BRITISH COLUMBIA
MINISTRY OF FORESTS, MINES AND LANDS

Prince George Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective January 11, 2011

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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 (BC) 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.

Statutory framework

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

Acknowledgement

For preparation of the information I have considered in this determination, I am indebted to staff of the BC Ministries of Natural Resources Operations (MNO) and Forests, Mines and Lands (MFML) (formerly the Ministry of Forests and Range – MFR) in the Prince George, Vanderhoof and Fort St. James Forest Districts, the Northern Interior Forest Region, and the MFML Forest Analysis and Inventory Branch. I am also grateful to the individuals and companies who contributed to this process.

Description of the Prince George Timber Supply Area

The Prince George TSA is situated in the north-central interior of British Columbia and covers approximately 7.97 million hectares, making it one of the largest management units in the province. There are three forest districts within the TSA: Prince George, Vanderhoof and Fort St. James. Each district is responsible for the administration of forest management activities within its borders.

The Prince George TSA stretches from almost 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 portion 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 the upper slopes. The TSA includes the Fraser, Nechako, Stuart, Skeena, Sustut, Nation, Parsnip and McGregor river systems, as well as numerous lakes of all sizes.

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 is dominated by lodgepole pine stands. The remainder is made up of 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 peaked in the Fort St. James District in 2006. Recently harvested stands have been planted with predominantly spruce, lodgepole pine 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 cedar and hemlock stands in the Interior Cedar Hemlock biogeoclimatic zone located in the eastern portion of the TSA.

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, McLeod Lake, Shelley, Stella'quo, Stoney Creek, Strathnaver, Tache, Takla Landing, Upper Fraser, Vanderhoof, and Yekooche.

Twenty-four First Nations groups, comprising about six percent of the Prince George TSA's population have asserted traditional territories overlapping the TSA. These First Nation communities are: Nak'azdli, Takla Lake, Tl'azt'en, Nadleh Whut'en, Stellat'en, Saik'uz, Lheidli T'enneh, McLeod Lake, and Yekooche. Other First Nations whose communities are located outside of the Prince George TSA but whose traditional territories extend into the TSA are: Cheslatta, Gitxsan, Lhoosk'uz Dene, Ulkatcho, Kaska Dena, Tsay Keh Dene, Red Bluff, Lake Babine, Nazko, Toosey, Anaham (Tl'etinqox-t'in), Skin Tyee, West Moberly, Halfway River and Tahltan First Nations.

The forest industry is an important source of employment and income for residents of the Prince George TSA. In 2007, the economic downturn forced some mills to undergo temporary shutdowns and implement shift reductions during 2007 to 2009 to reduce total production. Currently in 2010, there are 19 lumber mills, three pulp mills, one utility mill, two log home manufacturers, and three pellet manufacturers. Combined these mills can consume up to 11 million cubic metres of logs annually.

A significant opportunity exists in the Prince George TSA for biomass associated with utilization of waste from traditional sawlog harvesting. These opportunities for harvest of standing dead timber for bioenergy vary by district.

History of the AAC

In 2002, the AAC for the Prince George TSA was set at 12 244 000 cubic metres per year. Of this total AAC, 110 000 cubic metres were attributed to cedar and hemlock stands, 160 000 cubic metres to deciduous-leading stands, and 400 000 cubic metres to Supply Block A located in the northwest portion of the Fort St. James Forest District. Three million cubic metres of this AAC was intended to facilitate the harvest of timber damaged by the mountain pine beetle and to limit the extent of future damage.

In 2004, the AAC for the Prince George TSA was increased to 14 944 000 cubic metres per year to provide additional opportunity to salvage timber killed by the current and projected MPB epidemic. Of this total AAC, 160 000 cubic metres are attributable to deciduous stands, 110 000 cubic metres to cedar and hemlock-leading stands and 400 000 cubic metres to Supply Block A.

Apportionment of the Prince George TSA AAC

Table 1. Current apportionment of the AAC for the Prince George TSA (m^3/year)

Coniferous	
Forest Licences, Replaceable	5 695 441
Forest Licences, Non-replaceable	5 358 488
BCTS Timber Sale Licence/Licence	3 265 106
BCTS Non-replaceable	180 000
Timber Sale licence <10 000 Replaceable	2 885
Woodlot Licence	30 000
Community Forest Agreement	68 000
Forest Service Reserve	184 080
Total	**14 784 000**
Deciduous	
Forest Licences, Non-replaceable	113 000
BCTS Timber Sale Licence/Licence	40 000
Woodlot Licence	0
Community Forest Agreement	7 000
Forest Service Reserve	0
Total	**160 000**
Grand Total	**14 944 000**

New AAC determination

Effective January 11, 2011, the new AAC for the Prince George TSA will be 12.5 million cubic metres, including the following partitions:

- a maximum of 3.5 million cubic metres attributable to non-pine species, and non-cedar and non-deciduous leading stands;
- a maximum of 23 000 cubic metres attributable to cedar-leading stands; and
- a maximum of 160 000 cubic metres attributable to deciduous-leading stands in Prince George and Fort St. James Forest Districts.

In addition to these partitions, it is my expectation that a maximum of 875 000 cubic metres per year come from spruce-leading stands.

This AAC will remain in effect until a new AAC is determined, which may take place within 10 years of this determination.

Information sources used in the AAC determination

Sources of data and information referenced for this AAC determination include references listed in the analysis report and the following:

- Prince George TSA Technical Report, Ministry of Forests and Range, September 2010;
- Prince George TSA Timber Supply Analysis Public Discussion Paper, Ministry of Forests and Range, January 2010;
- Prince George TSA Timber Supply Review Data Package, Ministry of Forests and Range, November 2008;

- Provincial-Level Projection of the Current Mountain Pine Beetle Outbreak: Update of the infestation projection based on the 2007 Provincial Aerial Overview of Forest Health and revisions to the "Model" (BCMPB.v5), Canadian Forest Service and Ministry of Forests and Range, May 2008;
- Prince George TSA Rationale for AAC Determination, Ministry of Forests and Range, October 2004;
- Vegetation Resource Inventory file, Timberline Consultants Ltd. and Ministry of Forests and Range, updated 2008;
- Prince George Forest District, Documentation of Analysis for Vegetation Resources Inventory Statistical Adjustment. Churlish Consulting Ltd., Victoria, BC and Jahraus & Associates Consulting Inc., Maple Ridge, BC, March 2008;
- Vanderhoof Forest District, Documentation of Analysis for Vegetation Resources Inventory Statistical Adjustment. Forest Analysis and Inventory Branch, Ministry of Forests and Range, December 2008;
- Fort St. James Forest District, Documentation of Analysis for Vegetation Resources Inventory Statistical Adjustment. Forest Analysis and Inventory Branch, Ministry of Forests and Range, December 2008;
- Order Establishing Landscape Biodiversity Objectives for the Prince George Timber Supply Area, October 20, 2004, found at: http://archive.ilmb.gov.bc.ca/slrp/srmp/north/prince_george_tsa/pg_tsa_biodiversity_order.pdf
- Order to establish the Humbug Landscape Unit and Objectives, April 2003;
- Order to Establish the Dome and Slim Landscape Units and Objectives, October 31, 2002, found at: http://archive.ilmb.gov.bc.ca/slrp/srmp/north/prince_george/legalobj_Oct31_02.pdf
- The Herrick Local Resource Use Plan (LRUP), November 1994;
- Order, Pursuant to Section 93.4 of the Land Act, November 21, 2006. found at http://archive.ilmb.gov.bc.ca/slrp/srmp/north/vanderhoof/district_order4_20061123.pdf
- Natural Disturbance Units of the Prince George Forest Region: Guidance for Sustainable Forest Management. Unpublished Report. DeLong, S.C., Ministry of Forests and Range, Prince George, 2002;
- Prince George Land and Resource Management Plan (LRMP), Government of B.C., March 1999;
- Vanderhoof LRMP, Government of B.C., January 1997;
- Fort St. James LRMP, Government of B.C., March 1999;
- Prince George Crown Land Use Plan – Order establishing Agriculture Development Areas and Settlement Reserve Areas, November 21, 2006;
- Procedures for Factoring Visual Resources into Timber Supply Analyses, Ministry of Forests and Range, March 17, 1998;
- Procedures for Carrying out Visually Effective Green-up Tree Height Assessment in Scenic Areas, Northern Interior Forest Region, Ministry of Forests and Range, November 2007;
- Bulletin-Modelling Visuals in Timber Supply Review III, Ministry of Forests and Range, December 12, 2003;

- Ungulate Winter Range Orders, U-5-001, U-7-002, U-7-003, U-7-011, U-7-012, U-7-013, U-7-013, U-7-015, U-7-016, U-7-022, U-7-023, Ministry of Environment, B.C.;
- Letter from the Minister of Forests to the chief forester stating the Crown's economic and social objectives for the province, July 4, 2006;
- Letter from the Minister of Forests and Range to the Chief Forester stating the economic and social objectives of the Crown regarding mid-term timber supply in areas affected by the mountain pine beetle, October 27, 2010;
- Abundance of Secondary Structure in Lodgepole Pine Stands Affected by the Mountain Pine Beetle: Report for the Chief Forester. Coates, K.D., C. Delong, P.J. Burton, and D.L. Sachs. Ministry of Forests and Range, 2006;
- Secondary Stand Structure and its Timber Supply Implications for Mountain Pine Beetle Attacked Forests on the Nechako Plateau of British Columbia. Pousette, J.G. Masters Science Thesis. University of Northern British Columbia. Prince George, B.C., 2010; and
- Biodiversity Conservation during Salvage Logging in the Central Interior of BC, Forest Practices Board, November 2009.

Role and limitations of the technical information used

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

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

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

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

Guiding principles for AAC determinations

Rapid changes in social values and in the understanding and management of complex forest ecosystems mean there is always uncertainty in the information used in AAC determinations. In making the large number of periodic determinations required for British Columbia's many forest management units, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. In any specific circumstance where I may consider it necessary to deviate from these principles, I will explain my reasoning in detail.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations I consider particular uncertainties associated with the information before me and attempt to assess and address the various potential current and future, social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining 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, I intend to reflect, as closely as possible, those forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect to factors that could affect the timber supply that are not substantiated by demonstrated performance or are beyond current legal requirements.

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

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

In some cases, even when government has made a formal land-use decision, it is not necessarily possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. Many government land-use decisions must be followed by detailed implementation decisions requiring for instance further detailed planning or legal designations such as those provided for under the *Land Act* and the *Forest and Range Practices Act* (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 I will consider information on 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.

Some persons have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are incomplete, but this will always be true where information is constantly evolving and management issues are changing. The requirement for regular AAC reviews will ensure that future determinations incorporate improved information.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligation resulting from recent court decisions to consult with First Nations regarding asserted rights and title (aboriginal interests) in a manner proportional to the strength of their aboriginal interests and the degree to which the decision may

impact these interests. In this regard, I will consider the information provided to First Nations to explain the timber supply review (TSR) process and any information brought forward respecting First Nations' aboriginal interests including how these interests may be impacted, and any operational plans and actions that describe forest practices to address First Nations' interests, before I make my decision. As I am able, within the scope of my authority under Section 8 of the *Forest Act*, where appropriate I will seek to address aboriginal interests that will be impacted by my proposed decision. When aboriginal interests are raised that are outside my jurisdiction, I will endeavour to forward these interests for consideration by appropriate decision makers. Specific concerns identified by First Nations in relation to their aboriginal interests within the TSA are addressed in various sections of this rationale.

The AAC that I determine 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 my determination does not prescribe a particular plan of harvesting activity within the Prince George TSA. It is also independent of any decisions by the Minister of Forests, Mines and Lands with respect to subsequent allocation of wood supply.

Overall, in making AAC determinations, I am mindful of my obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests, Mines and Lands (previously the Ministry of Forests and Range) as set out in Section 4 of the *Ministry of Forests and Range Act*, and of my responsibilities under the *Forest and Range Practices Act (FRPA)*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the TSR program for TSAs and Tree Farm Licences (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 simulation model, a series of timber supply forecasts can be produced, reflecting different starting harvest levels, rates of decline or increase, and potential trade-offs between short- and long-term harvest levels.

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

Because the base case represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TSA 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 simulation used to generate it.

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

Such adjustments are made on the basis of informed judgement using current, available information about forest management that may well have changed since the original information package was assembled. Forest management data are particularly subject to revision during periods of legislative or regulatory change, or during the implementation of new policies, procedures, guidelines or plans. Thus it is important to remember that while the timber supply analysis with which I am provided is integral to the

considerations leading to the AAC determination, the AAC is not determined by calculation but by a synthesis of judgement and analysis in which numerous risks and uncertainties must be weighed. Depending upon the outcome of these considerations, the resulting AAC may or may not coincide with the base case forecast. Moreover, because some of the risks and uncertainties considered are qualitative in nature, once an AAC has been determined, further computer analysis of the combined considerations may not confirm or add precision to the AAC.

Base case for the Prince George TSA

A key issue in this AAC determination is how to manage the mature, non-pine forests following the mountain pine beetle (MPB) infestation until the current, immature stands are suitable for harvesting. In previous timber supply analyses one harvest forecast is presented that is an outcome of the best available information and current management practices. This forecast is referred to as the 'base case'.

In the Prince George TSA; however, the extent of damage caused by the MPB infestation has increased the uncertainty regarding the effect of forest management practices on timber supply. Therefore, no single timber supply forecast was presented as the base case. Instead, a common data set and set of assumptions were used to develop four timber supply scenarios, scenario 1, scenarios 2A and 2B, and scenario 3. These scenarios differ in the degree of pine salvage and the management of non-pine stands.

Of the four scenarios, scenario 2A was used as the reference scenario and the majority of sensitivity analyses were done using this scenario as a benchmark. Therefore, throughout this document I will be referring to scenario 2A as the 'reference' scenario. Scenario 2A is described below, while scenarios 1, 2B and 3 are discussed under '*alternative harvest rates'*.

Following the release of the *Prince George TSA Timber Supply Analysis Public Discussion Paper*, an error in the timber supply model was found that effectively removed the 'visually effective green-up' height constraints within visually sensitive areas. Once the model was corrected, timber supply in scenario 2A was reduced by 16 percent in the fourth decade. A new harvest forecast using the corrected height constraints was produced.

In scenario 2A, the initial harvest level of 12.5 million cubic metres per year was based on the average harvest level for the five-year period from 2004 to 2008.

In this scenario the salvage of dead pine was assumed to continue at the five-year average rate; however, in order to minimize the projected decrease in mid-term harvest levels, the harvest of non-pine stands was temporarily increased above the level that is sustainable in the long term.

