November 1, 2012.

Table 1. Apportionment of the AAC

Apportionment	Coniferous volume (m <sup>3</sup> )	Deciduous volume (m <sup>3</sup> )	% AAC
Forest Licences – Replaceable	5 695 441		45.6
Forest Licences – Non-replaceable	3 507 642	120 000	29.0
First Nations Woodland Tenure	450 000		3.6
BCTS Forest Licences	2 280 000	40 000	18.6
BCTS Forest Licences – Non-replaceable	180 000		1.4
Community Forest Agreement	45 000		0.36
Forest Service Reserve	181 917		1.46
<b>Total</b>	<b>12 340 000</b>	<b>160 000</b>	<b>100.0</b>

After accounting for the issuance of area-based tenures since the AAC was determined (Vanderhoof Community Forest Agreement, Lheidli T'enneh First Nations Woodland Licence, Fraser Lake Community Forest Agreement, Tl'azt'en First Nations Woodland Licence and Stellat'en First Nations Woodland Licence), the effective AAC is 12 206 407 cubic metres per year.

### New AAC determination

The new AAC that I am setting is two-tiered. For the first five years, beginning on October 11, 2017 the new AAC will be 8 350 000 cubic metres per year, 33 percent lower than the current AAC. I specify, under Section 8(5)(a) of the *Forest Act*, the following geographic, species and timber profile partitions:

1. A maximum of 1 500 000 cubic metres per year is attributed to supply blocks A and B;
2. A maximum of 6 100 000 cubic metres per year, is attributed to supply blocks other than A and B (supply blocks C, D, E, F, G, H), of which 62 000 cubic metres per year is attributed to deciduous-leading stands; and
3. A maximum of 750 000 cubic metres per year is attributed to bioenergy stands, which are mature, damaged pine-leading stands with less than 140 cubic metres per hectare net merchantable sawlog volume.

After five years, beginning on October 11, 2022, the new AAC will be reduced by a further 12 percent to 7 350 000 cubic metres per year. Partitions 1 and 3 will remain unchanged. Partition 2, the partition for supply blocks other than A and B (supply blocks C, D, E, F, G, H) which is lowered to a total of 5 100 000 cubic metres per year of which 62 000 cubic metres per year is attributed to deciduous-leading stands. The AAC for the second five years is 41 percent lower than the current AAC.

In the 2011 AAC determination for the Prince George TSA the chief forester specified a partition for live non-pine profile. Considering that this current AAC is predicated on continued salvage in MPB-damaged stands and sanitation and/or salvage in spruce beetle-damaged stands, in this determination I expect that

harvest over the next five years will be focused to the extent practicable in dead, dying and damaged stands. This includes both spruce- and pine-beetle infested stands as well as balsam bark beetle and fire damaged stands. I note that if spruce beetle remains of epidemic proportions the chief forester may establish a partition at any time for trees alive and uninfested at the time of harvest to account for the recovery of dead fibre in spruce beetle-impacted stands.

This determination is effective October 11, 2017, 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.

### **Information sources used in the AAC determination**

Information considered in determining the AAC for the Prince George TSA includes the following:

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### **Role and limitation 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. These inputs are concerned primarily with biophysical factors—such as the rate of timber growth and the definition of the land base considered available for timber harvesting—and with management practices.

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

Furthermore, computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Technical information and analysis, therefore, do not necessarily provide the complete answers or solutions to forest management decisions such as AAC determinations. Such information does however 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 Prince George TSA I have considered the 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 my approach in these matters explicit, I have considered and adopted the following body of guiding principles, which have been developed over time by BC's chief foresters and deputy chief foresters. In any specific circumstance in a determination where I consider it necessary to deviate from these principles, I will explain my reasoning in detail.

When considering the factors required under Section 8, I am mindful of my obligation as a steward of the forests of British Columbia, of the mandate of the Ministry as set out in Section 4 of the *Ministry of Forests and Range Act*, and of my responsibilities under the *Forest Act* and *Forest and Range Practices Act* (FRPA).

#### *Integrated decision making*

One of the responsibilities of the Minister of Forests, Lands, Natural Resource Operations and Rural Development (the Minister) is to plan the use of forest and range resources such that the various natural resource values are coordinated and integrated. In addressing the factors outlined in Section 8 of the *Forest Act*, I will 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 that exceed legislative 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, or to speculate about the possible effect on timber supply that could result from the scope, nature and geographic extent Aboriginal title being established by court decisions or by agreement. Where specific protected areas, conservancies, or similar areas have been designated by legislation or by order in council, these areas are deducted from the THLB and are not considered to contribute any harvestable volume to the timber supply in AAC determinations, although they may contribute indirectly by providing forest cover that helps meet resource management objectives such as 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 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, I will consider information that is relevant to the decision in a manner that is appropriate to the circumstance. The requirement for regular AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

Where appropriate, information will be considered regarding the types and extent of planned and implemented silviculture practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of their timber supply effects.

I acknowledge the perspective that alternative strategies for dealing with information uncertainty may be 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, I 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 in the context of the available information and analysis. Where appropriate, the social and economic interests of the government, as articulated by the Minister, can assist in evaluating how to respond to 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, I 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, I will consider related information in my 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.

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

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. I will continue to 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 that information emerges.

#### *First Nations*

Established Aboriginal title lands (meaning declared by a court or defined under an agreement) and other areas, such as Treaty Settlement 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 the nature, scope and geographic extent of Aboriginal rights and title have not been established, the Crown has a constitutional obligation to consult with First Nations regarding their asserted 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 through engagement and consultation respecting First Nations' Treaty rights or Aboriginal Interests, including how these rights or interests may be impacted; and
- iii. Any operational plans and/or other information that describe how First Nations' Treaty rights or Aboriginal Interests are addressed through specific actions and forest practices.

Treaty rights or Aboriginal Interests that may be impacted by AAC decisions will be addressed consistent with the scope of authority granted to the chief forester under Section 8 of the *Forest Act*. When information is brought forward that is outside of the chief forester's scope of statutory authority, this information will be forwarded to the appropriate decision makers for their consideration and /or to other appropriate, ongoing discussion tables with First Nations and the Government of BC. Specific considerations identified by First Nations in relation to their Aboriginal Interests and the AAC determination are addressed in the various sections of this rationale.

AAC determinations should not be construed as limiting the Crown's obligations under court decisions in any way, and in this respect it should be noted that AAC determinations do not prescribe a particular plan of harvesting activity within the management units. They are also independent of any decisions by the Minister 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 projections provided to me through the work of the Timber Supply Review Program (TSR) 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 harvest projections, 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, demonstrated performance and established management 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 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 of the assumptions made in generating the base case 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 the AAC determination, it is important to remember that the AAC determination itself is not simply a calculation. Even though the timber supply analyses 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. 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, particularly in cases characterized by a large degree of unquantified uncertainty, 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 Prince George TSA**

In TSR, one harvest projection is presented that is an outcome of the best available information and current management practices. This projection is referred to as the base case. Harvest level projections, even those prepared using the same information, data and timber supply model, are dependent on the harvest flow objectives used in the analysis. The harvest flow objectives used in preparing the base case for this determination include:

- Establish a maximum even-flow harvest level;
- Maximize the short-term harvest projection without lowering the mid-term harvest projection below the maximum even-flow harvest level;
- Attain a long-term harvest projection that is equal to or greater than the pre-mountain pine beetle AAC of 9.3 million cubic metres; and
- Attain a stable or increasing growing stock for the last half of the projection period, while ending the harvest projection with the same volume of growing stock that was available at the beginning of the projection.

***Original base case***

The base case harvest projection was constructed as three even-flows: one for the short term, one for the mid term and one for the long term. In TSRs for management units severely impacted by MPB, mid term refers to that portion of a harvest projection when dead pine is no longer an economically viable source of timber and before regenerating pine stands have reached harvestable condition. The transition between the short- and mid-term occurs at the end of the salvage period and the transition from the mid term to the long term occurs when 75 percent of the harvest comes from stands established after the onset of the MPB epidemic. The three harvest levels were established with the objective of maximizing the mid-term harvest projection. The original base case was presented in the *Prince George Timber Supply Area Timber Supply Analysis Discussion Paper (Discussion Paper)* in March 2016.

The Spatial Timber Supply Model (STSM), which is a Spatially Explicit Landscape Event Simulator (SELES) based model, was used for this timber supply analysis. The STSM is approved for use in timber supply analysis by the Forest Analysis and Inventory Branch (FAIB) of the Ministry; the results of the analysis were peer reviewed.

Although STSM has spatial capabilities which can track the geographic locations of harvest areas, the base case model did not simulate harvest block patterns. Objectives such as landscape biodiversity old forest retention thresholds and visual quality objectives were accounted for with an aspatial limits measured at each time step prior to and during the harvest cycle. This modelling approach likely provides more harvest flexibility than can be achieved operationally. However, this increased flexibility likely results in a small, unquantified overestimation in the base case, which I will account for in my determination, as discussed in ‘**Reasons for Decision**’.

In the base case for the Prince George TSA multiple assumptions were applied, including the following key assumptions (as presented in the Discussion Paper):

- i. Regenerating stands were prohibited from harvest until at least age 75 years, regardless of volume or piece size, allowing them to approach their potential maximum yield (refer to the ‘*minimum harvestable age and volume*’ factor below);
- ii. In addition to the age requirement, stands with salvageable volume are required to achieve a minimum net volume of 140 cubic metres per hectare to be eligible for the harvest (refer to the ‘*minimum harvestable age and volume*’ factor below);
- iii. Stands with the combination of highest volume per hectare, highest salvageable volume, and proximity to the milling complex were given priority for harvesting;
- iv. The sawlog shelf life of dead pine was assumed to decline exponentially over time (refer to the ‘*mountain pine beetle*’ factor below); and
- v. During the salvage phase, the harvest is allocated among pine-leading stands (81 percent of the harvest), deciduous-leading stands (four percent of the harvest) and all other stand types (15 percent of the harvest). The allocations reflect the distribution of harvest between stand types

since the previous TSR. The deciduous harvest contribution is projected as a maximum even-flow harvest level for the entire planning horizon.

In the original base case harvest projection, the initial harvest was set at 10.1 million cubic metres per year, which reflects the five-year average harvest for the TSA from 2010 to 2014. After one decade, the start of the mid term is marked by a decline in the harvest level to 6.35 million cubic metres per year for 50 years before increasing to a long-term harvest level of 9.85 million cubic metres per year. In addition to these harvest levels, in order to achieve 10.1 million cubic metres of merchantable sawlog volume, approximately 32 million cubic metres of non-sawlog fibre is harvested during the first decade of the projection.

One-year time steps were used for the first decade in the base case and five-year time steps were used thereafter. All harvest projections were applied for a period of 250 years. References to the short term in relation to timber supply projections in this rationale mean the first 10 years.

### ***Harvest projection modifications after First Nations and Public review***

Through consultation with First Nations and stakeholders regarding the *Prince George TSA TSR Data Package and Discussion Paper* new information was provided to Ministry staff. Two key factors brought forward by licensees were economic operability of MPB-impacted stands and ongoing infrastructure development.

The original base case harvest projection included the assumption that salvage harvest would continue to be a primary focus of harvest activities for the first 10 years. Licensees expressed that pine salvage fibre quality has degraded significantly and its utilization for lumber is expected to decline significantly during the term of this AAC decision. This information was confirmed by Ministry staff. I reviewed licensee comments and agree that the salvage harvest assumptions in the original base case are overestimated. A sensitivity analysis was conducted to compare the base case assumptions with an assumption that salvage harvest of pine would continue for the first five years of the harvest projection, after which the constraint requiring salvage focus was removed.

Economic operability, based on stand volume and haul cost (cycle time) has been demonstrated to be a significant factor in licensee forest management decisions within the Prince George TSA. In the base case a spatial index was applied to emulate the preference to minimize cost by harvesting closest to the mill, while reflecting the demand pressures among mills within the TSA (recognizing that timber can be transported to any mill, not just the closest or most optimal). To account for the demand tensions for timber among mills the average cycle time was weighted based on the annual productive capacity of each mill. Spatial index cycle time values radiate from the core where stands closest to the milling complex (the centre of productive capacity in the TSA) have the lowest index value. The spatial index is a key driver for harvest queueing by the STSM model. During public review a licensee commented that infrastructure development is nearing completion for a connector road between the Nadina Natural Resource District road network and the Driftwood Road on the west side of Takla Lake.

The licensee indicated that the plan to connect road infrastructure is to facilitate access to timber which was previously considered not economic, enabling timber flow from the Prince George TSA to their Houston mill along that route. Ministry staff confirm that permitting and development of the connector road is ongoing. I agree that although infrastructure development is not yet complete, it is reasonable to assume that completion of the connector will affect economic operability and hence the harvest flow within the AAC decision period. A sensitivity analysis assessed the effects of infrastructure development on the base case. In response, a revised spatial index was developed by FAIB which reflects the evolving pressure to move timber westward, and a revised harvest projection was completed.

### ***Modified base case***

Based on new information from public review (as discussed above) a modified base case was prepared, to incorporate both the shortened MPB-salvage period and revised hauling pattern and cycle times communicated by licensees.

In the modified base case harvest projection (referred to as the ‘base case’ for the remainder of this document), beginning in 2014 the initial harvest level was set at 10.1 million cubic metres per year, which reflects the five-year average harvest for the TSA from 2010 – 2014. After one decade, the mid term begins and the harvest level declines to 6.1 million cubic metres per year for 55 years before increasing to a long-term harvest level of 9.8 million cubic metres per year. In addition to these harvest levels, in order to achieve 10.1 million cubic metres per year of merchantable sawlog volume during the short term, approximately 19 million cubic metres of non-sawlog fibre is harvested over the first decade of the projection.

In the base case the transition from natural to managed stands occurs over a 20-year period beginning at year 45. The transition to the long-term harvest level occurs at about year 65. The transition to a stable long-term harvest level is complete by year 125 when the managed stand contribution makes-up greater than 95 percent of the harvest. Concurrently at year 125 the growing stock volume within the THLB stabilizes at levels equivalent to the starting condition.

I have reviewed in detail the assumptions and methodology incorporated in the base case; as well as the total growing stock, the harvest contributions from managed and unmanaged stands, the average volumes per hectare, the total area harvested annually, and the average ages of the forest stands harvested. Based on my review, I am satisfied, subject to the qualifications accounted for in this document, that the information presented to me provides a suitable basis from which I can assess the timber supply for the Prince George TSA.

In addition to the base case, I was provided with alternative harvest flows, a number of sensitivity analyses carried out using the original and modified base cases as a reference, and supplemental analyses. These analysis results and other information noted below have been helpful in the considerations and reasoning leading to my determination. Factors not included in the base case which significantly contribute to this decision include; the emerging spruce beetle outbreak, management for caribou and grizzly bear, and Aboriginal Interests and treaty rights. These factors, and others, are discussed further in this document, and my consideration of these factors is discussed in ‘**Reasons for Decision**’.

### **Consideration of Factors as Required by Section 8 of the *Forest Act***

I have reviewed the information for all of the factors required to be considered under Section 8 of the *Forest Act*. Where issues require additional discussion and evaluation, I will discuss these factors further in this rationale. For other factors, where uncertainty exists or where public or First Nations’ input indicates differences of opinion 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.

For several factors, I have concluded that the modelling of a factor in the base case appropriately represents current management and reflects the best available information or that uncertainties about the factor have little influence on the timber supply projected in the base case. In these cases, no discussion is included in this rationale. These factors are listed in Table 2.

Table 2. List of accepted factors

<b>Forest Act section and description</b>	<b>Factors accepted as modelled</b>
8(8)(a) Land base contributing to timber harvesting	<ul style="list-style-type: none"> <li>• Areas not administered by the Crown for TSA timber supply</li> <li>• Areas classified as non-forest</li> <li>• Roads, trails and landings</li> </ul>
8(8)(a)(i) Composition of the forest and expected rate of growth	<ul style="list-style-type: none"> <li>• Operational adjustment factors</li> </ul>
8(8)(a)(ii) Expected time for the forest to be re-established following denudation	<ul style="list-style-type: none"> <li>• Regeneration delay</li> <li>• Not satisfactorily restocked/backlog</li> </ul>
8(8)(a)(iii) Silvicultural treatments to be applied	<ul style="list-style-type: none"> <li>• Silvicultural systems</li> </ul>
8(8)(a)(v) Constraints on the amount of timber produced by use of the area for other purposes	<ul style="list-style-type: none"> <li>• Recreation</li> <li>• Crown land plan</li> <li>• Scenic resources and visual quality objectives</li> </ul>

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 First Nations or the public in relation to my statutory authority under Section 8 of the *Forest Act* and the AAC determination are addressed in the various sections of this rationale.

### **Forest Act Section 8 (8)**

**In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider**

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

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

#### Land base contributing to timber harvesting

*- general comments*

The total area of the Prince George TSA is about 7.97 million hectares. Of the total TSA area, about 5.10 million hectares or 64 percent is classified as productive Crown forest management land base (CFMLB).

As part of the process used to derive the THLB for use in the timber supply analysis, a series of deductions is made from the productive CFMLB. The THLB is a coarse estimate of the area available for timber production, at a single point in time, after areas reserved from harvesting for economic, cultural or ecological factors have been excluded. The THLB is an estimate derived for the purpose of timber supply modelling only, unless an area has a designation under legislation which dictates that no timber harvesting can occur, the inclusion or exclusion of an area in the THLB has no bearing on how it will be managed and whether or not it will be harvested.

For the Prince George TSA, the THLB used in the base case is 3 070 301 hectares, which is approximately 26 000 hectares or less than one percent smaller than in the previous TSR. A significant proportion of this difference is due to area reductions in the CFMLB resulting from the expansion of the community forest program, ungulate winter ranges, and the treatment of research forests as area-based tenures, which are excluded from the THLB of the TSA. Area reductions to the THLB in this analysis are partially offset by a broadened definition of stand merchantability.

As noted above under *'Role and Limitation of the Technical Information Used'* several of my considerations in this rationale relate to definition of the THLB, and some have led me to conclude that the base case THLB either over- or underestimates the area actually likely to be available for harvesting. These considerations are described in the relevant sections below.

The factors listed in this section of the rationale do not include all of the areas excluded from the THLB; some factors have been listed in Table 2, as noted above, while others are referred to later in this document.

*- additional area-based tenure withdrawals from the TSA*

The *Prince George TSA Data Package* was finalized in 2015. Since that time the Vanderhoof Community Forest Agreement (CFA), Fraser Lake CFA, and the Lheidli T'enneh First Nation Woodland Licence (FNWL), Tl'azt'en FNWL, and Stellat'en FNWL were issued. The removal of these five issued tenures was not reflected in the netdown to develop the base case THLB. The removal of these lands from the TSA land base results in a reduction of the THLB by 72 720 hectares (2.3 percent).

Currently government is working with First Nations within the Prince George TSA to establish two new FNWLs. These potential future changes to the land base of the TSA were not accounted for in the base case. Ministry staff indicate that the processes associated with these area-based tenures are well advanced and may be completed within this year. There is certainty associated with the establishment of the new area-based tenures in the TSA. I accept that the THLB used in the analysis is potentially overestimated in the mid- and long-term periods of the harvest projection.

For this decision I have considered only area-based tenures which are established. I will rely on other regulatory tools including the Allowable Annual Cut Administration Regulation to make future adjustments to the allowable annual cut when the new tenures are finalized. I conclude that not excluding the areas associated with the newly issued tenures results in an overestimation of the base case short-term harvest level by up to seven percent and the long-term harvest level by two percent, and results in a protraction of the mid-term period by up to 15 years. I will account for this in my determination as discussed in **'Reasons for Decision'**.

Public input included a comment from a licensee regarding new area-based tenures. The comment expressed concern regarding the process used to identify land base for new area-based tenures and the potential for disproportionate impacts to the land base remaining in the TSA. The award of new area-based tenures is outside my statutory authority as chief forester and is not within the scope of the AAC determination. Mandates for new area-based tenures are offered by the Minister. Guidance regarding selection of areas for new area-based tenures has been provided by the Deputy Minister in *Principles for Locating New Forest Tenures – October 27, 2011*; areas for FNWL consider traditional territory and Aboriginal strength of claim, and areas for CFAs are developed collaboratively with municipal governments. It is my understanding that in the Omineca Region timber supply analysis principles consistent with the most recent AAC determination are used to select lands for new area-based tenures. This approach to providing analytical support for selecting tenure areas appears technically sound and consistent with the existing forest management and decision making context.

Adjustments to the AAC of the TSA following the removal of land by way of the award of a new area-based tenure are guided by the Allowable Annual Cut Administration Regulation. The cyclical nature of the TSR process allows for regular review of changes to the THLB in a TSA. I expect to revisit the TSR for the Prince George TSA within a maximum of 10 years at which time the effects of newly awarded area-based tenures on harvest projections will be considered.

- *areas considered inoperable*

Areas are considered inoperable where there are physical barriers or limitations to harvesting, where appropriate logging methods (e.g., cable) are not available or deemed to be too costly, or where stands are not merchantable due to low volumes or low-value species or have a high harvest cost (primarily due to excessive haul distance). Steep slopes and unstable ground are examples of limited physical operability; low volumes, low-value species and excessive haul distance are examples of limited economic operability.

FAIB completed an assessment of the distribution of historic practice by operability categories including: slope, elevation, terrain stability and haul distance (cycle time). Using the criteria developed through statistical analysis of historic practice, the THLB was reduced by 500 054 hectares due to inoperability.

In addition, FAIB conducted sensitivity analysis to explore the potential impact of limiting haul distance on the THLB definition, as distance is the primary cost driver in the central interior of BC. The analysis compared the original haul cost spatial index with the revised spatial index, used in the base case, which includes the Houston milling complex. Cycle times within the original spatial index extend to above 22 hours within the THLB. Using the original spatial index and restricting harvest to the upper bound (99<sup>th</sup> percentile) of historic cycle time practices (16.5 hours) reduces the THLB by 214 000 hectares relative to the base case, and reduces short-term harvest level to 7.8 million cubic metres per year. In comparison, using the Houston weighted spatial index and restricting harvest to cycle times less than 16.5 hours, the THLB is not impacted and the base case can be achieved in the short- and mid-term harvest periods.

I discussed these results with Ministry staff, and conclude that if harvest follows the historic patterns of development the mid-term harvest level will be significantly lower than the base case. However, as discussed in '*Base case for the Prince George TSA*', Ministry staff state that a connector road between the Nadina and former Fort St. James districts will likely be completed within the effective period of this determination.

I have also heard strong opposition from Carrier Sekani First Nations (CSFNs) regarding the completion of the connector roads; they expressed concern regarding reduced employment opportunities for their members as fibre within their territory on the west side of Takla Lake will by-pass and/or flow away from their community. They also expressed concerns regarding impacts of connector roads to wildlife including grizzly bear, and to increased competition from non-Aboriginal hunters and gatherers in their territory. Takla Lake First Nation also links connector roads to their concerns regarding short periods of high levels of forest development in their territory, as simulated in the base case. They identified that a boom-bust development pattern negatively affects community socio-economic stability and health.

During public review concerns were expressed that significant remaining mature timber areas in the Prince George TSA are remote and mountainous and that it is likely not a feasible option to expect high levels of harvest from these stands at this time due to cycle times and other operability constraints. In the base case the harvest constraints were applied based on historic performance levels, including physical operability factors such as slope and economic operability factors such as cycle time.

I have reviewed the analysis methodology and criteria based on historic practice used to define areas likely to be inoperable. I accept that the netdown of the land base for areas considered inoperable accurately reflects historic performance, with the exception of haul cost. I believe that it is reasonable to assume that the revised spatial index is representative of future cycle times, and therefore adequately represents economic operability within the TSA. I conclude that the THLB in the base case is appropriate for use in the TSR, however I also conclude that there is uncertainty in the assumption that connector roads will be completed and therefore that the haul pattern on which the base case is built will be realized. I will account for this uncertainty in my AAC determination as discussed in '**Reasons for Decision**'.



I note that the assumptions used to establish the THLB do not dictate operational practices or subsequent decisions. It is my expectation that Ministry staff will monitor and report to the chief forester on the status of connector roads within the Prince George TSA. If the connector roads are not completed and the haul pattern assumptions used to develop the THLB for this TSR are not realized, it will be reflected in future TSRs.

*- low productivity and non-economic stands*

Stands are considered not merchantable if their characteristics are significantly different from the characteristics which have defined historic performance. Factors which define merchantability include volume, timber value and cost of timber harvest.

In order to define the lower bounds of merchantability, FAIB conducted a statistical analysis of harvest appraisal data. Analysis was completed for all cutting permits issued over the past 30 years to determine minimum volumes per hectare for merchantability using data from the Electronic Commerce Appraisal System (ECAS). From this analysis, a minimum volume per hectare criterion was established at 182 cubic metres per hectare. Stands with yield projections that never achieve the minimum merchantability criteria were excluded from the THLB.

