BRITISH COLUMBIA
MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS

Okanagan Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective February 29, 2012

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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 in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Okanagan timber supply area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Acknowledgement

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

Statutory framework

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

Description of the Okanagan TSA

The Okanagan Timber Supply Area (TSA) is located in south-central British Columbia. The TSA stretches from Seymour River and Shuswap Lake in the north to the Canada – United States of America border in the south, and from the Monashee Mountains in the east to the Okanagan Mountains in the west. The TSA covers approximately 2.25 million hectares of gross land base, of which 1 346 027 hectares were the Crown forest land base (CFLB). After excluding areas due to environmental, economic and operability issues, 782 693 hectares contributed to the long-term timber harvesting land base (THLB).

The varied climate and terrain produces a wide range of vegetation, from wet interior hemlock and cedar forests in the north to semi-arid sagebrush grasslands in the south of the TSA. Douglas-fir and lodgepole pine-leading stands represent 29 percent and 32 percent of the THLB. Spruce, Subalpine fir, western redcedar, western hemlock and yellow pine are also common, while white pine, aspen, birch, larch and cottonwood appear in smaller amounts.

The broad variety of habitat types in the TSA support many species, including approximately 30 red- and blue-listed vertebrates that are associated with forested ecosystems including: mountain caribou, mountain goat, grizzly bear, tiger salamander, great basin gopher snake, flammulated owl, interior western screech owl, Lewis's woodpecker, fringed myotis, and spotted bat. In addition, there are numerous fish species including: kokanee, rainbow trout, lake char, largemouth bass and whitefish. The Shuswap Lake system supports sockeye lake spawners and provides vital rearing area for hundreds of millions of coho, chinook and sockeye fry that makes it one of the most important salmon-producing areas in British Columbia. The Adams River sockeye run is the second largest in British Columbia.

Water is a primary and fundamental resource of the TSA. There are currently 57 community watersheds that cover about 20 percent of the THLB and given the growing population and dry climate, water stewardship is an important component of forest management in the TSA. Range use is prominent in the TSA and access to Crown range is critical for many operators, particularly during economic downturns. A higher priority is being placed on utilizing timber harvesting practices that promote livestock use, while ensuring that other non-timber resource values are maintained.

Communities within the TSA include: Penticton, Vernon, Kelowna and Salmon Arm. The natural resources of the TSA are administered by the Okanagan Shuswap District, located in Vernon, with field offices in Penticton and Salmon Arm. With a population of about 395,000 in 2010, the area has one of the fastest growing populations in British Columbia.

The traditional territories of 19 First Nations communities cover all or part of the Okanagan TSA. Of these First Nations, the Okanagan Indian Band, Osoyoos Indian Band, Penticton Indian Band, Upper Nicola Indian Band, Lower Similkameen Indian Band, Upper Similkameen Indian Band and Westbank First Nation are members of the Okanagan Nation Alliance (Sylix Nation). The Adams Lake Indian Band, Little Shuswap Indian Band, Neskonlith Indian Band, Spallumcheen, Simpcw First Nation and Shuswap Indian Band are members of the Shuswap Nation Tribal Council (Secwepemc Nation). The Ashcroft Indian Band is a member of the Nlaka'pamux Nation Tribal Council. The Coldwater First Nation, Cook's Ferry Indian Band, who are also represented by the Esh-kn-am Cultural Resource Management Services Joint Venture, and the Nooaitch Indian Band are members of the Nicola Tribal Association. The Lower Nicola Indian Band and the Lytton First Nation are unaffiliated First Nation communities.

The economy of the area is well-diversified and includes agriculture/viniculture, tourism, retail trade, manufacturing, forestry, range and construction. Emerging industries include film, aviation, health care and technology industries.

History of the AAC

From 1980 to 1986, the AAC for the Okanagan TSA was 2.7 million cubic metres. In response to mountain pine beetle (MPB) infestations between 1987 and 1993, the AAC was temporarily increased to levels that varied from 2.804 million cubic metres to 3.2 million cubic metres. In 1994, the AAC was decreased to 2.615 million cubic metres. In 2001, the AAC was set at 2.655 million cubic metres, including an 80 000 cubic metre partition for small-scale salvage.

In response to further MPB infestation in 2006, the AAC was increased to the level in effect prior to this determination - 3.375 million cubic metres, including a partition of 80 000 cubic metres for small-scale salvage and 20 000 cubic metres for deciduous tree species.

Table 1. Apportionment of current AAC

	Total m^3	%	Conventional	%	Deciduous leading	%
FL (replaceable)	1,827,215	54.14	1,827,215	55.79		
FL (non-replaceable)	792,988	23.50	757,988	23.14	20,000	100.0
BCTS FL (non-replaceable)	24,000	0.71	24,000	0.73		
BCTS Timber Sale licence/agreement	580,047	17.19	580,047	17.71		
Community Forest Agreement	40,000	1.19	40,000	1.22		
Woodlot Licence	20,000	0.59	20,000	0.61		
Forest Service Reserve	90,750	2.69	25,750	0.79		
Total	3,375,000	100.00	3,275,000	100.00	20,000	100.00

Source: http://www.for.gov.bc.ca/ftp/hth/external/!publish/web/timber-tenures/apportionment/APTR011-Okanagan.PDF (report effective date 2012-01-05)

New AAC determination

Effective February 29, 2012, the new AAC for the Okanagan TSA will be 3.1 million cubic metres. This AAC will remain in effect until a new AAC is determined, which must take place within 10 years of this determination.

Information sources used in the AAC determination

- *Forest and Range Practices Act – Regulations and amendments*, current to February 8, 2012;
- *Forest Act*, current to February 8, 2012;
- *Ministry of Forests and Range Act*, current to February 8, 2012;
- *Forest Practices Code of British Columbia Act* and amendments and guidebooks, January 31, 2004*;*
- *Okanagan-Shuswap Land and Resource Management Plan (LRMP)* approved by government in January, 2001;
- *Government Actions Regulation (GAR) Order Ungulate Winter Range # U-8-001 – Okanagan TSA (mule deer)*, 2006a. British Columbia Ministry of Environment;
- *GAR Order Ungulate Winter Range # U-8-006 – Okanagan TSA (moose)*, 2006b. British Columbia Ministry of Environment;
- *GAR Order Grizzly Bear # U-8-232 – Okanagan TSA*, 2006c. British Columbia Ministry of Environment;
- *GAR Order for Cultural Heritage Resource – Resource Feature at Wap Creek for the Okanagan Shuswap Forest District*, November 8, 2010;
- *Grizzly Bear # U-8-232 – Okanagan TSA*, 2006c. British Columbia Ministry of Environment;
- *Order Of The Minister Of Agriculture And Lands Establishing Objectives Set By Government In The Area Covered By The Okanagan-Shuswap Land and Resource Management Plan in the Okanagan-Shuswap Forest District*, effective March 1, 2007;
- *Procedures for Factoring Visual Resources into Timber Supply Analyses*, Ministry of Forests, and the update bulletin, Modelling Visuals in TSR III. 1998;