In scenario 2A, harvest operations in the Prince George and Vanderhoof Forest Districts were assumed to shift to the Fort St. James District, once all of the salvageable pine in the Prince George and Vanderhoof Forest Districts has been harvested. The increased harvesting capacity in the Fort St. James Forest District was used to increase the rate of pine salvage, which was assumed to continue until all of the available dead pine in this forest district has been harvested.

Spruce-leading stands initially contributed 875 000 cubic metres per year, which is about the recent level of harvesting in this stand type. After 12 years, the projected harvest level decreases to a mid-term level of about 6.2 million cubic metres per year. About six million cubic metres per year of this harvest is attributed to spruce-leading stands with cedar and deciduous stands contributing the remainder. The higher rate of spruce harvest during years 12 to 40 results in a lower rate of spruce harvest during years 40 to 60 of the forecast period.

The scenarios presented in the current analysis incorporate a number of changes in input data and methodology from the three base cases that were generated in the 2004 analysis. These differences include:

- phase 2 inventory adjustments for the three forest districts resulting in revised age, height and site index estimates for mid-rotation and mature stands;
- variable density yield prediction model version 7 (VDYP7) was used for yield estimates;
- terrain stability mapping replaced environmentally sensitive areas soils mapping;
- predictive ecosystem mapping was used across the three districts resulting in revised site index estimates for stands established since 1997 and future stands;
- implementation of the BC Mountain Pine Beetle model and its adjustments using UNBC ground plots;
- economic operability has been redefined;
- the "*Provincial Non-Spatial Old Growth Order*" was replaced with the "*Order Establishing Landscape Biodiversity Objectives for the Prince George Timber Supply Area"* in October 20, 2004;
- additional ungulate winter ranges were implemented and removed;
- polygons with visual quality objectives that have specific retention requirements were implemented;
- timber supply analysis used a spatial model in place of the aspatial timber supply model used in the previous TSR;
- extensive balsam mortality in the Fort St. James Forest District has been mapped and this was reflected in the forecasts; and
- young pine mortality has been mapped and is reflected in the forecasts.

Due to the change in factors between the previous and current analyses the current scenarios and previous base case projections are not directly comparable. These differences also make it difficult to attribute any changes in the current forecast to any one particular factor.

I have reviewed the assumptions and methodology incorporated in the three timber supply scenarios and I have considered the management of the mature, non-pine forests that remain following the MPB infestation and its implications to the mid-term timber supply. Based on my review, I am satisfied, subject to the qualifications accounted for in various sections of this document, that the information presented to me provides a suitable basis from which I can assess the timber supply for the Prince George TSA. In addition to the four harvest scenarios, I was provided with a number of sensitivity analyses and supplemental analysis work. This and other information noted below have been helpful in the considerations and reasoning leading to my determination.

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

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

For other factors, where more uncertainty exists, or where public or First Nations' input indicates contention regarding the information used, modelling, or some other aspect under consideration, this rationale incorporates an explanation of how I considered the essential issues raised and the reasoning leading to my conclusions.

Table 2. List of factors for which base case modelling assumptions have been accepted

Forest Act section and description	Factors accepted as modelled
8(8)(a)(i) Land base contributing to timber harvesting	• parks and ecological reserves • roads, trails, and transmission lines • unstable terrain • 'problem' forest types • resource management zones • preservation of visual quality objectives • recreation • old growth management areas • agricultural development and settlement reserve areas
8(8)(a)(i) Composition of the forest and expected rate of growth	• site productivity estimates
8(8)(a)(iii) Silvicultural treatments to be applied	• silviculture systems • rehabilitation programs (Forests for Tomorrow)
8(8)(a)(iv) Standard of timber utilization and allowance for decay, waste, and breakage	• utilization standards • decay, waste and breakage • minimum harvest volumes
8(8)(a)(v) Constraints on the amount of timber produced by use of the area for other purposes	• ungulate winter range and species at risk • ageing the inoperable • wildlife tree patches • riparian retention
8(8)(a)(vi) Other information	
8(8)(b) Short and long-term implications of alternative rates of timber harvesting from the area	
8(8)(d) Economic and social objectives of the government	

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 harvest

general comments

The area of the Prince George TSA, as estimated from inventory data and reported in the 2010 timber supply analysis is 7 965 504 hectares, of which 5 242 481 hectares are productive Crown forest.

The timber harvesting land base (THLB) is the area of productive forest land available for timber harvesting. As part of the process to define the THLB, a series of deductions were made from the

productive Crown forest. These deductions account for economic or ecological factors that operate to reduce the forest area available for harvesting. In reviewing these deductions, I am aware that some areas may have more than one classification. To ensure accuracy in defining the THLB, care must be taken to avoid any potential double-counting associated with overlapping objectives. Hence, a specific deduction for a given factor reported in the analysis or the AAC rationale does not necessarily reflect the total area with that classification; some portion of it may have been deducted earlier under another classification.

For the Prince George TSA, I acknowledge that the above approach was used in the timber supply analysis, resulting in a long-term THLB of 3 096 125 hectares, which means that 2 146 356 hectares of productive forest (41 percent) are unavailable for timber harvesting.

land ownership exclusions

A total of 1 423 862 hectares was excluded from the THLB to account for various land ownership types and tenures such as, woodlot licences, parks, agricultural development areas, Treaty 8 lands, and areas identified for treaty as part of First Nations' agreements-in-principle. After accounting for overlap with areas excluded for other reasons, a net area of 800 419 hectares were excluded from the THLB to account for land ownership exclusions.

Currently government is establishing a new community forest for the Yekooche First Nation and expanding the Fort St. James Community Forest. These changes in land ownership, which correspond to a combined harvest level of about 75 000 cubic metres per year, were not accounted for in the analysis. District staff indicate that the activities associated with these community forests are well advanced and will be completed this year.

In view of the certainty associated with the establishment and expansion of community forests in the TSA, I accept that the timber harvesting land base used in the analysis was over estimated resulting in a 75 000 cubic metres per year over-estimation of timber supply across the entire forecast period. I have taken this into consideration in my determination as discussed in **'Reasons for Decision'**.

economic land base

As part of the timber supply analysis, past harvest preferences were used to determine whether a stand is economic to harvest. It was assumed that tree species and volume per hectare would capture the variation in value and cycle time would capture the variation in cost. It was also assumed that these economic thresholds, volume per hectare and cycle time, would differ for the road and rail portions of the TSA. Deciduous-leading stands in the Vanderhoof Forest District, black spruce-leading and hemlock-leading stands throughout the TSA were considered uneconomic and were excluded from this analysis.

Information from 1613 logged timber marks over the last 15 years of timber harvesting were used to determine a reasonable upper limit for a cycle time and a reasonable lower limit for volume per hectare. Based on this information, a reasonable upper limit for a cycle time by road is 7.7 hours and by road and rail is 3.9 hours. A lower limit of volume per hectare by road is 182 cubic metres per hectare and by road and rail is 246 cubic metres per hectare.

Sensitivity analyses were used to assess the impact of these economic thresholds on timber supply. Results indicate that there is a direct relationship between changes in the thresholds and changes in mid-term timber supply. For every 10-percent decrease in volume per hectare and 10-percent increase in cycle time, the resulting mid-term timber supply could be increased by 10 percent.

In the analysis, the THLB included the majority of spruce-leading stands and excluded most of the balsam-leading stands. Therefore, increases in cycle time resulted in primarily balsam-leading stands being included in the THLB. Decreases in minimum harvest volume requirements resulted in the earlier harvesting of regenerating stands close to mills. If however, the productivity of managed stands does not materialize as predicted in the timber supply analysis, the gains in mid-term timber supply due to relaxed economic thresholds will not be realized.

A wide variety of input was received from several licensees, including:

- a higher proportion of balsam-leading stands should have been included in the timber harvesting land base;
- gross stand volume rather than sawlog volume should be considered in timber supply analysis;
- the Canadian to U.S. dollar exchange rate should be explicitly included in stand economic assessments;
- sustainable rates of timber supply will be overestimated if adequate manufacturing capacity is not accounted for; and
- future cycle times will likely exceed 7.7 hours because as timber supply declines, harvesting of lower volume stands further than 1.5 kilometres from existing roads will increase.

In conclusion, the sensitivity analysis assisted with identifying the potential gains of relaxing economic thresholds. I am satisfied, that while the cycle time and minimum volume per hectare represent timber harvesting to date, results indicate that future timber supply is very sensitive to these economic thresholds. The economic conditions of the day will influence what will be harvested. I am aware of the potential gains to the mid-term timber supply if economic thresholds change; however, these gains are dependent on timber market conditions, licensees' response to the market conditions, and the extent to which lower volume stands further away are harvested. Furthermore, these gains are also dependent on whether productivity gains associated with managed stands materialize in the mid-term.

I conclude the economic thresholds used in the analysis appropriately reflect current economic conditions. I recognize however, the uncertainty associated with these economic thresholds, and as such I request that district staff monitor licensees' performance and provide the information for the next AAC determination, as indicated under '**Implementation**'.

deciduous partition

There are currently two deciduous non-replaceable forest licences (NRFLs) in the TSA. T'sugus Timber Ltd. holds a licence for 55 000 cubic metres per year and Ainsworth holds a licence for 50 000 cubic metres per year. Overall performance has been poor in deciduous stands and both licensees have undercut their licences.

In addition to these NRFLs, there is a Community Forest Agreement with the Lheidli T'enneh First Nation in the Prince George Forest District. The AAC for this licence is 15 000 cubic metres of which 6000 cubic metres is to harvest deciduous stands. When CFAs are established, the area associated with the CFA is deleted from the TSA. In the analysis, exclusion of the CFA area from the land base had no effect and the current 160 000-cubic metre per year deciduous partition could still be maintained. The remainder of the deciduous partition is apportioned to British Columbia Timber Sales (BCTS).

District staff referred to recent literature that emphasized the value of deciduous stands and their importance in maintaining biodiversity, particularly in MPB-damaged units. Due to the lack of performance in deciduous stands and the growing awareness of the biodiversity values provided by these stands, district staff believe the deciduous partition should be continued. Furthermore, they indicated that as there are no suitable deciduous stands in the Vanderhoof Forest District, the deciduous partition should only apply to the Prince George and Fort St. James Forest Districts.

According to information provided by Ainsworth, their oriented strand board plant in 100 Mile House receives a significant portion of its deciduous fibre supply from the Prince George TSA. Consequently, the deciduous volume from this TSA supports numerous local jobs. Furthermore, through T'sugus Timber the deciduous volume is also a key economic driver for the Nak'azdli community.

Based on the results of the analysis, information and input received during consultation, I agree with district staff that the deciduous partition should continue at 160 000 cubic metres per year and be limited to the Prince George and Fort St. James Forest Districts , as noted in '**Reasons for Decision'**.

Existing Forest Inventory

forest inventory

The 2010 timber supply analysis was based on data from a Vegetation Resources Inventory (VRI) for which Phase I was completed at various times during the late 1990s and early 2000s for each forest district. At the time of the timber supply analysis, Phase II of the VRI involving ground and net volume adjustment factor sampling, was completed for about 85 percent of the TSA. The completed adjustments were approved by the Forest Analysis and Inventory Branch of MFML.

VRI Phase II adjustments using Variable Density Yield Prediction 7 (VDYP7) were completed by each district. As part of the Phase II adjustments, the forest cover of each district was divided into three categories to distinguish between pine and non-pine, and mature and immature stands (less than 141 years old). Across the TSA, the resulting volume adjustments for most of the stratums exceeded 15 percent, indicating there is a large amount of uncertainty associated with the inventory. Although it appears the adjustments were necessary, the amount of uncertainty associated with the adjustments implies that more ground sampling is required.

At the time of the analysis, only 72 percent of the forests in the Fort St James Forest District greater than 30 years old were sampled and adjusted. The forest was stratified by pine-leading and non-pine leading stands, resulting in deciduous-, balsam-, and spruce-leading stands being grouped together. The non-pine leading stratum is dominated by balsam-leading stands and consequently, the adjustments made were based primarily on data from balsam-leading stands. As a result, the same adjustment was used for both balsam- and deciduous-leading stands. Since most of the spruce was not sampled, spruce-leading stands were not adjusted. The adjustment for this stratum reflected both live and dead balsam so that balsam decline could be explicitly managed within the timber supply model, as further discussed under *'pests'* and *'non-recoverable losses'*. Doing so however, resulted in at least a one-third overestimation in the deciduous volumes within this stratum.

A significant portion of the spruce-leading stands in the Fort St. James District were neither sampled nor adjusted. This results in significant uncertainty in the inventory used in the analysis; however, as the same information was used for all of the analyses the relative differences between the forecasts are still valid.

The impact of the overestimated volume from deciduous stands was mitigated by modelling the deciduous forecast to determine whether the current AAC could be sustained.

For this determination, I accept that the adjusted VRI used in the analysis, although imperfect, represents the best available information and is therefore appropriate for use in this determination. With regards to the missing data, there is a risk that deciduous volumes may be overestimated, and there is uncertainty associated with the contribution of spruce to the mid-term timber supply. As little harvesting has occurred in these stand types, I conclude that any overestimation would likely have no significant impact on the short-term harvest level projections.

It is my understanding that since the time of the analysis, Phase II sampling of deciduous stands across the TSA and spruce stands in the Fort St. James Forest District has been completed. This information will be incorporated in the analysis for the next timber supply review.

Expected Rate of Growth

growth and yield

In order to simplify the analysis and development of the yield tables, similar forest types were grouped into analysis units based on predictive ecosystem mapping (PEM). An analysis unit was created for each predicted biogeoclimatic site series within the TSA. If data was lacking, site series were combined and in some instances PEM units were subdivided to facilitate the modelling of partitions.

In the analysis, stands established prior to 1987 were considered to be unmanaged. The VDYP7 model was used to generate mixed utilization yield curves for the unmanaged stand analysis units; whereas, the Table Interpolation Program for Stand Yields (TIPSY) was used to generate mixed utilization yield curves for managed stands. Due to a lack of local information, standard provincial operational adjustment factors (OAF) of 15 percent for OAF1 and five percent for OAF 2 were used. OAF 1 accounts for factors, such as unoccupied growing space and endemic pests and diseases that affect yield curves across all ages; while OAF 2 accounts for factors whose impacts increase over time such as decay, waste and breakage.

Based on stand development monitoring (SDM) in the Okanagan, Lakes and Kamloops TSAs conducted under the MFML Forest and Range Effectiveness Program (FREP), there is little evidence to suggest the stand density, diameter growth and height growth of well-spaced trees differ significantly between stands established pre- and post-1987.