To simulate the salvage harvesting of MPB-impacted stands, a shelf life loss adjustment factor was applied to inventory volumes, and a minimum net salvageable volume of 140 cubic metres per hectare was applied. Analysis conducted by FAIB indicates that this salvageable volume threshold, originally established during the TSR leading to the 2002 AAC determination, is consistent with current salvage practices.

Comments received during public review indicated concerns with the expectation that low volume pine leading stands would continue to contribute to timber supply. Merchantability criteria applied in the base case harvest projection were derived from statistical analysis of past harvest performance. These criteria were applied in the model and stands which are projected to never achieve merchantability criteria were removed from the THLB.

I have reviewed the analysis methodology and criteria applied to identify and remove low volume and non-economic stands from the THLB. I conclude that the merchantability criteria applied in the base case for low productivity and non-economic stands accurately reflects current practice and is appropriate for use in TSR.

*- parks and protected areas*

Parks and protected areas occur within the CFMLB but are removed from the THLB; a total of 334 565 hectares were removed. The Ancient Forest/ Chun T'oh Whudujut Provincial Park and Protected Area, were established in 2016, after the development of the *Prince George TSA Data Package and Discussion Paper*.

Comments received during public review indicated concern that the establishment of the new park was not reflected in the base case. During establishment of the boundary for the new park timber supply analysis was conducted to assess potential impacts to timber supply. The new park and protected area encompass 11 120 hectares of CFMLB and 4497 hectares of THLB. Sensitivity analysis indicated that the base case can be achieved with the removal of the land base of the Ancient Forest/Chun T'oh Whudujut Provincial Park and Protected Area. Removal of the park and protected area has negligible impact on harvest flow for the TSA but does reduce the harvest from western redcedar-leading stands by 7500 cubic metres per year.

I am pleased to see the successful, community driven process to establish these high biodiversity ecosystems as reserves with highest levels of protection. I commend the collaborative work between stakeholders, First Nations and government agencies, and the dedicated volunteers who worked tirelessly

to help to preserve these rare inland temperate ecosystems. The park designation ensures this unique habitat will be protected from timber harvesting and other commercial activity, which helps preserve plant ecosystems, wildlife habitat and cultural values.

I accept that the removal of the Ancient Forest/Chun T'oh Whudujut Provincial Park and Protected Area from the THLB has a negligible effect on timber supply and I will not adjust my AAC determination for this factor. Refer to the '*problem forest types – cedar-leading stands*' factor for further discussion.

- *problem forest types*

Problem forest types are stands that are physically operable and/or exceed the non-productive site index threshold used to define the CFMLB, but are not currently utilized or have marginal merchantability and are considered uneconomic. Historically western hemlock and black spruce-leading stands have been excluded from the THLB as problem forest types in the Prince George TSA. For the purposes of this TSR western redcedar, deciduous and sub-alpine fir-leading stands were also investigated as problem forest types.

To assess current practice for use of species where utilization is historically marginal, FAIB conducted an assessment of harvest performance for these profiles. I used this information to inform my assessment of current practice.

- *western hemlock leading stands*

Western hemlock is at the northern extent of its range in the Interior Cedar Hemlock (ICH) biogeoclimatic zone within the Prince George TSA and experiences extensive rot when mature. Western hemlock-leading stands make up 32 544 hectares of the CFMLB. In 2016 a bioenergy opportunity was offered as a 10-year non-replaceable forest licence (NRFL) for 25 000 cubic metres per year in this stand profile. Ministry staff report that to date no harvest has occurred on this licence and to date no forest stewardship plan has been submitted for approval. In the base case western hemlock-leading stands were removed from the THLB.

I accept that current practice is that western hemlock-leading stands have marginal utilization within the Prince George TSA and were appropriately removed from the THLB. I note that removal of these stands from the THLB does not preclude future development of opportunities within these stands. If, in future TSRs, harvest performance is demonstrated in these stands the chief forester will consider whether or not they should contribute to the THLB at that time.

- *black spruce-leading stands*

Historically black spruce-leading stands have been removed from the THLB as a problem forest type. A review of harvest history determined both incidental harvest and substantial in-block retention of black spruce. In the base case the majority of black spruce-leading stands (94 percent) were excluded from the THLB based on other criteria, the remaining 8292 hectares (six percent) of these stands contributes significantly to stand-level retention. In the timber supply model stand-level retention for riparian and wildlife values was applied aspatially; refer to '*stand-level retention*' for further discussion. In order to avoid double-counting retention, these stands were not removed from the THLB.

I accept that current practice is that black spruce-leading stands have marginal utilization within the Prince George TSA and contribute to stand-level retention. I therefore conclude that THLB and the base case appropriately reflect current practice with regards to utilization of black spruce-leading stands.

- *western redcedar-leading stands*

Historically western redcedar-leading (cedar) stands have contributed to the THLB and base case for the Prince George TSA. Analysis of harvest performance indicates that harvest of cedar stands has occurred sporadically in the Prince George TSA between 1997 and 2016. Ministry staff indicate there has been no

significant recent interest in accessing cedar stands despite the opportunity provided by the current partition and apportionment.

Cedar is at the northern extent of its range within the ICH in the Prince George TSA, and trees typically have hollow shells and extensive rot. Many of the cedar stands are old (i.e., stands established more than 250 years ago). Over the past 10 years there has been heightened community awareness of the uniqueness of these interior temperate rainforest ecosystems and the associated old or ancient cedar stands, culminating in the establishment of the Ancient Forest/Chun T'oh Whudujut Provincial Park and Protected Area. Significant community opposition remains to harvest of any cedar stands in the Prince George TSA.

After the removal of the Ancient Forest/Chun T'oh Whudujut Provincial Park and Protected Area the even-flow contribution of cedar stands to the base case is 27 500 cubic metres per year.

In the 2011 AAC determination, in order to maintain biodiversity in the ICH in the Prince George TSA, the cedar partition was lowered to 23 000 cubic metres per year. Ministry staff note that there has been negligible performance in the cedar profile since TSR4, with the exception of incidental harvest for road development to access spruce leading stands in 2016.

As discussed previously, the recent establishment of Ancient Forest/Chun T'oh Whudujut Provincial Park and Protected Area, which is an important area for cedar (refer to '*Parks and protected areas*') reduces the THLB. However, the base case harvest projection can be achieved after removal of the Provincial Park and Protected Area. Otherwise, I have reviewed the information provided by FAIB and I recognize that harvest performance in cedar stands is marginal, which is consistent with the small contribution of cedar to the base case projection. Therefore, I accept that it is appropriate for the THLB to include cedar-leading stands outside of the new Provincial Park and Protected Area.

- *deciduous-leading stands*

Deciduous-leading stands are dominated by trembling aspen, paper birch and/or cottonwood. Historically deciduous-leading stands outside Vanderhoof Forest District have been included in the base case THLB. The current AAC includes a 160 000 cubic metre per year partition attributable to deciduous-leading stands. For this TSR, the base case includes a maximum even-flow harvest contribution of 400 000 cubic metres per year from deciduous-leading stands in the Prince George and former Fort St. James Forest Districts.

Harvest performance by licences specifically targeting deciduous-leading stands has averaged 21 000 cubic metres per year over the past 10 years. For this TSR, Ministry staff conducted an economic operability assessment for deciduous-leading stands. Staff collaborated with licensees to develop the assessment based on a review of harvest performance over the past decade, current economic environment as well as market demand for deciduous wood products. Sensitivity analysis tested the new deciduous operability parameters, which resulted in a maximum even-flow harvest contribution of 62 000 cubic metres per year from deciduous-leading stands. Reducing the contribution of deciduous-leading stands to 62 000 cubic metres per year, while maintaining the base case mid-term harvest level of 6.1 million cubic metres per year, results in a seven percent reduction in the base case short-term harvest level.

Comments received from licensees during public review indicate a continued interest in utilization of the deciduous-leading stand profile, which they expect to increase as forest management focus shifts away from salvage harvest of MPB-impacted stands towards alternative fibre sources. I also learned that in addition to utilization for oriented strand board, deciduous timber can contribute to bioenergy pellet production, and can also be utilized in a proposed biofuel initiative. This potential fibre usage within the Prince George TSA could support a significant number of jobs for local communities. This is encouraging; however, the economic operability assessment indicates that although a significant amount of deciduous fibre is available within the Prince George TSA, it is unlikely to be fully realized due to

transportation costs and fibre quality. In addition, analysis indicates there continues to be significant fibre available in MPB-impacted stands (refer to 'Bioenergy' factor for further discussion). I agree with Ministry staff that there is opportunity for improved utilization of deciduous-leading stands, but I encourage licensees to maximize utilization of remaining dead standing fibre in MPB-impacted stands before shifting to deciduous-leading stands that are potentially important contributors to mid-term timber harvest levels.

Deciduous-leading stands are highly important for non-timber values including: biodiversity, wildlife and song-bird habitat. First Nations express that these stands are dense with cultural values, and support traditional practices including as preferred hunting and trapping locations and as gathering sites for berries and medicinal plants. Due to their typical landscape position and habitat types these stands also often reflect higher densities of traditional trail networks and cultural infrastructure including camps and cabins. First Nations have expressed concerns regarding potential over-harvesting of these stands, which they express are integral to the exercise of their Aboriginal Interests.

Ministry staff have expressed that deciduous-leading stands also contribute significantly to meeting stand and landscape-level biodiversity objectives. Mature deciduous-leading stands are often identified for retention and are relied upon for winter cover by many species including moose. These stands also provide specialized habitat for wildlife such as elk, fisher, small mammals and songbirds. Deciduous-leading stands often provide anchors for wildlife movement corridors, and connectivity across the landscape. For these reasons, I expect that Ministry staff will continue to consider established biodiversity thresholds when developing tenure opportunities for licences specific to deciduous-leading stands.

I have considered the deciduous economic operability assessment conducted to support my determination. I conclude that deciduous-leading stands that do not meet the economic operability criteria should be considered problem forest types and therefore excluded from the THLB. Exclusion of the uneconomic deciduous-leading stands reduces the short-term timber supply by about seven percent or approximately 700 000-cubic metres per year. I will account for this in my determination as discussed in '**Reasons for Decision**'. It is reasonable to expect that exclusion of a large proportion of the deciduous stands that were in the base case THLB from contributing to my AAC determination, in addition to other land base exclusions from the THLB for specific values such as riparian buffers, wildlife habitat and biodiversity, addresses the concerns raised by First Nations and Ministry staff about the importance of deciduous-leading stands to non-timber values. If there is demonstrated performance in the deciduous-leading profile beyond the economic operability limits assessed by the Ministry staff, an increased contribution to the AAC from deciduous-leading stands may be considered in the future. I expect that Ministry staff will monitor utilization of deciduous-leading stands and deciduous fibre in order to inform future AAC decisions.

- *balsam-leading stands*

Historically subalpine fir (referred to herein as balsam) leading stands have contributed to the THLB and harvest projection. In this TSR balsam-leading stands which meet merchantability criteria were included in the base case THLB. Balsam-leading stands represent 17.3 percent of the volume within the THLB but they have contributed only 1.6 percent of all harvested volume within the Prince George TSA, according to data from the Harvest Billing System (HBS).

FAIB conducted an analysis of the frequency and distribution of balsam as a percentage of merchantable volume in cutting permits in the Prince George TSA since 1995, as recorded in ECAS. The data suggests that prior to the MPB epidemic, balsam was logged primarily as a "by-catch" during spruce/pine harvest, with little targeted harvest in balsam-leading stands. With the concentration of harvest in MPB-impacted stands over the past decade the harvest of balsam has declined appreciably.

There is significant volume in balsam-leading stands that contain more than 80 percent balsam in the Prince George TSA. The majority of balsam volume is located in the northern half of the Fort St. James District and occurs in near homogenous stands. In the Prince George District balsam volume occurs predominately in mixed stands with 50 to 70 percent balsam composition.

There are additional uncertainties related to merchantable volume in balsam-leading stands, these will be discussed further in the '*Volume estimates for natural stands*' and '*Non-recoverable loss*' factors.

Due to the significant mature volume available in these marginally economic stands, and the potential effects to timber supply, FAIB conducted sensitivity analysis to assess the contribution of balsam-leading stands to the base case. By applying the assumptions from the base case, the maximum even-flow harvest level for pure balsam stands ( $\geq 80$  percent balsam) is 385 000 cubic metres per year. If the harvest of pure balsam stands were set at this maximum even-flow harvest level, maintaining the mid-term harvest level of 6.1 million cubic metres per year would require a reduction of the short-term harvest level to 9.1 million cubic metres per year.

FAIB also conducted a sensitivity analysis to test the effects of removing all pure balsam stands from the THLB. Removing pure balsam stands reduces the THLB in the TSA by six percent (185 367 hectares). In order to maintain the base case mid-term harvest level of 6.1 million cubic metres per year the short-term harvest level is reduced by 29 percent to 7.2 million cubic metres per year.

I have discussed the potential implications of removing pure balsam stands from the THLB with Ministry staff; staff note that impacts to timber supply may be significant, but that due to the operational challenges and condition of these stands, it is unlikely that they will be developed in the foreseeable future. Ministry staff also indicate that these stands contribute to meeting landscape-biodiversity thresholds and their retention may also contribute significantly to the protection of other non-timber values including caribou and grizzly bear, refer to '*Landscape level biodiversity*', '*Caribou and Grizzly Bear*' and '*Unsalvaged losses*' for further discussion.

Through collaboration regarding the TSR with CSFNs, I heard concerns from Takla Lake First Nation regarding modelled harvest flow over time, which show large fluctuations in harvest levels in their territory in the short- and mid-term harvest periods. In order to reduce these fluctuations and the resulting socio-economic impacts to their communities, Takla Lake First Nation recommended that I establish a partition in their territory and require that harvest be distributed evenly across the pine, spruce and balsam profiles. Removing pure balsam stands reduces the THLB by 16.5 percent (141 437 hectares) in Takla Lake traditional territory.

I have considered the historical utilization of balsam-leading and pure balsam ( $\geq 80$  percent balsam) stands within the TSA and I agree with Ministry staff that current practice indicates marginal utilization of these stands. I conclude that pure balsam stands are problem forest types and should therefore be excluded from the THLB. Based on this information I conclude that the base case overestimates timber supply in the short term by 29 percent. I accept that removal of pure balsam stands from the THLB significantly affects timber supply projections for the TSA; however I believe that the stewardship risks to timber and non-timber values which result from overestimating the AAC by including the pure balsam stand profile are also significant. I also believe that excluding pure balsam stands from the THLB addresses some of Takla Lake First Nation's concerns about the potential for large harvest level fluctuations related to uneven utilization of all tree species in the THLB.

I will discuss pure balsam stands in '**Reasons for Decision**'. I am aware that salvage and sanitation harvesting of beetle-impacted stands will continue to affect harvest patterns in the short term, reducing the likelihood that pure balsam stands will be harvested. If, in subsequent TSRs, there is demonstrated performance in pure balsam stands, an increased contribution to the AAC by this stand profile may be considered by the chief forester at that time. I expect that Ministry staff will monitor utilization of all balsam-leading stands and balsam fibre in order to inform future AAC decisions.

- *Summary of land base contributing to timber harvest*

I have reviewed the analysis and netdown process used to identify the THLB. For this determination, I conclude that the best available information was used to estimate the THLB and is adequate for use in this determination, with the exception of the factors discussed above. Refer to '**Reasons for Decision**' for further discussion.

Existing forest inventory

The Prince George TSA has a standard Vegetation Resources Inventory (VRI) based on photography flown primarily from 1991 to 2010, updated and projected to March 2014. The VRI Phase I (photo interpretation) was completed in 2003 and the VRI Phase II and Net Volume Adjustment Factor (NVAF) programs were completed between 2005 and 2009. An audit of mature forest in the inventory was initiated by FAIB in the summer of 2014, sampling a random subset of inventory polygons to validate the VRI Phase I volume estimates; for this TSR mature volume estimates were adjusted based on the 2014 mature inventory audit findings.

The inventory data were updated to account for harvest depletions to March 2014 using the consolidated cutblock layer developed by FAIB; this data set utilizes harvest depletions from VRI Phase I and Reporting Silviculture Updates and Land Status Tracking System (RESULTS), supplemented with satellite-based change detection data to identify disturbances not recorded in the other data sources. Areas of large-scale natural disturbance resulting from wildfire were also depleted using information collected and maintained by BC Wildfire Service.

Stand volumes and other attributes were projected to 2014 using standard inventory procedures and growth and yield models.

Comments received during public review expressed concerns regarding the vintage, accuracy and precision of the existing forest inventory including volume, species and age estimates. I agree that there have been significant changes to the forests of the TSA since the base inventory information was collected, and there is related uncertainty in the base case; I have considered this uncertainty in making my AAC determination. A re-inventory for the Vanderhoof Forest District was initiated in 2013 and was completed in 2016 (well after the Prince George TSA TSR was underway), a re-inventory of the Fort St. James District was initiated in 2015 and is expected to be completed in 2018, and a re-inventory of the Prince George District was initiated in 2015 and is expected to be completed in 2020. Once complete, information from the re-inventory projects will be used in subsequent TSRs.

I am aware that the inventory is up-to-date to 2014, the time that the TSR Data Package was published. I have reviewed the information sources and process used to develop the existing forest inventory and conclude that the inventory, based on VRI Phase I, VRI Phase II and NVAF, with depletions applied from the consolidated cutblock data set and from the BC Wildfire Service is the best available information and is appropriate for use in TSR.

Expected rate of growth

- *volume estimates for natural stands*

For the base case all stands harvested prior to 1987 or not yet harvested are considered to be natural stands. In the base case the projected growth of natural stands was modelled using the variable density yield project (VDYP) v7 model, which estimates growth and yield from the stand attributes in the forest inventory. Natural stand yield curves were adjusted based on the comprehensive ratio adjustments for VDYPv7 processes. Adjustment ratios were developed from 186 ground samples measured in 2014/15 (100 VRI phase II ground samples and 86 Change Monitoring Inventory / National Forest Inventory ground samples). I have reviewed the process and sample strata with staff, I understand that the overall sample size is large, the adjustment ratios are reasonable and the sampling error is low.

The approach used to model secondary stand structure in the previous TSR (in support of the 2011 determination) was implemented again for this TSR. After the MPB outbreak there are stands with sufficient numbers of mature trees, saplings and seedlings that have remained alive and will regenerate into a fully stocked, mature, merchantable stand. Research shows that as overstorey trees die, nutrients, moisture and light become available and existing understory trees will respond and occupy the growing space. The base case simulates the growth and yield of remaining overstorey and understory in pine-leading stands (greater than 60 years old) with greater than 50 percent MPB mortality. The model applies a 10 year regeneration delay to the simulated understory, after which the understory contributes to stand volume proportional to the available growing space. Secondary stand structure follows natural stand growth and yield curves, and is assumed to be merchantable after 50 years of growth. Volume accruing from the understory is added to the volume from the overstorey to determine the total merchantable volume achieved for harvest queuing in the model. In the base case secondary stand structure contributes approximately 500 000 cubic metres per year to the harvest projection between years 50 and 100.

With regards to natural stand growth and yield I accept that volume estimates for natural stands were modelled using the best available information and are appropriate for use in TSR. I have reviewed the modelling assumptions and accept that there is significant uncertainty related to the development and merchantability of secondary stand structure. I accept that the process adequately estimates volume contribution for projected growth and yield for MPB impacted stands, and is based on the best available information. I will account for uncertainty related to the natural stand volume estimates with respect to inventory adjustments and secondary stand structure in my decision, as discussed in **‘Reasons for Decision’**.

I encourage Ministry staff to continue working with licensees and research institutes to study and monitor secondary stand structure development in MPB-impacted stands to prepare for more robust modelling in future TSRs. It is my understanding that the Ministry North Area Research team is contributing to several ongoing studies within the Prince George TSA. I encourage staff to continue this work and I look forward to the results and their future implementation in TSRs.

Ministry staff note that the consideration of secondary stand structure will become increasingly important as harvest focus shifts towards stands with lower and more recent MPB mortality. Staff indicate that future MPB salvage is likely to occur in mixed-species stands which are ecologically more favourable to spruce and balsam understory establishment. It is my expectation that licensees will follow the guidance provided in the Forest Planning and Practices Regulation, Section 43.1, Secondary structure retention in mountain pine beetle-affected stands in order to mitigate the effects to the mid-term harvest period. I recommend that Ministry staff work collaboratively with licensees to improve training and implementation of this regulation, emphasizing the importance of secondary stand structure to timber and non-timber values.

*- volume estimates for managed stands*

Growth and yield of managed stands is known to differ significantly from natural stands, as a result of silviculture practices. The *Forest Act Silviculture Regulation* was enacted in 1987; in the base case stands with a known harvest history originating in or after 1987 are considered managed stands. In the base case managed stand volume estimates were produced using Table Interpolation Program for Stand Yields (TIPSY) model version 4.3. As previously discussed, growth and yield for stands harvested prior to 1987 is modelled using VDYP7 (refer to *‘volume estimates for natural stands’*).

For stands established between 1987 and 2002 the free-growing survey provides the primary information source; stocking was based on the weighted average total stems per hectare and the natural option was employed in TIPSY. Due to the substantial natural ingress occurring in these stand types, genetic worth was not applied. For stands established after 2002 regeneration survey summaries provide the primary

information source; stocking is based on the area-weighted uncapped well-spaced stems per hectare; and genetic worth and the planted option were applied in TIPSY.

In 2014 the Young Stand Monitoring (YSM) program established 72 permanent sample plots within the Prince George TSA in stands between 15 and 50 years of age; 64 of these plots are in the THLB. FAIB conducted a preliminary assessment to test whether the growth and yield models adequately project the development of these stands by comparing projected field sample data to yield models used in this TSR. Results indicate that for stands established before 1987 the VDYP yield projections at rotation age are significantly lower than the projected yield from YSM field samples; while for stands established in or after 1987 the TIPSY yield projections at rotation age are similar to the projected yield from YSM field samples. I note that as the YSM program advances remeasurements will improve confidence with YSM growth and yield projections.

To test the sensitivity of the timber supply projection to changes in managed stand growth and yield projections FAIB conducted a sensitivity analysis to compare the base case to harvest projections using TIPSY projections for older managed stands. FAIB reviewed historical silviculture treatment information and YSM sample data and determined that stands established in or after 1980 could be appropriately projected using TIPSY. Changing the managed age definition from 28 years (1987) to 35 years (1980) increases the mid-term harvest level by 11.5 percent, and the model shifts to harvest managed stands approximately 10 years early. This shift to managed stands releases volume being held by the model for mid-term harvest, and may allow for an increased short-term harvest level. Results of this sensitivity analysis show that if the base case mid-term harvest level of 6.1 million cubic metres per year is maintained, the short-term harvest level can be increased by 29.7 percent. These results demonstrate that the base case is highly sensitive to the age at which existing young stands are considered managed.

I received comment from a member of the public expressing concern regarding the uncertainty around managed stand yield assumptions and the relationship to timber supply projections. Ministry staff note that when compared to field measurements from the YSM program, growth and yield projections using TIPSY are considered to be consistent with YSM projections, based on initial measurement data.

I have reviewed the methods and results for modelling managed stand volume estimates in the base case and in other sensitivity analysis prepared by FAIB. I have reviewed the YSM sample data with FAIB's growth and yield specialists. I accept that it may be appropriate to model managed stand volume estimates using TIPSY for stands established in or after 1980. I conclude that the base case mid-term harvest projection is underestimated by 11.5 percent, or alternatively that volume available for the short term may be up to 29.7 percent higher than in the base case. I acknowledge that there is uncertainty related to this assumption. I have considered this in my AAC determination and will discuss this further in '**Reasons for Decision**'.

Analysis conducted for this timber supply review demonstrates the importance of managed stand monitoring and the establishment of long term, statistically rigorous, repeated measurement programs such as YSM. This is even more important in management units that have been highly impacted by MPB and associated salvage harvesting, such as the Prince George TSA. I expect that the Ministry will continue to support the YSM program, to gather improved estimates of managed stand growth and yield to support the chief forester in future AAC determinations.

*- site productivity estimates*

In the base case, volume estimates for natural stands used VRI age and height while estimates for managed stands used the Provincial Site Productivity Layer (PSPL). The PSPL site index is a species composition weighted average value, estimated based on data from exiting ecosystem mapping coupled with site index estimated by Biogeoclimatic Ecosystem Classification Site Series (SIBEC).



In order to validate the site index estimates from the PSPL FAIB conducted an assessment comparing PSPL values to existing field data from projects including: YSM, previous local Site Index Adjustment projects and recent stand development monitoring. Results indicate that PSPL tends to underestimate site index for spruce stands by up to 10 percent. Sensitivity analysis indicates that adjusting the site index for spruce-leading managed stands results in an increase in timber supply in the long term. I have considered this in my AAC determination, as discussed in '**Reasons for Decision**'.