- *Methods to Estimate Unsalvaged Losses for Timber Supply Reviews*. Henigman, John. British Columbia Ministry of Forests, Forest Practices Branch, Victoria, BC. 2000;
- *British Columbia Local Area Economic Dependencies.* Gary Horne, BC Stats, March 2009;
- *Enhanced Type II Silviculture Analysis, Okanagan TSA, Analysis Report,* Timberline Natural Resource Group Ltd. *2008*;
- *Site Index estimates by Site Series (SIBEC) Okanagan TSA 2007, Project:* SOTSA22 4776003 for the Okanagan Innovative Forestry Society. Alex Inselberg. November 29, 2007;
- *Okanangan Shuswap Forest District Draft Stand Level Biodiversity Report.* British Columbia Ministry of Forests and Range. February 2010;
- *Provincial-Level Projection of the Current Mountain Pine Beetle Outbreak: Update of the infestation projection based on the 2010 Provincial Aerial Overview of Forest Health and the BCMPB model (year 8).* Walton, Adrian. B.C. Ministry of Forests, Lands and Natural Resource Operations, Forest Analysis and Inventory Branch, June 22, 2011;
- *Stream/Riparian Classification.* Wildstone Resources Ltd. 1997;
- *Okanagan TSA Phase II VRI Statistical Adjustment Report.* Ecora Resource Group Ltd. 2011;
- *Okanagan Timber Supply Area, Analysis Report*. British Columbia Ministry of Forests and Range. 2005;
- *Okanagan TSA Rationale for Allowable Annual Cut Determination;* British Columbia Ministry of Forests and Range, January 1, 2006;
- *Okanagan Timber Supply Area Timber Supply Review Data Package.* British Columbia Ministry of Forests and Range. 2010;
- *Okanagan TSA Timber Supply Analysis Public Discussion Paper;* British Columbia Ministry of Forests, Lands, Natural Resource Operations, August 4, 2011;
- *Okanagan Timber Supply Area, Analysis Report* (unpub.) British Columbia Ministry of Forests, Lands and Natural Resource Operations, 2011;
- Letter from the Minister of Forests and Range (now the Ministry of Forests, Lands and Natural Resource Operations) to the chief forester stating the economic and social objectives of the Crown, July 4, 2006;
- First Nations consultation summary, including summary of correspondence and meetings with chief forester; and
- Technical review and evaluation of current operating conditions on the Okanagan TSA through comprehensive discussions with staff from the Ministry of Forests, Lands and Natural Resource Operations and the Ministry of Environment, including the AAC determination meeting held in Kelowna, B.C. on November 29, 2011 and November 30, 2011.

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 Okanagan 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 analyse and account for the consequent timber supply impacts in a current AAC determination. Many government land-use decisions must be followed by detailed implementation decisions requiring, for instance, further detailed planning or legal designations such as those provided for under the *Land Act* and 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 judgment 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 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 TFL 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 Okanagan TSA. It is also independent of any decisions by the Minister of Forests, Lands and Natural Resource Operations with respect to subsequent allocation of wood supply.

Overall, in making AAC determinations, I am mindful of my obligation as a steward of the forested land of British Columbia, of the mandate of the Ministry of Forests, Lands and Natural Resource Operations (formerly 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 Timber Supply Review Program for TSAs and TFLs.

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

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

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

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

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

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

Base case for the Okanagan TSA

The current AAC was determined on January 1, 2006. Since then, several changes have occurred to the land base and forest management information that are reflected in the timber supply analysis, including the base case. The major changes include: newly introduced old growth management areas, ungulate winter range, wildlife tree patches, and larger reductions to account

for existing roads and operability. These changes result in a timber harvesting land base (THLB) of 795 948 hectares, which is about 22 percent less than the THLB used in the 2006 analysis.

The base case was modelled according to the provincial policy objectives of creating a sustainable harvest flow that avoids both excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. Other objectives included: achieving a timber supply flow that most equitably spreads the current and subsequent step downs in harvest between the early decades in the planning horizon, and ensuring a gradual transition from short- to mid- to long-term, by avoiding large and abrupt disruptions in the timber supply.

In the base case, the initial harvest rate of 3 355 000 cubic metres per year, which represents the current AAC of 3 375 000 cubic metres, less the 20 000 cubic-metre deciduous partition (deciduous stands were excluded from harvesting in the base case), can be maintained for 10 years. After the first decade, the harvest level declines to 2 354 000 cubic metres per year. Beginning in the sixth decade, the harvest level increases to a stable, long-term level of 2 469 400 cubic metres per year for the remainder of the forecast.

Based on recent harvest performance data, pine volume currently accounts for about 55 percent of the total harvest volume in the TSA. Therefore, during the first 15 years in the base case, pine volume was capped at 55 percent of the harvest. After 15 years, the pine volume contribution decreases to less than 10 percent. During the first 10 years, the average harvest volume of non-pine and live pine volume together is 2 469 257 cubic metres per year.
I have reviewed the assumptions and methodology incorporated in the base case, as well as the total growing stock, age class distribution, the harvest contributions from managed and unmanaged stands, the average volume per hectare and average age of harvested stands and the total annual harvest area. 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 Okanagan TSA. In addition to the base case forecast, I was provided with alternative harvest flows, a number of sensitivity analyses carried out using the base case as a reference, 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 (8) of the *Forest Act*

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

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 accepted as modelled

***Forest Act* section and description**	**Factors accepted as modelled**
8(8)(a)(i) Land base contributing to timber harvesting	• non-forest, non-productive forest and non-commercial cover • parks, protected areas and ecological reserves • environmentally sensitive areas • physical operability and unstable terrain • sites with low timber growing potential
8(8)(a)(i) Composition of the forest and expected rate of growth	• minimum harvestable ages
8(8)(a)(ii) Expected time for the forest to be re-established following denudation	• not satisfactorily restocked/backlog
8(8)(a)(iii) Silvicultural treatments to be applied	• incremental silviculture
8(8)(a)(iv) Standard of timber utilization and allowance for decay, waste, and breakage	• utilization standards • decay, waste and breakage
8(8)(a)(v) Constraints on the amount of timber produced by use of the area for other purposes	• identified wildlife species • grizzly bear • ungulate winter range • landscape-level biodiversity • stand-level biodiversity • scenic resources
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	—
8(8)(e) Abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area	• non-recoverable losses

Section 8 (8)

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

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

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

Land base contributing to timber harvesting

- *general comments*

The total area of productive Crown forest land in the Okanagan TSA, as reported in the analysis report is 1 346 027 hectares of which 795 948 hectares are currently available for timber harvesting - 22 percent smaller than in the 2006 base case. This decrease is due to a variety of factors, including the establishment of old growth management areas, ungulate winter range, wildlife tree patches along with higher reductions for existing roads and changes in operability assumptions.