Although, little work has been done on hard-pine rusts in the Vanderhoof Forest District, district staff informed me that considerable hard-pine rust and stem breakage exists in this district. In the neighbouring Lakes TSA, an OAF 1 of 20 percent was used in pine-leading stands to account for the impacts of hard pine rusts. Therefore, the growth of post-1987 stands – particularly pine-leading stands in the Vanderhoof Forest District – has probably resulted in an unquantifiable overestimation in the projected long-term timber supply.

Based on my review of the growth and yield information, particularly the presence of hard-pine rusts in the Vanderhoof Forest District, I conclude that the long-term harvest level projected in the reference forecast has likely been overestimated by an unquantified amount and I will account for this as noted in '**Reasons for Decision'**.

Prior to the next determination, I request that staff determine the incidence of hard-pine rusts in the Vanderhoof Forest District as part of refining Phase II of the inventory, and I have issued an instruction to this effect in '**Implementation'**.

Section 8 (8)(a) (iii)

Silviculture treatments to be applied to the area

stand development monitoring

The MFML Reporting Silviculture Updates and Land status Tracking System (RESULTS) was used to derive establishment densities for TIPSY. Based on advice from MFML Research staff, well spaced density measures were extracted from RESULTS. These densities ranged from 700 to 2000 stems per hectare (sph) with most analysis units having derived establishment densities of 1100 to 1200 sph.

Stand development monitoring (SDM) has commenced in the Prince George TSA, however at this time, there is insufficient data to draw conclusions specific to the TSA. In general, SDM results suggest that early rotation tree survival, as modelled by TIPSY, is optimistic.

Results from the sensitivity analysis based on the preliminary SDM value of 850 sph indicate that the harvest levels projected in the fourth and fifth decades may be overestimated by about 11 percent and

nine percent, respectively. However, there is still insufficient SDM data specific to the Prince George TSA to conclusively determine whether the stand densities assumed in the analysis were appropriate.

In consideration of the results from the sensitivity analysis and the preliminary results of SDM that indicate that stand development densities are likely lower than those used in the analysis, I conclude that the mid-term timber supply projected in the reference forecast has been overestimated by a significant, but unquantified amount, as noted in '**Reasons for Decision'**.

In preparation for the next AAC determination, I instruct district staff to continue monitoring the performance of managed stands and I have issued an instruction to this effect in '**Implementation'**.

genetic worth

Genetic worth estimates were applied to stands established after 1997 and future managed stands. For each relevant analysis unit, an average genetic worth was calculated for each species to account for the genetic worth of each available seed type, the proportion of area available for each seed type, and the average percent utilization of improved seed over the past seven years.

The results of a sensitivity analysis in which genetic gain assumptions were not applied indicate that due to the decrease in productivity, some stands no longer met the minimum volume threshold of 182 cubic metres per hectare by age 60 and; therefore, did not contribute to mid-term timber supply. In comparison to the reference forecast (scenario 2A), by decade 5 in the sensitivity analysis there was up to 18 percent less managed stand volume available for harvest and the long-term harvest level was up to five percent lower.

In addition to the information used in this analysis, I am also aware of the significantly improved height growth of increased genetic worth seedlings observed in orchard trials. Due to the relatively short time since the establishment of these trials the actual performance of trees with increased genetic worth over an entire rotation is as yet unknown. However, given the strong correlation between height growth and volume, I am willing to accept that the best available genetic worth information was used in the analysis and will make no adjustments to the reference forecast on this account.

Section 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

shelf life

In the reference forecasts (scenarios 1 and 2A), it was assumed that deteriorating pine trees would remain standing and retain commercial value for some form of wood product for 15 years after MPB attack, i.e. shelf life was assumed to be 15 years.

In order to assess the effect of varying shelf life assumptions by five years, three sensitivity analyses were prepared relative to scenario 1 (see *'alternative harvest rates'*) with shelf lives of either 15 years, 10 years or 20 years. However, for each sensitivity analysis the initial harvest level was reduced from the scenario 1 level of 14.9 million cubic metres per year to 12.5 million cubic metres per year, as in scenario 2A. The harvest level for spruce-leading stands was maintained at 875 000 cubic metres per year throughout the forecast horizons.

Comparing the results of the 10-year and 20-year shelf life sensitivity analyses to the 15-year shelf life sensitivity analysis indicates that increasing the shelf life by five years increases the volume available for salvage by about 24 million cubic metres. Decreasing shelf life by five years decreases the volume available for salvage by about 30 million cubic metres. Maximizing the mid-term harvest level in the

20-year shelf life sensitivity analysis delays the harvest transition to spruce-leading stands by three to four years; whereas, in the 10-year shelf life sensitivity analysis the transition period is decreased by about three to four years. Increasing or decreasing the timing to the transition to harvesting spruce-leading stands by three to four years resulted in a corresponding 12-15 percent change in mid-term harvest levels.

Comments received during the public review period included:

- dead pine trees have already started to fall down;
- a sensitivity (analysis) could be done with trees standing for 15 years on wet sites, and 20 to 25 years on dry sites;
- mills have been upgraded and are producing lumber from trees killed 10 years ago; and
- a tree standing for 15 years after attack may not produce quality saw logs.

Shelf life is highly variable and is influenced by a variety of factors including: market conditions, pricing, demand for chips and bioenergy and the bio-physical nature of pine, all of which are subject to uncertainty. However, as indicated in the sensitivity analyses, the longer harvesting focuses on pine-leading stands, the longer spruce-leading stands can be conserved; thereby, maintaining higher mid-term harvest levels.

Based on the previous discussions, I accept that the shelf life assumptions used in the analysis are subject to significant uncertainty. For this determination, in the absence of better information, I will make no adjustment to the reference forecast on this account, other than to note that this factor introduces unquantifiable uncertainty into the analysis.

bioenergy

The British Columbia (BC) Bioenergy Strategy is a provincial initiative to help BC reduce greenhouse gas emissions and strengthen the provinces' long term economic competitiveness and energy self-sufficiency. One of the goals of the bioenergy strategy is to diversify rural economies by recovering maximum value from British Columbia's forest and agricultural sectors. In areas affected by MPB, bioenergy can help capture value from deteriorating pine stands and help the forest sector and affected communities remain competitive.

There are currently three pellet production facilities in the Prince George TSA with a total annual fibre consumption of about 1.3 million cubic metres. Fibre sources for these pellet plants include residue from local sawmills and harvesting operations. Other users of fibre for bioenergy include a Canfor Pulp co-generation plant and a wood pellet heating system at the University of Northern British Columbia.

An issue with basing a bioenergy industry on residues from pine salvage is how to continue supporting the bioenergy sector when MPB-affected pine is no longer suitable or available. When this point is reached, the bioenergy sector could be in direct competition with the sawlog industry for fibre from spruce-leading stands, thereby creating additional pressure on these stands.

From this, I conclude that the AAC should incorporate bioenergy opportunities in order to avoid added pressure on spruce-leading stands in the short- to mid-term. Therefore, I am going to account for bioenergy opportunities in the AAC, as discussed in '**Reasons for Decision**'.

Section 8(8)(a)(v)

The constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production

Integrated resource management objectives

visual quality objectives

The *Forest and Range Practices Act* (FRPA) provides for scenic areas to be identified and made known. Visual quality objectives (VQOs) are established to limit the amount of visible disturbance permitted in sensitive areas. Guidelines to meet these VQOs require setting a maximum percentage of a specified area or 'viewshed' that is allowed to be harvested at any one time, and a 'visually effective green-up' (VEG) height is set at which a stand of reforested timber is perceived by the public to be satisfactorily greened-up.

Designated scenic areas and VQOs have been established in the TSA, such that 14 percent of the THLB is classified as visually sensitive. New techniques were applied in the model such as, analysis of scenic areas by slope class, use of perspective ratios for calculating netdown by slope class, and use of permissible percent alterations by VQOs. These percentages apply to the visible-treed portion of the landscape, while rock, snow and ice patches were excluded from the calculation. Harvest was constrained if the area with stand height less than VEG height threshold exceeded the scenic area denudation threshold.

As noted previously, following the release of the *Prince George TSA Timber Supply Analysis Public Discussion Paper*, an error in the model was found that effectively removed the VEG height constraints within visually sensitive areas. Once the model was corrected, timber supply in scenario 2A was reduced by 16 percent in the fourth decade.

Two contrasting perspectives were presented during the public review period. Concern was expressed that objectives for visual quality are no longer being met by dead pine stands and harvesting will return these dead stands to a productive state sooner. Consequently, harvesting these stands will improve timber supply in the short term and improve visual quality sooner in the long term than if they remain unsalvaged. In contrast, concern was also expressed that stands required to meet VQOs should remain unsalvaged, as even dead trees are visually more appealing than a clearcut and it is necessary to retain standing trees – both live and dead – in scenic areas to maintain recreation and tourism values.

Regardless of whether VQOs are met with standing live or dead trees, there is a legal requirement to meet established VQOs , i.e. to limit the amount of visible disturbance, in designated scenic areas. However, given the proportion of the THLB classified as visually sensitive, visual quality management does represent a significant constraint on mid- to long-term timber supply. For this determination, I accept that the VQOs used in the analysis represent current management and are consistent with the legal requirements for visual quality. However, given the modelling error that effectively removed the visually effective green-up height requirements in the analysis, I conclude that the harvest level in fourth decade of the reference forecast was overestimated by 16 percent, or about six percent, if averaged across the entire mid-term period, and I will account for this as noted in '**Reasons for Decision**'.

stand-level biodiversity

Retention of wildlife tree patches (WTPs) and riparian areas are important to the conservation of biodiversity at the forest stand level. The FRPA provides for retention of wildlife trees and riparian zones in harvested areas.

In the timber supply analysis, retention estimates for each district within the TSA were modelled based on the historical retention practices of the last seven years, which were heavily weighted towards management practices under the *Forest Practices Code of BC Act.* The total retention estimates include

areas occupied by riparian zones, WTPs, archaeological features, site specific habitat features and blue-listed species.

Trends from recent years show increasing levels of retention in landscapes dominated by pine-leading stands that have been salvaged. If this trend continues, there is a risk that the assumptions used in the analysis may underestimate future stand level retention, thereby overestimating the mature volume available for harvest.

During public input, the BC Trappers Association and others indicated that the amount and distribution of coarse woody debris that remains following logging operations is inadequate to support all forest values. They suggest that harvest practices should reflect the habitat management practices described in the report, *Mountain Pine Beetle Infestation: Coarse Woody Debris and Impacts on Furbearers*. Other input supported the retention of more standing timber in order to create connecting corridors between cutblocks and the burning. Another respondent suggested that the burning of coarse woody debris and removing all available timber for bioenergy are not consistent with meeting the biodiversity requirements.

I am aware of the issues presented by the BC Trappers Association and other concerned citizens regarding the amount and distribution of coarse woody debris that remains following timber harvesting. Coarse woody debris is a valuable component of productive forest ecosystems as it produces healthy soils and provides important wildlife habitat for furbearers.

As part of the FREP, resource stewardship monitoring is being done for various resource values such as stand level biodiversity. Volume of coarse woody debris is one factor used as an indicator to assess the state of biodiversity in a group of cutblocks, and is compared against the volume of coarse woody debris found in unharvested areas of the same ecosystem. Based on the FREP results, I have recently issued *Chief Forester's Guidance on Coarse Woody Debris Management* to inform resource professionals and raise awareness around the need for increased coarse woody debris planning and management before and during harvest operations. As such, I encourage licensees to refer to my guidance when planning harvest operations.

Based on my review of the stand-level biodiversity information used in the analysis, specifically the trend towards increasing stand level retention, I request that staff monitor stand level retention and that this information be incorporated in the next timber supply analysis, as noted in '**Implementation**'.

retention guidance

In the previous timber supply analysis, an enhanced retention level of 20 percent was assumed for each salvage cutblock. In 2005, I provided guidance on the importance of implementing an enhanced level of retention and specified how these retention levels could be met. Specifically, I recommended that landscape-level planning of salvage and retention be conducted and implemented such that stand-level retention increases as block size increases.

In the report, *Biodiversity Conservation during Salvage Logging in the Central Interior BC*, the Forest Practices Board of BC reported on the application of the chief forester's guidance in the Prince George, Quesnel and Lakes TSAs from 2006 to 2008. A subsequent report was produced updating the work done in the Prince George TSA to 2009. It concluded that despite the chief forester's guidance, no landscape level planning of salvage and retention had occurred; however, in-block retention levels did increase with cutblock size. The retention levels described in the Forest Practices Board report were based on data from 2006 to 2008. The retention levels described in 'stand level biodiversity' were based on data from 2001 to 2007. Both data sets indicate that there is a trend towards increasing levels of stand retention. Therefore, the assumptions used in this analysis likely underestimated stand-level retention and the

magnitude of the underestimation may increase over the next decade as salvage area size continues to increase.

A comment provided during the public review period indicated that the retention of large areas of dead standing trees will result in "silviculture slums" from decaying and falling trees that will be costly to reforest. In contrast, another comment indicated that the quick removal of MPB-killed pine will have negative and possibly irreparable consequences on current and future wildlife values, and recommends that a minimum of 25 percent of the MPB-killed stands be retained.

As noted in the chief forester's guidance, where possible standing dead pine should be retained to help sustain cavity nesting species and to provide shade for slowing down spring snowmelt. Furthermore, once the dead pine falls, it becomes coarse woody debris that provides habitat and shade for other species. The chief forester's guidance emphasised that, where possible, areas with live trees should be retained in order to maximize the potential to move water from the soil through evapotranspiration.

Based on my review of this information and discussions with staff, I conclude that actual retention levels are higher than those used in the timber supply analysis resulting in an unquantified overestimation in the harvest levels projected in the reference forecast. I also note that the current trend is to increase retention as salvage creates increasingly larger openings. However, as it is uncertain whether this trend will continue, I will make no further adjustments to the reference forecast on this account. Prior to the next timber supply review, I request that staff monitor retention levels and how they are linked to the achievement of other objectives on the land base as noted in '**Implementation**'.

landscape-level biodiversity

Legal direction for landscape-level biodiversity in the Prince George TSA is provided by three spatially-explicit orders and one aspatial order. The *Order to Establish Dome and Slim Landscape Units and Objectives* (2002) and the *Order to Establish Humbug Landscape Unit and Objectives* (2003) gave effect to the direction provided in the *Biodiversity Guidebook* by establishing old growth management areas (OGMAs) to be reserved from harvesting in the three landscape units. The third spatially-explicit order was issued in March 2009 to protect an area along the Ancient Forest Trail.