I have reviewed the methods and results of the assumptions regarding site index in the base case. I conclude that the site index estimates used in the base case generally reflects the best available information. However, preliminary results from the YSM program indicate that the PSPL may be underestimating the site productivity of managed spruce-leading stands. Stand measurement and monitoring through the YSM program are needed to improve site index estimates for managed stands. As the YSM program matures, sampling results will become more robust, and improved information will become available. As improved information becomes available it will be incorporated into future TSRs for consideration by the chief forester.

- *genetic gains*

The *Chief Forester's Standards for Seed Use* require the use of the best available seed when replanting Crown land. The use of Class A seed, which is produced by trees that are genetically superior, is one of several strategies for improving timber production in BC in the regeneration of forests. Class A seed is produced in seed orchards, where seedlots with a positive Genetic Worth for growth (GWg) or for resistance to pests and disease, are selected for breeding and seed production. Genetic worth may result in reduced stand establishment time and increased growth, which may in turn result in timber that is available for harvest sooner. Genetic worth values for openings regenerated by planting come from the Forest Improvement and Research Management Branch, Seed Planning & Registry Application database; values are provided for each species and have been prorated based on the values recorded in the RESULTS planting table.

In the Prince George TSA hybrid spruce Class A seed was introduced by 1993, with full implementation by 2001. Lodgepole pine Class A seed has been used, when available, since 1993, and Douglas-fir Class A seed has been in use as it has become increasingly available. In the base case GWg was applied to all stands established after 2002 where use of Class A seed is recorded in RESULTS. Due to substantial regeneration through natural ingress in stands established in or prior to 2002, GWg was not applied to those stands in the base case.

During public review a concerned citizen recommended that site and stand regeneration productivity improvements resulting from best silvicultural practices, including the use of Class A seed, should be incorporated into timber supply models. The use of Class A seed is mandatory where available, as per the *Chief Forester's Standard for Seed Use*; genetic gains were modelled in the base case where appropriate.

CSFNs expressed concern that seed selection is reducing genetic variability which they believe makes stands more susceptible to climate change effects and to insects and disease. They communicated a perspective that this reduced genetic variability will lead to decreased ecological resiliency throughout their traditional territories. I am aware that the Ministry's Forest Science and Tree Improvement programs, in collaboration with research partners, are focused on using science to inform management that will help ensure our forests are healthy, resilient and productive through the ecological transformations associated with climate change. This management framework includes best practices that will maintain ecological, species and genetic diversity at multiple scales and reforestation with species and provenances (seed sources) that are suitable to both today's and future climates. Ministry staff indicate that research by the Tree Improvement Branch, Forest Genetic Section shows wild-stand seed collections do not have appreciably more genetic diversity than orchard seed collections.

I have reviewed the methods and results used to model genetic worth. I accept that the assumptions regarding genetic gain in the base case reflect current practice. I will not make adjustments for this factor when making my AAC determination.

- *minimum harvestable age and volumes*

Minimum harvestable age (MHA) and minimum harvestable volume (MHV) reflect the time required for a stand to become merchantable. In the base case the MHA was identified as the age at which 95 percent of the maximum mean annual growth increment is first achieved. In the Prince George TSA the area-weighted mean 95 percent culmination age is 75 years. As well as reaching at least 75 years of age, stands must achieve 182 cubic metres per hectare to be eligible for harvest (refer to '*low productivity and non-economic stands*').

FAIB conducted a series of analyses to test the sensitivity of the timber supply to changes to MHV and MHA criteria; many of these analyses were presented in the *Discussion Paper*. In summary, analysis shows that the land base definition, harvest queue and harvest projection are highly sensitive to changes to merchantability assumptions, and the base case mid term could increase by up to 26 percent if lower MHV and MHA thresholds are realized in practice. However, doing so would extend the period until the full long-term timber supply is achieved.

Comments received from licensees expressed support for lowering MHV to 100 cubic metres per hectare, but cautioned against supporting an elevated mid-term harvest level by lowering the MHA threshold. The MHV and MHA thresholds applied in the base case represent current practice derived from a statistical assessment of harvest performance derived from ECAS. Analysis indicates there has been negligible harvest performance in stands with net volumes of less than 100 cubic metres per hectare by major licensees. Concerns were also expressed by licensees and members of the public that the thresholds applied in the base case could potentially limit the production of sawlog volume in the future. It is important to note that the base case represents a sawlog profile and incorporates current timber utilization standards as guided by the *Interior Timber Merchantability Specifications*.

North Central Guide Outfitters, the BC Trappers Association – Stuart Nechako Local (BC Trappers Association), a licensee and several concerned citizens expressed that harvesting at younger ages could lead to serious impacts to non-timber values including ecological integrity and wildlife habitat. Natural and managed forests, and their ability to provide functional habitat, change with time. An objective of forest stewardship is to retain habitat structure and function across the land base. Multiple strategies are used to achieve this objective including: landscape- and stand-level retention of old forests; habitat conservation and forest cover; and silviculture management regimes designed to meet wildlife habitat requirements.

Ministry staff state that every species within a regional ecosystem has evolved to take advantage of specific habitat conditions. Many of these habitat conditions are closely tied to the age, structural characteristics, and dominant tree species within a forest system. The amount and distribution of these habitat types will potentially influence abundance and distribution of species which rely on those habitats. The base case applies aspatial constraints to reflect established landscape-biodiversity thresholds (refer to '*Landscape level biodiversity*' for further discussion).

While I acknowledge the observations received during public review and the response provided by government staff I note that habitat conservation planning is not within the scope of the AAC determination. As stated in '*Guiding Principles for AAC Determinations*' I do not speculate on decisions that have yet to be made by government.

I have reviewed the analysis process and results and I accept that the minimum harvestable age and volume thresholds applied in the base case appropriately reflect current practice and the best available information. I will not make adjustments for this factor when making my AAC determination.

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

As noted in Table 2, I accept that the factors related to this section of the *Forest Act* were appropriately addressed in the analysis, and I will not discuss them further in this document.

**8(8)(a)(iii) Silviculture treatments to be applied to the area**

*- incremental silviculture*

Incremental silviculture treatments are carried out to maintain or increase the yield and value of regenerating forests beyond the free-growing stage. Examples include juvenile spacing, pruning, fertilization and commercial thinning. Fertilization and reforestation of MPB-impacted stands are two incremental silviculture systems which are employed in the Prince George TSA.

Fertilization of young- and mid-seral spruce and Douglas-fir leading stands was conducted in the Prince George District through the Forests for Tomorrow (FFT) program. Treatments were applied annually between 2005 and 2016, over an area of 52 000 hectares. These treatments are expected to increase the available volume in the mid-term harvest period by over 780 000 cubic metres in total. The base case does not include the additional volume gained through the FFT fertilization program. It is expected that continued investments in future forests through programs like FFT and implementation of integrated silviculture strategies will help to improve the mid- and long-term timber supply.

The FFT program has also invested in programs to reforest stands impacted by wildfire and MPB. Incremental silviculture treatments have included the removal of affected trees followed by tree planting and under planting of high mortality areas deemed unsuitable for full stand rehabilitation or harvest. Following treatment, stand information is updated in RESULTS and this was incorporated in the forest inventory information used in the base case.

Public review included comments from a concerned citizen and the District of Fort St. James which recommend expansion of basic and incremental silviculture programs to improve rehabilitation and regeneration of MPB- and wildfire- impacted stands. The Province provides funding for programs such as FFT, Forest Enhancement Society of British Columbia (FESBC), the Forest Carbon Initiative (FCI) and the BC Rural Dividend program to local forest dependent communities to promote the rehabilitation and regeneration of MPB- and wildfire-impacted stands. These programs were developed, in part, to benefit communities like the District of Fort St. James.

I have reviewed the growth and yield estimates resulting from incremental silviculture treatments and conclude that there is a small underestimation of the base case of 20 000 cubic metres per year in the mid-term harvest period. I will account discuss this factor in '**Reasons for Decision**'.

*- rehabilitation programs*

During the MPB epidemic research showed that some young managed pine-leading stands experienced mortality. Research observed mortality in stems as small as 12 cm diameter at breast height (DBH) and brood development in stems as low as 17 cm DBH. Mortality estimates applied in the base case, using the BCMPBv11 model, only considers stands greater than 60 years of age.

To support the 2011 TSR, surveys were completed in 2008 to assess total number of managed stands impacted by MPB. Beetle attack was summarized by age class and landscape unit and this information was included in the harvest projection by adjusting growth and yield assumptions for these stands. The FFT program has continued to monitor mortality in young pine stands, results are consistent with the assumptions developed for the 2011 TSR. Ministry staff note that some of the overall impact of MPB to managed stands will be mitigated by rehabilitation programs but the benefit will not be realized until the long term.

A comment received from a licensee recommended the application of innovative approaches to making low salvageable volume stands economically viable. Government promotes the rehabilitation of MPB- and wildfire-impacted stands. The FFT program for reforestation and the Forest Enhancement Society of BC are examples. I encourage interested licensees to utilize these opportunities and work with Ministry staff to support ongoing efforts to rehabilitate these naturally disturbed stands.

I accept that the modelling of rehabilitation programs appropriately reflects current practice and I will not make adjustments for this factor when making my AAC determination.

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

*- utilization standards and compliance*

Licensees are required to meet merchantable timber specifications through legislative and licensing requirements. In the Prince George TSA the Interior Timber Merchantability Specifications are established in the *Interior Appraisal Manual*. The prescribed utilization standards were applied when generating growth and yield information for managed and natural stands used in the base case. Ministry staff confirm that the utilization standards in the base case reflect current practice.

The Regional District of Vanderhoof requested that additional sensitivity analysis be completed to assess impacts of lowering utilization thresholds. I encourage licensees to optimize fibre utilization. I have reviewed the harvest performance assessment and received input from Ministry staff and I understand that there is little to no evidence to indicate that alternate utilization standards would significantly affect the base case.

I accept that the utilization standards applied in growth and yield modelling for the base case reflect current practice and I will not make adjustments for this factor when making my determination.

*- decay, waste and breakage*

Factors are applied to VDYP7 yield projections for natural stands to model decay, waste and breakage, which is not generally economic to recover during harvest operations. The volume adjustments applied in the VDYP7 yield curves are based on an extensive sampling program.

The base case does not consider increased amounts of decay, waste and breakage relative to shelf life implications in rapidly expanding spruce beetle-impacted stands. Therefore, there is potential that yield estimates used in the base case overestimate the actual recoverable fibre in those stands. There is a high level of uncertainty surrounding this factor at this time, but preliminary information indicates that the base case harvest projection may be overestimated, but with a high degree of uncertainty.

During public review I received comment from a concerned citizen regarding air pollution from burning of waste piles. The regulation of air pollution is overseen by the Ministry of Environment and is outside of my jurisdiction. The amount of harvesting waste is regulated by utilization standards, Ministry staff report that increasingly waste is being utilized by the pulp and bioenergy sectors; also that the Ministry is exploring options to maximize the utilization of fibre within the Prince George TSA.

I accept that the decay, waste and breakage assumptions applied in growth and yield modelling for the base case reflect current practice, with the exception of spruce beetle stands, as discussed above. I will consider this uncertainty in my AAC determination as discussed in '**Reasons for Decision**'.

**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**

*- land and resource management plans*

Three Land and Resource Management Plans (LRMPs) cover the Prince George TSA and were completed with significant public involvement and approved by the BC Government; Vanderhoof was completed in 1997, Prince George and Fort St. James were completed in 1999. The three LRMPs continue to be implemented as guidance by government agencies and resource proponents. A number of important values, (i.e. including: ungulate winter range, landscape-level biodiversity and scenic areas) that were identified in the LRMPs are now subject to established objectives. In addition, protected areas that were identified in the approved LRMPs have since been enacted.

During public review the Prince George Backcountry Society expressed a concern that the LRMPs are outdated and of low relevance, and recommended that the plans should be updated and any impacts of updates should be reflected in future AACs. I have heard from Ministry staff that the LRMPs have guided the implementation of resource management objectives including: wildlife habitat areas (WHA), visual quality objectives (VQO), ungulate winter range (UWR) and old growth and biodiversity management objectives since their establishment. Implementation of management objectives for non-timber values is ongoing and adaptively managed.

In determining the AAC for the Prince George TSA, I have considered the requirements in established orders and, to the extent reflected in current management, I have considered the other provisions of the LRMPs. I accept that the base case reflects current practice regarding LRMPs and I will not make adjustments for this factor when making my AAC determination.

*- cultural heritage resources*

Archaeological values, which are managed under the *Heritage Conservation Act* (HCA), and archaeological sites are physical evidence of how and where people lived in the past. The provisions of the HCA apply whether sites are located on public or private land. A variety of archaeological tools are used in the Prince George TSA: Archaeological Inventory Studies (AIS), Archaeological Impact Assessments (AIA), Preliminary Field Reconnaissance (PFR), Traditional Use Studies (TUS), and Archaeological Overview Assessments (AOA).

The *Forest Act* defines a cultural heritage resource (CHR) as an object, site or location of a traditional societal practice that is of historical, cultural or archaeological significance to British Columbia, a community or Aboriginal people. CHRs are managed through FRPA. CHRs include traditional use features that are associated with past and current Aboriginal use, and may include; hunting grounds, fishing areas, travel corridors and camp/seasonal village sites.

Features associated with past and current human use, including Aboriginal use are found throughout the Prince George TSA. First Nations have advised the Province of the importance of managing for CHR, in part since traditional diets are based on numerous plant foods and animals. In addition plants, fungi and animals provide a wide range of important material resources for fuel, tools, medicine and transportation. First Nations express that their belief systems, art, songs and ceremonies are dependent on the biodiversity of the landscape. Past and current Aboriginal culture is closely associated with the network of ancient and modern trails and cultural infrastructure. Aboriginal peoples have a long history of cultural resource use in their territories as evidenced by archaeological sites, structural features, heritage landscape features and traditional use sites. This factor considers both resources that are strictly archaeological and resources that are not exclusively archaeological (e.g., sites with ongoing traditional uses, including sacred sites).

I understand that licensees have been working with First Nations through operational planning processes to conserve CHRs while minimizing the effect on timber production. I also understand that it is current practice when new archaeological sites are identified through operational planning processes involving First Nations and licensees, to mitigate impacts by modifying blocks or excluding areas from timber harvesting.

In order to account for known archaeological resources, a gross area of approximately 10 300 hectares was excluded in the derivation of the THLB. These areas were identified using the mapped polygon information from the FLNRO's Remote Access to Archaeological Data (RAAD) website. This database is updated with new information on a monthly basis. A review of RAAD data set indicated that over the past five years in the Prince George TSA, 226 new archaeological sites were identified, with a total area of 122 hectares. Although archaeological sites identified following an AAC determination are accounted for at the time of the next determination, protection of the sites during operations begins as soon as they are identified.

The Lheidli T'enneh First Nation and the Ministry of Forests signed a Memorandum of Understanding (MOU) in 1994 that provides a procedural framework for mutual cooperation with respect to resource management within the Lheit-Lit'en First Nation Management Area (Ice Mountain Sacred Area). This area encompasses 53 154 hectares (8380 hectares of THLB) within the Herrick Creek Local Resource Use Plan (LRUP) area, and is also known as the Herrick Sacred Area. This area was subsequently referenced in the Prince George LRMP; licensees have not applied for development permits in this area in the 23 years since the MOU was ratified. Licensees acknowledge that, in addition to cultural significance, the area contributes significantly to meeting landscape biodiversity objectives. To simulate current management of the Herrick Sacred Area, in the base case a constraint was applied to the Herrick Sacred Area which prevented harvesting for the full planning horizon.

Ministry staff indicate that there are several voluntary no-harvest areas which have been in place over time. Information provided by First Nations during consultation and information sharing has led to no harvesting occurring in some areas. I am pleased to hear that government and licensees are conscious and respectful of culturally important sites when planning for forest development. Ministry staff also note that as forest operations within the Prince George TSA shifts into previously undeveloped areas, more areas may be voluntarily avoided by forest operators.

First Nations expressed concern that the THLB does not account for all culturally sensitive areas and areas of special interest of which the government is currently unaware. I have also heard concerns from First Nations that if sacred and/or culturally significant areas are identified, operations will simply shift to other sensitive areas within their territories; that all of the lands in their territories are culturally important, and the health of their lands, water and air is directly linked to the health of their communities.

I acknowledge the concerns, and I encourage First Nations to continue to work with government and forest licensees, through cumulative effects and collaborative planning initiatives such as the Environmental Stewardship Initiative (ESI) Omineca Demonstration Project ([see '*cumulative effects*' for more discussion on the ESI), to establish formal government protection for sacred and culturally significant areas. As discussed in '*Guiding Principles for AAC Determinations*' I do not speculate on land-use decisions that have yet to be made by Government. In the absence of direction from Government regarding land use in sacred and culturally significant areas, and in recognition that my statutory authority in determining AACs does not include the establishment of land use objectives, additional areas which are not Government designated areas were assumed to be available for harvest in the base case.

In addition to the Province's information sources, I met with TI'azt'en First Nation regarding *Neyun Huwuts'inli - Taking Care of Our Land*, the land use plan (LUP) developed by the TI'azt'en Natural Resources Department, and affirmed by band council resolution in February 2017. I heard that the TI'azt'en LUP was developed through community engagement and traditional knowledge gathering, and

identifies areas of cultural and biological significance with the objective of managing the land in order to sustain the Tl'azt'en seasonal round.

Tl'azt'en's LUP contains information about culturally significant areas, recommended management strategies and prioritization regarding resource development in the Nation's traditional territory. Identified values where mitigations have been recommended include; food fisheries watersheds, riparian management zones, fisheries sensitive watersheds, grizzly bear management zones, biodiversity management zones and moose management zones. It is my understanding that Tl'azt'en First Nation's Natural Resource Department staff have been meeting with forest licensees to share their LUP and to collaborate regarding forest management and planning to incorporate the LUP management strategies. Ministry staff confirm that many licensees who operate within Tl'azt'en territory are incorporating these management strategies into forest planning and operations. Additionally, Ministry staff indicate that they are working collaboratively with Tl'azt'en on the proposed Tl'oba grizzly bear wildlife habitat area and on proposed fisheries sensitive watersheds. I am pleased to hear that Ministry staff and licensees are collaborating with Tl'azt'en to implement their LUP management objectives. I would like to commend Tl'azt'en for the work they have completed to improve the available information about their interests in the TSA land base, and I encourage the sharing of information with the provincial government and licensees to continue. Refer to '*wildlife, ungulate winter range and wildlife habitat areas*' and '*fisheries sensitive watersheds*' for further discussion regarding collaborative implementation of the Tl'azt'en LUP.

I understand that several other First Nations are developing land use and/or stewardship plans for their territories. I encourage government, forest licensees and other stakeholders to familiarize themselves with these land use and/or stewardship plans when they are available, and to work collaboratively with First Nations to implement their management objectives where applicable and practicable. I expect Ministry staff to monitor and report to the chief forester regarding the status and implementation of First Nations stewardship plans. If or when management objectives result in changes to current practice which significantly impact timber supply, I am prepared to revisit this determination sooner than the 10 years required by legislation.

I am aware that archaeological and cultural heritage resources are often able to be managed during the operational planning process that provides for consultation and adaptations at the cutting permit level. However, there is a high likelihood that additional sites will be identified, and the potential isolation of some stands by licensees accommodating First Nations interests suggests that the management of these areas could have an effect on timber supply. In order for this effect to be quantified and accounted for in an AAC determination, the location and extent of known culturally sensitive sites (and new sites as they are identified) needs to be made available to Ministry staff.

I have considered the assumptions for archaeological and cultural heritage resources used in the base case and the input provided by First Nations, as well as the direction provided by the provincial government. From this I conclude that although it may be viewed as incomplete, the best available information was used in the base case. As discussed under '**Implementation**', I encourage Ministry staff and licensees to work collaboratively with First Nations to improve the identification and mitigation of impacts to cultural heritage resources. The new information and any changes in land use or management objectives will be addressed in the subsequent TSRs.

*- landscape-level biodiversity*

Established biodiversity objectives for old forest included in the *Order Establishing Landscape Biodiversity Objectives in the Prince George TSA* (also referred to as the landscape biodiversity order [LBO]), established old growth management areas (OGMA) and other areas identified for retention for the purposes of old forest conservation (old forest retention areas) were accounted for in the base case. Spatially delineated OGMAs and old forest retention areas were removed from the THLB. The aspatial old forest retention thresholds established in the LBO were modelled implicitly, wherein the model

retains or recruits to meet old forest thresholds on a priority basis; first by retaining old forest in the non-contributing land base, second by retaining old forest in the THLB and third by recruiting mature stands on an oldest first basis. Ministry staff note that a review of the analysis indicates that the method applied to meet old forest thresholds established under the LBO was effective throughout the modelling horizon.

In addition to retention thresholds for old forest, the LBO also includes retention thresholds for old interior forest and a requirement for a trend toward targets for young patch size distribution; these additional targets and thresholds were not modelled in the base case. The retention of old interior forest is monitored and reported by the government and licensee Landscape Objectives Working Group annually and young patch size distribution targets are monitored and reported every five years.

A licensee commented that it is important to minimize the restrictions to the THLB in order to maximize the economic benefits to communities, with the recognition of the importance of non-timber values. They recommended exploring the potential mitigating effects of establishing reserves with overlapping non-timber values. The Province is aware of the importance of co-location when establishing spatial reserves. The processes used to delineate and establish OGMAs and spatial old forest retention areas did and does consider overlapping values. In the base case co-location is explicitly considered, non-contributing old forest is prioritized by the model to meet the aspatial old forest retention thresholds before impacting the THLB.

A concerned citizen remarked that meeting the LBO would present some challenges which may affect the AAC, and recommended the implementation of stronger consequences for missing biodiversity targets. Compliance with the LBO is required for landscape-level biodiversity objectives and is therefore considered current practice. Forest licensees and BCTS provide annual reporting with regards to the thresholds established under the Order. The LBO allows flexibility to manage for catastrophic events and recruitment strategies. The thresholds in the LBO were established to provide a balance between economic and stewardship values.

Through collaboration with CSFNs regarding the Prince George TSA TSR, additional biodiversity focused sensitivity analysis was completed. The objective of the analysis was to test the potential effects of increasing old forest retention thresholds to reflect natural range of variability (NRV) research conducted by government (refer to DeLong 2012). The CSFNs expressed concerns that the thresholds established in the landscape biodiversity order are too low to maintain the ecological integrity of their traditional territory and therefore result in potential risk to their ability to meaningfully exercise their Aboriginal Interests including: hunting, gathering and trapping. The sensitivity analysis demonstrated that increasing old forest retention thresholds to minimum, median or maximum natural range of variability (NRV) levels results in significant impacts to the short-, mid- and long-term harvest levels; impacts ranged from 18 to 40 percent downward pressure on the mid-term harvest level.

Implementing a maximum NRV policy for old growth management would require an immediate drop in harvest of 60 percent in the short term and 40 percent in the mid term. Under the maximum NRV scenario, simulated harvest in the Prince George TSA is concentrated in the Omineca natural disturbance unit, in the traditional territory of Takla Lake First Nation. Under this scenario, simulated harvest is also concentrated in caribou core and matrix habitat.

Sensitivity analysis presented to CSFNs also explored retention of interior forest in units with the least old interior forest condition, resulting in an impact of a 9 to 19 percent downward pressure in the short-term harvest level and no significant mid- or long-term effect on timber supply. Additional analysis explored the alternative management scenario of applying constraints to the amount of young seral forest in order to promote the retention of old forest. The analysis results show a five percent reduction to the base case mid-term harvest level.



The Province is working with the CSFNs on the ESI which is a collaborative cumulative effects assessment, management and monitoring framework. Forest biodiversity is one of three Valued Ecological Components (VEC) identified through consensus. The forest biodiversity cumulative effects assessment incorporates indicators for old forest, young natural forest, large live trees and snags, grizzly bear, caribou, furbearers (marten) and riparian function. One management response option under consideration by the ESI project team is to spatially locate reserve areas to address forest biodiversity assessment results. Refer to ‘*cumulative effects*’ for further discussion regarding ESI. Any changes to forest management that result from the ESI project and are reflected in new requirements under legislation will be considered in subsequent TSRs.

I have reviewed the methods and results applied in the base case with regard to established OGMAs and old forest retention areas as well as aspatial old forest thresholds in the *Order Establishing Landscape Biodiversity Objectives in the Prince George TSA*. I accept that the base case appropriately accounts for established old forest management objectives, but does not account for old interior forest requirements or young patch size distribution trends contained in the landscape-biodiversity order, resulting in an unquantified overestimation in the base case short-term harvest level. I will account for this in my AAC determination as discussed in ‘**Reasons for Decision**’.