As part of the process used to define the timber harvesting land base (THLB), a series of deductions was made from the productive Crown forest land base. 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 Okanagan TSA, I acknowledge that the above approach was used in the timber supply analysis, resulting in a current THLB of 795 948 hectares and a long-term THLB of 782 693 hectares.

- *forest inventory*

The initial forest inventory of the Okanagan TSA was carried out from 1962 – 1979 as a forest cover (FC1) inventory. In 1996 an inventory audit was completed that indicated the audit and inventory volumes were well correlated but that discrepancies in species composition, ages and height were present. To update the forest cover inventory, a Vegetation Resources Inventory Phase I (VRI 1) photo-interpreted inventory was completed between 2001 and 2007 for about 80 percent of the THLB. The results of recently completed VRI Phase II ground sampling were not available at the time of the analysis. The inventory used in the base case was updated for depletion to 2008 and growth was projected to 2009.

- *problem forest types*

Problem forest types (PFT) are physically-operable stands that exceed low site criteria but are not currently utilized or have marginal merchantability. With the exception of deciduous stands, stands classified as a PFT were excluded from the THLB.

In keeping with current practice, deciduous stands should have been fully excluded from the THLB. However, due to an error in methodology, 9500 hectares of deciduous-leading stands without a harvest history were inadvertently included in the THLB used in the base case. Inclusion of these stands corresponds to a 1.2 percent overestimation in the base case long-term timber supply, and I will account for this in my determination as discussed in '**Reasons for Decision**'.

- *roads, trails and landings*

Roads were identified based on information compiled in April 2009 and assigned to one of four categories: highway, local and forest roads and trails. Application of 15-metre, 10-metre and 5-metre wide buffers to the identified highway, road and trail line features, respectively, resulted in the exclusion of 129 358 hectares from the THLB.

District staff indicate that trails, which represent 80 percent of the total road length, are typically five metres wide. However, in deriving the THLB used in the base case, a five-metre wide buffer was incorrectly applied to both sides of the trails identified in the inventory. Consequently, the total area excluded was overestimated by 67 799 hectares, and after accounting for overlaps, resulted in the incorrect exclusion of 10 000 hectares from the THLB used in the base case.

In addition to the spatial reductions, managed stand yields in the model were decreased by 0.5 percent after initial harvest to account for the loss of stand productivity associated with in-block trails and landings. Managed stand yields for stands older than 50 years for which there is currently no access were reduced by 2.5 percent following initial harvest to account for future roads.

I accept the approach used in the base case to account for existing and future roads, and landings. However, I conclude that the area of productive forest excluded from the THLB to account for

trails was overestimated by 10 000 hectares, which represents a 1.25 percent underestimation of the harvest levels projected in the base case and I will account for this in my determination as discussed in '**Reasons for Decision**'.

- recreation

All recreation sites, reserves and 'use, recreation, and enjoyment of the public' (UREP) areas within the Okanagan TSA were excluded from the THLB. In addition to these areas, there are five controlled recreation areas (CRA), which are managed primarily for recreational purposes such as resort development. In total, the CRAs cover 9840 hectares of Crown forest land base (CFLB), of which 4860 hectares were assumed to contribute to timber supply and were included in the THLB.

Inclusion of CRAs, which are not managed for timber production, results in about a 0.5-percent overestimation of the harvest levels projected in the base case and I will account for this in my determination, as discussed in '**Reasons for Decision'**.

- existing and managed stand yields

Inventory volume and yield curves for existing stands – stands older than 30 years – were projected using the ministry's Variable Density Yield Projection model, version 7 (VDYP7). All stands 30 years or younger with a logging history, including deciduous stands, were assumed to be managed stands. Managed stand yields were created using the ministry's Table Interpolation Program of Stand Yields (TIPSY) model version 4.1.

Stand productivity was based on Site Index Biogeoclimatic Ecosystem Classification (SIBEC) site indices. With the exception of Douglas-fir and cedar, standard operational adjustment factors were used. For Douglas-fir and cedar, non-standard OAF2 values were used in order to reflect volume losses due to root rot.

In August 2011, the Okanagan Innovative Forestry Society (OIFS) submitted a report entitled *Okanagan TSA Phase II VRI Statistical Adjustment Report* (Ecora Resource Group Ltd). This report included an analysis in which use of VRI Phase I and Phase II data in conjunction with new dry-belt managed stand site productivity information, in lieu of SIBEC, indicated that stand volumes on the TSA were underestimated by about 15 percent. The methodology used and the results of this study are currently being reviewed by Forest Analysis and Inventory Branch (FAIB) staff.

The VRI Phase II and new drybelt managed stand site productivity information was not available for use in the base case and the validity of the information has yet to be confirmed. Therefore, for this determination, I am satisfied that the best available inventory and existing and managed stand volume information was used in the base case and I will make no adjustments to the base case on this account.

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

- regeneration delay

The two-year regeneration delay used when creating the yield and height curves for managed stands was based on information in the ministry's RESULTS database. In addition to regeneration delay, genetic gains were applied based on the current availability of improved seed.

Based on a review of RESULTS data from 2000 to 2008, district staff indicated that about 13 percent of harvested stands regenerate naturally. For these stands, the actual regeneration

delay may exceed two years, and the naturally regenerated seedlings may not grow as well as seedlings from improved seed. These factors may increase the age at which these stands reach minimum harvest criteria. However, in the absence of information about the performance of naturally-regenerated stands in the TSA, I accept that the information used in the base case is based on the best available information and is adequate for use in this determination.

In order to assess the potential timber supply impact of allowing up to 13 percent of harvested stands to regenerate naturally, I expect district and licensee staff to monitor stand regeneration, including the delay associated with natural stand regeneration instead of planting and to use this information to inform the next AAC determination, as indicated in '**Implementation**'**.**

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

- silvicultural systems

Within the Okanagan TSA, the most widely applied silvicultural system is even-aged, clearcut harvesting. In the base case, a partial harvest silvicultural system was applied to 57 000 hectares of dry belt, Douglas-fir leading stands, which equates to a rate of 400 hectares per year of selection harvesting.

District staff reviewed information from the ministry's RESULTs database and found that current practice is variable. The 10-year average (2001 to 2010) rate of partial harvesting is 168 hectares per year instead of the 400 hectares per year assumed in the base case.

When mountain pine beetle (MPB) infested stands are no longer an economically viable source of fibre and before regenerating pine stands reach minimum merchantability requirements, dry belt Douglas-fir stands may be an important source of wood fibre. Failure to demonstrate that these stands can be successfully harvested and regenerated using a partial-harvesting silvicultural system represents a significant risk to mid-term timber supply. Therefore, although the current emphasis on pine harvesting to mitigate the impact of MPB infestation needs to continue over the next 5 to 10 years, further effort is required to demonstrate the feasibility of partial harvesting in dry belt Douglas-fir leading stands and I have noted this in '**Implementation**'.