In 2002, a Landscape Objectives Working Group (LOWG) was established to develop strategic biodiversity landscape-level objectives for the Prince George TSA. Based on its review of 13 timber supply scenarios and additional modelling to account for MPB impacts, this group provided the recommendations, including ones for MPB mitigation, that resulted in the *Order Establishing Landscape Biodiversity Objectives for the Prince George TSA* (2004) (2004 Order). In addition to the order, this group also developed and agreed to a results-based implementation policy and reporting structure.

The 2004 Order outlines objectives for old forest retention, old interior forest retention, and young forest patch size distribution that are applied to the merged biogeoclimatic units (mBEC). These mBECs are a combination of natural disturbance sub-units and biogeoclimatic subzones. Any OGMAs established outside of the 2004 Order are considered to contribute to the overall aspatial targets.

Old forest retention in the TSA is to be retained as per the targets outlined in Part A of the 2004 Order. These targets are specific to each district by mBEC unit, and are identified as a minimum percent of the Crown forest land base (CFLB). Old forest is defined as either greater than 120 or 140 years depending on the frequency of natural disturbance in each mBEC unit.

In anticipation of both the expected impacts of the MPB infestation and future unanticipated events, the 2004 Order includes Section D, Contributions, Interpretations and Alternatives. Factors of this section stipulate that old forest in parks and protected areas, and a representative portion of old forest stands

killed by MPB would contribute to the old forest retention targets. Section D also requires that licensees ensure the targets are met by a representative portion of non-pine-leading stands. The dead pine stands that contribute to the old forest target are considered to be natural forest areas (NFAs). Though it is not clear in the 2004 Order as to how long NFAs can contribute to the target, current direction is for NFAs to contribute until they are harvested following natural regeneration into mature forests. In addition, the 2004 Order does not specify the minimum percentage of CFLB to be retained as old non-pine-leading forest; however, the attached Implementation Policy does indicate a minimum percentage of CFLB be retained as old non-pine-leading stands in order to meet the objectives for specific mBECs units.

Part B of the 2004 Order provides the minimum percentage of the old forest target that must be retained as old interior forest. Old interior forest is buffered from young forest and disturbance such as harvesting or roads, and this is further defined in the implementation policy. NFAs are assumed to contribute as old interior forest, where adequately buffered from disturbance.

Part C of the 2004 Order requires a demonstrated trend toward young forest patch size distribution by natural disturbance sub-unit. Reporting of patch size was not done in this timber supply analysis because of the complexity of the assumptions needed to be modelled. It is anticipated however, that no impact to the forecasted timber supply would apply because the objective only stipulates that licensees demonstrate they are working towards the target.

Results from the timber supply analysis indicate a challenge for the Prince George Forest District to meet old interior forest management targets. Two merged biogeoclimatic (mBEC) units fall below these targets in 2020, and three units fall below the targets in 2040, 2060 and 2080. The Moist Interior and McGregor Plateau natural disturbance units within the Prince George District are dominated by pine-leading stands. These units tend to have the lowest targets for overall retention and a reduced age criterion for old stands of 120 years instead of 140 years. Furthermore, these units are prioritized for harvest in the model, and are simultaneously "drawn down" or maintained at the minimum threshold of the old forest retention target for prolonged periods during the forecast. This suggests that old interior objectives may be difficult to maintain under scenario 2A.

Therefore, concentrated harvest in the Prince George Forest District appears to present challenges in maintaining old growth. More specifically, it will be challenging to maintain adequate biodiversity in the retained stands due to drawdown of old growth levels to the minimum level in 14 units. There are also challenges in maintaining old interior forest retention targets. The timber supply analysis for old interior forest retention suggests that timber supply will be constrained in year ten. Considerations such as strategic planning to identify retention areas prior to harvest, direction for management of units to be managed across district boundaries, and the possible amalgamation of units to meet targets, may mitigate this impact.

Concerns were raised during the public review period about the assumptions regarding dead pine and its contribution to old forest targets. As well, the inability to model interior old forest and young patch size distribution and quantifying their impacts on timber supply may not accurately reflect the constraint on harvest opportunities.

Although young forest patch size could not be modelled for this timber supply analysis, the assumptions applied in scenario 2A on the various parts of the 2004 Order were factored into the model as best possible. It is also anticipated that young forest patch size will not impact timber supply because the objective only requires that licensees demonstrate a trend toward meeting the target.

There is a well defined old growth order for the Prince George TSA that has involved collaboration between government agencies and licensees. The Implementation Policy attached to the 2004 Order

provides flexibility in managing units and combining units in order to meet the old growth targets. There is however, a projected and sustained impact to timber supply starting in year ten because of old interior forest retention requirements. Staff advised me that strategic planning and consideration of specific management practices across units may mitigate this impact. Furthermore, the 2004 Order represents a significant constraint on timber supply in the future. Again, staff informed me that a mitigation strategy to address the units experiencing drawdown in old growth targets across the three districts has been initiated.

For this determination, I am prepared to accept that the landscape-level biodiversity assumptions used in the analysis are adequate in anticipation that strategic planning will occur which will mitigate timber supply impacts. However, prior to the next determination I request that the LOWG develop mitigation strategies to address the old growth target drawdown in several of the landscape units, as noted in '**Implementation**'.

interior cedar hemlock old growth management

The interior cedar hemlock (ICH) biogeoclimatic (BEC) zone contains spruce-leading stands, which are a critical source of timber supply once the pine salvage has been completed. Currently, there are no licensees operating in the ICH, and there are no existing NRFLs in this BEC zone, as any such licences have either expired or have been transferred to salvage pine. There are however, three major licensees who have operating area within the ICH.

The Integrated Land Management Bureau (ILMB) produced a document entitled *Guidance and Technical Background Information for Biodiversity Management in the Interior Cedar Hemlock Zone within the Prince George Land Resource Management Plan Area* (2008), which includes recommendations for additional spatial OGMAs. These recommended spatial OGMAs are guidance OGMAs and are, therefore not legal requirements.

District staff completed a project to identify the area of economic operability for cedar-leading stands in the TSA and compared this with the area of economic operability for cedar-leading stands designated by licensees who have operating area in the ICH. Five sensitivity analyses using the different definitions of economic operability were conducted to determine the timber supply impacts of making the guidance OGMAs legal requirements.

The first sensitivity, scenario A, used the economic operable area identified by district staff and included the area for guidance OGMAs. This resulted in a flat line harvest forecast of 53 500 cubic metres per year within the ICH. In scenario B, using the same economic operable area but excluding the guidance OGMAs resulted in an even-flow harvest of 48 000 cubic metres per year. The lower harvest forecast in scenario B is attributed to a smaller THLB due to the exclusion of the guidance OGMAs, which would occur if the guidance OGMAs were legal requirements.

In the timber supply model, the area for guidance OGMAs is included in the THLB and therefore, portions of the guidance OGMAs would contribute to timber supply.

Scenario C used the economic operable area identified by the licensees, which is a smaller area than identified by district staff. Guidance OGMAs were included and the resulting harvest forecast is 42 500 cubic metres per year. Scenario D uses the licensees' economic operable area and excludes the guidance OGMAs resulting in a harvest forecast of 35 000 cubic metres per year. In scenario E the licensee's economic operable area was used again, however the old growth retention requirement that 53 percent of the timber harvesting land base be greater than 140 years old was applied. The resulting harvest forecast for the ICH is 23 000 cubic metres per year.

The 2004 Order does not specify which species are to be retained to meet the 53-percent target for stands greater than 140 years. Given the importance of preserving old cedar-leading stands, this lack of specificity is a cause for concern, as licensees have the option to harvest only old cedar-leading stands. Therefore, the volume specified in a cedar partition will likely impact the amount of non-cedar, such as spruce, that is available for harvest in the short term, because the more cedar contributing to the AAC, the greater the amount of spruce retention required to achieve the old growth retention target in the short term.

Based on the information presented by district staff, there are three areas of uncertainty associated with the timber supply analysis. First, if guidance OGMAs are legally established, their exclusion from the THLB would result in a 5000-cubic metre per year decrease in timber supply. Second, there is uncertainty regarding the size of the economically-operable area in the ICH due to different definitions presented by district staff and licensees. Finally, given the biodiversity values in old cedar forests and the potential impacts of a cedar partition in the AAC, consideration should be given to the trade-offs associated with harvesting cedar-leading stands or spruce-leading stands.

Following a complaint investigation, the Forest Practices Board issued a report entitled *Biodiversity in the Interior Cedar-Hemlock Forests Near Dome Creek* (2008). In response, the ILMB regional executive director (RED) indicated a number of factors contribute to decisions on how to balance and provide direction for managing values pertaining to the ICH. Such factors include: the development of the ICH Guidance Document, the legally established OGMAs (Slim, Dome and Humbug landscape units 2002 and 2003), and the 2004 Order that established biodiversity objectives for the Prince George TSA. In addition, there are 4770 hectares identified as guidance OGMAs, and the regional executive director is confident that professional reliance will ensure appropriate consideration of the guidance.

Input on the data package was received from the Canadian Standards Association (CSA) Certification Public Advisory Group and the Forest Practices Board regarding old growth management in the ICH. They recommended that guidance OGMAs be recognized and a buffer around these OGMAs be applied so as to maintain connectivity between them. A Forest Practices Board report suggested that a 10-year moratorium be placed on logging in the ICH. Furthermore, a recommendation was made to run a sensitivity analysis that excludes cedar from the THLB to determine its impact on timber supply.

Another comment on the data package indicated that the implementation of the recommendations made in the ICH Guidance Document be addressed during the timber supply review under Part 13 of the *Forest Act.*

During the public review period for the public discussion paper, 24 written comments were received regarding old growth management in the ICH. Most of these were a form letter in support of a 10-year moratorium on logging under Part 13 of the *Forest Act* for the ICH near Dome Creek, and to implement the recommendations of the Forest Practices Board Complaint Investigation of May 2008 to maintain biodiversity. Several people expressed the value of cedar-leading stands as carbon sinks and of having significant social and recreational value, and that these stands should be excluded from harvesting. Another suggestion was made to reduce the cedar partition to below 15 000 cubic metres per year. In addition to the written submissions a public meeting was held in April 2010 and was attended by 28 people in Dome Creek. The majority of the public who attended expressed interest in the cedar partition being reduced to between zero and 15 000 cubic metres per year.

For this determination, I conclude that the assumptions used in the analysis for old growth management in the ICH were based on the best available information. As compared to the timber supply forecasts reported in the PDP, the information presented to me indicates that the current cedar partition represents a significant overestimation in timber supply. I agree that the retention of old cedar-leading stands is

important and that we need to ensure that old growth cedar is maintained on the landscape for future generations. On this basis, I have decided to reduce the cedar partition as noted in '**Reasons for Decision**'. This will assist in meeting the 53 percent target of old growth retention through maintaining old cedar-leading stands.

cultural heritage resources

Provincial legislation requires that BC's forests be managed in a sustainable manner that includes considering the social and cultural needs of First Nations. The *Forest Act* defines a cultural heritage resource as 'an object, site, or location of a traditional societal practice that is of historical, cultural or archaeological significance to the province, a community, or an aboriginal people'. Cultural heritage resources include archaeological sites, structural features, heritage landscape features and traditional use sites. Features associated with past and current human use, including aboriginal use are found throughout the Prince George TSA.

During the consultation process, all First Nations expressed the importance of managing cultural heritage resources, and provided additional information including:

- traditional diets are based on numerous plant foods and animals;
- plants, fungi and animals have provided a wide range of important material resources for fuel, tools, medicine and transportation;
- First Nations' 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 in the area. These trails were recently expanded with information provided by Nak'azdli First Nation; and
- cultural heritage resources, medicinal plants and berries are gathered around various lakes and along trails.

In addition to the information provided, I am advised that licensees, First Nations and district staff have worked cooperatively to identify areas of cultural importance. These areas are considered to be 'log-around' areas, some of which may represent temporary exclusions but have no legal designation preventing timber harvesting, and therefore were not excluded from the THLB in the analysis. I am aware of these areas throughout the Prince George TSA, and many of these areas overlap with other objectives, such as resource management zones, protected areas, wildlife and fish habitat areas, riparian zones, scenic areas, old growth reserves, and visual preservation zones. These log-arounds are incorporated into management planning and are being respected by licensees. Therefore, I conclude that district staff are responding to First Nations' concerns and interests and these are being incorporated into management planning across the TSA. Cultural heritage resources that do not overlap with areas managed for other objectives are to be managed in accordance with the *Heritage Conservation Act*.

From this I conclude that district staff have a good understanding of what is required operationally to manage cultural heritage resources and other culturally significant interests. Discussions are also being held between First Nations and district staff to support planning for practices that are appropriate for managing these values. Overall, given the available information, it is reasonable to conclude that appropriate management is occurring in the field. As more information becomes available, it can be incorporated into future analyses and AAC determinations.

First Nations consultation process

The Crown has a duty to consult with, and accommodate if necessary, those First Nations for whom it has knowledge of the potential existence of aboriginal interests that may be impacted by a proposed decision,

including strategic-level decisions such as AAC determinations. As chief forester, I must therefore consider information arising from the consultation process with First Nations respecting aboriginal interests and treaty rights that may be affected by my AAC determination. As well, I will consider other relevant information available to the ministry regarding aboriginal interests, including information gathered during other consultation processes.

Consultation on the timber supply review began in June 2007 with 24 First Nations that have asserted traditional territory overlapping the Prince George TSA. During this time, the *Tsilhqot'in Decision* was released defining the Charleyboy Writ area, an area that Tsilhqot'in Nation claim rights to and overlaps with a portion of the Prince George TSA. This area of overlap identified two additional First Nations, Toosey and Tl'etinqox-t'in First Nations who are members of the Tsilhqot'in Nation that were subsequently consulted on the Prince George TSA timber supply review.

Twenty-four First Nations were consulted on the timber supply review and include the Nak'azdli, Takla Lake, Tl'azt'en, Nadleh Whut'en, Stellat'en, Saik'uz, Lheidli T'enneh, Yekooche, McLeod Lake, Cheslatta, Lhoosk'uz Dene, Ulkatcho, Toosey, Anaham, (Tl'etinqox-t'in), Skin Tyee, West Moberly, Halfway River, Gitxsan, Lake Babine, Tsay Key Dene, Red Bluff, Nazko, Kwadacha Nation and Tahltan First Nations.