- *stand-level retention*

Stand-level retention refers to unharvested area associated within individual cutblocks. In order to determine current management practices FAIB conducted an assessment of retention practices. The FAIB analysis was based on the Forest and Range Evaluation Program (FREP) Stand-Level Biodiversity data from 2006 to 2014. The FREP data was validated against BC Timber Sales retention data and the RESULTS dataset to ensure that it represents retention across the Prince George TSA. The retention estimate includes areas occupied by riparian retention, grouped wildlife tree retention, as well as retention for the protection of forest values including archaeological features and site-specific habitat features. An aspatial stand-level retention reduction factor of 9.5 percent was applied in the base case to the merchantable volume for each hectare in the THLB.

As part of collaboration with CSFNs regarding the TSR, an analysis was conducted to examine current retention practices at the stand- and landscape-levels relative to *Guidance on Landscape and Stand-level Structural Retention on Large-scale Mountain Pine Beetle Salvage Operations* (Snetsinger 2005). The analysis used an analysis methodology first implemented in *Biodiversity Conservation During Salvage Logging in the Central Interior of BC* (FPB 2009), and an age threshold for young managed forest of 30 years. The analysis found that openings smaller than 100 hectares predominantly met or exceeded the chief forester’s guidance while larger functional openings predominantly retained less timber than recommended in the guidance. The patch and retention analysis suggests that MPB salvage harvesting has created large, continuous harvested areas of uniform age with less planned retention of mature and old forest than recommended. These large (>1000 hectare) and very large (> 10 000 hectare) amalgamated functional openings are the cumulative landscape-level result of stand- and cutblock-level decisions. The rate at which these young-seral functional openings are being created, and their size, may be inconsistent with natural disturbance patterns, and may pose increased risk to non-timber values including biodiversity, wildlife and watershed health.

However, analysis shows that stand-level retention increased after the guidance was released. In addition, there is opportunity for increased retention if remnant intra-patch mature forest areas are designated as reserves. Designation of intra-patch mature forest as stand-level retention areas in large and very large functional openings would increase mean retention in these patch categories of from 8 to 14 percent, which is still well below the 25 percent recommended best practice in the chief forester’s guidance.

During public review several comments were received that relate to stand-level retention:

- North Central Guide Outfitters recommended that the chief forester needs to consider options that do more to reduce the risks to wildlife and biodiversity from those associated with the base case, and suggested that declines in ungulate populations are due to MPB salvage harvesting. They also expressed concerns regarding diversity differences between mature natural and mature managed forests;
- BC Trappers Association referred to research and reports that indicate the importance of coarse woody debris for furbearer habitat and forest health. The Association also recommended operational strategies to increase stand-level, biodiversity including the establishment of a variety of sizes of retention patches;
- A guide outfitter and trapper from the Vanderhoof District stated that past overharvest of timber has resulted in a large scale habitat loss which has impacted the guiding and trapping industries. The commenter linked large disturbances to low densities of moose and fur bearing animals and expressed concern that at this time there is very little merchantable timber left in their guiding area and trapline;
- A guide outfitter commented that he has been impacted by the limited area of mature timber remaining in his guiding territory as well as a lack of road deactivation; and,
- North Central Guide Outfitters expressed strong concerns that in the future, forest over 80 years of age will only be found in parks, riparian areas, OGMAs, ungulate winter ranges and on slopes too steep or rocky to log.

Similar comments were also heard from First Nations. The CSFNs expressed concern that stand-level retention reflected in current practice is not sufficient for riparian and wildlife ecological integrity. First Nations expressed that maintenance of biodiversity, by retaining a range of ecosystems that support the fish, wildlife and plants that First Nations traditionally use, is important to their Aboriginal Interests to hunt, fish, trap and gather.

I appreciate the input from First Nations and other stakeholders regarding biodiversity and stand-level retention. The MPB epidemic was an unprecedented event. I am concerned regarding the possible risks to biodiversity and other non-timber values that have resulted from the infestation and from salvage harvesting of MPB impacted stands. Stand-level retention in large and very large functional harvest openings falls short of the chief forester's guidance. This is unfortunate, and I understand that this has accumulated over time. As we reach the end of MPB salvage harvesting, it is time to shift the stewardship focus to recovery and rehabilitation of non-timber values.

I have reviewed the stand retention analysis methodology and results. I accept that the retention assumptions applied in the base case adequately reflect current practice in the Prince George TSA. I note that the base case applied a stand-level retention reduction based on current practice from FREP and RESULTS, and is not necessarily based on best practice as presented in the chief forester's guidance for retention in large scale salvage operations.

I understand that analysis by FAIB shows that smaller openings predominately met or exceeded the chief forester guidance; however, larger openings predominately retained significantly less that what has been recommended, even when considering intra-patch mature timber, that is not currently designated as retention. I conclude that increasing retention to the levels recommended in the chief forester's guidance would result in an unquantified reduction in the base case mid-term level. There is also an unquantified impact to the short- and mid-term harvest level if intra-patch remnant mature stands in large and very large functional openings are designated as retention. I will account for this in my determination as discussed in '**Reasons for Decision**'.

It is my expectation that in the future, during further MPB salvage harvesting as well as in spruce beetle sanitation and salvage harvesting, that best practices for stand-level retention will be developed and all licensees will adhere to those practices. As discussed under ‘**Implementation**’, I expect Ministry staff and licensees to engage collaboratively with First Nations to develop a plan for retention which considers stand- and landscape-biodiversity aspects and strategies to continue to meet recommended stand-level retention thresholds following the chief forester’s guidance. The plan should also include strategies to rehabilitate the land base where retention is deficient which may include permanent retention of intra-patch mature timber.

*- fisheries sensitive watersheds*

A fisheries sensitive watershed (FSW) is a designation under the FRPA Government Actions Regulation (GAR). It has associated objectives which describe desired conditions for that specific watershed. To be considered an FSW, a watershed must have significant fisheries values as well as inherent watershed sensitivities. As such, they are the watersheds that require special management to:

- Conserve natural hydrological conditions, natural stream bed dynamics and stream channel integrity;
- Conserve the quality, quantity and timing of water flow consistent with the needs of fisheries values; and,
- Prevent cumulative hydrological effects that would have a material adverse effect on fish and fish habitat.

There are three established FSWs in the Prince George TSA. Constraints to model these requirements were applied in the base case.

Comments regarding FSWs were received during public review. North Central Guide Outfitters expressed concerns that objectives for designated FSWs were developed with the assumption that surrounding forests would include a mix of seral stages. They expressed concerns that these designated areas would no longer be able to achieve conservation objectives if they are surrounded by young seral forest. Ministry staff note that the two criteria (fisheries values and inherent watershed sensitivities) driving the identification and establishment of a FSW are specific to the watershed for which the designation is proposed and/or established. As such, the functionality and conservation objective for a FSW is not affected by the spatial and/or temporal arrangement of the age classes of the area outside of its boundary.

A licensee recommended that relaxing harvesting constraints for non-timber values including visual quality, old-growth retention and FSWs in areas that have been severely damaged by spruce beetle could result in a smaller overall impact on timber supply. The writer commented that this would offset the need for changes in minimum harvestable age and volume. Although I understand that areas with non-timber management objectives contain significant timber volume, relaxing the operational restrictions in partially protected forests may increase risk to other values supported by the forested land base.

Ministry staff have informed me of 17 proposed FSWs. The process to establish these FSWs is near completion and staff expect to present management objectives to the statutory decision maker imminently. Sensitivity analysis indicates that if these FSWs are approved the base case mid-term harvest level would be reduced by one percent.

TI’azt’en First Nation informed me that nine of the proposed FSWs are identified in the TI’azt’en Land Use Plan, and have been collaboratively developed with the Ministry. These watersheds have important subsistence food fisheries and are culturally significant. Ministry staff have worked with TI’azt’en Natural Resource staff, subject matter experts and other stakeholders to design proposed management objectives to include in the GAR orders and to recommend to the delegated decision maker.

I have reviewed the methodology and results and conclude that the base case appropriately applied harvesting constraints for the management objectives for the existing, established FSWs and therefore reflects current practice. I will not adjust the base case timber supply projection for this factor. Ministry staff have communicated that designation for the 17 proposed FSWs is currently being pursued; at the time of this determination, the designations have not been finalized. As discussed in *'Guiding Principles for AAC determinations'* I cannot speculate in my determination on land-use decisions that have yet to be made by government. Impacts to timber supply from any new FSWs established following this decision will be considered by the chief forester in future TSRs. Given sensitivity analysis results that showed a total impact of one percent, this factor does not present a high level of risk to this determination.

- *wildlife, ungulate winter range and wildlife habitat areas*

The Prince George TSA provides habitat for a wide variety of fish and wildlife populations such as but not limited to:

- Ungulate species including: caribou (mountain and northern ecotypes), moose, mule deer, elk, mountain goat and bighorn sheep;
- Large predator species including: black and grizzly bear, cougar, wolverine, wolf and coyote;
- Furbearer species including: fisher, marten, ermine, lynx, weasel, otter and beaver;
- Freshwater and anadromous fish species including: Nechako white sturgeon, several species of salmon, bull trout, rainbow trout, whitefish, char, arctic grayling, and burbot; and,
- Numerous additional wildlife species including: small mammals, reptiles, amphibians, raptors, waterfowl and songbirds.

In addition to spatial and non-spatial landscape and stand-level biodiversity requirements, government uses a variety of management designations and practices to protect wildlife habitat and populations, including ungulate winter range (UWR) and wildlife habitat areas (WHA).

UWRs are established under a FRPA GAR Order for areas that contain habitat that is necessary to meet the winter requirements on an ungulate species. UWRs are spatial habitat designations with corresponding general wildlife measures that provide management direction. General wildlife measures for UWRs may involve exclusion of timber harvesting and roads, and requirements for maintenance of specified forest conditions. Currently, eight UWRs are established in the Prince George TSA, and are reflected in the base case; one for the management of mountain goat, three for the management of caribou, and four for the management of mule deer. The total area occupied by UWRs in the Prince George TSA is approximately 1.1 million hectares, of which 281 000 hectares of Crown forest is designated as no harvest, all of which was removed from the THLB. Approximately 100 000 hectares within the UWRs are subject to conditional harvest requirements to maintain specified forest cover conditions, which with one exception noted below were reflected in the base case.

The GAR order for UWR-7-026 was approved by the Omineca Regional Executive Director (RED) in June 2016, with the intent to protect and manage 40 000 hectares of core high elevation winter habitat for northern caribou. The UWR also includes 100 000 hectares of low elevation moose winter habitat within a conditional harvest zone. This specified area was included to manage an important component of predation risk to caribou, and is consistent with management guidance within the federal *Recovery Strategy for the Woodland Caribou, Southern Mountain Population*. This UWR was established after the development of the Prince George TSA data package and is therefore not reflected in the base case.

WHAs are established under FRPA GAR Orders for species designated as Identified Wildlife. These are spatial habitat designations with corresponding measures that provide management direction. General wildlife measures for WHAs may include no harvesting and/or no roads and/or maintenance of a specified forest condition. They may identify both core areas and associated management zones, or may restrict the timing of certain forestry-related activities. There is one existing WHA in the Prince George TSA to protect a mountain caribou mineral lick, which was excluded from the base case THLB.

TI'azt'en First Nation and Ministry staff have informed me about the draft TI'oba grizzly bear WHA that they have collaboratively developed in accordance with culturally and biologically significant habitat features. This WHA is identified in the TI'azt'en Land Use Plan and Ministry staff have worked with TI'azt'en Natural Resource staff and subject matter experts to survey, delineate and develop management objectives to recommend to Ministry decision makers. Ministry staff indicate that the process to establish the GAR order is underway, and they expect to present management objective packages to the decision maker within the year. Staff note that the proposed TI'oba WHA is entirely within the proposed TI'azt'en FNWL and was a consideration during the process to identify the proposed FNWL land base.

Extensive feedback regarding wildlife values was received during the public review period.

- North Central Guide Outfitters inquired regarding habitat suitability matrix analysis which was completed for the 2011 TSR. The Habitat Suitability Matrix incorporated in that TSR was a coarse-scale analysis that reflects changes to forest age over time and was replaced for this TSR with species-specific analyses of caribou and grizzly bear that were developed as part of collaborative work with CSFNs. Information regarding species specific analysis can be found in the '*Caribou and Grizzly Bear*' factor, later in this document.
- A member of the public expressed concern regarding landscape-biodiversity objectives, linking those objectives to declining moose and goshawk populations, and expressed a need for a moose strategy. North Central Guide Outfitters also expressed concerns regarding development affecting moose populations. With respect to Northern goshawk, Ministry staff indicate that that species is not of specific management concern in the Prince George TSA at this time. Omineca Region moose inventory work is currently ongoing and scheduled for completion 2017/18. A Provincial moose research project also is underway. Information from these processes will be used to inform the establishment of new UWRs in the Prince George TSA. Once established these new requirements will be accounted for in future AAC determinations.
- Comments were received from a trapper, a concerned citizen and the BC Trappers Association, expressing concerns that past and future harvesting has and will have a massive impact on their tenures in the Prince George TSA. Their comments indicate that they are committed to sustainable use of all valuable forest resources; however, they express concern that other values supported by the forest are not addressed in the analyses presented in the discussion paper, and suggest that all scenarios presented in the report will have severe impact on other forest values such as furbearers and ungulates. I appreciate the feedback from non-timber tenure holders regarding effects of timber harvesting on their tenures. In making my AAC decision I account for established management objectives. As described in '*Guiding Principles for AAC Determinations*' I cannot speculate regarding land use and management objectives that may be established in future by other statutory decision makers. Ministry staff indicate that work is currently underway in Omineca Region to establish additional WHAs and UWRs. Once established these new requirements will be accounted for in future TSRs.
- Comments were received with questions pertaining to whether block size, green-up and adjacency restrictions would once again be implemented. These commenters also expressed concerns related to road density in salvage harvest areas and impacts to the landscape and to wildlife species. Requirements for block size, green-up and adjacency are included in FRPA, and are included in licensee Forest Stewardship Plans. It is my understanding that harvest in the Prince George TSA is currently focused on salvage and sanitation harvest, under which exemptions from requirements for block size, green-up and adjacency are available under the *Forest Planning and Practices Regulation*. The effect of roads created by forestry development on wildlife such as grizzly bear is not addressed in the base case. Through collaborative work with the CSFNs, sensitivity analysis was completed to assess the potential effects of modelled future forestry development and associated roads on grizzly bear populations in the Prince

George TSA. The results of this analysis are discussed further in this document under the ‘*Caribou and Grizzly Bear*’ factor.

- A licensee provided comments recommending sensitivity analyses to determine the opportunity to account for multiple and overlapping non-timber values, in recognition that multiple tools are available to manage non-timber values without reducing the THLB. The TSR and AAC decision are a reflection of current management practice and established land use and management objectives, and comprehensive land-use planning is outside of my statutory authority under the *Forest Act*. Timber supply projections prepared to support my AAC determination reflect the established requirements for non-timber values. As discussed in ‘*landscape-level biodiversity*’ staff confirm that co-location of non-timber values has been considered during the establishment of spatial reserves and is implicitly accounted for in the base case with the applied methodology for the aspatial landscape-level biodiversity objectives.
- Comments from BC Trapper’s Association, guide outfitters and concerned citizens referenced the report from Minister Morris entitled, *Getting the Balance Right: Improving Wildlife Habitat Management in British Columbia*. The commenters expressed concerns that management of fish, wildlife and migratory birds needs to become a greater priority when managing our forests. Comments also emphasized the importance of waterways, creeks, lakes and wetlands to the terrestrial ecosystems, and their role in storing and transporting water and nutrients in addition to providing important ecological services such as habitat and carbon storage. I thank the commenters for their input regarding the importance of non-timber values within the Prince George TSA. The Province is working with CSFNs on the ESI which is a collaborative cumulative effects assessment, management and monitoring framework. Forest biodiversity is a VEC in ESI; the forest biodiversity cumulative effects assessment incorporates indicators for grizzly bear, caribou, furbearers (marten) and riparian function. Any changes to forest management that result from the ESI can be considered in subsequent TSRs. Refer to ‘*cumulative effects*’ for further discussion regarding ESI.
- North Central Guide Outfitters expressed concerns regarding recent declines in moose and caribou populations and assert that harvesting of timber negatively affects habitat. They also note that there is no mention of movement corridors, thermal cover and/or limits to adjacency which would reflect values in maintaining habitats and wildlife populations in the discussion paper. The commenter also expressed concerns regarding risks to wildlife populations associated with management of forests within the THLB on short rotations. Within the THLB there are a number of established management objectives that address habitat and biodiversity management. These include GAR orders such as UWRs, WHAs and FSWs, the Prince George TSA Landscape Biodiversity Order and stand-level retention requirements. The base case reflects established management objectives and several UWRs and WHAs include provisions for thermal cover and connectivity. Many established UWRs also have seral stage management regimes that affect age class distribution within the THLB. The Province is currently working on the ESI with First Nations; moose, forest biodiversity and freshwater and anadromous fish are identified as VECs in that process. The biodiversity cumulative effects assessment incorporates indicators for grizzly bear, caribou, furbearers (marten) and riparian function. Any changes to management that result from the ESI will be considered in subsequent TSRs.

First Nations also provided many comments related to wildlife values:

- Nazko First Nation commented that protection of Douglas-fir stands is required for deer habitat. Ministry staff indicate that there are two established mule deer UWRs in Nazko traditional territory to manage Douglas-fir stands for mule deer winter range. Staff add that they are considering amendments that expand protection in a number of UWR orders within the Prince George TSA, including mule deer UWRs. Once amendments are complete, any new management objectives will be accounted for in future TSRs.
- Tl'azt'en First Nation expressed that Douglas-fir in their territory represents the very northern reach of the species, is relatively rare, and provides important wintering grounds for deer. They stated that where Douglas-fir has been harvested the resident deer populations have moved away or disappeared. For these reasons they stated that there should be no harvesting of live Douglas-fir in their territory. A review of the VRI indicates a significant inventory of stands which contain Douglas-fir in Tl'azt'en territory, within the TSA, as well as within the Community Forest Agreement (CFA) and FNWL held by Tl'azt'en and within the John Prince Research Forest (JPRF) land base. The JPRF is jointly managed by the University of Northern BC and Tl'azt'en First Nation. Ministry staff indicate that restricting harvest of all mature Douglas-fir within Tl'azt'en territory could have significant socio-economic impacts for the TSA, for Tl'azt'en's area-based tenures, and for the JPRF. Ministry staff also indicate that management practices for mature Douglas-fir typically include stand-level retention which promotes natural regeneration via ingress.
- Nazko First Nation and Saik'uz First Nation commented that habitat for moose and elk is important because these animals are an important food source for their community members. Omineca Region moose inventory work is currently ongoing and scheduled for completion in 2017/18. A Provincial Moose Research project is also underway. In addition, moose and forest biodiversity are VECs under the ESI. The forest biodiversity cumulative effects assessment incorporates indicators for grizzly bear, caribou, furbearers (martens) and riparian function. Any changes to forest management that result from the ESI and other moose management projects will be considered in subsequent TSRs.
- Ulkatcho First Nation and Saik'uz First Nation expressed that caribou habitat is a significant concern. Within Ulkatcho and Saik'uz traditional territories, the base case appropriately reflects UWR, U-7-012, established for northern caribou. In addition, the Province is actively working on habitat supply modelling and a management strategy for the Tweedsmuir caribou herd, which will be reflected in future AAC determinations when management requirements are established under legislation. Caribou related work is also occurring collaboratively as part of the ESI project. Refer to '*Caribou and Grizzly Bear*' for further discussion.
- The CSFNs expressed concerns that salvage harvesting for MPB-impacted stands has led to decreased moose and grizzly bear populations. They report that effort required to hunt moose has increased significantly in the last few years and hunting success has decreased, particularly for their southern nations (Saik'uz, Stellat'en and Nadleh Whut'en). They also expressed concerns that past, present and potential future harvesting operations will continue to negatively impact the habitat and populations of species traditionally trapped for fur including martens, fisher, mink, ermine, beaver and lynx. The Province is working collaboratively with CSFNs on the ESI which is a cumulative effects assessment, management and monitoring framework. Any changes to management objectives that result from the ESI can be incorporated into future TSRs.
- The CSFNs also expressed concerns regarding the use of herbicides in their territory and the impacts to biodiversity, wildlife habitat and populations, and drinking water. I encourage Ministry staff and licensees to work collaboratively with First Nations and to be responsive to their concerns when implementing silviculture treatments including the application of herbicides.

I have reviewed the methodology and results in the base case, in relation to wildlife, ungulate winter range and wildlife habitat areas. I conclude that the base case appropriately reflects the established wildlife management objectives, with the exception of UWR U-7-026 which was established in June 2016. The implementation of UWR U-7-026 results in a one percent overestimation of timber supply in the base case. I will account for this in my determination as discussed in '**Reasons for Decision**'.

I am encouraged by the high level of engagement of First Nations, stakeholders and members of the public in wildlife management within the Prince George TSA, as demonstrated by the input that I received during the public review periods. I recommend that Ministry staff and licensees work collaboratively with First Nations and stakeholders to continue to strengthen wildlife conservation within the TSA, and to conduct research and monitoring to ensure that the best available information can be used by the chief forester in future AAC determinations. To the extent that is appropriate, the principles of co-location should be considered when establishing management objectives which have potential to impact timber supply.

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

*- climate change*

Considering climate change impacts in AAC determinations aligns with the ministry's Climate Change Strategy to incorporate climate change into decision making. The MPB epidemic, which resulted from many factors and was exacerbated by climate change, was an unprecedented example of damage to forest resources greatly affecting the Prince George TSA. Extreme cold has typically kept forest pest populations at manageable levels, but significantly higher minimum temperatures in recent years in the Prince George TSA have contributed to both the MPB epidemic as well as the current spruce beetle outbreak. Information from forest health surveys has shown the Prince George TSA has also experienced loss of aspen to the aspen leaf-miner and forest tent caterpillar, and of sub-alpine fir to western balsam bark beetle. Winter, late fall, and early spring cold snaps have all decreased in frequency, making conditions more favourable for expansion of these pests.

Recognizing that projections of future climate are highly uncertain, and can only indicate trends in climate variables, climate monitoring for 1895 to 2015, and projections based on results from a combination of climate models for 2025 (period of 2010 to 2039) for the Prince George TSA show the following results and trends:

- Mean annual precipitation has increased by 11.6 percent over 1895-2015, mainly driven by increasing spring, summer, and fall rain; winter precipitation has declined. Mean annual precipitation is projected to increase by an additional five percent. Precipitation as snow is projected to decrease by an additional 20 percent, more so in the spring and fall than the winter.
- Mean annual temperature has increased by 1.6°C; double the global average. Winter has warmed the most (2.6°C) and fall the least (1.0°C). Mean annual temperature is expected to increase by an additional 2.1°C.
- Extreme maximum temperatures have increased by over one degree in the summer and fall over 1895-2015. Extreme maximum temperatures are expected to increase by an additional 2.4°C.
- Extreme minimum temperatures have increased dramatically over 1895-2015 by 6.1°C (annual) and in all seasons (winter 4.5°C, spring 3.6°C, summer 1.6°C, and fall 2.1°C). Extreme minimum temperatures are expected to increase by an additional 3.2°C.
- Decreasing cold air outbreaks, especially in the late fall and early spring are directly related to increases in populations of forest pests as many are kept at endemic levels if low temperatures prevail over extended periods.



- Increasing minimum temperatures and precipitation during the growing season may be increasing the incidence of Dothistroma needle blight and rusts, as observed in young pine plantations within the Prince George TSA.
- Lower snowpack coupled with warmer springs have contributed to earlier fire season start dates in recent years and have shortened winter logging seasons.
- Growing degrees days are projected to increase from 1166 (1961-1990) to 1580, which may make conditions more favourable for certain tree species but should not result in heat stress that could affect growth rates. The frost-free period could be increased by approximately 27 days.
- The growing season droughts in 2012-2015 may have contributed to the current spruce beetle outbreak. It is projected that despite minor increases in precipitation, evaporative demand will likely increase due to increasing temperatures.

The Province is currently working with research institutes to model potential changes to ecosystems as a result of climate change. The Province's research climatologists report that research on the impacts of climate change on soil moisture and evaporation should help to reconcile conflicting projections of ecosystem change. Trends which are reflected in all models include:

- Interior spruce on dry sites in the Sub-boreal Spruce zone will likely be vulnerable to drought stress and more susceptible to disease in years with hot and dry growing seasons;
- Given that temperatures are projected to continue to increase, outbreaks of bark beetles are also predicted to increase in both frequency and severity; and
- Projections of increasing temperatures, lower snowpack and minor increases in growing season precipitation but enhanced evaporative demand is conducive to increasing fire frequency, severity and season length within the Prince George TSA.