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

As noted in Table 2, I accept as modelled the factors usually considered under this section, and I will not discuss them further.

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

The Ministry of Forests and Range (now the Ministry of Forests, Lands and Natural Resource Operations) is required under the *Ministry of Forests and Range Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. The *Forest and Range Practices Act* (FRPA) and other legislation provide for, or enable, the legal protection and conservation of timber and non-timber values.

Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

In the Okanagan TSA, additional guidance for IRM objectives is provided by the Okanagan-Shuswap Land and Resource Management Plan (OSLRMP), portions of which were established as 'objectives set by government' in 2007, and in orders issued under the *Government Actions Regulation* (GAR) of the *Forest and Range Practices Act.* In determining the AAC for the Okanagan TSA, I have considered the legal requirements established in these orders and, to the extent reflected in current management, I have considered the provisions of the OSLRMP.

- *riparian management*

Riparian management in the Okanagan TSA is consistent with the provisions of the *Forest and Range Practices Act*, the objectives identified in the *Riparian Management Area Guidebook* (1995), the Okanagan-Shuswap Land and Resource Management Plan (2001) and the order issued in 2007 under Section 93.4 of the *Land Act.*

In order to account for the objectives in the riparian guidebook, the results of an assessment by Wild Stone Resources were used to calculate a 12.4-metre weighted-average riparian buffer width. Application of this buffer to all identified streams, in addition to the buffers applied to lakes and wetlands, which were based on the riparian guidebook, resulted in the exclusion of 36 148 hectares from the THLB.

The 2007 land use order includes objectives for enhanced riparian management to provide for water, fish, wildlife and biodiversity conservation. The objectives specify that during forestry operations, including salvage and sanitation, that 10 000 hectares of THLB be used to establish enhanced riparian reserves and that [tree] retention be enhanced in riparian management zones in the OSLRMP area. The OSLRMP area includes areas that are outside of the Okanagan TSA. Therefore, only 9290 hectares of area that would otherwise have contributed to timber supply, were excluded from the THLB used in the base case.

I am aware that many First Nations interests including: fish, wildlife, medicinal plants, cultural heritage sites etc. are often associated with riparian areas. Therefore, as discussed under 'First Nations considerations', the provisions for riparian management are also a significant contribution to accommodating First Nations interests and on-going traditional uses.

- *cultural heritage resources*

Archaeological and cultural heritage resources include archaeological sites and traditional uses of the land by First Nations. In 2005, a review identified 956 archaeological sites protected under the *Heritage Conservation Act*. Of these sites, 37 were in the THLB covering a total area of 11 hectares. This relatively small area (in the context of timber supply review of an entire TSA), was not excluded from the land base in the base case.

First Nations have indicated that the AOA model for the Okanagan TSA is incomplete and includes errors that need to be corrected. While development of the model is reaching the point of being compatible with existing ARC/GIS information, First Nations indicate that funding is needed to complete field verification. In the previous timber supply review, comments from First Nations included concerns about the archaeological and traditional use study (TUS) information considered in AAC determinations and indicated that sacred areas, like Mt. Ida, should be excluded from the THLB.

Since the 2006 AAC determination, the district has responded to these concerns by:

- updating the Archaeological Overview Assessment platform;

- obtaining First Nations advice on implementation of Archaeology Overviews and predictive modelling concepts;
- providing Resource Inventory Standards Committee certified archaeological field crew training for Secwepmec communities (in coordination with similar training for ONA communities provided by the Integrated Land Management Bureau);
- completing a three-year plant study on Mt. Ida;
- completing a Land and Cultural Overview Plan for Mt. Ida;
- building capacity for Splatsin communities to complete their traditional use study;
- preparing the Little Shuswap Traditional Use Study and Best [Forest] Management Practices Report; and
- establishing a 490-hectare Cultural Heritage Resource Feature at Wap Creek, which was implemented under a GAR order.

During consultation for this AAC determination, First Nations continued to express concern about the consideration given to both recorded and unrecorded archaeological sites and trails. They indicate that ancient and modern trail networks are closely associated with current aboriginal cultural practices. District staff indicate that archaeological sites and trails frequently occur in valley bottoms and along lake shores and that some of these trails have likely been lost to development. However, further inventory of trails remains a high priority for the district.

District staff state that current practices for the management of cultural heritage resources include fee-for-service arrangements and memoranda-of-understanding wherein many of the major forest licensees undertake to engage in contractual agreements with First Nations to conduct cultural heritage resource assessments prior to harvesting. In response to First Nations input, licensees may amend cutblock boundaries or photograph, map and/or stump culturally modified trees.

First Nations have told me that I need to consider culturally-significant areas. To some degree, this information is available from traditional use studies; however, such studies have not been completed for all areas of the TSA. In some cases, due to the importance of a site or feature to First Nations, the available information has not been made available. Significant exceptions include the boundaries of the Kela7scen (Mt. Ida) Magic Circle and the Wap Creek Cultural Heritage Feature.

While previously forest management in the Mt. Ida sacred area was contentious, implementation of the Mt. Ida Protocol has resulted in the salvage and reforestation of fire-damaged stands. Currently the Adams Lake Indian Band are managing portions of the area and small-scale salvage operations have been approved by Mt. Ida Working Group.

In 2010, the district issued an order under the Government Actions Regulation to establish the Wap Creek Cultural Heritage Feature. The GAR order provides guidance regarding the compatibility of primary forest and range management activities for 490 hectares of CFLB.

Based on the input received from First Nations; the support provided by district staff to improve First Nations' capacity, archaeological and traditional use information; major licensee memoranda-of-understanding and fee-for-service agreements with First Nations to conduct site assessments; and the general high level of cooperation between all three groups, I conclude that First Nations archaeological and cultural heritage resources interests can be accommodated at an operational level and do not significantly constrain timber supply at this time. Therefore, I am satisfied with the assumptions for cultural heritage resources used in the base case and I will make no adjustments on this account.

- community watersheds

About one-fifth of the THLB occurs within the drainage areas of streams within the TSA's 57 community watersheds (CW). In the absence of the detailed information required to calculate equivalent clearcut areas (ECA), which are referenced in the OSLRMP, CWs in the base case were modelled by restricting harvest in integrated resource management units to a maximum of 30 percent of stands under two metres in height. However, in CWs impacted by the mountain pine beetle harvesting was permitted to exceed the 30 percent limit. Further harvesting in these areas may be delayed until hydrologic recovery of the watersheds occurs.

District staff agree with the approach used in the base case to model community watersheds. However, they are concerned that the increasing demand for water in the TSA may constrain future timber supply and that this uncertainty is not reflected in the base case.