All but three First Nations, Tahltan, West Moberly, and Halfway River have some form of an agreement with MFML. Such agreements include Forest and Range Opportunity Agreements, Interim Measures Agreements, Interim Accommodation Agreements, and Short Term Forestry Agreements. In cases where these agreements contain consultation provisions, they were adhered to in this consultation process. In addition, three First Nations, West Moberly, Halfway River and McLeod Lake are signatories of Treaty 8. Currently, MFML is negotiating an Economic Benefits Agreement with some Treaty 8 First Nations including West Moberly, and this agreement will contain consultation requirements. At the time of my decision, this agreement is still being negotiated.

In response to previous requests from First Nations to be involved earlier in consultation processes, district staff engaged with First Nations early in the timber supply review process. This earlier engagement constituted an approach beyond the consultation requirements specified in the previously mentioned agreements.

Consultation with First Nations was initiated by Vanderhoof, Prince George and Fort St. James District Offices in June 2007 and concluded in August 2010. Letters were sent to First Nations in June 2007 to initiate consultation; invite First Nations to a timber supply review information session; and to request information on their aboriginal interests to be included in the data package. In October 2007, a presentation on the timber supply review process was given at the Carrier Sekani Tribal Council (CSTC) and MFR Forestry Forum. Attempts were made in March 2008 for a First Nations meeting jointly hosted by CSTC and MFR, however the meeting was cancelled.

In November 2008, district staff sent the Prince George TSA Data Package to each First Nation and asked for their review and comment. In February 2009, a letter was sent introducing the pilot project, Assessment of Impacts to Wildlife Habitat and First Nations' Wildlife Needs in the Timber Supply Review, and requested information on First Nations' wildlife needs. District staff sent the *Prince George TSA Timber Supply Analysis Public Discussion Paper* in January 2010, and requested First Nation review and comment. In addition, results from the wildlife habitat pilot project were provided, which consisted of a map of each First Nation's traditional territory showing how wildlife habitat could potentially change over time, given the different timber harvesting levels modelled in the timber supply review. A preliminary assessment of First Nations' aboriginal interests was also provided at this time, which was

based on the information available to MFML and the potential impact the proposed AAC decision may have on these interests.

During the consultation process, district staff met with several First Nations regarding this timber supply review including Lheidli T'enneh, Takla Lake, Nak'azd'li, Gitxsan, Ulkatcho, Nazko, Cheslatta, West Moberly, Tl'azt'en, Nazko, and McLeod Lake First Nations. In addition, following the release of the public discussion paper, I personally met with Gitxsan, Lheidli T'enneh, and Nak'azdli First Nations.

From these meetings numerous interests and concerns were identified by First Nations and because of the extent of comments received, they have been grouped into similar themes and include the following:

- protection and maintenance of riparian areas and water quality;
- protection and maintenance of biodiversity and old growth reserves;
- excessive blowdown adjacent to cutblocks;
- protection and maintenance of cultural interests;
- protection of spruce stands;
- forest health;
- balance of harvesting various species;
- sufficiency of wildlife and wildlife habitat to meet First Nations' needs;
- shelf life of dead lodegpole pine;
- First Nations participation in land use planning;
- cumulative impacts;
- reforestation;
- consideration of climate change in timber supply review;
- lack of capacity;
- traditional use studies;
- opportunities for timber harvesting licences for First Nations;
- desire for co-decision making for AAC determinations;
- desire for revenue sharing;
- Aboriginal title must be addressed; and
- apportionment – desire for access to timber.

District staff informed me that they have provided responses, or met with First Nations to determine an appropriate course of action with respect to these concerns, and in the case of operational issues, district staff will take these concerns into consideration at the operational planning level. The TSA will continue to be managed under the FRPA and its regulations, which govern the activities of forest licensees and maintain a high level of protection for forest values including watersheds, wildlife habitat, and biodiversity. The manner in which several of the issues identified by First Nations, notably biodiversity, cultural interests, riparian areas, wildlife habitat, shelf life, forest health, reforestation, and protection of spruce stands have been addressed in my determination and are discussed in other sections of this rationale. In regards to opportunities of timber harvesting licences for First Nations, a new First Nations Woodland licence is being developed. At the time of my decision, these licences are still being negotiated with various First Nations.

The remaining concerns are matters that I cannot address directly in an AAC determination. My role in AAC determinations is to identify the total volume of timber that may be made available in TSAs and TFLs for timber harvesting opportunities, which will be distributed among licensees as decided by the Minister of Forests, Mines and Lands through the apportionment process.

As noted previously, 24 First Nations have asserted overlapping traditional territories within the Prince George TSA, and several Nations have explicitly asserted aboriginal title to extensive portions of the TSA. I acknowledge that First Nations people make up a significant portion of the TSA's population and that evidence of First Nations' uses is substantial in the TSA; however, the overlapping nature of the claims makes it difficult to be conclusive about where title claims may be strong in particular areas of the TSA. Despite the uncertainty, I recognise that there is some potential for claims of aboriginal title to be proven in some of the areas of the Prince George TSA. However, the question of how those claims could be accommodated in an AAC determination is not clear. I emphasize that the forest management regime employed on Crown land in British Columbia as stipulated in FRPA and its related regulations and policies, and reflected in land-use decisions, is designed to ensure the maintenance of the capacity of the land to support values associated with forests, such as water, wildlife, fish, and other forest vegetation. I have reflected that forest management framework in my AAC determination. In particular, in making an AAC determination one of my objectives is to ensure that timber is continually available through time, and that allowable timber harvest levels in the short term are consistent with a sustainable long-term timber supply. I base the determination on analysis that indicates this objective can be met.

I would like to add in relation to First Nations' generally expressed concerns for habitats and matters of forest stewardship that in all AAC determinations I already must and do consider and account for many wildlife management issues associated with potential implications for timber supply. For instance by ensuring appropriate forest cover provisions for riparian areas, for ungulate winter range and habitats for other species, for biodiversity at the stand and landscape levels through OGMAs and wildlife tree patches, and other such objectives, all of which are routinely assessed in operations and in timber supply analysis and accounted for as required by law. In situations where particular interests in stewardship are raised by a First Nation, I can then determine whether operational and analytical procedures are appropriate to address the interests raised or whether further steps may be necessary to address adequately a particular interest and the impact my decision may have on that interest. Wherever reasonable and appropriate, I have accounted for such changes in practice however, not all input from First Nations is always uniform. Nonetheless, I have considered all of the input received.

From all of the foregoing in this section, I conclude that reasonable efforts were made by district staff to inform First Nations about the timber supply review and engage them in consultation regarding their aboriginal interests and how these interests may be affected by this AAC determination. A large amount of valuable information was received from First Nations and I acknowledge their concerns and interests; many of these concerns are being managed under FRPA, and objectives established under the *Land Use Act*, and accordingly have been incorporated into the analyses supporting my decision.

Although the preliminary assessment was not formally shared with First Nations at the beginning of the timber supply review process, the findings from the assessment were referenced in subsequent consultation letters. Based on my review of the consultation process and the aboriginal interest information available to staff and the potential impact my decision may have on these interests, I believe that the MFML has engaged in consultation at an appropriate level on the consultation spectrum as outlined in the *Haida* decision. Furthermore, I note that district staff will continue to be available to meet and consult with First Nations on issues at the operational planning level.

If new information regarding First Nations' aboriginal interests 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.

Section 8(8)(a)(vi)

Any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber

secondary stand structure

Secondary stand structure is defined by Coates *et al.* (2006) as mature trees, saplings and seedlings that have remained alive in pine stands after the MPB infestation has run its course. Research suggests that as components of the overstory (mature trees) die, existing understory seedlings and saplings will accelerate their growth in response to increased availability of nutrients, moisture and light. Current information suggests that preserving stands with increased amounts of secondary structure will help to mitigate the decrease in mid-term timber supply. All harvest scenarios in the timber supply analysis for the Prince George TSA incorporated some consideration of secondary stand structure. Further, secondary stand structure sensitivity analysis refined the assumptions in scenario 2A regarding the live understory component (trees less than 12.5 cm in diameter at breast height).

In scenario 2A, it was assumed that the understory component of secondary stand structure germinates and begins to grow 10 years after the overstory stand reaches 50 percent mortality. It was also assumed that this natural understory has the same species mix and projected volume increase as the stand it is replacing. A sensitivity analysis examined the contribution of understory in scenario 2A. Eliminating its contribution extended the mid-term period by 10 years to 50 years and reduced the long-term harvest level by over 600 000 cubic metres per year until at least year 150.

Recent research from a Masters of Science thesis, *Secondary Stand Structure and its Timber Supply Implications for Mountain Pine Beetle Attacked Forests on the Nechako Plateau of British Columbia*, suggests that significant areas of understory exist in advanced development stages and that the species mixes are not the same as the existing mature stand they are replacing.

Additional sensitivity analyses were run using attributes of advanced regeneration. Two alternate growth and yield models, VDYP7 and SORTIE ND were used to provide separate estimates of the expected volume from the advanced regeneration component of secondary stand structure.

Results using VDYP7 to generate understory volumes from the advanced regeneration component of secondary stands, indicated that on average, the mid-term timber supply between years 15 and 60 is increased by 380 000 cubic metres per year. This increase is approximately six percent higher than the mid-term harvest level in scenario 2A. However, when SORTIE ND was used to generate understory volumes, the mid-term harvest level increased by about 1.46 million cubic metres per year or 25 percent.

The discrepancy in results could be because in VDYP7 the increased mid-term harvest level is not filled with timber from secondary stands, instead the additional volume between years 40 and 150 allows for existing mature volume from spruce and other species to be harvested earlier. In contrast, the mid-term harvest level using SORTIE ND is directly affected by the additional volume from the advanced regeneration as indicated by the different advanced regeneration yield curves that reflect understory release. Using SORTIE ND, several of the biogeoclimatic variants show volumes greater than 150 cubic metres per hectare accruing 20 years from now.

Input was received during the public review periods for the data package and public discussion paper. A licensee indicated an inability to extrapolate data to determine the presence or absence of understory throughout the TSA. This licensee stated that they are currently working on an inventory project to improve this information. A second comment suggested that a significant percentage of wetter

pine-leading stands have varying amounts of regeneration, some of which has been released and is responding well in many areas. Therefore, several dead pine-leading stands should not be logged because regeneration in these stands could add to future timber supplies.

Based on these analyses, I conclude that secondary stand structure will help to mitigate the mid-term timber supply and I account for this in '**Reasons for Decision'**.

There is however, uncertainty regarding how much secondary stand structure will contribute to mid-term timber supply. In view of this, I have outlined instructions in '**Implementation'** for district staff to monitor the development of MPB-killed pine stands, and to determine how licensees are managing for secondary structure, i.e., are licensees avoiding and preserving these stands and are they meeting the secondary stand regulation.

wildife habitat and TSR Pilot Project

The *Tsilhqot'in Nation v. British Columbia* decision stated the Tsilhqot'in Nation (TN) have an aboriginal right to hunt, trap and trade in the area claimed by the TN, and any decision or activity that reduces wildlife abundance, diversity or habitat would constitute an infringement. In order to justify an infringement, government should have sufficient credible information to allow a proper impact assessment on the wildlife in the area by considering information on wildlife abundance in the area, First Nations' wildlife needs, and potential impacts to First Nations' wildlife needs.

In response to the *Tsilqot'in* decision, an interagency pilot project with the Ministry of Environment (MOE) and MFR (now MNRO/MFML) was undertaken in the Prince George TSA. The purpose of this pilot project was to gather and generate information on the potential impacts of timber harvesting levels on wildlife habitat and First Nations' wildlife needs as part of the Prince George TSA timber supply review. As part of this pilot project, First Nations were asked during the consultation process for information on their wildlife needs.

MOE wildlife experts indicated it is difficult to collect definitive information on wildlife populations, and hence there is substantial uncertainty about wildlife abundance. These experts emphasized that the most feasible approach for estimating impacts on wildlife populations is to assess impacts on habitat. As a result, MOE developed a wildlife habitat suitability matrix that correlated forest conditions (specifically tree species and forest age with each biogeoclimatic subzone) to habitat quality for various wildlife species. Three habitat suitability classes were created: poor, medium, and good. The habitat suitability matrix could then be linked to forest conditions projected under the various harvest forecasts that were developed for this timber supply review, and thus project potential changes in habitat attributes over time as a result of the harvest forecasts.

Since there are numerous species in the TSA, MOE wildlife biologists grouped wildlife species into five classes based on the species' relationship to forest types and age classes. Representative species for each wildlife class were then chosen. For example, the moose class represents species that utilise young forests dominated by deciduous species with drier winter conditions and less snow pack. The representative species were moose, pine marten, bear and caribou and mountain goat.

Two harvest scenarios, no harvest and reference were used. The no harvest scenario provides baseline information, while the Reference scenario corresponds to scenario 2A in the timber supply analysis. For each harvest scenario, wildlife habitat maps were generated for moose and pine marten species classes and for each First Nation's traditional territory, showing the estimated quality of moose and pine marten under the two harvest scenarios for five points in time, 2008, 2022, 2040, 2060 and 2080. Wildlife habitat maps for the remaining two wildlife species classes, bear and caribou and mountain goat, were

provided upon request. Discussions with First Nations focused on two wildlife species classes: moose as representing disturbance tolerant species and pine marten representing disturbance intolerant species. Discussions were focused on these two wildlife species classes because of their significance to First Nations.

For the pine marten class (disturbance intolerant), under the no harvest scenario the distribution of habitat remains relatively stable through the mid-term with a gradual decline in the proportion of the poor class as stands mature and achieve moderate or good quality. Conversely, under the Reference scenario, there is an initial increase in the area of good habitat as harvest focuses on pine-leading stands and non-pine stands mature. Once harvest shifts to a non-pine focus in the mid-term the proportion of the good class begins to decline, and by 2080 there is a 46 percent reduction in the area of good class habitat relative to the no harvest scenario, and an increase in the poor habitat class. This reduction in the area of good habitat is due to the conversion of mature and old non-pine forests into managed stands.

These effects are concentrated more in the central portion of the Prince George TSA, which overlaps with the traditional territories of Nak'azdli, Tl'az'ten, Saik'uz, Nazko, Lheidli T'enneh and Nadleh Whut'en First Nations. These traditional territories contain mainly mature stands dominated by pine and non-pine species, and because this area was heavily impacted by MPB, salvage harvesting is forecasted to increase. The effects of elevated salvage harvesting on wildlife habitat are amplified in those traditional territories that have been heavily impacted by MPB and will be further impacted by post-salvage harvest levels in the non-pine. Therefore, these First Nations' traditional territories contribute significantly to the non-pine harvest in the mid-term, resulting in a proportionately larger reduction in the area of good class habitat relative to the TSA.