The Province has developed mitigation/adaptation options with input from regional hydrology, fire, wildlife, ecology, entomology and stewardship specialists as well as information from the *Omineca Climate Action Plan* and the *Adapting Forest and Range Management to Climate Change in the Omineca Region Extension Note*. Recommended options to mitigate climate change impacts related to timber supply are as follows:

- Increase riparian buffers both to improve shading, thus reducing the impact of warmer temperatures to aquatic habitat, and maintain bank stability to decrease the impact of potential increases in storms/flooding events. Retaining mature riparian habitat will also reduce the impact of evaporation from streams during times of low flow or drought. Increasing riparian retention areas and FSW areas, while important for protecting fish and aquatic habitat against climate change, would also mitigate climate change by maintaining forest carbon sinks, an objective of Ministry's Forest Carbon Strategy.
- Promote ecosystem adaptation to climate change by considering spatially located systems of reserves (OGMAs, UWRs, WHAs) across elevation bands (valley bottoms to height of land) to facilitate natural migration of ecosystem components.
- Coordinate efforts focused on sanitation harvesting intended to reduce insect populations during outbreaks to lessen the impact on mid-term timber supply. The potential for large outbreaks is increased due to climate change-induced tree stress and favorable climate for many forest pests to thrive.
- Consider directing harvest in areas of potential future drought stress as per the Stand-Level Drought Risk Assessment Tool.
- Increase spring fire season response readiness, especially in years with low snowpack and/or warm, dry springs, in order to mitigate potential impacts of large-scale fire disturbances.
- Incorporate fire management into all land base decisions within the Prince George TSA and collaborate with Wildfire Service to mitigate the impacts to timber supply given projections of increased frequency and intensity of fire with climate change.

- Increase utilization of fibre where appropriate to reduce post-harvest fuel hazard.
- Support current biogeoclimatic ecosystem classification site-level tools being developed to produce stocking standards that facilitate the establishment of species now while considering future risk of maladaptation.
- Consider incorporating the natural range of variation for tree species at rotation age when regenerating stands, to limit the possibility of large-scale outbreaks of forest pests impacting future timber supply, as described in the *Chief Forester's Standards for Seed Use*.
- Modify expectations of the winter harvest season in the Prince George TSA to avoid hauling in unfavourable conditions that could lead to site degradation. Consider greater stockpiles of logs that may be needed to keep mills working due to road closures during freeze-up, break-up, or periods of mid-winter thaw.
- Where appropriate, rehabilitate roads not identified as critical infrastructure, to benefit wildlife values and to mitigate climate change by maintaining forest carbon sinks, an objective of the Ministry's Forest Carbon Strategy.
- Incorporate information from regional water planning tools and hazard mapping (Omineca Water Tool and Watershed Health Project Omineca Region) to identify potential hazards due to current and future peak flow and sedimentation as well as low-flow risk to aquatic ecosystems by considering environmental flow needs and the combined impacts of climate change and harvesting.
- Support current research and monitoring efforts aimed at quantifying the current impacts of climate change and improving model projections within the Prince George TSA to provide recommendations for future TSRs and AAC determinations (e.g., research on growth rates, moisture availability, drought stress, forest health issues, fire risk, watershed health, and wildlife habitat).

I have reviewed the information provided by the Ministry Research Climatologist and note that while there are several options for adaptation and mitigation practices, to date implementation of such practices is limited. I note however, that the Province's Forest Carbon Initiative will result in more actions directed at mitigation in the near future. Implementing the mitigation options listed above could reduce the impacts of past and future climate change to timber supply while protecting other values and promoting forest regeneration suitable for future climates. I note that the conditions arising from climate change are likely to result in more frequent and severe forest pest infestations and diseases in the short term, regardless of uncertainties in climate model projections.

Tree mortality from drought and wildfire risk are likely to increase given projections of declining summer precipitation and snowpack coupled with the potential for increasing evaporative demands from further increases in temperature. Strategies such as directing harvest towards areas at risk of current or short-term pest outbreaks or drought to avoid timber losses and facilitate establishment of more forests better adapted to potential future conditions may involve consideration of temporary short-term increases in harvest levels. Increasing retention areas to buffer against water temperature increases and bank failures would result in downward pressures on timber supply projections, but may also help address forest carbon management objectives. Future risk and vulnerability assessments should be completed as research projects within the Prince George TSA progress.

FAIB is collaborating with climate modelling, growth and yield and timber supply specialists to begin to integrate climate change considerations into timber supply, growth and yield, and natural disturbance models to help inform future decisions. I support enhancements in both climate and impact monitoring and research within the Prince George TSA to help to decrease future uncertainty and improve model projections.

Public comments provided advice for me to consider regarding the changing climate and forest stewardship. In regards to climate change, the *Omineca Climate Action Plan* advocates for the implementation of stocking standards that account for climate change, as well as evaluating roads that are no longer in use for rehabilitation opportunities. These strategies are just some of the ways that government is trying to adaptively manage the forests in the face of climate change. I support the continued exploration and ultimate implementation of such climate change related actions.

As noted in “**Guiding principles for AAC determinations**” incorporating climate conditions in decisions like AAC determinations is highly challenging due to the high uncertainty, and the wide range of potential responses. However, the requirement for regular AAC determinations provides the ability to incorporate both emerging knowledge, and changes in forest practices intended to mitigate or adapt to climate change. In this decision, for example, I have considered information that has been updated to reflect the shifts that have occurred in stand composition due to the loss of mature pine and spruce due to beetle infestations. However, given the uncertainty regarding the future magnitude of insect infestations; or changes in dynamics such as fire frequency, tree growth, and reforestation success, I have not speculatively accounted for them in this AAC determination.

- *harvest performance*

Over the past decade harvesting in the Prince George TSA has been directed at pine-leading stands to expedite the salvage of MPB-impacted timber. Since 2005 over 128 million cubic metres of timber was harvested, of which approximately 67 percent has been pine. In the period of 2010 to 2014 the mean annual harvest billed was 10.1 million cubic metres per year of which approximately 62 percent has been pine (the annual average for 2010-2016 was 9.5 million cubic meters, reflecting declining harvests in the last two years). Analysis of ECAS data shows that there has been a steady decline in the volume per hectare approved for harvest under cutting permits during the salvage period as the declining shelf life decreases pine merchantability. ECAS data also shows a decline in the percentage of the median volume of pine approved for harvest under cutting permits in the TSA, with the greatest decline occurring in the Prince George District. Further discussion regarding shelf life of MPB-impacted timber is provided in the ‘*Mountain Pine Beetle*’ factor in this document.

The CSFNs stated that too much green wood has been harvested during MPB salvage operations, which affects mid-term timber supply, biodiversity, and wildlife and plant habitat. The CSFNs’ concerns relate to secondary stand structure, live pine harvest in MPB-impacted stands and non-pine harvest in pine-leading stands, which are addressed in other sections of this rationale. As participants in the forest economy, they expressed expectations that a decline in the AAC to the mid-term harvest level and subsequent downturn in the industry will be detrimental to both Aboriginal and non-Aboriginal communities.

I note that there has been an ongoing decline in the percent pine of pine authorized under cutting permits in the TSA, and a concurrent shift in pine salvage harvesting from supply blocks D and F, to supply block C. This trend is inconsistent with the harvest assumptions applied in the 2011 TSR, which assumed salvage of the earliest and most seriously impacted stands first, before shifting to stands impacted later in the MPB outbreak that had lower mortality and higher species diversity. This emphasizes the importance of routine harvest monitoring by the Ministry. For this TSR, I am satisfied that the harvest performance assumptions in the base case adequately reflect current practice and are appropriate for use in this determination. I expect Ministry staff to continue routine, annual harvest monitoring so that the chief forester can be responsive to harvest trends which could impact timber supply for the TSA. Ministry staff should refer to the requirements identified within the *Provincial Timber Management Goals, Objectives and Targets* policy for guidance regarding a comprehensive approach.

*- partition performance – non-pine*

In January 2011, in response to information regarding limited shelf life of MPB-impacted stands, the chief forester established two targets within the AAC determination rationale for the Prince George TSA. The first was a partition directed at non-pine species, in non-cedar and non-deciduous-leading stands (referred to as non-pine partition), which was set at 3 500 000 cubic metres per year. The second was an expectation that no more than 875 000 cubic metres per year of the partition be harvested from spruce-leading stands. The remainder of the non-pine partition was attributed to by-catch from salvage of pine-leading stands.

Monitoring forest harvesting in comparison to the AAC is done at the TSA and district levels by both licensee and Ministry staff, using several methods which rely on information from ECAS, HBS, and the VRI. Ministry staff state that based on an assessment of all harvest monitoring reporting methods, they are satisfied that the non-pine partition is being met generally, but that the expectation for maximum harvest from spruce-leading stands was exceeded.

Several comments were received during the public review period. A licensee stated that the province needs to be more firm with licensees not following the partition, as green timber plays a critical role in the stability of the northern forest sector in the mid-term. I agree that green timber plays an important role in the mid-term, and in '**Reasons for Decision**' I will discuss the need to focus harvests in the short term on dead, dying and damaged timber. I note that, as chief forester I have the statutory authority to establish partitions in the AAC decision; however implementation of harvest partitions in the licences is at the discretion of the Minister.

Several licensees, the Omineca Beetle Action Coalition, North Central Guide Outfitters and a concerned citizen expressed a need to continue to focus on salvage harvesting of MPB-impacted stands, while allowing flexibility for forest licensees to respond to forest health emergencies including the spruce beetle outbreak. Comments included several recommendations regarding the AAC and potential use of partitions, including the need for partition criteria to be clear and implementable, and for improved monitoring and reporting of partition performance by government. I am encouraged that comments received from a broad range of stakeholders recognize the importance of non-pine timber to the mid-term timber supply and the socio-economic well-being of communities. I agree that routine monitoring and reporting on partition performance is necessary to inform licensee and government decision-making, including AAC determinations.

I understand that the response to the recent spruce beetle outbreak has resulted in higher than expected harvest of spruce-leading and non-pine stands. I have reviewed the analysis of harvest performance in the non-pine profile, and methods and assumptions applied in the base case. I conclude that the base case appropriately reflects current practice and I will not make adjustments to my determination for this factor. I note that the continued efforts for sanitation of spruce beetle infested stands and salvage in MPB-impacted stands must be prioritized in the short term. It is imperative that all sanitation and salvage efforts are balanced with conservation of non-timber values.

*- bioenergy*

As a result of the impact of MPB on mature timber in the Prince George TSA, alternative opportunities for fibre utilization have been identified. A significant opportunity is the use of fibre for the production of bioenergy including electricity production, fueling of hot water-based heating systems, and manufacture of fuel pellets. The previous AAC determination included a contribution of 1.5 million cubic metres per year from bioenergy stands; however, the rationale did not provide a clear definition of the characteristics of bioenergy stands.

All bioenergy licences awarded and contemplated in the Prince George TSA have included a definition of eligible stands. These licences apply to stands below sawlog specifications to ensure protection of current commitments to sawlog licensees. Ministry staff indicate that to date, minimal harvesting has occurred

under the awarded licences; bioenergy producers have predominantly relied on surplus hog fuel, and wood waste sourced from waste piles and bush grind.

Over the first 10 years of the base case harvest projection, an average of 1.9 million cubic metres per year of non-sawlog fibre is produced as by-catch during the harvest of sawlog profile stands. FAIB conducted an analysis to estimate timber volume available within the THLB which may be available for bioenergy production. Using merchantability criteria described in the '*low productivity and non-economic stands*' factor, the exponential decay shelf life curve was applied to estimate volume that could be available, either as fibre by-catch or in stands that have declined below the minimum net salvageable volume of 140 cubic metres per hectare. At the beginning of the harvest projection approximately 5.8 million cubic metres of merchantable sawlog volume is available in stands with net salvageable volume below 140 cubic metres per hectare; these stands are considered to meet these bioenergy fibre criteria. The shelf life decline is expected to accelerate over the following 20 years, such that in 2055 approximately 28 million cubic metres of sawlog volume is projected to be available from those low volume stands. Additional analysis was conducted to assess total inventory of fibre in pine-leading stands outside the THLB (i.e., less than 182 cubic metre per hectare, greater than 70 percent dead, and not constrained by other economic and/or stewardship management objectives). Results show that when combined with stands in the THLB that are no longer eligible for harvest (less than 140 cubic metres per hectare net salvageable volume), 57 million cubic metres of timber currently meet the bioenergy criteria in the Prince George TSA.

During public review a licensee expressed concerns regarding the impending awards of bioenergy licences. The concerns included the potential for changes to the bioenergy licence criteria, which could result in conflicts between bioenergy producers and sawlog harvesters if the bioenergy profile were to be included in the AAC determination. I have considered the available fibre inventory; the benefits of maintaining a bioenergy opportunity both to improve fibre recovery from MPB-impacted stands, and to promote re-establishment of stands in impacted areas; and the need for clear criteria for bioenergy eligible stands.

I also received input from the BC Trappers Association, which commented on the benefits of leaving standing dead pine stands to promote biodiversity and on the role these stands play in maintaining the diversity and health of natural forests. The Association asked me to consider these factors in the management of future salvage operations. The comments also identified the importance of coarse woody debris to forest health and for wildlife recovery following logging. Coarse woody debris management objectives are established under FRPA, and monitored and evaluated under the FREP program.

I have reviewed the analysis methods and results and note that although significant fibre is available to continue to support bioenergy opportunities, there has been little to no performance in this profile. I also acknowledge the concerns regarding the current condition of the land base and associated risks to non-timber values. I believe that it is reasonable to include an opportunity for bioenergy in my AAC determination, but at a lower level than the previous determination, and will establish a partition of 750 000 cubic metres per year for this profile. I will include a discussion regarding bioenergy opportunities, including the criteria for bioenergy profile stands, in '**Reasons for Decision**'. I expect Ministry staff and licensees to collaboratively monitor and report to the chief forester regarding performance in bioenergy profile stands.

- *grade 4 credit*

To encourage utilization of Grade 4 (pulp logs) and to limit the amount of timber left in the bush, Section 17 (6) of the *Cut Control Regulation* (Grade 4 credit) allows licensees to apply for a cut control credit for any Grade 4 log shipped to a facility other than a sawmill or veneer plant. Ministry staff indicate that major licensees in the Prince George TSA have received Grade 4 credits totalling over 2.4 million cubic metres since 2011, or an average of 480 850 cubic metres per year. This represents

slightly less than four percent of the total AAC. Based on estimated fibre recovery rates at mills, Ministry staff infer that the delivery of low quality logs from licensees to pulp mills exceeds the Grade 4 credits that have been applied for.

Timber supply models cannot anticipate what volume will be attributed as Grade 4 credit. In the base case, an incidental fibre by-catch of 3.2 million cubic metres per year was associated with the achievement of the short-term harvest of 10.1 million cubic metres per year. This by-catch represents the potential Grade 4 portion of the harvest in the short term. Ministry staff indicate that it is possible in a declining timber supply situation with some continued salvage of MPB-impacted timber that the use of Grade 4 credit by licensees may increase and could affect mid-term timber supply.

Comments regarding Grade 4 credit were received from a licensee recommending the establishment of a maximum volume limit on Grade 4 timber credited to cut control, and suggesting that this would encourage the utilization of Grade 4 timber for non-lumber uses while ensuring sustainable forest practices. I recognize the importance of optimizing utilization of timber resources and the benefit of non-lumber producers to the forest economy and will forward these comments to the Minister, who has the mandate regarding cut control decisions.

I have discussed issues relating to the Grade 4 credit with Ministry staff. I acknowledge that cut control credit for Grade 4 timber is an important tool that supports the continued operation of chipping plants and pellet facilities in the Prince George TSA. I recognize that continuation of Grade 4 credits could result in harvesting more area in order to achieve the AAC, which may increase risks to non-timber values. I conclude that because of the difficulty in predicting licensee use of the Grade 4 credit, there is some uncertainty related to the base case in the mid-term; however I will not adjust the base case for this factor. Due to potential implications to mid-term timber supply, I expect Ministry staff to continue to monitor use of Grade 4 cut control credits and report regularly to the chief forester.

*- Caribou and Grizzly Bear*

FAIB staff collaborated with the CSFNs and Lheidli T'enneh First Nation on analysis to assess how past, current and future forest management practices may impact the First Nation's Aboriginal Interests related to wildlife. The collaboration identified grizzly bear and caribou as priority wildlife species for the focus of the analysis.

Grizzly bear and caribou are both wide-ranging wildlife species that are broadly influenced by forest development. In general, forestry has been found to have negative effects on caribou populations across Canada. Higher cutblock density has consistently been correlated with lower caribou abundance. Increases in early-seral forest habitat in caribou range creates more forage for other ungulates (moose and deer), which in turn supports higher predator densities, resulting in higher predation rates on caribou and declining caribou populations. Similarly, research has shown that roads can have significant impacts on grizzly bear survival through increased human-caused mortality and displacement from good habitat caused by increased interactions with road users. Forestry is a significant contributor to road development in British Columbia.

Importantly, a linkage can be made between forestry-related development, populations of grizzly bear and caribou, and Aboriginal Interests and treaty rights. Caribou were historically hunted in the Prince George TSA by First Nations people. Grizzly bear populations are representative of ecosystem health and sustainability for the CSFNs, and grizzly bear and caribou are of cultural and spiritual importance to the CSFNs. Caribou and grizzly bear are also species of management concern for the BC and Canadian governments. Caribou are listed as Threatened under Canada's *Species at Risk Act* (SARA) and a recovery strategy is in place. The Committee on the Status of Endangered Wildlife in Canada lists grizzly bear as species of Special Concern. In BC the Conservation Data Centre monitors caribou as a species at risk of extinction or extirpation (red list), and grizzly bear as a species of special concern because they are

sensitive to human activities or natural events (blue list). Caribou and grizzly bear populations are managed as species at risk under BC's Identified Wildlife Management Strategy.

The results of the collaborative analysis referenced above showed that current levels of forestry development are likely having negative effects on grizzly bear and caribou populations in portions of the Prince George TSA. In particular, forestry has likely had negative effects in central portions of the TSA, areas that were heavily harvested in response to the MPB outbreak. These model results are consistent with surveys by provincial staff, which show recent declines in caribou and grizzly bear population estimates for portions of the TSA and with anecdotal accounts from First Nations.

The results of the collaborative analysis indicate that future forest development and harvesting, as simulated in the base case, could increase impacts on caribou and grizzly bear in the central and northern portions of the Prince George TSA. Alternative management regimes, specifically with limits to forestry development in important habitat areas for grizzly bear and caribou, could improve grizzly bear and caribou population performance in the future. Analysis also showed that strategic tools such as a reduction in AAC or the application of coarse-filter management objectives such as biodiversity thresholds may not be as effective to mitigate impacts to caribou and grizzly bear as species-specific conservation tools such as UWRs and WHAs.

I acknowledge the conservation and socio-economic importance of grizzly bear and caribou to Aboriginal and non-Aboriginal people in the Prince George TSA, and more broadly in BC and Canada. I am concerned with recent declines in grizzly bear and caribou populations in portions of the Prince George TSA. The MPB outbreak and subsequent salvage harvest contributed to high cutblock and road densities in portions of the TSA that have likely negatively influenced wildlife species such as grizzly bear and caribou. The cumulative effects of forestry and other land uses have contributed to increased risks to these species as a result of the current landscape condition. I have considered the potential impacts to caribou and grizzly bear habitat and populations in my AAC determination, as discussed in '**Reasons for Decision**'. However, I acknowledge that these cumulative effects cannot be mitigated by a single decision; the AAC determination is strategic in nature and planning and operational decisions and actions by others will be needed to rehabilitate highly impacted landscapes and to avoid negative impacts in currently less developed areas.

I understand that BC and Canada are developing management objectives to implement the caribou recovery strategy. In addition, the province is working collaboratively with CSFNs on the ESI. Ministry staff indicate that grizzly bear and caribou are indicators in the Forest Biodiversity cumulative effects assessment and will be considerations in collaborative development of new management objectives. If new information regarding caribou, grizzly bear, or other wildlife species of management concern becomes available that significantly varies from the information that was available for this determination, the chief forester may revisit this determination sooner than the 10 years required by legislation. Any changes to management objectives established under legislation which impact the THLB or current practice will be accounted for in subsequent TSRs.

The collaborative analysis demonstrates that roads are a key influence on wildlife populations and indirectly on First Nations ability to exercise their Aboriginal Interests related to wildlife. I recommend that Ministry staff and licensees work collaboratively with First Nations to develop and implement a strategic access management plan which includes strategies to limit road density in areas that have not been previously developed. Strategies should also be implemented to rehabilitate roads in areas where road densities are above thresholds which research shows increase hazards to wildlife, including grizzly bear and caribou, as well as to watershed health. I expect that Ministry staff will monitor and report on the status of the strategic access management planning process so that the chief forester can be responsive to management practices that affect timber supply and forest stewardship.

I acknowledge that the Province is actively managing caribou and grizzly bear populations. I expect Ministry staff to work collaboratively with subject matter experts, licensees, First Nations and the province's caribou program to enhance caribou management and to improve research and monitoring of the Prince George TSA's caribou populations. I expect that Ministry staff will monitor and report regularly to the chief forester regarding new management objectives and implications to timber supply. I also recommend that Ministry staff work collaboratively to develop forest management regimes that could help to mitigate impact of forest development activities on grizzly bear habitat and populations.

As noted in this section, I have considered caribou and grizzly bear habitat and populations, and current and potential impacts of forest management, in my AAC determination, and will discuss this factor further in '**Reasons for Decision**' and '**Implementation**'.

- *watershed health*

As part of collaborative work with CSFNs, analysis was completed by FAIB to assess the implications of road density, as well as current and modelled timber harvesting disturbance, on watershed function within CSFNs territories in the Prince George TSA. One assessment simulated the Aquatic Ecosystem Assessment (AEA) protocol for cumulative effects. A second assessment was developed from the Watershed Health Omineca Region (WHOPR) model. In the WHOPR the peak flow hazard rating is responsive to disturbance, in particular, to changes in equivalent clearcut area (ECA).

The AEA analysis indicates there is a low to moderate hazard associated with impaired hydrologic function throughout the CSFNs traditional territories, with areas of high hazard concentrated in the south-central portion of the Prince George TSA. The analysis results indicate that approximately 16 percent of the watersheds within CSFNs territories within the Prince George TSA have a road density above 2.4 kilometres per square kilometre, indicating high hazard and increased vulnerability to impaired hydrologic function. Ministry staff indicate that Omineca Region research shows that the higher hazard rating is associated with extensive pine mortality, combined with impacts from cutblock and road disturbance associated with the large-scale MPB salvage operations over the past 15 years.

To test the effects of implementing management objectives to mitigate peak flow hazard and associated risks to water quality, quantity and timing, sensitivity analysis was conducted setting toe maximum ECA in each watershed to 20 percent (based on review of results via the WHOPR). In comparison to the base case, application of ECA constraints in the timber supply model, results in greater hydrological recovery in the south-central portion of the TSA in the mid-term. Applying ECA constraints moderates the increase in peak flow hazard rating in and around Takla Lake. The application of the ECA constraint has a significant impact to timber supply, reducing the short-term harvest projection by 37 percent, the mid term by 19 percent and the long term by 11 percent.

During collaboration regarding the TSR, the CSFNs expressed concerns that the rate of harvest during MPB salvage operations has led to ECAs in the southern Nation's (Saik'uz, Stellat'en and Nadleh Whut'en) traditional territories that have impacted watershed health and subsequently food fisheries. They express that their ability to meaningfully exercise their rights to fish is moderately to severely constrained by cumulative effects of climate change, resource development and water impoundment, and that any additional impacts to water quality, quantity and flow timing will further impact their Aboriginal Interests to fish.

The CSFNs also informed me of the *Yinka Dene 'Uza'hné Surface Water Management Policy* and *Yinka Dene 'Uza'hné Guide to Surface Water Quality Standards*. These policies have been implemented by Nadleh Whut'en, Stellat'en and Saik'uz First Nations to protect their Aboriginal Interests related to water. I heard from these Nations that they consider these policies to be law within their territories. I commend the Nations for the development of these water policies and encourage government and licensees to work with Nadleh Whut'en, Stellat'en and Saik'uz and to consider the Yinka Dene water policies when designing and implementing practices.



Comments were also received from Lheidli T'enneh First Nation regarding watershed health and the impact of forestry-related road development on natural drainage patterns and water quality (siltation). Included in their recommendations was a request to engage with the Province regarding road impacts on a strategic level, and to work towards multi-stakeholder strategic access management planning process.

The base case does not incorporate modeling constraints that account for peak flow hazard, the potential hydrological impacts of further road development, or canopy removal from timber harvesting. Sensitivity analysis suggests a broad implementation of forest cover constraints, such as ECA thresholds, designed to protect hydrologic function would have significant downward pressures on timber supply in the Prince George TSA. I recognize that the current watershed conditions within the TSA are the result of the MPB outbreak and extensive salvage harvesting. The WHOPR modelling indicates that hydrologic recovery is expected within the mid-term harvest period.

It is clear that increased consideration needs to be given to hydrologic hazards and risks resulting from harvesting and road development. I understand that specific operational considerations for minimizing hydrologic response to beetle related harvesting are provided in *Omineca Region - Guidelines for Watershed Planning*. I support ongoing research and tool development by Ministry staff regarding watershed health. I recommend that Ministry staff and licensees work collaboratively with First Nations to implement management objectives to protect and rehabilitate watershed health in the Prince George TSA. I recommend that this includes strategic access management planning, which is discussed under '*Caribou and Grizzly Bear*'. If formal management objectives related to watersheds are established under legislation, they will be accounted for in future AAC determinations.