For this determination, I accept that the community watershed assumptions used in the base case reflect the best available information and have been incorporated into the analysis using acceptable methodology and I will make no adjustments on this account. Community watersheds account for a significant portion of the THLB and anything that serves to either increase the number, such as the increasing water requirements of an expanding population, or increase the constraints, such as harvesting delays until hydrologic function recovers in MPB-impacted watersheds, can have a significant effect on timber supply. This uncertainty is compounded by the increasingly dry climate predicted for the region. Although it is not possible to predict the exact outcome of these uncertainties, the ongoing monitoring of forest management in community watersheds and the requirement for regular timber supply reviews will help to reduce the uncertainty.

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

Other information

- First Nations considerations

The Crown has a duty to consult with, and accommodate if 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.

The traditional territories of 19 First Nations communities cover all or part of the Okanagan TSA. Of these First Nations, the Okanagan Indian Band, Osoyoos Indian Band, Penticton Indian Band, Upper Nicola Indian Band, Lower Similkameen Indian Band, Upper Similkameen Indian Band and Westbank First Nation are members of the Okanagan Nation Alliance (Sylix Nation). The Adams Lake Indian Band, Little Shuswap Indian Band, Neskonlith Indian Band, Spallumcheen, Simpcw First Nation and Shuswap Indian Band are members of the Shuswap Nation Tribal Council (Secwepemc Nation). The Ashcroft Indian Band is a member of the Nlaka'pamux Nation Tribal Council. The Coldwater First Nation, Cook's Ferry Indian Band, who are also represented by the Esh-kn-am Cultural Resource Management Services Joint Venture, and the Nooaitch Indian Band are members of the Nicola Tribal Association. The Lower Nicola Indian Band and the Lytton First Nation are unaffiliated First Nation communities.

First Nations in the Okanagan TSA have entered into a range of agreements including: Forestry Consultation and Revenue Sharing Agreements (FCRSA), Forest and Range Opportunity Agreements (FRO), as well as several non-replaceable forest licences (NRFL), mountain pine beetle agreements and grazing licences. The details of the information regarding the various agreements can be found in the consultation record. The FCRSA and FRO provide for revenue sharing and forest tenure opportunities, and contain a framework for establishing consultation processes to guide consultation on administrative decisions, including AAC determinations. The First Nations consultation requirements specified in these agreements were followed during the consultation conducted as part of this timber supply review. For those First Nations communities who have not established consultation processes, consultation was conducted in accordance with the consultation spectrum described in the *Haida* decision.

As part of the consultation process, preliminary assessments were undertaken by district staff that considered existing information and information provided by First Nations regarding the strength of aboriginal interests and the potential impact this decision will have on these interests. Based on these assessments, the consultation undertaken for First Nations belonging to the Shuswap Nation Tribal Council and First Nations in the Okanagan Nation Alliance was at the "normal" level. For the Nlaka'pamux Nation, the level of consultation was at the "notification" level. The details of the preliminary assessment information can be found in the consultation record.

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

- notification of the upcoming AAC determination and information sharing in February 2009;
- release of the draft data package in April 2010; and
- release of the Public Discussion Paper in August 2011.

In 2009, following the start of consultation, district staff confirmed First Nations asserted territories that overlapped the Okanagan TSA. These neighbouring groups were notified about the TSR 4 in 2010, and were provided information about the draft data package in 2010, and notified about the public discussion paper in 2011.

Based on information provided to me in a meeting with representatives of the Okanagan and Shuswap Nations on July 27 and 28, 2009, the consultation process was modified. Specifically, I invited representatives of these nations to join the Timber Supply Working Group. Through participation in this group, both First Nations participated directly in development of the data package.

In the course of the consultation process a number of concerns and aboriginal interests were expressed by First Nations as described below.

First Nations expressed concerns regarding the general well being of wildlife populations, their sustenance needs, and the cultural connection aboriginal people have with wildlife species. Hunting and fishing remain key aboriginal interests and continue to provide food supplies for many aboriginal people. First Nations are concerned that roads constructed during logging create access to a wider user group, thereby increasing the impacts on wildlife and plants. The timber supply analysis accounted for habitat requirements of mule deer, big horn sheep, mountain goats and moose. The analysis also reflected other management practices such as leaving wildlife tree patches, retaining old growth for landscape-level biodiversity, and reserving riparian areas and unstable terrain. These areas also provide for wildlife habitat. Measures to address concerns or mitigate impacts continue to be identified during operational planning.

First Nations highlighted the importance of berry production, and impacts to the abundance and distribution of berry plants caused by forest management practices such as clearcutting and historical fire prevention. Road construction and access management are strongly correlated with impacts to aboriginal gathering practices by increasing public access for commercial collection

of non-timber forest products. First Nations are concerned that these factors will contribute to overall decline in the abundance, distribution, availability and productivity of berries.

Plants used for medicinal purposes are also a focus of concern for First Nations. Often medicinal plants are associated with spiritual or sacred areas. Some of these medicinal plants grow in riparian areas and high elevation areas. The timber supply analysis did not account for berry and medicinal plant production. However, to some extent, the management objectives modelled for riparian areas, terrain stability, and wildlife tree patches also provide for berry or traditional plant gathering. I am aware that the working relationship between the licensee and the First Nations provides an opportunity for these First Nations to comment if proposed cutblocks or road locations may disturb preferred plant and berry collection areas.

First Nations expressed the connection that aboriginal people have with water, including its spiritual significance. Specific concerns include the adverse effects of forest management activities on water quality, quantity, and peak and low flows. Over the last five years, the Chase, Wap, Chapperon, Pentiction, and Mission Creeks, fish-bearing creeks, as well as the Ashnola River have been identified as areas of particular concern. In some areas, there has been criticism that the ECAs in MPB-impacted watersheds, such as Chase Creek have been exceeded. The base case included specific green-up requirements that constrain harvesting in community watersheds (see 'community watersheds'), as well as riparian reserves and management zones (see 'riparian management'). I am aware that regional and district staff have undertaken measures to address these concerns, including research by the regional hydrologist, allocation of an enhanced riparian budget (see 'riparian management'), reforestation and retention planning to mitigate hydrological impacts in areas subject to large-scale losses.

First Nations are concerned about how I will consider the aboriginal right to harvest wood for domestic purposes. District staff have heard that First Nations are looking to exercise their right to harvest timber that will be used in construction to alleviate housing shortages on reserve lands. Under the current AAC, the minister has apportioned 25 000 cubic metres per year to the Forest Service Reserve and some of this volume is available to First Nations under free-use permits. To date, the district office has not received applications for a free-use permit associated with domestic timber harvesting rights. I conclude that the current licence provisions adequately provide for the anticipated harvesting activity that might occur should First Nations choose to exercise their domestic harvesting rights.