For the moose class (disturbance tolerant), under the no harvest scenario there is a significant decline in the amount of moderate and good habitat as stands mature and habitat quality for moose declines. Under the reference scenario there is a 78 percent increase in the area of good moose habitat relative to the no harvest scenario by 2080, reflecting the accelerated salvage of pine-leading stands and harvesting of mature forests. Again, these effects are amplified in those traditional territories heavily impacted by MPB.

In summary, the impacts of the MPB infestation and the forecasted elevated rates of timber harvesting generate significant changes in the distribution of habitat attributes for both disturbance tolerant and intolerant species classes. Generally, the change favours the disturbance tolerant species at the expense of the disturbance intolerant species. The extent, location and rate of change in habitat attributes are greatly influenced by the harvest preference and economic assumptions built into the timber supply model. Furthermore, the change in habitat attributes associated with the reference scenario tend to be concentrated within the central portion of the TSA, and therefore, affect First Nations' traditional territories within that portion of the TSA more than the traditional territories in other parts of the TSA.

Results from the wildlife habitat analysis were shared with First Nations by providing them with a wildlife habitat map illustrating the estimated quality of habitat for moose under the no harvest scenario. First Nations were invited to meet with district staff to discuss the results of the wildlife habitat analysis and additional maps illustrating the potential effects of the harvest scenarios on wildlife habitat of bear, pine marten, caribou and mountain goat over time, were provided upon request. Meetings with some First Nations took place to discuss the wildlife habitat analysis results and the timber supply review, as well as to share information on First Nations' wildlife needs. Several comments on the wildlife habitat pilot project were received from First Nations and include:

- several First Nations assert that all wildlife species are important;
- impacts of timber harvesting have accumulated over time on wildlife habitat;

- one First Nation indicated they have discontinued harvesting wildlife from their traditional territory because fur bearing animals have become scarce due to habitat loss from timber harvesting;
- some First Nations identified their wildlife needs in terms of the number of species needed for the community;
- management of caribou habitat is a significant concern–snowmobiling is creating more access allowing wolves to easily hunt caribou;
- amphibians such as salamanders and frogs are related to water quality and a representative species for amphibians should have been included in the pilot project;
- concern was expressed that guide outfitters' hunting quotas are too high for moose and grizzly bear;
- habitat needs to be preserved (e.g. moose licks, foliage, winter cover, bear dens);
- moose require both young and mature forests, because they need calving grounds and winter habitat and not only high amounts of forage;
- protection of mature spruce stands is very important and one First Nation questioned how old growth stands will be recruited;
- habitat maps were not useful because of the short horizon and wildlife interactions were not considered;
- Douglas-fir areas are important deer habitat in the Blackwater area and need to be protected in the long term;
- when one species is favoured by creating more habitat through timber harvesting, it is done at the peril of other species–a balance must be found–wildlife interactions were ignored in this pilot project;
- concern was expressed that wildlife habitat maps indicate timber harvesting is good for all ungulates;
- concern was expressed that Keyoh Holders have cabins throughout the traditional territory and timber harvesting will impact Keyoh Holders' ability to trap wildlife;
- some First Nations are currently unable to meet their sustenance needs through hunting;
- concern was expressed that hunting restrictions are not being adequately implemented by the MOE; and
- it appears that pine marten and fisher habitat areas will not recover in Nazko's traditional area. This makes the remnant mature spruce and pine stands even more important to protect from harvest. It was suggested that these areas be placed in wildlife tree patches and riparian areas wherever possible. There was a question about whether a strategy is being considered to get some of this area back into an older state that would provide martin habitat.

The wildlife habitat analysis indicated the no harvest scenario had a greater impact on the moose class, while the reference scenario had a greater impact on the pine marten class. The analysis results highlight that it is challenging to manage for various wildlife species that have different habitat requirements and to find a balance between the needs of wildlife, the needs of First Nations' for wildlife, and the economic and social benefits of timber harvesting. Although First Nations were asked to identify their wildlife needs, many of them did not and it is difficult to manage the landscape without knowing which species' habitat should be protected.

Wildlife habitat is managed and protected in the province through designation of wildlife habitat areas and ungulate winter ranges, all of which were incorporated into the timber supply review analyses. In addition, FRPA requirements for management of biodiversity (OGMAs, WTPs) and riparian areas assist in protecting wildlife habitat. The MOE has also developed a Conservation Framework that provides a set of decision support tools to enable collaboration between government and non-government resource managers to prioritize species and ecosystems for conservation, and to determine effective management

actions. The provincial-scale of the Conservation Framework and the site-level measures undertaken in the TSA through FRPA complement one another in managing, protecting, and monitoring wildlife habitat. As well, MOE is working on site specific issues and connectivity, because connectivity is critical in maintaining a sustainable vision of the entire landscape.

In conclusion, from a pilot project perspective the methodology carried out appears sound. Much of the remaining mature spruce-leading stands in the central portion of the TSA overlap with objectives for OGMAs, ungulate winter ranges, and riparian areas. Furthermore, stands will become available through secondary stand structure which will provide habitat earlier than originally thought, and possibly mitigating the loss of wildlife habitat for the pine marten class of disturbance intolerant species in the mid-term.

Many aspects of wildlife management and related concerns from First Nations are addressed in the timber supply analysis undertaken in support of my AAC determination. My challenge here is to assess if harvesting at the levels indicated in the timber supply forecasts may have undue implications on wildlife and First Nations' ability to hunt and trap. Based on the wildlife habitat analysis, I have concluded that in central portions of the TSA in particular where First Nations indicated that they use disturbance intolerant wildlife species such as pine marten, some accommodation for those uses is warranted in my AAC determination.

In an AAC determination, my ability to accommodate First Nations' interests is limited to accounting for reservation of land from harvesting and for management practices needed to manage for First Nations' interests. Accounting for those kinds of land base and management practices, may be reflected in changes to the AAC.

Results from the preliminary assessments of First Nations' strength of claim as noted under '*First Nations consultation process*', indicated that First Nations in the central portion of the TSA have strong aboriginal rights to hunt and trap, and some would likely have a strong prima facie claim of aboriginal title within portions of their traditional territory. Since these First Nations, whose asserted traditional territory falls within the central portion of the TSA that heavily impacted by the MPB and contains much of the residual mature spruce for the mid-term, I have made accommodations for this in how I have set my AAC decision, which I have accounted for in this determination as noted in '**Reasons for Decision'**.

innovative forest practices agreement

An innovative forest practices agreement (IFPA) is an agreement between MFML and licensees to test new and innovative forestry practices to improve forest productivity. Licensees are encouraged to carry out such practices through an opportunity to apply for an increase in their allocated harvest levels to enhance and maintain employment.

An IFPA in the Vanderhoof Forest District is held collectively by Canadian Forest Products (CANFOR), Fraser Lake Sawmills, L&M Lumber Ltd., and Lakeland Mills Ltd. In 2002, the IFPA holders were granted an AAC uplift of 415 400 cubic metres per year with the conditions that this uplift be included in the total AAC of the Prince George TSA and that this uplift volume must be harvested from MPB damaged stands.

More recently, the IFPA holders requested an additional AAC uplift of 507 400 cubic metres per year based on their forest practices. At the time of my determination this decision to grant an AAC uplift to the IFPA holders is still pending and will be made by the regional executive director (RED) of the Northern Interior Forest Region.

The RED will determine whether the forest practices carried out by the IFPA holders are sufficiently innovative to warrant an AAC uplift. If the uplift is granted, the RED will also decide if the uplift is included within the AAC for the Prince George TSA or if the volume is in addition to the AAC. There is little risk if the uplift is in addition to the AAC because the uplift will be focused on salvaging pine.

alternative harvest rates

Preparing a key issue in the four harvest flows presented in the public discussion paper was how to manage the mature, non-pine forests that remain following the MPB infestation until current immature stands are suitable for harvesting.

Four timber supply scenarios based on different management assumptions were prepared to explore the implications of a range of forest management choices. Scenario 2A, the reference scenario, was described previously under *'base case for the Prince George TSA'*. The remaining three scenarios are described below.

In scenario 1, the initial harvest level is set at the current AAC of 14.9 million cubic metres per year. Spruce-leading stands contribute 875 000 cubic metres per year to this harvest level, which is also the current harvest level of these stands. After the first 12 years of this harvest forecast, all of the pine-leading stands have either been salvaged or have fallen over and are no longer merchantable. Consequently, the harvest level is reduced to approximately 4.4 million cubic metres per year and is comprised of primarily spruce-leading stands, which is the sustainable long-term level for the spruce harvest that can be maintained throughout the forecast period. After 40 years, the harvest level increases to about 6.5 million cubic metres per year as regenerating stands become available for harvest. This forecast was not affected by the error which removed the height constraints in visually sensitive areas, as discussed in the *'base case for the Prince George TSA'*.

In this scenario 1, a maximum sustainable harvest of 55 000 cubic metres per year from cedar-leading stands could be achieved, which is 50 percent less than the current partition of 110 000 cubic metres per year. This decrease is attributed to a revised inventory for cedar-leading stands and a change in old growth management requirements since 2004. The current partition of 160 000 cubic metres per year for deciduous-leading stands was considered to be sustainable.

In scenario 2B, the initial harvest level is set at the average harvest level of 12.5 million cubic metres per year from the past five years, similar to scenario 2A. The salvage of dead pine continues at an average rate observed over the last five years, and in order to minimize the projected decrease in mid-term harvest levels, the harvest of non-pine stands is temporarily increased above the level that is sustainable in the long term.

The difference between scenarios 2A and 2B is that in scenario 2A harvesting operations in the Prince George and Vanderhoof Forest Districts are assumed to shift to the Fort St. James District, once all of the salvageable pine in the Prince George and Vanderhoof Forest Districts has been harvested. The increased harvesting capacity in the Fort St. James Forest District is used to increase the rate of pine salvage, which will continue until all of the available dead pine in this district has been harvested. In contrast, in scenario 2B the harvesting capacity used in the Prince George and Vanderhoof Forest Districts to salvage pine is not shifted to Fort St. James. Instead the additional harvesting capacity is used to increase the rate of the non-pine harvest. As a consequence, the increase in the non-pine harvest happens earlier in scenario 2B than in scenario 2A.

Since salvage harvesting of pine does not shift to the Fort St. James Forest District, spruce-leading stands are harvested, and gradually the harvest level is reduced to about 5.5 and 4.8 million cubic metres per year in the third and fourth decades, respectively. Due to the earlier transition to harvesting

spruce-leading stands and less salvaging of pine-leading stands, the projected total harvest between years 60 and 80 is lower than both scenarios 1 and 2A. Similar to scenario 2A, this forecast was impacted by the error noted in the *'base case for the Prince George TSA'*, which reduced the forecast in the fourth decade from 4.8 million to 4.2 million cubic metres/year.

In the unlikely event that pine salvage ceases in the Prince George TSA, a third scenario was developed to examine the timber supply impacts if the salvage of dead pine stopped immediately and the harvest of non-pine-leading stands increases to the 2008 harvest level of about 10 million cubic metres per year. This harvest level could be maintained for five years before decreasing to a mid-term level of 4.4 million cubic metres per year. In the mid-term, the harvest level would decrease below 4.4 million to 2.7 million cubic metres per year.

Although scenario 3 is unlikely, it illustrates the effects of immediately increasing the harvest of non-pine leading stands. The faster the non-pine growing stock is depleted, the more adversely the mid-term harvest levels are impacted and the less flexibility there is to transition to the mid-term harvest levels without seriously impacting the latter part of the mid-term.

Subsequent to the determination meeting I asked the analyst to investigate what the highest mid-term harvest level would be if harvesting at the mid-term level started today. A harvest forecast was prepared based on the following:

- the highest even-flow harvest level of non-pine was determined for the next four decades.
- the harvest level was raised as much as possible in the earlier decades without compromising the projected harvest level in the fourth decade; and
- all other assumptions from scenarios 1 through 3 were maintained.

It was assumed that after four decades the harvest level would begin to recover at a slower rate than scenarios 1, 2A or 2B. These assumptions resulted in a harvest forecast of approximately 4.7 million cubic metres per year for the first 20 years, followed by a harvest level of 4.5 million cubic metres per year for decades three and four.

To conclude, all of the analyses presented in the timber supply analysis report have been helpful in identifying the advantages and shortcomings of various harvest flows. I am satisfied that the harvest flow projections in scenario 2A represents the most advantageous progression of harvest levels achievable in the Prince George TSA, while also considering how to manage the remaining mature, non-pine forests that remain following the MPB infestation until current immature stands are suitable for harvesting.

Section 8(8)(d)

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

Economic and social objectives

- *Minister's letter*

The Minister of Forests and Range (now the MFML) has expressed the economic and social objectives of the Crown for the province in a letter to the chief forester, dated July 4, 2006, attached here as Appendix 3.

The letter stresses the importance of a stable timber supply to maintain a competitive and sustainable forest industry while being mindful of other forest values. In respect of this, in the reference forecast and

in all of the alternative harvest flow projections with which I have been provided in this determination, a primary objective in the harvest flow has been to attain a stable, long-term harvest level in which the growing stock stabilizes, neither increasing nor decreasing over time. Consequently, in my determination I have remained mindful of the need for the allowable harvest in the short term to remain consistent with maintaining the integrity of the timber supply projection throughout the planning horizon.

I have also carefully considered the adequacy of the provisions, both as made in current practice and as assumed in the analyses, for maintaining a range of forest values. From applying careful attention to all of these considerations throughout, I am satisfied that my determination is in accordance with the objectives of government as expressed by the Minister of Forests, Mines and Lands.

local objectives

Two public review periods of 60-days were provided for the data package and public discussion paper.

Twenty-four submissions were received regarding the data package in addition to 64 submissions regarding the public discussion paper. Submissions were received from various licensees, BCTS, members from regional and municipal governments, various non-governmental organizations, such as the BC Wildlife Federation, Save-The-Cedar League, and BC Trappers Association and concerned members of the public. Several of the comments received were incorporated under the relevant factor; however, some were outstanding and are discussed below.