- *cumulative effects*

The Province's Cumulative Effects Framework (CEF) policy was developed as a standardized approach to assess, validate and communicate the condition of identified CEF values and the effectiveness of existing management regimes. In the Omineca Region, the Environmental Stewardship Initiative (ESI) is being utilized to enable collaboration with First Nations on cumulative effects assessment, management and monitoring. The ESI Omineca Demonstration Project (ESI) is enabled through the Environmental Socio-Cultural Initiatives Agreement and confirmed by the Environmental Stewardship Agreement – CSFN Omineca Demonstration Project Agreement, ratified in October 2016. Collaboration with CSFNs regarding the ESI has been ongoing since 2015.

Through the ESI, a framework is being collaboratively established to assess cumulative effects (including historic, current and future states of the VECs and the ability for CSFNs to exercise their rights), jointly recommend management response options, and undertake monitoring. Valued ecosystem components identified in the current phase of ESI include: forest biodiversity, moose and freshwater and anadromous fish. Initiation of the analysis and recommendation components of the ESI will support the consideration and potential approval of management response options. Also, the socio-economic implications (including timber supply effects) for CSFNs and BC stakeholders will be explored. Information on the ability of the options to address stewardship issues and address the interests of the CSFNs and BC will be presented to the CSFN-Provincial Forestry Table where the stewardship management options will be weighed against the community and economic development aspirations of CSFNs and the Province. Mandates for implementing management response recommendations will be sought through appropriate government decision makers and will require involvement of First Nations and stakeholders for implementation.

During public review, I received comment from North Central Guide Outfitters, who expressed concern that the TSR discussion paper included little recognition of risks to non-timber resources resulting from increased levels of harvest within the pine salvage zones of the TSA. For this TSR a series of value-specific analyses were conducted through collaborative work with CSFNs, which are discussed in the '*landscape-level biodiversity*', '*Caribou and Grizzly Bear*' and '*watershed health*' factors in this

document. In addition, the Province is working collaboratively with First Nations on the ESI. In this project the use of a variety of indicators in the assessment of moose and forest biodiversity (which includes; habitat indicators for ungulates, grizzly bear, fur bearers and riparian indicators) allows for hazard assessments of other resources. Ongoing work to identify management responses will help to recover forest biodiversity in support of these other resources. This project is ongoing, and I am encouraged by the proposed methods and preliminary results. As discussed in '*Guiding Principles for AAC Determinations*' I do not speculate on potential land-use and management decisions that have yet to be made by government. If management objectives established through the ESI result in changes to current practice which significantly impact timber supply, I am prepared to revisit this determination sooner than the 10 years required by legislation. Likewise, any new land use designations or management objectives that are established under legislation will be incorporated into future AAC determinations.

I have considered the information provided to me regarding the ESI. I encourage Ministry staff and First Nations to continue to work collaboratively to develop cumulative effects projects which initiate CSFNs participation in gathering more data to support current and future or historic assessments of valued ecosystem components, as well as to refine indicators and complete assessments for moose, forest biodiversity and freshwater and anadromous fish. I expect that Ministry staff will continue to inform me of the status, results and new management objectives which flow from the ESI and other collaborative land use planning processes so that I can be responsive to changes which significantly affect timber supply in the Prince George TSA. Management responses which flow from the ESI and are subsequently incorporated in policy and regulation changes will be reflected in future TSRs.

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

*- harvest assumptions*

The base case is a result in part of applying a set of modelling inputs and assumptions related to queuing stands for harvest according to age, volume, and geographic location (haul distance). Information on the principles used in developing base case projection is included in '*Base case for the Prince George TSA*'. Sensitivity analysis was used to explore the effect of changes to these model parameters. For the most part, neither changes in age and volume criteria used to queue stands for harvest, nor removal of the base case preference for stands closest to mills had significant impact on the mid-term harvest level when the short-term level was maintained. An exception was that setting highest harvest priority based on culmination age, which delays harvesting of managed stands, substantially reduced the mid-term level.

I have considered the harvest queuing assumptions applied in the timber supply model to simulate current practice and future forest management and I am satisfied that the assumptions appropriately reflect the best available information regarding historic and reasonably foreseeable practice related to harvest preference within the Prince George TSA.

*- alternative harvest flows*

In addition to alternative harvest flows presented in the *Discussion Paper*, FAIB conducted alternative harvest flows to explore the timber supply impacts of alternative assumptions regarding MPB salvage or the use of a geographic partition as a means to promote increased salvage on both MPB and spruce beetle damaged stands.

The scenarios demonstrate the continued importance of salvage efforts to optimize utilization of damaged and dead fibre and to regenerate stands quickly. Rehabilitation of MPB impacted stands, through programs discussed in the '*Incremental Silviculture*' and '*Rehabilitation Programs*' factors in this document, may also moderate the duration and depth of the timber supply reduction in the mid term. I encourage licensees to continue to be innovative and seek opportunities to optimize the salvage of

MPB-impacted stands, with consideration of non-timber values including stand and landscape-level biodiversity and wildlife habitat.

During public review I received comments from licensees and the Omineca Beetle Action Coalition expressing support for a step down approach to any potential reductions in the AAC, both to reduce socio-economic impacts of the decline to mid-term harvest levels and allow for ongoing land-use planning and decision making. I discuss the potential for phased timber supply reductions as a mechanism for providing time for socio-economic adjustment under '**Reasons for Decision**'.

Public comments were received from many stakeholders regarding the use and benefits of partitions to guide harvesting within the Prince George TSA. Where appropriate, partitions may be used to direct harvest of profiles or geographic locations to ensure stable harvest flows, stimulate utilization, or mitigate losses from natural disturbances.

The alternative harvest flows completed by FAIB provide me with important insight regarding the impacts of forest management decisions, by government and licensees, to the short- and mid-term timber supply within the TSA. The information demonstrates that there remains a significant opportunity for short-term salvage of MPB-damaged stands before their merchantability wanes. Analysis indicates that increased salvage without a geographic partition does not have a significant positive impact on the mid-term harvest level. I am aware that the alternative scenarios provided incorporate salvage assumptions that are not reflected in historic practice or recent harvest trends. Further discussion regarding partitions in this AAC decision is included in '**Reasons for Decision**'.

***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 of the Crown*

The Minister of Forests and Range (now the Minister of Forests, Range, Natural Resource Operations and Rural Development) has expressed the economic and social objectives of the Crown in several letters to the chief forester. The first letter is dated July 4, 2006 (attached as Appendix 3). In this letter, 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. As well, 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. With respect to the 2006 letter, I note that the base case harvest projection for the Prince George TSA, as well as the alternative harvest flow projections, provide harvest schedules that project an orderly transition to a stable, long-term harvest level where the growing stock is also stable.

The minister, in another letter dated October 27, 2010 (attached as Appendix 4), provided the Crown's objectives with respect to mid-term timber supply in areas affected by the mountain pine beetle. In particular, the Minister asked for reassessment of management objectives and administrative approaches developed prior to the MPB outbreak in order to enhance understanding of how best to balance objectives for non-timber values with timber supply objectives, in order to achieve a range of socio-economic benefits. As well, he requested that innovative practices and incremental silviculture be assessed to determine if they could mitigate mid-term timber supply shortfalls, and to determine if flexibilities could be found in timber supply administration. With respect to the 2010 letter, I am aware that Ministry staff have considered if reassessment of objectives and approaches could improve mid-term timber supply in the Prince George TSA.

During my consideration of the factors required under Section 8 of the *Forest Act*, I have been mindful of both the local objectives, as provided in the Prince George, Fort St. James and Vanderhoof LRMPs and associated plans and orders, as well as the Aboriginal Interests and treaty rights of First Nations including information provided to me during collaboration with Carrier Sekani First Nations.

I have considered the socio-economic objectives expressed in the Minister's letters in this determination for the Prince George TSA, and I have reviewed processes undertaken by Ministry staff for consulting the public and engaging with First Nations, and considered the input received in making my determination. On this basis, I am satisfied that this determination accords with the objectives of the Province as expressed by the Minister. If new economic and social objectives of the Crown are provided to me by Government I am prepared to revisit this AAC determination sooner than the 10 years required by legislation.

- *socio-economic information for the Prince George TSA*

The total population of Prince George TSA was 103,706 in 2011 census. In 2015, the four primary municipalities within the Prince George TSA (Prince George, Fort St. James, Vanderhoof, and Fraser Lake) had a population of 78,780 people. This is a 3.1 percent decrease since 2011. Other smaller Aboriginal and non-Aboriginal communities are scattered throughout the TSA.

The labour force in the former Fort St. James and Vanderhoof forest districts is dominated by the forestry sector, which accounts for 49 percent and 45 percent of basic employment, respectively. Prince George is the supply and service hub for northern BC, and the Prince George District relies on the forest sector for about 26 percent of its employment. The forest sector includes forestry and logging, support activities for forestry and logging, wood product manufacturing and pulp and paper manufacturing. Direct benefits are directly attributable to these industries, indirect benefits are from their suppliers, and induced benefits are from employees spending their wages.

In the Prince George TSA there are 13 large sawmills with a combined annual capacity of approximately 2.9 billion board feet per year; seven located in the Prince George District, four in the Vanderhoof District and two in the Fort St. James District. There are also a number of smaller timber processing facilities in the Vanderhoof and Prince George Districts. The sawmill log consumption in the Prince George TSA in 2014 of 10.6 million cubic metres was close to the estimated annual mill capacity of 10.3 million cubic metres. I note that log consumption may include volume from outside of Prince George TSA and that timber harvested within the TSA may be processed at facilities located outside of the TSA. It is estimated that the capacity of sawmills in the Prince George TSA decreased by five percent between 2011 and 2015 as a result of destruction and rebuild of the Lakeland Mill.

The pulp and paper mills within the Prince George TSA are also significant employers within communities. The capacity of pulp and paper mills in the TSA did not change between 2011 and 2015. As previously discussed in the 'bioenergy' factor, pellet mills and other bioenergy producers also utilize fibre from the Prince George TSA, and contribute to local employment. Ministry staff indicate that at this time the majority of fibre utilized by the bioenergy and pulp and paper mills is derived from lumber mill residues.

In meetings with the CSFNs they expressed concern about how I will consider their interests in increasing their participation in the forest industry in order to create long-term jobs and promote economic viability in their communities. With regard to the economic interests expressed by First Nations, I note that although the AAC I set is a key determinant in the level of forest sector activity in the TSA, apportionment of the AAC, and government and industry investments and business decisions are not within the scope of my authority under the *Forest Act*. In this regard, I have shared the interests expressed by First Nations during consultation on this decision with the Minister for consideration in the apportionment of the new AAC.

In addition to the many biological and geophysical factors that I am required to consider in determining an AAC, I am also mindful of the critical importance to local communities of an abundant and stable timber supply for current and future generations while also protecting the productivity of all forest lands and resources. I recognize the importance of the forest sector to the economic wellbeing of the

communities within the Prince George TSA. I also recognize the importance of sustainable forest management supporting non-timber values. I will discuss this further in '**Reasons for Decision**'.

*- summary of public input*

The Minister's letter of July 4, 2006 suggests that the chief forester should consider important social and economic objectives that may be derived from public input during the TSR, where these are consistent with government's broader objectives. To this end, two 60-day public review periods were provided, one for the *Data Package* and one for the *Discussion Paper*. The submissions received during these reviews were used to amend the *Data Package* on which the timber supply analysis was based and/or were presented for my consideration prior to determining a new AAC for the Prince George TSA.

Substantial input was received from a wide range of groups and individuals including forest licensees, industry groups, guide outfitter and trapper organizations, outdoor recreation groups, and other concerned citizens. I am encouraged to have a highly engaged group of stakeholders in the Prince George TSA, and I appreciate the information and interests that I received during the public review period. The input received that is relevant to this TSR has been incorporated throughout the rationale under the appropriate factor. In reviewing these submissions, much of the input received is outside my authority as chief forester under Section 8 of the *Forest Act*. Therefore, I have forwarded these comments to the appropriate decision makers.

*- First Nations engagement*

There is a rich and diverse Aboriginal history in area covered by the Prince George TSA; 27 First Nations have traditional territories overlapping the TSA. Nine First Nations have communities within the Prince George TSA; Nak'azdli Whut'en, Takla Lake First Nation, Tl'azt'en Nation, Nadleh Whut'en, Stelat'en First Nation, Saik'uz First Nation, Lheidli T'enneh First Nation, McLeod Lake Indian Band, and Yekooche First Nation. Other First Nations whose communities are located outside of the Prince George TSA but whose traditional territories extend into the TSA are: Cheslatta Carrier Nation, Gitksan Hereditary Chiefs, Lhoosk'uz Dene Nation, Ulkatcho First Nation, Tsay Keh Dene First Nation, Lhtako Dene Nation, Lake Babine First Nation, Nee-Tahi-Buhn, Nazko First Nation, Tsilhqot'in National Government, Skin Tyee, Tsetsaut Skii Km La Ha, Simpcw First Nation, Blueberry River First Nation, West Moberly First Nation, Saulteau First Nation, Halfway River First Nation and Tahltan First Nation.

Aboriginal peoples of Canada have distinct, constitutionally protected rights. The Crown has a duty to consult with, and accommodate if required, those First Nations for whom it has knowledge of the potential existence of Aboriginal Interests or treaty rights that may be impacted by a proposed decision, including strategic-level decisions such as AAC determinations. In particular, recent court decisions have stated that decision makers must use credible information to consider the effects of land management decisions, including AAC determinations, on Aboriginal Interests or treaty rights. As chief forester, I must therefore consider information arising from the engagement process with First Nations, respecting Aboriginal Interests and treaty rights that may be affected by my AAC determination. As well, I will consider other relevant information available to the provincial government regarding Aboriginal title, rights and interests, including information gathered during other consultation processes.

As part of the First Nations engagement process a preliminary assessment was completed. This assessment included a review of available information on Aboriginal Interests and an analysis of the potential impacts the AAC decision might have on these interests. Sources of information reviewed include: available traditional use studies; ethno-historical assessments; archaeological overview assessments; remote access to archaeological data (RAAD); agreements between First Nations and the Province; and information from past consultation processes.

The above information indicates that First Nations with traditional territory which overlaps with the Prince George TSA have Aboriginal Interests related to traditional activities, practices, customs and/or

traditions. These Aboriginal Interests are connected to biophysical, spatial, social, cultural, spiritual or experiential values. In addition to Aboriginal rights, many of these First Nations assert Aboriginal title within the Prince George TSA. Preliminary strength of claim assessments indicate that many First Nations in the TSA have a strong '*prima facie*' claim of Aboriginal title within portions of their territory.

Five First Nations with asserted traditional territory in the Prince George TSA are signatory to Treaty 8. Nations now known as Blueberry River, Sauleau, West Moberly and Halfway River signed onto Treaty 8 between 1899 and 1914. In 2000, McLeod Lake Indian Band signed the Treaty 8 Adhesion and Settlement Agreement under which that Indian Band, Canada and the Province, on a without prejudice basis, resolved litigation brought by the band regarding the location of the western boundary of Treaty 8. This agreement resulted in MLIB adhering to Treaty 8.

The Province continues to work with First Nations to develop agreements including tenure opportunities related to forestry. The following agreements are in place at the time of this decision:

- The CSFNs have Government to Government agreements including: the Collaboration Agreement, the Environmental Socio-Cultural Initiatives Agreement, the Interim Forestry Revenue Sharing Agreement and the *Whubats'ut'en Nus Whetee Agreement* (Pathway Forward Agreement);
- McLeod Lake Indian Band and BC have recently ratified a Government to Government agreement in relation to forestry;
- Lheidli T'enneh First Nation, Lhoosk'uz Dene Nation, Lhtako Dene Nation, Nazko First Nation, Nee-Tahi-Buhn, Simpcw First Nation, Yekooche First Nation each have Forestry Consultation and Revenue Sharing Agreements (FCRSA) with the Province;
- Lake Babine Nation has the Foundation Pathway Agreement, the Reconciliation Framework Agreement and an Interim Forestry Agreement with the Province, in relation to forestry;
- The Tsilhqot'in National Government has a Strategic Engagement Agreement; and,
- West Moberly First Nation has a Forests and Range Resource Management Agreement.

Information gathered pursuant to the various agreements can be found in the consultation record. The terms of these Agreements vary, but in general provide opportunities for revenue sharing and/or forest tenure and contain a framework for establishing processes to guide engagement and consultation on strategic forestry decisions, including AAC determinations.

Many of the First Nations are involved in Treaty negotiations and are at various stages of that process. I am aware that Yekooche First Nation and Lheidli T'enneh First Nation have identified Areas of Interest (affecting 2961 and 2508 hectares of the THLB respectively), which are included in treaty negotiations. Ministry staff confirm that although these lands continue to be Crown forest, licensees are aware of the status of these lands and are not applying for cutting permits in these areas.

In addition I am aware that lands have been identified within the TSA as part of the McLeod Lake Indian Band Tripartite Land Agreement, as accommodation for Site C, affecting a total of 813 hectares of the THLB. However, since these lands are still part of the Crown forest, I am obligated to consider these as contributing to the TSA base case harvest projection. The cyclical nature of TSR will allow consideration of any removal of these lands from the Crown land base in future AAC determinations. It is important to note that the base case can be achieved, at least for the term of this determination even if these Areas of Interest are removed from the Crown forest.

As part of the consultation process, preliminary assessments were undertaken by Ministry staff that considered existing information provided by First Nations regarding the strength of Aboriginal Interests and the potential impact this decision will have on these interests. I have concluded that consultation has been carried out at appropriate levels and in good faith based on the preliminary assessments, and that the Crown's process of seeking to understand issues and impacts was reasonable. I also believe that the

potential for adverse effects on the Aboriginal Interests of Aboriginal groups have been avoided, minimized or otherwise accommodated to an acceptable or appropriate level. I note that deeper consultation was undertaken with the CSFNs in accordance with a collaborative TSR process.

Initial engagement with all First Nations began in June 2014 with the issuance of letters explaining the TSR process and an invitation for input. The *Data Package* was sent to all First Nations in April 2015; the *TSR Discussion Paper* was sent to all First Nations in March 2016. All communication to First Nations included a request to provide information and an invitation to meet.

Several First Nations responded to the *Data Package* and the *Discussion Paper* consultation letters. Concerns and comments received from First Nations related to: wildlife; inventory data; cumulative effects; rehabilitation of stands; ecosystem resilience; forest health factors; watershed health, cultural heritage resources; Aboriginal Interests including impacts to wildlife, riparian areas, berries, medicinal plants and water; partitions; and, access to tenures and volume. Where relevant to my determination, I have addressed First Nations' concerns in the individual sections related to these topics.

From Gitxsan First Nation I was informed of arboroglyphs and arborographs (tree carvings and paintings) that occur across their traditional territory. Although Gitxsan territory within the Prince George TSA is excluded from the THLB because it is remote and difficult to access, I strongly encourage licensees to be aware of the potential existence of these cultural features during forestry planning and development, and to work in good faith with Gitxsan representatives to mitigate potential impacts to arboroglyphs and arborographs.

*- Carrier Sekani First Nations collaboration*

In April of 2015 the Province entered into the Collaboration Agreement and the Environmental and Socio-Cultural Initiatives Agreement with the CSFNs in contemplation of a number of Provincial decisions on natural resources. The agreements included recognition of the existence of Aboriginal rights and title in their territories and commitments to collaborative decision making in relation to major projects. Early in the negotiations, the CSFNs chiefs expressed that addressing forestry interests was a high priority to them. In March 2017, the Province and CSFNs ratified a third agreement, the Whubats'ut'en Nus Whetee Agreement (Pathway Forward Agreement). This is an interim agreement under which both parties agree to work towards a comprehensive reconciliation agreement in order to make progress on outstanding challenges related to title and to begin to address CSFNs forestry interests.

In June 2015, in response to engagement regarding the *Data Package*, the CSFNs requested deeper engagement regarding the Prince George TSA TSR. In response, the Province agreed to work with the CSFNs to develop a deeper engagement strategy in order to respond to their interest in incorporating their Aboriginal Interests into the TSR process. A technical team consisting of CSFNs representatives, supporting consultants and Ministry staff met regularly from September 2015 to November 2016. In addition to technical team meetings, subgroups were established to further collaborative efforts, and the co-chairs met frequently. In total, the Collaborative TSR technical team met 55 times between September 2015 and February 2017.

The Collaborative TSR technical team generated information and analyses to explore the effects of current practice, as simulated in the base case, on values that link to the CSFNs' Aboriginal title, rights and interests. The collaborative analyses also explored the potential effects on the timber supply of changes to current practice designed to lower risks to CSFNs values. Discussions regarding collaborative analyses are included in other factors in this document including: stand-level retention, landscape-level biodiversity, caribou, grizzly bear and watershed health.

To further engage with the CSFNs I met face to face with the CSFNs chiefs and representatives on February 28<sup>th</sup>, May 31<sup>st</sup> and August 15<sup>th</sup>, 2017. At these meetings the CSFNs presented information from analyses they undertook independently regarding the potential impacts of three timber supply scenarios on their ability to meaningfully exercise their Aboriginal rights. The analyses used data provided by

Ministry staff and others. In addition, I met independently with Tl'azt'en First Nation on February 27<sup>th</sup>, with Saik'uz First Nation on February 27<sup>th</sup>, with Takla Lake First Nation on February 28<sup>th</sup> and with Nak'azdli Whut'en on August 15<sup>th</sup>, 2017.

CSFNs expressed their perspective that their ability to meaningfully exercise their Aboriginal rights is moderately to fully constrained by factors including natural resource development, climate change and reservoir impoundment, and that additional impacts to values which support those rights are not acceptable to CSFNs. I heard from the CSFNs that the southern Nations' (Nadleh Whut'en, Saik'uz First Nation, Stelat'en First Nation and Ts'il Kaz Koh) traditional territories have been significantly impacted by MPB and associated salvage harvesting, and that any additional development would significantly increase risks to non-timber values. I heard that the northern Nations (Nak'azdli Whut'en, Tl'azt'en First Nation and Takla Lake First Nation) are concerned that future development, as simulated by Ministry timber supply models, will result in similar risks to their territories. The CSFNs stated that due to the highly disturbed state of the forest landscape in their traditional territories, each incremental impact arising from the AAC determination could seriously impair their ability to meaningfully exercise their Aboriginal rights.

CSFNs provided me with a report entitled, *Prince George Timber Supply Area Timber Supply Review (5): An assessment of the Seriousness of Impacts of Several Rate-of-Cut Scenarios to the Rights, Title and Interests of the Carrier Sekani First Nations*. This report detailed the CSFNs views on the current state of their fishing, hunting, trapping, spiritual and cultural rights expressed as the ability to meaningfully exercise those rights. Causative factors for declines in the health or status of fish and wildlife populations were explored and the authors projected potential risks to the ability to exercise those rights associated with three timber supply scenarios (base case, spruce beetle and median NRV) to exercise those rights.

I also heard from CSFNs that they are active participants in the forest industry and they feel that a significant decline in AAC and the subsequent downturn in the industry could be detrimental to socio-economic stability generally, but would have disproportionately large effects on CSFNs communities since their harvesting rights are non-replaceable.

In the summer of 2017, I was provided with recommendations from individual CSFNs. These submissions included recommendations regarding partitions, caribou, riparian management, harvest of live trees and in particular, limits to harvest of live spruce and Douglas-fir. The CSFNs also provided recommendations regarding the AAC implementation instructions. I have responded separately to the CSFNs on their specific recommendations, where not otherwise discussed in this rationale. The CSFNs also stated that they require long-term forestry tenure to provide economic stability for their communities.

I have addressed CSFNs recommendations regarding partitions, caribou and riparian management elsewhere in this rationale. Some of the recommendations, such as operational practices to enhance protection of riparian habitat are not within the scope of my statutory authority; however I recommend that Ministry staff and licensees work collaboratively with First Nations to develop and implement guideline for habitat related to small streams, wetlands and lakes.

With respect to the CSFNs guidance on limiting the harvest of live Douglas-fir, I acknowledge that CSFNs' perspectives are that the harvest of fir should be minimized or avoided completely, and that Douglas-fir supports values important to CSFNs, including deer habitat. Analysis for the TSR indicates that Douglas-fir leading stands contribute approximately two percent to the THLB. To the extent that the recommended reservation of Douglas-fir from harvest is intended to protect deer habitat, Ministry staff note that existing UWRs have been established in Douglas-fir stands. Ministry staff also indicate that policies exist in the Prince George and Stuart Nechako districts which provide guidance regarding management for Douglas-fir, however there are no objectives established under legislation relating to management of Douglas-fir.