First Nations express a strong connection to forested ecosystems as reflected in their traditional practices and customs. During this timber supply review, concerns regarding the sustainability of timber supply have been repeatedly expressed. Much of the concern relates to the reliability of the inventory information and the accuracy of modelling predictions. At a meeting with the ONA, I heard First Nations communities express the importance of the 'right' AAC, in that it be neither too high nor too low. They also indicated that it is important that First Nations communities have opportunities to participate in the forest sector economy. In making this determination for the Okanagan TSA, I am mindful, both as a steward of the province's forests, as set out under the *Ministry of Forests and Range Act* and under the *Foresters' Act*; and as specifically set out under Section 8 of the *Forest Act*, I am bound to consider a wide range of biophysical, social and economic factors, as well as the long-term sustainability of the forest in making AAC determinations.

No specific information was presented to me that quantifies the amount of wildlife or wildlife habitat, or area for the collection of berries or medicinal plants that is needed in addition to the assumptions made in the base case to address First Nations' hunting needs. The ungulate winter ranges on the Okanagan TSA for mule deer, bighorn sheep, mountain goat, and moose, as well as the old-growth management areas, riparian reserve zones and areas excluded from the THLB for

other reasons will serve to address this issue to some extent. While the hunting, fishing, berry and medicinal plant collection, and watershed concerns may affect on-the-ground operational layout and management, it appears generally that at this time the required management adjustments can be, and are being, made operationally, without incurring changes in the projected timber supply as currently analysed. If further clarity is gained on any of these issues, for instance through ongoing consultations or joint studies, this can be considered in future determinations.

Based on my review of the information sharing and consultation processes followed, the aboriginal interest information available to FLNR staff, and the potential impact my decision may have on these interests, I believe that FLNR 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.

Opportunities were provided to all First Nations to share their concerns related to specific aboriginal interests that may be impacted by this decision. If new information regarding First Nations' aboriginal interests becomes available that significantly varies from the information that was available for this determination and that may affect timber supply, I am prepared to revisit this determination sooner than in 10 years, as required by legislation.

- log grade adjustments

In April 2006 new log grades were implemented for the BC Interior. Previously, a log was assessed according to whether the tree it came from was alive or dead at the time of harvest. Prior to April 2006, Grade 3 endemic (the 'normal' mortality observed in a mature stand) and Grade 5 (dead tree with less than 50 percent firmwood and/or less than 50 percent of lumber produced is merchantable) were not charged to the AAC if harvested. Under the new system, grades are based on log size and quality at the time it is scaled, not simply whether it was alive or dead at harvest. To better account for all harvested volume in the AAC cut control, logs that were previously considered Grade 3 endemic or Grade 5 are now charged to the AAC. Therefore, this volume now needs to be taken into account in the AAC determination.

Estimates of timber volume in the base case did not include dead potential volume. Possible sources of data about dead potential volume include inventory audit plots, VRI phase II ground samples, permanent sample plots, and temporary sample plots. At this time, the inventory audit is considered the best of the above-mentioned sources of data regarding dead potential timber in the Okanagan TSA.

The inventory audit data indicate that dead potential volume is about five percent of the 'green' volume for stands older than 60 years. Data from the provincial harvest billing system for the period 1995 to 2004 show that grade 3 endemic and grade 5 totalled about eight percent of the cut-accountable volume.

Having considered the available information, I concur with FLNR staff that the inventory audit data provides the best estimate of dead potential timber in the Okanagan TSA. Given that the inventory information used in the base case did not account for about five percent of the 'green' volume for stands older than 60 years, I conclude that the short- and mid-term harvest levels projected in the base case were underestimated by about five percent and I will account for this in '**Reasons for Decision**'.

- harvest performance

In 2006, the chief forester increased the AAC from 2.655 million cubic metres to 3.375 million cubic metres. Of the increase, 20 000 cubic metres was partitioned to deciduous-leading stands and 700 000 cubic metres was intended to facilitate the salvage of beetle-killed pine stands.

Based on data from the provincial harvest billing system (HBS), the proportion of the AAC harvested in the period following the 2006 determination is as follows: 98 percent (2006), 93 percent (2007), and 94 percent (2008). More recently, this proportion has decreased to 71 percent (2009) and 87 percent (2010).

Performance in deciduous-leading stands has varied, with the average annual harvest ranging from 2500 cubic metres to 3000 cubic metres. The 20 000 cubic metre AAC partition was established to promote the availability of birch logs for mills such as the Squilax Birch Mill. Current efforts by the district to promote deciduous utilization include trialing the issuance of a three-year, small-scale deciduous licenses for up to 5000 cubic metres. District staff indicate that the current demand for deciduous timber is being met by the incidental harvest of hardwood species during the harvest of mixed-coniferous stands.

Based on the low level of harvest activity in deciduous-leading stands and the availability of deciduous volume from mixed stands, as discussed in '**Reasons for Decision**', I have decided to discontinue the 20 000 cubic metre partition to deciduous-leading stands in the AAC. In addition, I accept the exclusion of decision-leading stands from the THLB used in the base case, with the exception of the adjustment noted under 'Problem forest types*'* earlier in this rationale. I will discuss licensee performance in the context of pine harvesting and the mountain pine beetle in this document under 'Mountain pine beetle'.

I encourage district staff to monitor the contribution of deciduous-leading stands and to present this information at the next AAC determination. I also commend them on their proposed trial to issue small-scale deciduous licenses, which will assist in accommodating First Nations birch requirements for traditional basket-making.

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

- Harvest sequencing and alternative rates of harvest

The timber supply model Woodstock was used in an optimization mode to maximize the total volume harvested. In addition to the base case and sensitivity analyses, two alternative harvest forecasts were prepared.

In the first alternative forecast, reducing the initial harvest level from 3.355 million cubic metres per year to 3 million cubic metres per year resulted in less than a two-percent increase over the base case level. In the second, reducing the initial harvest to the level of the pre-MPB AAC of 2.655 million cubic metres resulted in less than a four percent increase over the base case level.

I have considered the timber supply implications of alternative rates of harvest and I will discuss them further in '**Reasons for Decision**'.

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

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

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

Economic and social objectives

- *Minister's letter*

The Minister of Forests and Range (now the Minister of Forests, Lands and Natural Resource Operations) expressed the economic and social objectives of the Crown for the province in a letter to the chief forester, dated July 4, 2006 (attached as Appendix 3). The Minister asked for consideration, during AAC determinations, of the importance of a stable timber supply in maintaining a competitive and sustainable forest industry while being mindful of other forest values.

In respect of this, in the base case projection and in the alternative harvest flow projections described above, a primary objective in the harvest flow has been to attain a stable, long-term harvest level where the growing stock also stabilizes. I have also considered with care the adequacy of the provisions made both in current practice, and assumed in the analyses, for maintaining a range of forest values.

Finally, the Minister suggested that the chief forester should consider the local social and economic objectives expressed by the public, and relevant information received from First Nations.

Local objectives for land and resource use in the Okanagan TSA are captured in the Okanagan-Shuswap Land and Resource Use Management Plan (OSLRMP) and in orders under the *Government Actions Regulation* of the *Forest and Range Practices Act.* The base case assumptions reflected the directions as provided by these orders.