Numerous comments were received and subsequently grouped into the following themes:

- impacts of climate change on future timber supply;
- silviculture practices;
    - Support for a silvicultural system to promote fast growing, marketable species
    - Silviculture responsibilities should support using other species such as hardwoods that would provide future volume and create habitat
- timber quality;
- management and balance of all forest values;
- protection of wildlife and wildlife habitat;
- suggested levels for the AAC;
- fewer opportunities for public input on forest management planning;
- mitigation processes to address mid-term timber supply falldown;
- economic spin-offs of the forest industry;
- compensation to trappers for loss of income;
- compensation to BCTS for reductions in the timber harvesting land base;
- forest industry spin-offs in Fort St. James;
- diversified forest industry;
- carbon offsets;
- community stability;
- support for various pilot projects to continue;
- suggestions for various AAC partitions; and
- economic viability.

In addition to the input during the public review, input was received from the Omineca Beetle Action Coalition (OBAC). This group was formed in 2005 and their objective is to develop and implement a diversification plan and strategies for the region in response to the MPB.

The OBAC participated in a pilot project as part of the Prince George TSA timber supply review process and provided input on the public discussion paper and provided the following recommendations:

- adopt scenario 1 and set the initial harvest level at 14.9 million cubic metres per year;
- partition the harvest level to allow a maximum of 875 000 cubic metres per year from spruce-leading stands; and
- partition the harvest level to allow a maximum of 10.2 million cubic metres per year to be harvested from the Prince George and Vanderhoof Forest Districts.

District staff informed me the pilot project was successful in involving the local community to respond to the MPB epidemic and could be used as a model in other TSAs. The OBAC, with assistance from regional and district staff, spent a significant amount of time to learn and review the information provided in this timber supply review. In addition, I met with the OBAC board of directors and it was a beneficial meeting as we had an opportunity to discuss the various issues and provide them with a clearer understanding of the timber supply review process. Their recommendations are discussed under '**Reasons for Decision'**.

Substantial input was received from a wide range of groups and individuals. The input relevant to this timber supply review has been incorporated throughout the rationale under the appropriate factor. In reviewing these additional submissions, much of the input received is outside my authority as chief forester as my responsibilities remain under Section 8 of the *Forest Act.* Therefore, I have forwarded these comments to the appropriate decision makers.

apportionment and timber processing facilities

In the previous two timber supply review processes, temporary MPB uplifts were apportioned to the non-replaceable forest licence (NRFL) and BCTS apportionment categories. The NRFL category received approximately 77 percent of the uplift and BCTS received 23 percent.

Since the first MPB uplift in 2002, the total amount of pine harvested in the TSA by NRFL holders and major licensees (excluding area based licences) is approximately 60 million cubic metres, or 70 percent of the total harvest.

Data derived from the publication, *Major Timber Processing Facilities in British Columbia – 2007, by Economics and Trade Branch, Ministry of Forests and Range, Victoria B.C. November 2009,* indicated that the estimated consumption from 19 sawmills in the Prince George TSA is about 14 million cubic metres per year. While the majority of fibre supplied to the pulp and paper mills is derived from lumber mill residues.

Therefore, I conclude that although the current elevated AAC of the Prince George TSA meets the current mill capacities, these mills were in existence prior to the uplifts and traditionally relied on both Crown and private sources. There is a potential economic impact if the AAC is reduced below pre-uplift levels, which I have accounted for in this determination as noted in '**Reasons for Decision'**.

Section 8(8)(e)

Abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area

- *mountain pine beetle mortality in immature stands*

The British Columbia Mountain Pine Beetle Model (BCMPB v.5) produces a provincial-level projection of the current MPB outbreak. The model uses annual forest health aerial surveys to estimate future mortality of pine stands greater than 60 years old. In 2005, regional entomologists and district staff observed significant beetle attack in young stands less than 60 years old. For the Prince George TSA timber supply review, BCMPB v.5 was adjusted based on ground data provided by the University of Northern B.C.

Consequently, the three districts in the Prince George TSA undertook projects to assess mortality in young pine stands from 2005 to 2007. In the Vanderhoof Forest District, ground sampling was undertaken in 30 randomly selected pine-leading stands for age classes, 2, 3 and 4. While in the Fort St. James and Prince George Forest Districts helicopter aerial estimates were used to assess the mortality of pine-leading stands for age classes 1 to 3 in Fort St. James Forest District, and age classes 2 and 3 for Prince George Forest District. The percentage of MPB attack was summarized by age class and landscape unit and incorporated into the harvest forecasts; thereby, reducing the growth curves of these stands.

In addition to these projects, analysis was done using VRI to determine the area of pine-leading stands between the ages of 15 and 60 years old within the Crown forest land base. This amounted to 281 219 hectares of pine-leading stands within this age class, which is approximately 10 percent of the THLB.

Additional information from the Forests for Tomorrow (FFT) program was considered but not included in the timber supply analysis. Since 2006, the FFT program surveyed young pine-leading stands and found MPB attack in these stands amounting to 52 200 hectares.

Public input was received from a trapper who acknowledged mortality in immature trees between 10 to 20 years old, and expressed the importance of protecting these trees for future economic gain. British Columbia Timber Sales (BCTS) also commented on how young pine mortality could be modelled. They assume there will be some initial stratification regarding managed stands as opposed to natural stands. Volume loss in fully or overstocked young stands may be insignificant at attack levels of 50 percent, however this is dependent on the distribution of attack, whether it is dispersed or concentrated. Therefore, BCTS suggest young pine stands are best modelled by a stem per hectare reduction corresponding to the associated level of attack in the landscape unit.

In conclusion, the timber supply analysis reflects the best available information and subsequently, MPB mortality in immature stands was modelled appropriately. Although, new information from the FFT program presents some uncertainty in the estimate of MPB mortality in young pine-leading stands, their survey sample was small in comparison with the samples surveyed in each district. This does however, represent a small, unquantified overestimation of mid-term timber supply. The FFT rehabilitation program involves treatments such as stand removal followed by tree planting, which is funded by the provincial government in stands impacted by fire and MPB.

It is clear that MPB is impacting second-growth stands and therefore, it would be beneficial to determine the stand development trajectory now that the MPB infestation has run its course. In view of this, I have outlined an instruction in '**Implementation'** for district staff to monitor the development of young,

MPB-affected stands. Implementation of the FFT rehabilitation program could mitigate some of the decrease in mid-term harvest levels.

- *other pests*

Since the early 1990s, the decline of balsam has been a serious forest health issue in the Fort St. James Forest District. This decline is a result of the western balsam bark beetle, spruce budworm, and heart rot diseases, which are common to old balsam. To date, this has led to extensive stand mortality and a significant loss of merchantable volume. No particular forest health strategies or salvage have been undertaken because the majority of balsam stands are remote or are marginally economical, and the extensive TSA-wide pine salvage took precedence.

Balsam stands in Fort St. James were included as part of phase one VRI updates completed in the Prince George TSA. Subsequent to the VRI update, the Fort St. James Forest District conducted a two-phase reconnaissance, which included ground plots of Supply Blocks A and B to quantify the current cumulative balsam mortality. Severity class mapping was established and calibrated by these ground plots. The results provided a percentage of mortality for each severity class of low, moderate and high, and the timber volume of affected balsam stands were reduced by the percentage of mortality designated to each severity class. Results indicated a significant amount of existing mature balsam stands no longer contributing to the THLB because prior to the mortality percentage netdowns, the majority of these stands marginally surpassed the minimum economic operability limits. Due to the age and species composition of balsam stands in the Fort St. James Forest District this decline is expected to continue.

In addition, Douglas-fir stands have experienced increased attack by the Douglas-fir bark beetle particularly in the Prince George Forest District, however; recently the amount of new attack is subsiding. Although the extent of attack was notable in areas of the Prince George District, no adjustments to inventory estimates were considered necessary to account for timber losses.

Public input received suggested to retain balsam stands because of the lichen growing on these trees feed endangered caribou. District staff responded indicating that the results of the timber supply analysis show that substantial portions of the northern valleys in the TSA contain balsam stands. These valleys are not expected to provide viable timber harvesting opportunities, and therefore; were excluded from the THLB.

Additional input expressed the value of biological diversity of the flora and fauna in balsam stands found in the northern portion of the Fort St. James District. These areas are pristine creating opportunities for recreation and tourism, and therefore, supporting economic resilience and a diversified economy. It was requested that I recognize the value of these pristine, wild areas beyond timber harvesting. District staff provided a similar response as above.

I have considered the information that the balsam yield curves of supply blocks A and B were reduced to reflect the mortality levels surveyed subsequent to the VRI update, and I have concluded this yield curve reduction represents the appropriate application of the best available information. However, there is also regeneration occurring in these stands and secondary stand structure was not accounted for in the analysis. The latter may balance the decline in these stands; therefore, I will make no adjustments to the reference forecast on this account.

If balsam mortality continues as expected, the yield curves used in the analysis may result in an overestimation in the reference forecast mid-term timber supply. In conclusion, I have outlined an instruction in '**Implementation'** to monitor stand development of balsam-leading stands.

- *non-recoverable losses*

Based on provincial overview detection mapping from 1999 to 2008 an annual loss due to damaging agents was determined by district staff. The damaging agents impacting mature forests that were used in this analysis include balsam bark beetle, Douglas-fir bark beetle, spruce bark beetle, windthrow and fire. Losses in mature and managed stands due to MPB and balsam decline in Fort St. James Forest District were addressed separately.

The timber supply model distinguished four management units within the Prince George TSA, deciduous, cedar, pine and non-pine primarily consisting of spruce-leading stands. Estimates of non-recoverable losses (NRLs) were calculated for each district and implemented proportionately to the harvest forecast by the area of each management unit within the THLB. Prorating the NRL estimates across the four management units attributed 50 percent of the estimate to pine-leading stands across the TSA. Although, additional losses are anticipated in pine-leading stands the expectation is that these losses will be captured with salvaging MPB attacked stands, and therefore are not considered to be a NRL.

NRL estimates were calculated for each district then aggregated to determine a total estimate for the TSA, which was then prorated across the four management units. Prorating the NRL estimates across the four management units attributed 50 percent of the estimate to the pine-leading management unit. Although losses are anticipated in pine-leading stands the expectation is that these losses would be captured with salvaging MPB attacked stands, and therefore should not have been considered to be an NRL.

Consequently, a greater proportion of the NRL estimates should have been applied to the non-pine leading management unit than what was modelled in the forecast, that is, the NRL estimates should have been more heavily distributed to non-pine. This presents a risk of overestimating available mature volume of non-pine stands in the mid-term.

In consideration of the information presented to me, I conclude there is a small to moderate overestimation in mid-term harvest level as noted in **'Reasons for Decision'**. I have included an instruction in '**Implementation'** to refine the application of NRL estimates and separate the pine and non-pine stands for the next timber supply review.

- *pine salvage harvesting report card*

The timber supply analysis assumes that 92 percent of the harvest will come from pine-leading stands for as long as possible. This assumption reflects licensees' performance to 2008, and is also supported by the report, *Monitoring harvest activity across 29 mountain pine beetle impacted management units*, written by the Forest Analysis and Inventory Branch of MFML. In the Prince George TSA, harvest of pine-leading stands increased from 92 percent in 2007 to approximately 99 percent in 2009.

Despite the focus on harvesting pine-leading stands, the incidental harvest of other species in these stands (by-catch) is inevitable. In 2009, the three forest districts produced a harvest summary by species based on the MFML Harvest Billing System. In the Vanderhoof Forest District, 80 percent of pine was harvested of the total harvested volume, while 77 percent of pine was harvested in the Fort St. James Forest District, and 71 percent of pine was harvested in the Prince George Forest District.

Two additional sensitivity analyses were done in which pine-leading stands contribute 92 percent to the overall harvest for the first five years, after which harvest shifts to non-pine species such as spruce. The first sensitivity analysis examined the timber supply impacts of shifting the harvest after five years from 92 percent of pine-leading stands to 50 percent of pine-leading stands and 50 percent of non-pine. This 50 percent of harvesting non-pine species is equivalent to 6.7 million cubic metres of primarily spruce.

Under this scenario, the harvest level of 12.5 million cubic metres could be maintained for 18 years before decreasing to a mid-term level of approximately six million cubic metres per year. From year 30 to 40 the mid-term harvest level is reduced to about 1.3 million cubic metres per year.

The second sensitivity analysis reduced the harvest level to 9.5 million cubic metres after five years to determine, if from year 30 to 40, the significant drop in the harvest level to 1.3 million cubic metres could be alleviated. Similar to the previous sensitivity analysis, there was a bycatch of 6.7 million cubic metres of spruce and the remaining 2.8 million cubic metres comprised of pine, for a total harvest level of 9.5 million cubic metres. The harvest level of 9.5 million cubic metres could be maintained for 20 years after which it falls to the mid-term level of six million cubic metres, following, from year 30 to 40 the harvest level drops further to 1.4 million cubic metres, similar to the first sensitivity analysis.

Public input was received suggesting the need to focus the current harvest on salvaging MPB-attacked pine. Additional comments were received from licensees suggesting that a partition was not necessary to ensure continued focus on pine because to date, licensees have demonstrated they are focusing their harvest on pine.

In conclusion, the sensitivity analyses indicated if current practice of harvesting 99 percent of pine-leading stands continues, the risk to the mid-term timber supply is low. However, if licensees do not continue to focus their harvest on pine-leading stands, the impacts to the mid-term will be severe. District staff suggest that I partition the non-pine to ensure harvesting continues to focus on pine. I understand the risks associated with shifting the harvest to non-pine species sooner than what was modelled in scenario 2A, and I will discuss this issue further in '**Reasons for Decision'**.

Reasons for Decision

In reaching my AAC determination for the Prince George TSA, I have considered the information presented above, all of which is integral to the reasons for my decision, and from which I have reasoned as follows.

The current AAC for the Prince George TSA, determined under Section 8 of the *Forest Act* effective October 1, 2004, is 14 944 000 cubic metres per year, an increase of about 22 percent from the previous AAC. This increase was intended to provide districts with sufficient AAC to salvage MPB-attacked pine. Partitions were incorporated in this AAC including: 160 000 cubic metres for harvesting deciduous-leading stands, 110 000 cubic metres for cedar and hemlock-leading stands and 400 000 cubic metres for harvesting in Supply Block A.

Since the AAC determination in 2004, the MPB infestation has killed the majority of the pine volume available for harvesting in the Prince George TSA. There has been a continued effort by government and forest licensees to salvage these MPB-infested stands. The MPB infestation has essentially taken its course in the Prince George and Vanderhoof Forest Districts and is still unfolding in the Fort St. James Forest District and as salvage harvesting progresses licensees will eventually exhaust the component of dead pine that is economic to harvest. Consequently, a key issue in this timber supply review is how to manage the remaining mature, non-pine forests following the MPB infestation. Therefore, I need to consider a harvest level that accounts for the MPB-attacked stands and manages the remaining mature non-pine stands to mitigate the mid-term timber supply impacts.