Given the small contribution of Douglas-fir to the timber supply, it would be more practical and appropriate from a stewardship perspective to consider management of fir in planning and operational practices. I recommend that Ministry staff review and update existing policy regarding forest management in stands which contain Douglas-fir, including best management practices, and work collaboratively with licensees and First Nations regarding training and implementation of best practices for Douglas-fir management. Any new management objectives for Douglas-fir that are established under legislation will be reflected in future TSRs. I expect that Ministry staff and licensees will collaboratively monitor and report to the chief forester regarding performance and utilization in Douglas-fir leading stands. If new information regarding the management of Douglas-fir becomes available that significantly varies from the information that was available for this determination, I am prepared to revisit this determination sooner than the 10 years required by legislation.

It is my understanding that Government to Government negotiations between the Province and CSFNs are ongoing; with the joint intent to work together in a collaborative, step wise manner towards ongoing reconciliation of Carrier Sekani and BC titles, rights and interests in CSFNs territories. I am aware that negotiations include revenue sharing, forest tenure opportunities, industry partnerships and a stewardship framework for natural resource management. I will monitor these negotiations, and if the outcomes result in changes to land use and management requirements under applicable legislation, I will consider the need to determine an AAC sooner than required under the *Forest Act*.

Many of the interests I heard from the CSFNs are outside the scope of the AAC determination, and are not within my purview as a statutory decision maker. Where practical and appropriate I have considered the need to improve available information and/or clarify management regimes that relate to CSFNs' concerns in my expectations and recommendations, as discussed in '**Implementation**'. I expect that ongoing collaborative efforts between the Province and the CSFNs, including Forestry Table negotiations and the ESI, will continue to make progress towards achieving long-term mutual reconciliation of rights, title and interests in CSFNs territory.

*- summary of First Nations engagement*

Based on my review of the engagement processes followed, the Aboriginal Interest information available to Ministry staff, and the potential impact my decision may have on these interests, I conclude that the Province has engaged in consultation at appropriate levels on the consultation spectrum as outlined in the *Haida* decision and as per current provincial guidance and applicable case law. Furthermore, I note that Ministry staff will continue to be available to meet and consult with First Nations on issues at both operational and landscape-level planning levels.

I have considered the information received from First Nations and, where appropriate, I have addressed these concerns in my decision. Some concerns were identified that are not within my authority under Section 8 of the *Forest Act*, and other concerns were identified that are being or can be addressed under subsequent AAC decisions.

I have reviewed the information regarding the consultation undertaken with First Nations and discussed it in detail with Ministry staff. I am satisfied that the engagement with First Nations was conducted appropriately and that reasonable efforts were made by Ministry staff to engage and inform First Nations in the TSR process, collect information regarding First Nations' interests and understand how these may be affected by the AAC determination. I have also participated directly in engagements with CSFNs in response to their requests. While I am of the view that the issues and concerns raised have been appropriately addressed, given the information available at this time, if new information regarding First Nations' Aboriginal Interests and treaty rights becomes available that significantly varies from the information that was available for this determination, I am prepared to revisit this determination sooner than the 10 years required by legislation.

***8(8)(e) Abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area***

*- Mountain Pine Beetle*

The MPB epidemic began to impact the Prince George TSA in 2001, and from that time progressed northward, peaking in the south-central portion of the TSA between 2005 and 2007. The severity and extent of the MPB epidemic was forecast in previous analyses using the BC Mountain Pine Beetle Model (BCMPB). For this TSR the BCMPB v.11 model was used to estimate existing and future mortality of pine in stands greater than 60 years of age. Approximately 60 percent of the THLB is impacted by MPB, with an estimated 40 percent of the total volume killed. On average, trees killed by MPB have been dead for about 10 years.

The estimate of unsalvaged volumes of MPB-killed timber depend on the estimated shelf life of the pine for various forest products, and the pre-infestation merchantable volume on the affected land base. In the previous TSR, it was assumed that 100 percent of the impacted pine would be useable for some product for 15 years post-attack, after which time it no would longer contribute to the total stand volume. For this TSR, merchantable sawlog volume within an attacked stand was assumed to decrease exponentially over time, with a total loss occurring at 23 years following death. This sawlog shelf life curve was developed collaboratively with licensees, and is based on field sampled cruise data and milling information. Use of this sawlog shelf life curve also enables the estimate of both fibre by-catch and total harvested volume and area required to achieve the projected harvest level.

Analysis of current practice indicates that licensees have shifted away from MPB-impacted stands with high mortality and lower salvageable volume in supply blocks D and F, and are now focused on pine-leading stands with lower mortality and higher net volume. The base case assumes that dead pine volume from these supply blocks will be a significant contribution for the first five years of the projection. However, Ministry staff indicate that applications for cutting permits in supply block F have halted, and expect minimal development there over the short- and mid-term. FAIB completed sensitivity analysis to explore the impact of deferring harvest in MPB-impacted stands in supply block F for 100 years. This would result in a five percent (500 000 cubic metres per year) reduction in the short-term harvest level. Ministry staff also expressed that further harvest in supply block F is of concern because of extensive large and very large functional openings in this unit from salvage harvesting of MPB-impacted stands as discussed in *'stand-level retention'*.

During public review I received comment from forest licensees and other stakeholders regarding shelf life and harvest assumptions for MPB-impacted stands, as well as concern regarding impacts to non-timber values should significant harvest continue in severely impacted units. In response to input from licensees the base case was modified to shorten the period in which salvage harvest is prioritized by the timber supply model, as discussed in *'Base case for the Prince George TSA'*.

I have heard from First Nations that their ability to meaningfully exercise their Aboriginal Interests in the south-central portion of the Prince George TSA has been significantly constrained due to impacts of MPB and subsequent salvage harvesting. CSFNs presented information to suggest that values which support their Aboriginal Interests are placed at risk due to concerns related to road density, disturbance size and distribution, low landscape and stand-level retention, watershed health and wildlife habitat/populations. They expressed concerns regarding the ecological integrity of their territories, and indicated that any additional impacts in their traditional territories will seriously impact their Aboriginal Interests. They stated that impacts to their Aboriginal Interests have social, cultural and economic impacts on their communities and directly link to the health and wellness of their people.

I understand that areas of the TSA have been significantly impacted by the MPB infestation and associated salvage harvesting over the past 10 to 15 years, and that risks to non-timber values have increased. It is important for managers of the forest and other natural resources to consider the impacts

that salvage harvest has had on the land base, and to begin to invest in rehabilitation to protect and preserve non-timber values including biodiversity, wildlife, watershed health and all values which support First Nations' Aboriginal Interests.

I have reviewed the shelf life model applied in the base case to estimate net salvageable volume for MPB-impacted stands. I conclude that the application of the shelf life curve is an improved methodology in comparison to the assumptions applied in the 2011 TSR. The shelf-life curve is based on the best available information and appropriately represents the decline in salvageable sawlog volume. There is uncertainty in the assumption that licensees will continue to harvest significant amounts of dead pine in the short term. If dead and decaying pine stands are not salvaged before expiry of the shelf-life of the timber, there is potential that the mid-term harvest period will be protracted relative to what is suggested in the base case, while stands recover naturally or undergo rehabilitation treatments. I will consider this uncertainty in my decision, as well as the need for balance between timber supply and the conservation of non-timber values. I will discuss this further in '**Reasons for Decision**'.

*- Spruce Beetle analysis*

Over the past four years the Ministry's forest health overview assessment has been monitoring a spruce beetle outbreak within the Omineca Region. The spruce beetle outbreak has expanded significantly in supply block E of the Prince George TSA and is expanding in supply block H. Spruce beetle infestations are also being monitored in supply blocks C and G. As of Fall 2016 the spruce beetle has affected approximately 116 000 hectares in the THLB and non-THLB. Within the THLB there are approximately 27 million cubic metres of timber in spruce-beetle impacted stands, of which approximately six million cubic metres is dead spruce. Provincial forest health specialists, Ministry staff and forest licensees are closely monitoring the spruce beetle outbreak and at present the focus of the management response is sanitation.

To explore potential timber supply implications of directed harvest to sanitize and salvage impacted spruce volume FAIB completed sensitivity analyses exploring three alternative harvest scenarios.

The first scenario maintains a salvage focus for five years with 50 percent of the harvest directed at pine-leading and 50 percent explicitly prioritizing non-pine harvest at the current spruce beetle outbreak. The scenario achieves the base case short-term harvest level of 10.1 million cubic metres for the first five years. In year six the harvest level drops to 8.1 million cubic metres per year with no further MPB salvage focus. At year 10, the mid-term harvest level is 6.2 million cubic metres per year for 55 years after which it climbs to 9.4 million cubic metres per year and achieves the base case long-term harvest level of 9.8 million cubic metres per year by year 130 of the harvest projection.

The second scenario has a starting harvest level of 9.4 million cubic metres per year while maintaining a salvage focus for five years with 50 percent of the harvest directed at pine-leading and 50 percent explicitly prioritizing non-pine harvest at the current spruce beetle outbreak. In year six the harvest level drops to 7.5 million cubic metres per year with no further salvage focus. The mid-term harvest level, beginning at year 10 is 6.4 million cubic metres per year for 50 years after which it climbs to 9.4 million cubic metres and achieves the base case long-term harvest level of 9.8 million cubic metres per year by year 130 of the harvest projection.

The third scenario applies the assumptions from the base case and simulates a harvest partition in supply blocks E and H, directing 50 percent of the harvest to these units for the first five years of the projection. In this projection the harvest of affected stands from the spruce beetle detection surveys are prioritized, with 15 million cubic metres of simulated harvest occurring in the first five years. The scenario maintains focus on pine salvage outside of the spruce-beetle affected stands, and to a lesser extent, within supply blocks E and H for the first five years. This scenario has a starting harvest level of 9.9 million cubic metres for five years after which the harvest level falls to 9.1 million cubic metres per year. This scenario achieves the base case mid-term harvest level of 6.1 million cubic metres per year at year 10 and climbs

to achieve the base case long-term harvest level of 9.8 million cubic metres per year at year 75 of the projection.

Sensitivity analysis indicates that the current level of spruce-beetle attack can be accommodated in the initial harvest level modelled in the base case, with the implementation of a partition. Ministry staff are satisfied with how spruce beetle was modelled by FAIB and indicate that there is currently no need for additional uplift AAC. Stands with current attack are harvested during the short-term period of the timber supply sensitivity analysis.

- *Spruce Beetle action plan*

The Prince George TSA Spruce Beetle Working Group was established in the summer of 2015 with licensee and Ministry staff working collaboratively to address the spruce beetle outbreak at an operational level. Licensees whose chart areas were impacted by spruce beetle began to coordinate harvest scheduling to address the emerging outbreak in 2015.

In February 2016, the Ministry's Omineca RED requested that impacted licensees and BCTS collaborate to develop a spruce beetle action plan. A draft spruce beetle action plan was submitted to the Omineca RED in January 2017. The plan provides spatial and tabular information by each licensee on proposed actions, timing of treatments, and information on constrained areas. Information was provided for each drainage with known spruce-beetle impacts above trace or endemic levels. Operational challenges identified within the plan include road access given limited harvest activity affected areas in the previous 20 to 30 years, difficult terrain and the need to address stewardship values.

The action plan is a snap shot in time based on current spruce-beetle infestation levels from aerial and ground surveys. The plan prioritizes sanitation harvest in moderate and higher levels of infestation and targets areas that are most accessible first, low infestation areas will be a focus in the areas that meet sanitation harvest requirements, areas with trace infestation will be monitored and trap trees utilized. Based on the action plan from January 2017, staff indicate that licensees plan to harvest over eight million cubic metres between 2016 and 2019 to address spruce beetle in the Prince George TSA.

The action plan uses a seven-year time frame, based on a seven-year stand shelf life assumption. This shelf life assumption is based on professional judgment and was agreed upon by the Prince George TSA licensees. Ministry staff note that a shelf life study analyzing the impacts of spruce beetle on the quantity and quality of the available fibre over time is being led by the Ministry's Omineca Regional Research Entomologist.

Ministry staff indicate that next steps for the spruce beetle action plan include interim reporting of harvest activities in September 2017, a check-in planned for December 2017 and collaborative work to compare new information in the aerial overview survey and ground probes. Preliminary reporting estimates that in the Prince George Natural Resource District (both TSA and non-TSA portions), approximately 1.8 million cubic metres of timber was harvested in response to spruce beetle from November 1, 2016 to March 31, 2017. Ministry staff note that the action plan will be updated as and when new information is acquired. The Ministry will continually review these plans to understand the current capacity within the TSA for spruce beetle treatment and take appropriate steps such as additional licensee opportunities or transfers.

I am encouraged that licensees have worked together to develop the spruce beetle action plan to mitigate impacts to spruce beetle infected stands and to monitor the spruce beetle population size and dispersal. It is my expectation that licensees will continue to focus on sanitation harvest treatment, preserving as much green timber as possible, while also adhering to stand and landscape-level biodiversity thresholds as required under FRPA and as per the *Omineca Region Guidance: Stand and Landscape-level Retention for Harvesting in Response to Spruce Beetle Outbreaks*. As stated in the guidance document, it is also my expectation that licensees will work collaboratively on a co-ordinated stand and landscape-level retention plan to supplement the spruce beetle action plan.

Many comments related to the spruce beetle were received from forest licensees and other stakeholders during the public review. Most comments expressed concern with management responses to the spruce beetle outbreak, potential impacts to the Prince George TSA's mid-term timber supply, and potential impacts to non-timber values which could result from large-scale salvage harvest of impacted stands. I also received a variety of recommendations regarding options for consideration in my AAC decision.

During collaboration regarding this TSR, CSFNs expressed concerns that past forest management practices, such as those that led to blowdown on edges, have contributed to the current spruce beetle outbreak. They also expressed concerns regarding timing and intensity of salvage related to the spruce beetle infestation and subsequent impacts to their communities and territories. From Ministry staff I heard that in response to the CSFNs concerns regarding spruce beetle, capacity building including spruce beetle information sessions and training on spruce beetle probing were conducted. Staff also shared with CSFNs the timber supply scenarios described under '*Spruce beetle analysis*' above.

I have reviewed the analysis methods and results, as well as input provided by forest licensees, other stakeholders and First Nations. I have discussed the management of timber and non-timber values in spruce beetle-impacted stands with Ministry staff, as well as team members from the Provincial forest health program. We discussed challenges and benefits of implementing various strategies to support licensee management responses to spruce beetle, while mitigating impacts to the mid-term timber supply and other values, and optimizing salvage harvest of MPB-impacted timber. I have considered this information in my determination and will discuss this further in '**Reasons for Decision**'.

The monitoring and management response to the spruce beetle outbreak within the Omineca Region will be highly important for future forest stewardship decisions in the Prince George TSA, including future AAC decisions. As such, it is my expectation that:

- Ministry staff will work with licensees to maintain focus on spruce beetle sanitation harvesting, and the removal of live, infested trees at the leading edge of the outbreak; and
- Ministry staff will continue to monitor spruce beetle sanitation harvesting and rate of spread of the spruce beetle infestation and provide regular reporting so that the chief forester is able to consider whether a change in the AAC is required in order to respond to any changes in the distribution and/or intensity of the outbreak.

In addition, I recommend that Ministry staff work with provincial forest health and forest practices specialists to develop appropriate management guidelines for retention and harvest techniques to use in spruce beetle areas, taking into consideration constraints and retention targets related to other values including wildlife, fisheries sensitive watersheds and biodiversity. The guidance document discussed above in this section contains additional information regarding this recommendation.

Any new information regarding spruce beetle monitoring and management practices will be incorporated into subsequent TSRs. In addition, I will closely monitor the status of the spruce beetle outbreak. If stewardship and sustainability issues materialize that affect timber supply, I am prepared to revisit this determination sooner than in 10 years, as required by legislation, including the potential application of partitions.

*- unsalvaged losses*

Unsalvaged losses are the timber volumes lost to periodic natural disturbances due to extreme weather, fire, or epidemic forest health factors, and not recovered by salvage harvesting. Unsalvaged losses are accounted for by averaging recorded periodic volume losses to approximate an average annual volume loss for factors including insects, fire and blowdown. The losses attributed to above normal infestations of mountain pine beetle (MPB) and spruce beetle (IBS), and mortality of western balsam fir were excluded from the estimates developed for this TSR.

Balsam decline has been a serious forest health concern in the former Fort St. James District since the early 1990s. Ongoing outbreaks of western balsam bark beetle and spruce budworm, coupled with various heart rot diseases common to over mature balsam-leading stands have contributed to extensive stand mortality and significant loss of merchantable volume over the past decade. Following the previous 2011 TSR, stand sampling was conducted. Using this data, FAIB developed a mortality regression model to adjust stand volumes in balsam-leading stands in supply blocks A and B. The mean volume reduction for mortality in balsam-leading stands was 23 percent.

Volume losses in MPB and spruce beetle impacted stands are discussed in the '*Mountain Pine Beetle*', '*Spruce Beetle analysis*' and '*Spruce Beetle action plan*' sections of this document. Ministry staff indicate that they are satisfied that unsalvaged losses to other factors have been appropriately accounted for in the base case.

I have reviewed the impacts of the 2017 fire season to the Prince George TSA, and discussed the potential impacts to timber supply with Ministry staff. I believe that the impacts from the 2017 fire season are consistent with the unsalvaged loss assumptions applied in the base case harvest projection.

During public review a licensee expressed concerns that trends of increasing frequency and intensity of wildfires, linked to climate change and resulting changes in forest conditions, are not included in the timber supply modeling. A concerned citizen also expressed a need to be conservative with harvest predictions because of uncertainties related to future unsalvaged loss. Losses due to wildfires, pests and blowdown are accounted for in the model using the average of the yearly loss from the past 15 years net of salvage. As discussed in the '*climate change*' section of this document as well as in '*Guiding Principles for AAC Determinations*', the cyclical nature of TSR ensures that the best available information can be used for each timber supply review. Over time, as changes in forest condition occur, they will be reflected in subsequent TSRs.

I have reviewed the methods used to estimate unsalvaged loss for the salvage and post-salvage periods and discussed the methods and results with Ministry staff. I conclude that the base case reflects the best available information regarding unsalvaged losses and I will not adjust my AAC determination for this factor. Monitoring and recording changes in forest condition over time are imperative. As better information is gathered, it can be reflected in future TSRs.

- *supplemental analysis*

I have reviewed the assumptions in the base case harvest projection and I acknowledge that several issues have been brought forward which have significant impacts on timber supply in the Prince George TSA. The combined impact of these factors is difficult to gauge without conducting further sensitivity analyses. Significant quantifiable issues include harvest for spruce beetle management, newly established area-based tenures, changes in the treatment of problem forest types and changes to assumptions related to the managed stand yield modelling. A set of three supplemental analyses was provided to me by FAIB which explored the effect of modifying the THLB and changing managed stand assumptions based on the spruce beetle scenario that I believe best reflects expected management responses by licensees (as discussed in '*Spruce Beetle analysis*'). Refer to '*problem forest types*', '*additional area-based tenure withdrawals from the TSA*' and '*volume estimates for managed stands*' for further discussion regarding these factors.

In all three of the supplemental scenarios the Vanderhoof CFA and the Lheidli T'enneh FNWL and the Yekooche First Nation Area of Interest excluded from THLB exclusion area. The THLB was also modified by removing all pure balsam ( $\geq 80\%$  balsam) stands. The harvest contribution from deciduous-leading stands was set to 62 000 cubic metres per year, based on the economic operability assessment. In the base case volume estimates for managed stands established between 1987 and 2001 were modelled using TIPSYP natural yield curves and stands established prior to 1987 were modelled using VDYP. In the supplemental analysis volume estimates for managed stands established during the

period of 1980 to 1986 were modelled using TIPSYS natural yield curves. A key objective of these supplemental analyses was to maintain the base case mid-term harvest level of 6 100 000 cubic metres per year.

The first supplemental harvest projection has a starting harvest level of 8 400 000 cubic metres per year for the first five years. At year six the harvest level declines to 7 200 000 cubic metres per year, and remains at that level until year 10, at which time the harvest projection declines to the base case mid-term harvest level of 6 100 000 cubic metres per year.

The second sensitivity analysis tested the effects of implementing proposed FSWs and new area-based tenures. I note that at the time of this decision the Fraser Lake CFA, Tl'azt'en FNWL, and Stellat'en FNWL have been established. All three of these tenures were removed in this scenario. This scenario has as starting harvest level of 8 100 000 cubic metres per year for the first five years. At year six the harvest level declines to 6 850 000 cubic metres per year, and remains at that level until year 10, at which time the harvest projection declines to the base case mid-term harvest level of 6 100 000 cubic metres per year. I note that the 17 proposed FSWs are not yet established; however the implementation of the proposed FSWs had no additional effect on the short-term harvest projection.

The third sensitivity analysis built on the assumptions applied in the second scenario, and tested the effects of implementing a geographic partition for supply blocks A and B, limiting harvest in these units to the maximum long-term sustainable harvest level of 1 500 000 cubic metres per year. This scenario has a starting harvest level of 7 600 000 cubic metres per year for the first five years. At year six the harvest level declines to 6 600 000 cubic metres per year, and remains at that level until year 10, at which time the harvest projection declines to the base case mid-term harvest level of 6 100 000 cubic metres per year.

I have reviewed the supplemental analysis and discussed the assumptions and results with Ministry staff. I have considered the supplemental analysis in my AAC determination as discussed in '**Reasons for Decision**'.

## **Reasons for Decision**

In reaching my AAC determination for the Prince George TSA I have considered all of the factors required under Section 8 of the *Forest Act*. In the following section I will summarize the factors which influenced my understanding of available timber supply in relation to the base case. These factors include: modifications to the base case assumptions regarding current practice; the influence of the spruce beetle outbreak; the remaining salvage opportunities from MPB-impacted stands; potential impacts of timber harvest on forest values other than timber, notably wildlife; socio-economic implications of reducing timber supply; and potential impacts to Aboriginal Interests and treaty rights.

In the base case, the initial harvest was set at 10.1 million cubic metres per year, which reflects the recent five-year (2010-2014) average harvest for the TSA. This is approximately 19 percent lower than the AAC in place prior to my determination of 12.5 million cubic metres per year and was selected, even though it is significantly lower than the current AAC, to reflect current practice by licensees within the TSA. The initial harvest level includes 400 000 cubic metres per year of harvest attributable to deciduous-leading stands. During the first five years of the projection the base case reflects a significant focus on salvage harvest of MPB-impacted stands. After five years dead pine is no longer considered economically viable, therefore the harvest focus shifts primarily to non-pine leading stands. In order to achieve 10.1 million cubic metres per year of merchantable sawlog volume, approximately 19 million cubic metres of non-sawlog fibre by-catch is projected to be harvested over the first decade of the base case. After one decade, the projected harvest level declines to 6.1 million cubic metres per year for 55 years before increasing to a long-term harvest level of 9.8 million cubic metres per year.

In determining AACs I typically identify factors which, considered separately, indicate reasons why the actual timber supply may be either greater or less than the harvest levels projected in the base case. Some

of these factors can be quantified and their implications assessed with reliability. Others may influence the assessment of the timber supply by introducing risk or uncertainty, but cannot be quantified reliably at the time of the determination and must be accounted for in more general terms. Several factors that were not reflected in the base case were identified in this TSR as potentially having significant impacts on short-, mid- and long-term timber supply, as discussed below.

I am aware of one factor which indicates a potential underestimation in the base case harvest projection:

- *Volume estimates for managed stands* – the base case assumes that regenerating stands established in or after 1987 have improved growth and yield, and are modelled using the TIPSYS growth and yield model. In the base case, stands established before 1987 are modelled using VDYP. A comparison of YSM sampling to TIPSYS and VDYP growth and yield estimates in the TSA indicates that growth and yields in stands established in 1980 to 1986 inclusive are also best approximated by TIPSYS, based on natural stand inputs. If TIPSYS is applied to these stands, the mid-term harvest level increases by 11.5 percent relative to the base case. This change results in the ability for modelled harvest to shift into managed stands 10 years earlier, meaning that volume that used to maintain the mid term in the base case may be shifted to the short term. Results of a sensitivity analysis show that if this yield change is made and the base case mid-term harvest level of 6.1 million cubic metres per year is maintained, the short-term harvest level can be increased by 30 percent. It is reasonable to assume that this effect means that the base case significantly underestimates short-term timber supply.

In considering the assignment of yield estimates to older regenerated stands I have reviewed the preliminary results from the YSM program and I accept that the base case underestimates volume for managed stands established between 1980 and 1986. I also acknowledge there is uncertainty about the degree to which these older managed stands will achieve better growth and yield than natural stands. I have considered the underestimation and the associated uncertainty in my AAC determination. I understand that the uncertainty will be reduced as the YSM program progresses, and that future YSM results will be used to inform subsequent TSRs.