Seeking input for the timber supply review, the district created an Okanagan TSA Technical Working Group, which included FLNR staff, major licensees and First Nations representatives, in May 2009. This group provided input to the data package used in this timber supply review.

The availability of the *Okanagan TSA Timber Supply Review: Data Package* for public review and comment was advertised in the Kelowna Daily Courier, Vernon Daily Courier, Penticton Herald, Morning Star (Vernon), Capital News (Kelowna) and Salmon Arm Observer in December 2009. In August 2011, advertisements were placed in the same publications listed above to notify the public that the Okanagan TSA Timber Supply Review: Public Discussion Paper was available for review.

Comments and concerns regarding the data package were addressed as required and an email was sent to all who provided input in October 2010. There were two comments regarding the public discussion paper and these, along with any significant revisions to the data package were presented to me at the AAC determination.

During my consideration of the factors required under Section 8 of the *Forest Act* and, I have been mindful of the local objectives, as provided in the OSLRMP. I have also reviewed the public consultation process undertaken by the district and considered the input received in making my determination. On this basis, I am satisfied that this determination accords with the objectives of government as expressed by the Minister.

- employment and community dependence

Distributed across 30 cities, towns, villages and rural areas, the population of the Okanagan Valley in 2009 was estimated at about 351 000. This level is projected to increase by about 30 percent over the next 25 years, reaching 461 000 by 2036.

The regional economy is well-diversified and includes: agriculture/viticulture, tourism, retail trade, manufacturing, forestry and construction sectors. Emerging industries include film, aviation, health care and technology industries. The area is a popular destination for residential and small business relocations due to the moderate climate, strong transportation network, trained labour force and availability of diverse recreational opportunities. The economic diversity of the area results in a low vulnerability of local communities to changes in the forest sector.

The forest sector is well established and there are value added manufacturing companies that provide a large number of products such as furniture, cabinetry, plywood and building materials. Wood processing in the TSA results in a net import of wood, as a large portion of local mill fibre requirements is met from outside of the TSA through trading agreements and purchases. Labour force statistics from 2006 show that approximately one percent of the employment in the Okanagan Valley was in the forestry and logging industry.

I have reviewed the information regarding employment and community dependence related to the Okanagan TSA. I am aware of the linkages between AAC volume and employment, both locally and provincially and I have taken this into account in this determination. I also note that in spite of the recent downturn in forest product markets, the level of harvest activity and forest sector employment in the TSA has remained relatively stable.

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

- non-recoverable losses

Non-recoverable losses (NRL) are used in the analysis to account for average annual volume losses due to natural causes (e.g., pests, fire and wind) that are not recovered or salvaged. For the base case, NRL calculations were based on 12 years of data rather than the recommended 10 years in order to account for years with above average losses, such as 2003, when there were very large wildfires in the TSA. On this basis, the NRLs used in the base case were calculated as 228 300 cubic metres per year (excluding mountain pine beetle losses), which is 153 700 cubic metres per year higher than the level used in the previous TSR.

District staff indicated that the large difference in NRLs is due primarily to fire and noted that there appears to be a trend of increasing fire size and intensity within the TSA. They also informed me that the NRL calculations for this determination were based on the methodology described in *Methodology to Estimate Unsalvaged Losses for Timber Supply Reviews* (Hennigman, 2000); whereas, the previous NRLs were based on information from the Protection Branch database and estimates provided by Forest Health staff. There is also some uncertainty about how to compare the NRL averages because of other potential differences in the assumptions applied in the current and previous TSR.

Based on my discussions with staff, I am satisfied that the best available information and methodology was used to calculate the NRLs and that they are adequate for use in this determination.

Prior to the next determination, it is my expectation that further study of how the non-recoverable losses are calculated will be done to refine this process. The confirmed results can then be used to inform the next timber supply review, as noted in '**Implementation**'.

- mountain pine beetle (MPB)

Lodgepole pine is a significant species in the Okanagan TSA. Although pine-leading stands do not dominate the THLB to the same extent as in other management units, pine-leading stands do occupy 32 percent of the THLB. And, the total timber volume on the THLB is about 146.5 million cubic metres, of which 27 percent or 39.6 million cubic metres is lodgepole pine.

The base case analysis assumed that pine mortality in the Okanagan TSA would be 70 percent. This level was generated using the BC Mountain Pine Beetle (BCMPB) model (2008). However, since the base case was prepared, the BCMPB model has been updated and based on 2010 aerial overview information, the 2011 projected pine mortality has decreased by about half to 37 percent. Therefore, the total volume of MPB-killed pine is estimated be 21 million cubic metres instead of 42 million cubic metres, as projected in 2008.

District staff believe that MPB mortality will most likely fall somewhere in between the base case estimate of projected cumulative attack (42 million cubic metres) and the current estimate of projected cumulative attack (21 million cubic metres). The MPB epidemic continues to run its course through susceptible pine stands, and has generally progressed from the northern portion to the southern portion of the TSA. Although district staff remain cautiously optimistic about the recently revised pine mortality projection, they are concerned about the high volume of susceptible pine in the southern portion of the TSA that lies within a biogeoclimatic zone with the highest MPB hazard rating.

Data from HBS supports the district's assertion that licensees' have been successfully targeting pine stands for harvest. Based on the HBS information, between 2006 and 2010, the contribution of pine volume to the total harvest has increased steadily from 48 percent to 57 percent. I would like to commend not only the licensees' but also the district staff for helping to conserve mid-term timber by strategically directing pine salvage in the TSA. The influence of MPB in the timber supply of the Okanagan TSA is pivotal to my AAC decision and I will discuss this information further in "**Reasons for Decision**".

- forest health

Insects and diseases that occur in the TSA, in addition to MPB include: balsam, Douglas-fir and spruce bark beetle; western spruce budworm and western hemlock looper, which are defoliators; and *Armillaria ostoyae*, which is a root disease. Although these agents have not been responsible for the same level of devastation as MPB, populations of these pests have been increasing in recent years.

Inventory information, including growth and yield impacts, for these pests in the Okanagan TSA is limited and this introduces a level of uncertainty around the accuracy of the volume projections used in the base case. Regional forest health staff have suggested, and I concur, that improved inventories of non-MPB pests are needed to identify areas at increased risk of infestation and to account for any associated losses in stand productivity.

For this determination, I accept that the best available information was used in the base case and I will make no adjustments on this account. However, as indicated under "**Implementation**", it is my expectation that FLNR staff will continue to monitor forest health and will report on this information at the next determination. In the context of provincial inventory priorities, I expect district and regional staff to pursue funding to improve the availability of forest health information for the TSA.