In the timber supply analysis, scenario 2A projected a harvest level of 12.5 million cubic metres per year, which could be maintained for 12 years after which the harvest forecast decreases to a mid-term level of approximately 6.2 million cubic metres per year. I am satisfied that the assumptions applied in

scenario 2A for the majority of the factors applicable to the Prince George TSA were appropriate, as detailed earlier in Table 2.

In determining AACs, my considerations typically identify factors that indicate reasons why the timber supply may be overestimated or underestimated in the harvest levels projected for various periods in the timber supply scenario. Some of these factors can be quantified and their implications assessed with reliability, and others may influence the assessment of the timber supply by introducing an element of risk or uncertainty, but cannot be quantified reliably at the time of the determination and must be accounted for in more general terms. In regards to the Prince George TSA, several critical issues were presented that impact timber supply and cannot be quantified reliably and therefore, were accounted for in more general terms of either an overestimation or underestimation of the harvest level.

In my considerations for the Prince George TSA I have identified the following reasons why the timber supply may have been overestimated in the projection of scenario 2A:

- Community forest agreements: Development of a new community forest agreement for the Yekooche First Nation and expansion of the Fort St. James community forest reduce the initial harvest level for the TSA by 75 000 cubic metres per year.
- Visual quality objectives: Implementation of legally established scenic areas and visual quality objectives cause the timber supply projected in scenario 2A to be overestimated by 16 percent in the fourth decade or approximately six percent if averaged across the mid-term.

I have also identified the following factors as indicative of a potential overestimation of the timber supply in the forecast scenario 2A to a degree that currently may not be quantified with accuracy:

- Growth and yield: Hard-pine rust and stem breakage found in the Vanderhoof Forest District results in an overestimation of timber supply in the long term.
- Stand development monitoring: Results from stand development monitoring, in particular for pine-leading stands suggest the assumptions in TIPSY regarding early rotation tree survival may be optimistic causing timber supply to be potentially overestimated in the mid-term.
- Wildlife habitat analysis pilot project: Consideration of the results from the pilot project, Assessment of impacts to wildlife habitat and First Nations' wildlife needs, and its implications indicate accommodation is warranted by adjusting the AAC for First Nations whose traditional territories overlap the central portion of the TSA.
- Non-recoverable losses: The overestimation of NRLs for pine-leading stands and underestimation of NRLs for non-pine-leading stands resulted in an overestimation of timber supply in the mid-term.

In my considerations for the Prince George TSA, I have identified the following factor as indicative of a potential underestimation of the timber supply in the forecast scenario 2A to a degree that currently may not be quantified with accuracy:

- Secondary stand structure: The advance regeneration found in pine-leading stands will likely contribute to the mid-term timber supply resulting in an unquantified underestimation of timber supply in the mid-term.

I am also mindful of one factor that introduces further uncertainty to the decision:

- Shelf life: Many aspects affecting shelf life make it difficult to assess the accuracy of assumptions employed in the analysis. Over the next few years, more information will become known;

however for this determination I conclude this factor introduces an unquantified uncertainty to timber supply and I make no adjustments for shelf life.

From reviewing all of my considerations above, including the above list of factors identifying the under- and overestimations in the projected timber supply, relative to scenario 2A I have reasoned and concluded as follows.

In the mid- and long-term, timber supply in the TSA is overestimated because of the presence of hard pine rust and stem breakage found in the Vanderhoof Forest District; the establishment of a new community forest agreement and an expansion of an existing agreement; and the implementation of legally established visual quality objectives. As well, stand development monitoring suggests there is a risk in maintaining stand density particularly in pine-leading stands due to the extent of hard pine rusts and MPB attack in second-growth stands. Additionally, NRLs were applied to both pine- and non-pine-leading stands causing an overestimation of timber supply, because losses in pine-leading stands are already captured in the salvage of pine, and therefore a greater proportion of the NRL estimates should have been applied to non-pine-leading stands.

Furthermore, the results of the wildlife habitat analysis pilot project indicated that the MPB infestation and the forecasted elevated rates of timber harvesting generate significant changes in the distribution of habitat attributes for both disturbance tolerant and intolerant species. Generally, the change favours the disturbance tolerant species at the expense of the disturbance intolerant species. This change in habitat attributes tends to be concentrated within the central portion of the TSA due to the dominance of pine-leading stands and the presence of residual spruce for the mid-term, and therefore affects First Nations' whose traditional territories lie within that portion of the TSA more greatly than other First Nations.

Based on First Nations' interests in hunting and trapping, and a general knowledge of their past and ongoing use of wildlife in the TSA, as well as guidance provided in recent court decisions, I believe an accommodation for First Nations' interests in wildlife, beyond those incorporated in the harvest forecast scenario 2A is warranted for this determination. I have therefore adjusted the AAC with a reduction on the account for the need to accommodate First Nations' interests in hunting and trapping and to reduce potential impacts on wildlife.

In contrast, the likely contribution of secondary stand structure to future timber supply leads to an underestimation of the mid-term timber supply as projected in scenario 2A because advanced regeneration of the understory is being seen in pine-leading stands, which is not captured in the timber supply analysis.

In consideration of the range of uncertainties inevitably present, in my judgement it is reasonable to assess that the overall combined implications of the above listed over- and underestimations in the timber supply as projected in scenario 2A, would indicate a harvest level of 12.5 million cubic metres for the total AAC of the TSA.

Within this AAC of 12.5 million cubic metres, approximately 1.5 million cubic metres is available for bioenergy opportunities and for potential synergies to be created between major licensees to harvest damaged pine stands. Although at this time no bioenergy licences have been granted, support for the utilisation of fibre for bioenergy is a government objective.

As I have discussed in some detail in *'pine salvage harvesting report card'*, I am concerned about the potential impact on non-pine species if licensees do not continue to focus their harvest on pine-leading stands. In the interest of good stewardship, specifically that of protecting the integrity of the timber

supply profile for the future, particularly in spruce- and cedar-leading stands, and the non-timber values associated with these stands as identified by First Nations and concerned citizens, I consider it incumbent upon me at this time to specify particular portions of the harvest as attributable (a) to pine-leading stands, (b) to non-pine-leading stands.

To ensure ongoing sustainability of non-pine species and protection of non-timber values present in these stands, I am establishing a partition of 3.5 million cubic metres for non-pine species including predominantly spruce, balsam, and Douglas-fir, and of which 875 000 cubic metres is from spruce-leading stands. The remaining volume is by-catch from the pine salvage consisting largely of spruce, Douglas-fir and balsam. This partition of 875 000 cubic metres for spruce-leading stands would address First Nations' and others' concerns of protecting these stands, retaining older stands, and maintaining biodiversity and old growth. Furthermore since this partition helps to maintain old growth, habitat for pine marten and other disturbance intolerant species would also be maintained, thus providing for First Nations' wildlife needs.

It is also important to maintain old growth cedar on the landscape for future generations and to meet the requirements outlined within the four legal Orders, which were established to manage old growth in the ICH. On this basis, I have reduced the cedar partition to 23 000 cubic metres from 115 000 cubic metres as an upper limit in cedar-leading stands. This will assist in meeting the 53 percent target of old growth retention.

Furthermore, I am applying a partition of 160 000 cubic metres for deciduous-leading stands in the Prince George and Fort St. James Forest Districts only, as there are no suitable deciduous stands in the Vanderhoof Forest District. This deciduous partition will continue to support local employment and because this is an upper limit, it will assist in maintaining biodiversity values provided by deciduous stands, and address First Nations' concerns of over harvesting deciduous trees because First Nations refer to deciduous trees as water trees.

The previous AAC determination in 2004 included a partition for Supply Block A. The timber supply analysis indicated that the contribution of Supply Block A to timber supply is minimal and no longer warrants a partition. Therefore, the partition for Supply Block A is removed.

Based on harvest performance over the last five years, an increasing proportion of pine is being harvested in the TSA. Implementation of the partitions will ensure this trend continues over the short term. This may cause harvesting to shift to the Fort St. James Forest District sooner in order to remain within these partitions.

I understand that administration of the pine and the 'non-pine' partitions will be challenging in this TSA, due to the diversity of species and topography and with the administration also being shared between three forest districts over multiple operating areas. I therefore recommend that MFML region and district staff collaborate with licensees in resolving the details of establishing the most fair, equitable and operationally effective means of administering these partitions.

In conclusion, I will reiterate that the primary purpose of the 'non-pine' partition is to maintain options to support the currently projected mid-term harvest level. In the short term, the implementation of this capped partition should allow for licensees to harvest in and sustain operations from Douglas-fir-, spruce- and balsam-leading stands during times when pine may not be economically viable, with the proviso that at the end of the 10-year period the total amount is not exceeded. To any extent that this is exceeded, the mid-term level would be compromised. Therefore, if ongoing monitoring shows a consistent trend toward over-reaching the partitions, I may revisit this determination earlier than required by statute to specify a new level of harvest in the 'non-pine' partition, consistent with achieving the mid-term level.

Alternatively, if district staff observe that harvesting has not shifted to the Fort St. James District, or licensees are not adhering to the partitions, then I recommend that district staff discuss this with licensees and subsequently formulate a recommendation to the minister to formalize the partition in licences.

The newly determined partitioned harvest attributed to non-pine species is set at a level that allows for a gradual decrease to the projected mid- and long-term levels for those species. This determination thus represents a necessary step toward protecting the integrity of these stands for their future contribution to timber supply and other forest values.

From all of the foregoing, it is my judgement that a harvest level of 12.5 million cubic metres for the duration of this AAC will account for a clearly needed reduction while also providing licensees the opportunity to harvest according to the conditions of this determination. Ongoing monitoring of operations will be required to assess the degree to which those opportunities are exercised, and that information will be important for future determinations.

Determination

Having considered and reasoned from all of the factors as documented above, including the risks and uncertainties in the information provided, it is my determination for the Prince George TSA that a timber harvest level that accommodates as far as possible the objectives for all forest resources, that reflects current management practices as well as the socio-economic objectives expressed for government by the Minister of Forests, Mines and Lands, that accounts for First Nations' expressed interests, and that represents an essential step toward ensuring the ongoing sustainability of the non-pine species currently preferred for harvesting in the TSA, and of the other forest values associated with these stands, can be best achieved in the TSA by establishing an AAC of 12.5 million cubic metres, including the following partitions:

- a maximum of 3.5 million cubic metres attributable to non-pine species, and non-cedar and non-deciduous leading stands;
- a maximum of 23 000 cubic metres attributable to cedar-leading stands; and
- a maximum of 160 000 cubic metres attributable to deciduous-leading stands in Prince George and Fort St. James Forest Districts.

In addition to these partitions, it is my expectation that a maximum of 875 000 cubic metres per year come from spruce-leading stands. Furthermore, I also expect that the overall AAC will be managed wherever possible to address the priority problem of the MPB infestation in the TSA.

This AAC will remain in effect until a new AAC is determined, which may take place within 10 years of this determination.

This new AAC excludes all volumes issued in woodlot licences and community forest agreements and will remain in effect until the next AAC is determined.

The new AAC is effective January 11, 2011.

Implementation

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

projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Prince George TSA.

1. MNRO staff should monitor licensees' performance in non-pine leading stands to ensure licensees are adhering to the partitions.

2. MNRO staff should monitor licensees' performance to determine if there is evidence of potential gains to the mid-term timber supply as a result of the economic thresholds, cycle time and minimum volume per hectare, so this information may be incorporated in the next timber supply review.

3. MNRO staff should determine the incidence of hard pine rusts in the Vanderhoof Forest District, and should monitor the growth and early tree survival or mortality of managed stands.

4. MNRO staff should continue monitoring the performance of managed stands by strata by examining each analysis unit and applying a systematic approach, as opposed to random sampling. A stratified sample would provide improved information on what is happening in each stand type.

5. MNRO staff should monitor retention levels, quantify the increase in future retention levels, and determine how retention levels may overlap with existing constraints or other land use objectives.

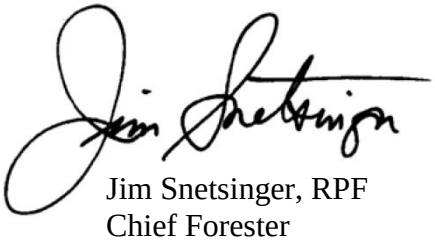
6. The LOWG should reconvene to develop mitigation strategies to address the units experiencing significant drawdown in old growth targets.

7. MNRO staff should monitor the development of secondary stands and determine how licensees are managing for these stands, and whether they are meeting the secondary stand regulation.

8. MNRO staff should monitor the development of young, MPB affected stands to determine the stand development trajectory.

9. MNRO staff should monitor stand development of balsam-leading stands because regeneration is occurring in these stands, and this volume will need to be included in the next timber supply review.

10. MNRO staff should refine the application of NRL estimates by distinguishing between pine and non-pine stands for the next timber supply review.



Jim Snetsinger, RPF
Chief Forester

January 11, 2011

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, c. 157, Consolidated to December 30, 2009, 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 portions of the allowable annual cut attributable to

(a) different types of timber and 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, and

(b) different types of timber and 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.

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

Section 4 of the *Ministry of Forests and Range Act* (consolidated to March 30, 2006) 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 sector
in 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

BRITISH COLUMBIA

JUL 0 4 2006

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

Dear Jim:

Re: Economic and Social Objectives of the Crown

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

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

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

Minister of Forests and Range and Minister Responsible for Housing

Office of the Minister

Mailing Address:
PO Box 9049 Stn Prov Govt
Victoria BC V8W 9E2
Telephone: 250 387-6240
Facsimile: 250 387-1040

Location:
Parliament Buildings
Victoria BC V8V 1X4
e-mail: FOR.Minister@gov.bc.ca

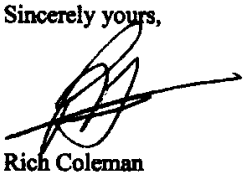
Jim Snetsinger

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,



Rich Coleman
Minister

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

BRITISH COLUMBIA
The Best Place on Earth

File: 280-30/MPB
Ref: 126097

OCT 2 7 2010

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

Dear Mr. Snetsinger:

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

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

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

Ministry of Forests and Range and Minister Responsible for Integrated Land Management Bureau
Minister's Office
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Victoria, BC V8W 1X4
Tel: (250) 387-6240
Fax: (250) 387-1040
Website:
gov.bc.ca/forilmbwww.gov.bc.ca

Jim Snetsinger, Chief Forester

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

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

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

Sincerely,

Pat Bell
Minister

pc: Dana Hayden, Deputy Minister