I am aware of several factors which indicate that the base case projection potentially overestimates timber supply:

- *Cultural heritage resources* – accounting for the mitigation or avoidance of impacts to cultural heritage resources outside of current known archaeological sites leads to a small, unquantified overestimation of timber supply in the mid- and long-term.
- *Area-based tenures* – the THLB used in the base case was not adjusted to account for issuance of new area-based tenures including: Vanderhoof CFA, Lheidli T'enneh FNWL, Fraser Lake CFA, Tl'azt'en FNWL, and Stelat'en FNWL. This results in up to a seven percent overestimation in short term projected harvest level and an up to two percent overestimation in the long-term harvest level.
- *Problem forest types: deciduous-leading stands* – based on the economic operability assessment it is reasonable to expect harvests of 62 000 cubic metres per year from deciduous-leading stands, as compared to the even-flow of 400 000 cubic metres in the base case. To maintain the base case mid-term harvest level of 6.1 million cubic metres per year, while excluding the non-economic deciduous-leading stands requires a reduction of the short-term timber supply of seven percent.
- *Problem forest types: pure balsam stands* – based on the assessment of current and historic practice it is reasonable to assume that harvest performance in balsam-leading and pure balsam (>=80 percent balsam) will be negligible. Removing pure balsam stands from the THLB reduces the THLB by six percent. To achieve the base case mid-term harvest level of 6.1 million cubic metres with the reduced THLB, the short-term harvest level must be reduced by 29 percent for the first 10 years of the harvest projection.



- *Wildlife, ungulate winter range, wildlife habitat areas* – the base case does not account for newly established UWR U-7-026, resulting in a one percent overestimation of the base case mid-term harvest level.

In addition to the considerations noted above that can to some degree be quantified at this time, I am aware of uncertainties about several factors that could result in higher timber supply than is projected in the base case, but the associated quantities are unknown:

- *Incremental silviculture* – fertilization conducted under the FFT program was not accounted for in the base case, which results in an underestimation of the long-term harvest level by a marginal, unquantified amount.
- *Site productivity estimates* - preliminary results from the YSM program indicates that the site productivity estimates for managed spruce stands may be underestimated by up to 10 percent; until additional sampling is completed the effects to timber supply are uncertain. This could reduce the length of the mid-term harvest period and/or increase the long-term harvest level;

I am aware of uncertainties about several factors that could result in lower timber supply than is projected in the base case, but the associated quantities are unknown:

- *Landscape biodiversity* – established landscape-biodiversity objectives for old interior forest and for young seral patch size are not accounted for in the base case. It is reasonable to assume that if these objectives were modeled, the timber supply would be reduced relative to the base case, but by an unquantified amount.
- *Harvest performance: non-pine profile* – the base case includes the assumption that dead pine volume in supply blocks D and F will be a significant contribution to timber harvest for five years. However, further harvest in supply block F is of concern related to extensive openings and insufficient stand-level retention that have resulted from salvage harvesting of MPB-impacted stands. If there were no harvest in supply block F during the short-term period, the short-term harvest level must be reduced by five percent in order to achieve the mid-term harvest level of 6.1 million cubic metres. It is reasonable to assume similar effects would result from lack of performance in supply block D. This results in an overestimation in the base case short-term harvest level by an unquantified amount.
- *Harvest opening not explicitly modeled* - the modelling approach used, without simulation of harvest openings, likely provides more harvest flexibility than can be achieved operationally. This increased flexibility may result in a small, unquantified overestimation in the base case;
- *Stand-level retention* - the base case projection is based on current practice, not on best practice as presented in *Guidance on Landscape and Stand-level Structural Retention on Large-scale Mountain Pine Beetle Salvage Operations* (Snetsinger 2005) provided by the chief forester. Retention guidance has also recently been provided in *Omineca Region Guidance: Stand and Landscape-level Retention for Harvesting in Response to Spruce Beetle Outbreaks*. As discussed in ‘*stand-level retention*’, if best practices are followed it will reduce the mid-term harvest projection by an unquantified amount. Given the concerns regarding the current condition of the land base, concerns regarding stewardship issues for biodiversity and wildlife, and concerns expressed by First Nations, I am stating an expectation under ‘**Implementation**’ regarding this factor.
- *Existing forest inventory* – inventory and disturbance information for the base case harvest projection is current to 2014. This information does not introduce a downward influence on timber supply projections, but does mean that we are currently three years into the base case and other timber supply projections developed for the TSR, and therefore, there is less time until the projected fall to the mid-term level.
- *Mountain pine beetle* - there is uncertainty in the assumption that licensees will continue to realize significant harvest of dead pine in the short term. If dead and decaying pine stands are not

salvage harvested before becoming uneconomical, there would be higher likelihood they will not be regenerated promptly, meaning there is potential that the mid-term harvest period will be protracted as affected stands would regenerate more slowly via natural processes.

- *Economic operability* – there is uncertainty in the assumption that connector roads between the Nadina and Stuart Nechako Districts will be completed, bringing into question the base case assumption that timber in supply blocks A and B, west of Takla Lake, will be economically operable to harvest and transport. I have included an expectation under ‘**Implementation**’, that I be provided with information on the status of the connector road and hauling patterns to allow for assessment of the contribution these supply blocks to the next AAC determination as well as potentially the need for a review of the AAC sooner than required by legislation.
- *Bioenergy* – the current AAC included a non-sawlog opportunity attributed to a bioenergy stand profile. There has been marginal historical performance in that profile, despite licences being awarded during the past six years. In response to the risk that if the bioenergy profile is assumed to contribute to the AAC, but that the attributed volume may be taken from other stand types, I will be applying a partition to these stands.
- *Decay, waste and breakage* – the base case projection does not consider the likelihood of increased amounts of decay, waste and breakage in spruce beetle impacted stands. I will be closely monitoring management response to the spruce beetle outbreak and I am prepared to re-determine AAC sooner than required by legislation if new information indicates it is warranted.

Finally, I am aware of uncertainties about some factors, which could result in changes to timber supply relative to the base case, but both the associated quantities and direction are unknown:

- *Volume estimates for natural stands (secondary stand structure)* - there is uncertainty in the modelled assumption of growth and yield for MPB-impacted stands with secondary structure. This uncertainty and the impact of changes to growth and yield inputs could have impacts on mid- and long-term harvest projections to an unknown extent. This is an issue that requires clarification, I have included expectations under ‘**Implementation**’.
- *Volume estimates for natural stands (inventory adjustment)* - inventory adjustments based on Phase II ground sampling increased merchantable volume estimates in the THLB by 38 million cubic metres primarily in the balsam-leading profile. Conversely, balsam-leading stands in supply blocks A and B were also adjusted on average downward by 23 percent to account for a combination of damage agents. There is an unquantified uncertainty that could reduce the mid-term harvest level if this volume from balsam-leading stands is not realized, as would be suggested by current practice. However, as noted above I am excluding pure balsam stands from contributing to the AAC for this determination, and hence the risk associated with uncertainty about the volume adjustments is likely to be low.

Analysis of quantified factors which over and underestimate timber supply indicates that the base case overestimates short-term timber supply by 12 percent. The third sensitivity analysis discussed under ‘*supplemental analysis*’ above, addressed the quantifiable issues discussed here. Unquantified factors could increase the overestimation substantially; however, by their nature it is not possible to quantify the overall impact. With respect to the uncertainties and risks I will be including expectations and recommendations in ‘**Implementation**’, and have included partitions in my decision to reduce potential impacts.

In addition to the factors listed above, there are several other considerations that have a direct bearing on my AAC determination including: the spruce beetle outbreak, caribou and grizzly bear management and potential impacts to Aboriginal Interests and treaty rights.

At this time, there is uncertainty regarding the impacts of spruce beetle on timber supply in the Prince George TSA. I have discussed the known extent of the spruce beetle outbreak with Ministry staff

and subject matter experts, and I have heard recommendations on management responses from licensees. In October of 2016, I was able to view the spruce beetle outbreak during a helicopter overview flight. Recently, reports from Ministry staff and licensees indicate that the outbreak has continued to intensify. Both Ministry staff and licensees have requested flexibility within this decision to mitigate potential volume loss in spruce-beetle infested stands.

I have reviewed several harvest projections which simulate potential management responses to spruce beetle, as well as the harvest performance by licensees regarding the non-pine partition, spruce-leading profile expectations and bioenergy profile opportunity established under the previous AAC determination. As stated in the 2011 rationale the chief forester established these partitions and expectations in the AAC to maximize salvage harvest of dead volume in MPB-impacted stands, and to defer harvest of live, non-pine timber to mitigate the potential socio-economic impacts in the mid term.

I have reviewed the information provided to me regarding stewardship options in response to both mountain pine beetle and spruce beetle. I emphasize that there continues to be a need for salvage harvesting in MPB-impacted stands, while the timber remains economically viable for sawlog and bioenergy production. At the same time it is imperative that sanitation and salvage harvest of spruce-beetle impacted stands occurs in an effective and timely manner. Based on the best available information at this time, my AAC decision is predicated on the assumption that harvest, particularly for the next five years, will prioritize dead, damaged and beetle-infested stands. I will be closely monitoring the spruce-beetle outbreak and harvest performance during the term of this decision. If harvesting is not focused on sanitation and salvage I may exercise my statutory authority to establish a partition for live timber.

I have considered the potential impacts of timber harvest to non-timber values including biodiversity, grizzly bear, caribou and hydrology. Salvage harvest of MPB-impacted stands has been concentrated in the south-central portion of the TSA. These intensive salvage operations, without coordinated planning regarding the extent of harvest openings, stand- and landscape-level retention, access development and watershed health have increased risks to many non-timber values. I believe efforts must accelerate to rehabilitate and restore the MPB-impacted land base to mitigate further impacts and lower risks to ecosystems, fish and wildlife. I am aware that portions of the TSA where non-timber values are currently at elevated risk contribute significantly to the base case projection. My AAC determination and my expectations and recommendations included in '**Implementation**' account for these risks.

Caribou and grizzly bear are important species both to Aboriginal and non-Aboriginal peoples, and their management is a priority for the governments of British Columbia, Canada and First Nations. Although grizzly bear populations in the northern areas of the TSA are stable, populations within the southern areas of the Prince George TSA are in decline. Of greater concern, most caribou populations within the TSA are in decline and could be at risk of being extirpated if caribou-specific management objectives are not implemented. Development for timber extraction, including harvesting and road building may increase risk to caribou populations by altering predator-prey dynamics. In addition, harvesting and road building increase the likelihood of human-grizzly bear interactions which may increase risk to grizzly bear populations. I have considered the potential impacts of timber harvest to caribou and grizzly bear habitat and populations within the scope of my statutory decision making authority.

While I could establish partitions that exclude timber harvesting from an area, such as wildlife habitat, I believe that such an action would extend beyond the intention of my statutory authority. In addition, decisions about the broad land use and forest management regimes that should apply across the TSA are more appropriately the topic of comprehensive and integrated deliberative land-use planning processes that involve representation from many affected parties. These processes would include all First Nations with territory overlapping the TSA, and be supported by analysis of the relative advantages and trade-offs associated with alternative management options. Therefore, I have not made specific adjustments in my determination to account for caribou and grizzly bear, although I will establish geographic partitions with

the intention of avoiding excessive concentration of harvesting in the north, and of easing pressures on central and southern portion of the TSA, which should be of some benefit to caribou. I note that a comprehensive, cross-agency management program is needed to ensure the sustainability of caribou populations in the Prince George TSA. The Province has committed to the development and implementation of such a program with the intention of supporting caribou population sustainability and to improving protection of critical habitat. Therefore, I expect that significant progress will be made during the effective period of this AAC decision. I have shared the information generated from this TSR with provincial staff working on caribou management and included my expectations and recommendations in ‘**Implementation**’.

In making this decision I have considered the potential for impacts to Aboriginal Interests and treaty rights. I acknowledge that although the AAC determination, due to its strategic nature and broad application to the TSA, may not result in direct impacts to Aboriginal Interests and treaty rights, there may be potential for direct impacts from operational decisions that follow from the AAC determination. I have heard the interests and concerns of First Nations through consultation and collaborative processes. I am aware of existing agreements, ongoing reconciliation processes and the Province’s recent commitments to implementation of the United Nations Declaration on the Rights of Indigenous Peoples. I have incorporated information and recommendations from First Nations into my AAC determination to the extent that I am able within the scope of my statutory authority under the *Forest Act* where it is reasonable, practical and necessary. Where information and/or recommendations from First Nations fall outside of my statutory authority, during my discussions with Ministry staff and decision makers in Omineca Region I have shared relevant information gathered and generated during the TSR, which can assist in addressing the issues at the appropriate scale. I have considered how my AAC determination effects reconciliation; I expect that ongoing negotiation and reconciliation processes will make significant progress towards resolution of the Province and First Nations’ title and interests within the Prince George TSA.

I believe it is appropriate to establish geographic partitions which promote the dispersal of timber harvest more broadly throughout the TSA to alleviate pressure on the central and southern portions that have historically been the focus of operations. While harvest will need to move to supply blocks A and B in the north in order to avoid even greater impacts to the central and southern areas, a geographic partition is needed to control the development pressure on these supply blocks. Supply blocks A and B are areas of the TSA with low existing disturbance, and therefore are important to values such as caribou and biodiversity. Shifting too much of the harvest to those areas would overly increase risks to those values. Information gathered during this TSR shows that concentrated development in supply blocks A and B would increase risk to the sustainability of the Chase, Takla and Wolverine caribou herds, as well as to other non-timber values and to Aboriginal Interests and treaty rights. I believe that a geographic partition is also needed for supply blocks C, D, E, F, G and H, to further constrain development in core of the TSA, which has been significantly impacted by the past decade of MPB-salvage efforts. I believe that this partition will also provide sufficient flexibility for management responses to the spruce beetle outbreak.

Analysis showed that the sustainable harvest level from supply blocks A and B is approximately 1 500 000 cubic metres per year. The supplemental analysis also showed that a harvest scenario which considers management for spruce beetle, recent land base changes due to approved First Nations tenures, and a limit on harvest in supply blocks A and B to the sustainable harvest level, results in a short-term harvest level of approximately 7 600 000 cubic metres per year for the first five years of the projection, with a decline to approximately 6 600 000 cubic metres per year at year six. This harvest level can be maintained from year six to year 10 of the projection, after which time the projected harvest level further declines to the base case mid-term harvest level of 6 100 000 cubic metres per year. I note that this projection did not include the contribution of bioenergy profile stands, which as discussed in ‘*bioenergy*’, I believe can provide up to 750 000 cubic metres per year. I have considered the unquantifiable upwards and downward pressures on timber supply as well as the factors which result in uncertainty and risk (as

discussed above), and I believe that this harvest projection best represents the sustainable timber and non-timber objectives for the Prince George TSA for the period of this AAC decision.

In making my decision I have considered the socio-economic impacts of a declining AAC. Analysis based on socio-economic coefficients developed using information from 2011 indicated that a harvest level of 10.8 million cubic metres (average annual harvest from May 2012 to April 2017) generated \$132 million per year in stumpage revenue, supported direct, indirect and induced full-time employment for approximately 8200 community members, with an annual government tax revenue of \$169 million. This analysis suggests that an immediate decline to the base case mid-term harvest level of 6.1 million cubic metres per year would reduce stumpage revenue, employment, government tax revenue substantially, by 44 percent. I have considered the potential socio-economic impacts of a declining timber supply to both Aboriginal and non-Aboriginal communities and have determined an AAC that balances the need to move toward a lower timber harvest level to achieve timber supply sustainability, with the objective for socio-economic stability, through a phased reduction in the AAC. In making my determination, I am also mindful that the harvest level over the past three years has been well below the full AAC attributed to the TSA. In my judgment, the objective of supporting socio-economic stability, where possible within the context of other objectives, effectively offsets the several unquantifiable uncertainties noted above in the discussion of factors that could affect timber supply.

I have considered information on Aboriginal Interests and treaty rights provided to me by First Nations. In particular, I have taken care to consider the balance between supporting a viable forest economy and stewardship of non-timber values. I believe that maintaining this balance is a shared interest of Aboriginal and non-Aboriginal communities in the Prince George TSA. In response to the recommendations I received from First Nations, I am prepared to review any new information and/or new land use or management objectives established under FRPA, the *Land Act* or other applicable statutes, as they become available. If the new information or land use objectives significantly alter timber supply, I am prepared to determine a new AAC for the Prince George TSA earlier than 10 years required by legislation.

As chief forester, in making an AAC decision I must determine a harvest rate that appropriately protects timber and non-timber values, sufficiently mitigates impacts to constitutionally protected rights and title of Aboriginal peoples, supports the regional economy and supports government's commitments to industry. In making this decision I have considered stewardship issues and Aboriginal Interests, as well as the potential socio-economic impacts of a reduction in timber supply, and reached a determination that I believe balances these factors appropriately. I believe establishing an AAC for the Prince George TSA of 8 350 000 cubic metres per year for the first five years of the decision achieves an appropriate balance.

## **Determination**

Having considered and reviewed all of the above information, including the risks and uncertainties of the information provided, and my obligations as chief forester, I have determined an AAC which in my view: appropriately protects timber and non-timber values, sufficiently mitigates impacts to potential risks to Aboriginal Interests and treaty rights, and supports the regional economy and supports government's commitments to industry. In consideration of the balance among these values, I have concluded that it is appropriate to establish an AAC for the Prince George TSA of 8 350 000 cubic metres per year for the first five years of the decision, which consists of various components as described immediately below.

The new AAC that I am setting is two-tiered. For the first five years, beginning on October 11, 2017 the new AAC will be 8 350 000 cubic metres per year, 33 percent lower than the current AAC. I specify, under Section 8(5)(a) of the *Forest Act*, the following geographic, species and timber profile partitions:

1. A maximum of 1 500 000 cubic metres per year is attributed to supply blocks A and B;

2. A maximum of 6 100 000 cubic metres per year, is attributed to supply blocks other than A and B (supply blocks C, D, E, F, G, H), of which 62 000 cubic metres per year is attributed to deciduous-leading stands.
3. A maximum of 750 000 cubic metres per year is attributed to bioenergy stands, which are mature, damaged pine-leading stands with less than 140 cubic metres per hectare net merchantable sawlog volume.

After five years, beginning on October 11, 2022, the new AAC will be reduced by a further 12 percent to 7 350 000 cubic metres per year. Partitions 1 and 3 will remain unchanged. Partition 2, the partition for supply blocks other than A and B (supply blocks C, D, E, F, G, H) which is lowered to a total of 5 100 000 cubic metres per year of which 62 000 cubic metres per year is attributed to deciduous-leading stands. This phased reduction is intended to ease the transition to the lower mid-term timber supply, to allow some time for local and regional economies to adjust.

In the 2011 AAC determination for the Prince George TSA the chief forester specified a partition for live non-pine profile. Considering that this current AAC is predicated on continued salvage in MPB-damaged stands and sanitation and/or salvage in spruce beetle-damaged stands, in this determination I expect that harvest over the next five years will be focused to the extent practicable in dead, dying and damaged stands. This includes both spruce- and pine-beetle infested stands as well as balsam bark beetle and fire damaged stands. I note that if spruce beetle remains of epidemic proportions the chief forester may establish a partition at any time for trees alive and uninfested at the time of harvest to account for the recovery of dead fibre in spruce beetle-impacted stands.

This determination is effective October 11, 2017, 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 made this decision, then I am prepared to revisit this determination sooner than the 10 years required by legislation.

## **Implementation**

In the period following this decision and leading to the subsequent AAC determination, I expect Ministry staff and licensees to undertake the tasks and studies noted below that I have also mentioned in above sections of this document. These expectations and recommendations are the result of my collaboration with Ministry staff, public input and engagement with First Nations, including collaboration with Carrier Sekani First Nations. I recognize that the ability of staff to undertake these projects is dependent on available time and funding. I expect Ministry staff and licensees to engage collaboratively with First Nations where practicable. These projects are important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Prince George TSA.

To support the chief forester in subsequent AAC determinations it is my expectation that:

1. Ministry staff and licensees to collaboratively monitor and report to the chief forester regarding performance and utilization in balsam-leading stands and balsam fibre, deciduous-leading stands and deciduous fibre, Douglas-fir leading stands and bioenergy profile stands.
2. Ministry staff to consider established biodiversity thresholds for old forest, interior old forest and young seral patch size in the *Order Establishing Landscape Biodiversity Objectives for the Prince George TSA* when developing tenure opportunities for licences specific to deciduous-leading stands.
3. Ministry staff to continue to support data collection and analysis for the Young Stand Monitoring program.

4. Ministry staff and licensees to work collaboratively with First Nations to develop a plan for retention during salvage and sanitation harvests which considers stand- and landscape-biodiversity and includes strategies (a) to continue to meet recommended stand-level retention thresholds in areas where retention meets or exceeds the chief forester's guidance as provided in *Guidance on Landscape and Stand level Structural Retention on Large-scale Mountain Pine Beetle Salvage Operations* and *Omineca Region - Guidance on Stand and Landscape-level Retention for Harvesting in Response to Spruce Beetle Outbreaks*, and (b) to rehabilitate the land base where retention is deficient.
5. Ministry staff to work with licensees to maintain the focus on spruce beetle sanitation harvesting, and the removal of live infested trees at the leading edge of the outbreak.
6. Ministry staff to continue to work with licensees to monitor spruce-beetle sanitation harvesting and rate of spread of the spruce-beetle infestation and provide regular reporting so that the chief forester is able to consider whether a change in the AAC is required in order to respond to any changes in the distribution and/or intensity of the outbreak.
7. Ministry staff to continue to engage collaboratively with First Nations to establish management objectives (may include FSWs, UWRs, WHAs and OGMAs) to conserve biologically and culturally significant areas, and may include areas identified by First Nations through their land use planning processes. I expect that Ministry staff will monitor and report regularly to the chief forester regarding new management objectives and potential implications to timber supply. I also expect Ministry staff to monitor and report to the chief forester regarding the status and implementation of First Nations stewardship plans, and associated changes to current practice.
8. Ministry staff to work with subject matter experts, licensees and the Province's caribou program to enhance caribou management and to improve research and monitoring of the Prince George TSA's caribou populations. I expect that Ministry staff will monitor and report regularly to the chief forester regarding new management objectives and potential implications to timber supply.
9. Ministry staff to monitor and report to the chief forester on the status of connector roads and haul patterns within the Prince George TSA.
10. Ministry staff to continue to monitor use of Grade 4 cut control credits and report regularly to the chief forester.
11. Ministry staff to collaborate with First Nations and licensees to monitor and report timber annually on harvesting activities by First Nations' territory.
12. Ministry staff to collaborate with licensees and First Nations to develop local timber management targets and strategies for the Prince George TSA, consistent with *Provincial Timber Management Goals, Objectives & Targets*.

In addition, this TSR has highlighted sustainability issues that will impact both timber and non-timber resources. Additional work is required to consider risks to forest values and if changes are warranted to develop improvements in management and stewardship. To support the long-term ecological integrity of the forested land base, I recommend that Ministry staff work collaboratively with licensees and First Nations to complete the following:

1. Work collaboratively on training and monitoring regarding secondary structure, emphasizing the importance of the secondary stand structure regulation (Forest Planning and Practices Regulation Section 43.1).
2. Obtain more information on secondary stand structure growth and yield, to provide for more robust modelling of this component of stand yields in the next TSR.

3. Work with subject matter experts to establish and implement best practices to mitigate risks to watershed health, and to support existing Regional research projects to determine options to alleviate watershed health hazards and risks.
4. Work collaboratively with First Nations and stakeholders to continue to strengthen wildlife conservation, as practicable, within the TSA, and to conduct research and monitoring to ensure that the best available information can be used by the chief forester in future AAC determinations.
5. Work with provincial forest health and forest practices specialists to develop appropriate management guidelines for retention and harvest techniques to use in spruce beetle areas, taking into consideration constraints and retention targets related to other values including wildlife, fisheries sensitive watersheds and biodiversity.
6. Develop forest management regimes (e.g., stocking standards, road rehabilitation guidelines) that could help to mitigate impact of forest management activities on grizzly bear habitat and populations.
7. Review and update existing policy regarding forest management in stands that contain Douglas-fir, including best management practices, and engage collaboratively with licensees and First Nations regarding training and implementation of best practices for Douglas-fir management.
8. Develop and implement a strategic access management plan for the Prince George TSA, which includes access development, monitoring, rehabilitation and ecosystem restoration.
9. Develop a process to improve the identification and mitigation of impacts to cultural heritage resources.
10. Develop and implement guidelines for enhanced protection of riparian habitat related to small streams (S4, S5 and S6), wetlands and lakes.



Diane Nicholls, RPF  
Chief Forester

October 11, 2017



## Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, c. 157, (current to September 13, 2017), 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 tree farm licence areas, community forest agreement areas and 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 regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine an allowable annual cut for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(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 September 13, 2017) 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  
3<sup>rd</sup> 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  
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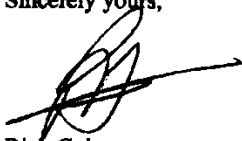
Jim Snetsinger

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 'RC', with a long horizontal stroke extending to the right.

Rich Coleman  
Minister