Reasons for Decision

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

In the base case, the initial harvest rate of 3 355 000 cubic metres per year, which represents the current AAC of 3 375 000 cubic metres, less the 20 000 cubic-metre deciduous partition, can be maintained for 10 years. After the first decade, the harvest level declines to 2 354 000 cubic metres per year. Beginning in the sixth decade, the harvest level increases to a non-declining, long-term level of 2 469 400 cubic metres per year for the remainder of the forecast.

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

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

- Log grade adjustments – the new interior log grade system results in logs being charged to the AAC if they meet grade specifications regardless of whether they were alive or dead at the time of harvest. This volume was not included in the base case harvest forecast. I have concluded that the harvest levels projected for the short- and mid-term in the base case have been underestimated by about five percent due to this factor.
- Roads, trails and landings – the area excluded to account for trails was overestimated due to the application of a five-metre buffer width to both sides of trail line features in the inventory. I have concluded that the base case harvest levels have been underestimated by about 1.25 percent due to the factor.

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

- Problem forest types (PFT) – deciduous stands are not currently being harvested, therefore, deciduous-leading stands without a harvest history should have been excluded from the THLB. However, due to an error in methodology, 9500 hectares of deciduous-leading stands were inadvertently included in the THLB used in the base case. I have concluded that the mid- to long-term harvest levels in the base case have been overestimated by 1.2 percent due to this factor.
- Recreation resources – five controlled recreation areas, totalling 9840 hectares of Crown forest land, were assumed to contribute 4860 hectares to the THLB. These areas are primarily managed for non-timber resources and on this basis I concluded that the base case harvest levels were overestimated by about 0.5 percent.

In considering the above-mentioned influences, I find that the combined effect of accounting for roads, trails, and landings; problem forest types and recreation results is a less than one percent underestimation of the short-timber harvest level and a less than one percent overestimation of the mid- to long-term harvest levels projected in the base case. Given the small magnitude of these adjustments, I will not account for them further in this determination.

The underestimation of short- and mid-term timber supply due to log grade adjustments, while significant when considered independently, is not a reason to contemplate an increase in harvest levels when considered in the context of mountain pine beetle salvage and the limited opportunity to salvage dead pine while it retains economic value. Therefore, in accounting for log grade

adjustment, any dead potential volume harvested in the short term in place of live timber that is currently accounted for in the inventory will provide for a more robust timber supply in future. I will therefore not consider this factor further in this determination.

In considering the information available to me for this determination, I am mindful of the most recent mountain pine beetle mortality projection, which indicates that total pine mortality in the Okanagan TSA is half of what was predicted at the time of the previous AAC determination and is now projected to be 37 percent instead of 70 percent. I am also mindful of and commend the efforts of licensees, First Nations and district staff for their excellent work focusing harvest on MPB-affected pine stands. These efforts help to significantly mitigate the projected decrease in mid-term timber supply.

I am also mindful of other areas of uncertainty that may serve to either improve or restrict timber supply in the future, such as the potential increase in existing stand volume due to new VRI phase II information and in managed stand yields due to potential improvements in site index estimates or the unknown effects of increasing population, changing climate and water requirements on forest management. For these, and the other factors discussed in this document, the requirement for regular timber supply reviews will help to adjust timber harvesting to reflect new information.

I have also considered the alternative harvest forecasts prepared for this determination that indicate decreases in initial harvest levels to three million and 2.655 million cubic metres per year result in relatively small increases in mid-term timber supply, less than two percent and four percent respectively.

Based on all of these considerations, including the reduction in projected MPB-mortality and the apparent decrease in the volume of pine contributing to the total harvest and the projected decrease in mid-term timber supply it is prudent for me to begin the transition in the AAC from its current level of 3.375 million cubic metres to the lower mid-term level. However, any decrease in AAC must also consider the ongoing need to salvage pine. Therefore, for this determination, I conclude that an AAC of 3.1 million cubic metres will begin the transition to the lower mid-term harvest levels while continuing to provide for the salvage of MPB-damaged timber.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next 10 years and that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in the TSA by establishing an AAC of 3.1 million cubic metres.

This determination is effective February 29, 2012, and will remain in effect until a new AAC is determined, which must take place within 10 years of the effective date of this determination.

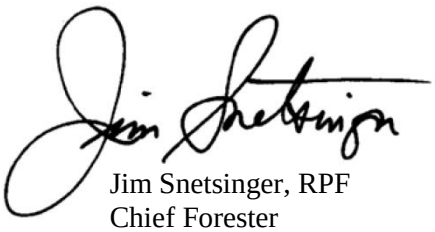
If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the 10 years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage Ministry of Forests, Lands and Natural Resource Operations (FLNR) staff and licensees to undertake or support 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 or support these projects is dependent on available resources, including funding. These projects are; however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Okanagan TSA.

1. I expect licensees continue to focus harvesting on MPB-impacted pine-leading stands in the Okanagan TSA and that FLNR staff include this information in an annual report on harvest activity in MPB-affected management units;
2. I expect licensees to report on the level of partial harvesting they undertake in dry belt Douglas-fir annually and that this information be presented by FLNR staff at the next AAC determination;
3. I request that district and licensee staff monitor stand regeneration, including the delay associated with natural stand regeneration instead of planting and to incorporate this information in the next timber supply review;
4. I request that district and licensee staff review how non-recoverable losses are calculated and to use these results to inform the next timber supply review; and
5. I request that FLNR staff continue to monitor forest health and to use this information to inform the next determination. In the context of provincial inventory priorities, I request that district and regional staff pursue funding to improve the availability of forest health information for the TSA.



Jim Snetsinger, RPF
Chief Forester

February 29, 2012

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, c. 157, (current to February 8, 2012), reads as follows:

Allowable annual cut

8 (1) The chief forester must determine an allowable annual cut at least once every 10 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding the Crown land in the following areas:

(i) tree farm licence areas;

(ii) community forest agreement areas;

(iii) first nations woodland licence areas;

(iv) woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (2) or (3),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 10 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 10 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 10 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(3.1) If, in respect of the allowable annual cut for a timber supply area or tree farm licence area, the chief forester considers that the allowable annual cut that was determined under subsection (1) is not likely to be changed significantly with a new determination, then, despite subsections (1) to (3), the chief forester

> (a) by written order may postpone the next determination under subsection (1) to a date that is up to 15 years after the date of the relevant last determination, and
>
> (b) must give written reasons for the postponement.

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

> (a) by written order may rescind the order made under subsection (3.1) and set an earlier date for the next determination under subsection (1), and
>
> (b) must give written reasons for setting the earlier date.

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

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

> (a) different types of timber or terrain in different parts of Crown land within a timber supply area or tree farm licence area;
>
> (a.1) different areas of Crown land within a timber supply area or tree farm licence area;
>
> (b) different types of timber or terrain in different parts of private land within a tree farm licence area.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(b) each tree farm licence area

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

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

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

Section 4 of the *Ministry of Forests and Range Act* (current to February 8, 2012) 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

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Jim Snetsinger

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

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

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

Sincerely yours,

Rich Coleman
Minister